

# solar decathlon europe

**sde21 rules**  
**version 1.0r 02\_07\_2018**

**note:**  
**this version of the SDE21 Rules is for  
reference only. A revised version will be  
issued with the SDE Call for Teams 2021.**



# summary of changes (V. I.Ør)

*Table 1. Summary of Changes*

| <b>Date</b> | <b>Rule</b> | <b>Designation</b> | <b>Page</b> | <b>Nature of Revision</b>                           |
|-------------|-------------|--------------------|-------------|---|
| 02/07/2018  |             |                    |             | Revised for Reference Version SDE21 Call for Cities |

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# introduction

## **Solar Decathlon**

The Solar Decathlon is an international competition created by the U.S. Department of Energy in which universities from all over the world meet to design, build and operate a grid-connected, energetically self-sufficient house using solar energy as the primary renewable energy source, equipped with the technologies that permit maximum energy efficiency. During the final phase of the Competition university Teams assemble their houses, open to the general public, while undergoing the ten contests of the Competition, reason for which this event is called Decathlon.

## **Solar Decathlon Europe**

The Solar Decathlon was initiated in Europe (SDE) through a signed agreement between the Ministry of Housing of the Government of Spain and the United States Government, in October 2007, in order to organize a sustainable solar house competition in 2010 and 2012. In 2014, a third SDE event was held in Versailles, France.

The 2019 edition of this competition is organized by EMI, BME and the City of Szentendre in Hungary.

The goal of the SDE21 Organisation is to contribute to the knowledge and dissemination of industrialized, solar and sustainable housing, with the following basic objectives:

- To raise awareness of participating students in the Competition on the benefits and opportunities offered by the use of renewable energies and sustainable construction, challenging them to think creatively and develop innovative solutions that contribute to energy savings.
- To encourage professionals of the building industry to select materials and systems that reduce the environmental impact of a building over its entire lifetime, optimizing its economic viability and providing the comfort and safety of occupants.
- To educate the general public about responsible energy use, renewable energy, energy efficiency, and the technologies available to help them to reduce their energy consumption.
- To emphasize the correct order of intervention: first reducing the building energy consumption and increasing its energy efficiency and afterwards integrating solar active systems and other renewable technologies. Moreover, the building systems must be selected and dimensioned using environmental and cost-effective criteria.
- To encourage the use of solar technologies.
- To promote architecturally attractive solar system integration, working on using the solar technologies to replace conventional construction materials in the building envelope such as the roof, skylights or facades, whether they be in new or existing buildings.
- To clearly demonstrate that high performance solar homes can be comfortable, attractive and affordable.

With the new edition in 2021, the project requirements are developed in a new set of Rules.

It is intended for habitats that meet the triple challenge that our societies are all facing: energy, environment and equitable living. Therefore, the evaluation of proposed projects, via the 10 contests of the Decathlon, tends to cover all issues related to the dwelling of the immediate future.

## **Energy Endeavour Foundation**

The Energy Endeavour Foundation was established after a lengthy collective campaign to bring the Solar Decathlon back to Europe. After many efforts to secure long-term support from various European agencies, the representatives of the EEf proposed a new organisational and stewarding model to the United States Department of Energy, which has been enthusiastically endorsed.

The Energy Endeavour Foundation stewards youth-driven and university research competitions and awareness activities in the fields of social, economic and environmental sustainability, empowering today's consumers and citizens to be energy-efficient and resource-responsible. The Solar Decathlon Europe is its flagship project. The Energy Endeavour Foundation champions today's generation of conscientious doers and makers to become tomorrow's creative leaders, ambassadors and change agents for energy literacy; the EEf seeks to emphasise the value of human capital, innovation, and entrepreneurship in the context of our built environment.

Based in the Netherlands, the Energy Endeavour Foundation is a non-profit entity, buttressed by a scientific advisory board. The EEf draws upon the input of the Solar Decathlon Europe Council of Experts, including former SDE Organisers, supporters and participants.

### **The specificity of SDE compared to other SD editions.**

The SDE will maintain the key features of the Solar Decathlon, namely the 20 university Teams, the 10 contests, the assembly period of 10 days and the 16 days for the competition and exhibition with a prize-giving ceremony on the 15th day (Saturday).

However, the Competition continues to evolve, providing an opportunity for longer lasting results, an option for visitors to appreciate the results through an extended period, and the emphasis on a competition scope for the most urgent challenges. The following issues are being considered:

- The impact of the renovation of the traditional housing typologies in various parts of Europe,
- Light-weight roof-top apartments, which can add to the densification of certain urban environments, thus contributing to the efficiency of cities,
- The rejuvenation of rural communities as an alternative to mega-city urban metropolitan areas,
- Other proposals addressing specific local challenges that could enrich the SDE community.

The competition and evaluation will take place during the exhibition, jury and monitoring phase of the competition, but the houses should be designed and built for all four seasons. The issues of heating and cooling should be addressed, as well as the summer overheating.

### **The house in its local setting vs. the prototype on the Competition site.**

It may seem paradoxical that Teams from around the world design a prototype of a house adapted to their region of origin, while being efficient on the Competition site. This paradox is clearly affirmed and each project must be a just response to the cultural, climatic and social contexts of team's region, as well as a high-performance prototype that should successfully perform during the short period of time during which it compares with others. This duality is meant to encourage young minds to acknowledge both sources of inspiration for the future: the very local conditions of each team tied to its homeland, and the universal dimensions of an international common goal for the planet. This dual stream of thought is also meant to install an innovative cultural relationship to R&D in the field of building industries: future urban designers, architects, engineers as well as communications, social and financial managers are required to find the most adapted solutions for a specific context while sharing the most innovative ideas with colleagues from other countries.

The Solar Decathlon is also a public event designed to increase awareness about energy for residential use. The competition demonstrates that a beautifully and well-designed house can generate enough electricity to meet the needs of a household, including electricity for lighting, cooking, washing clothes and dishes, powering home and home-office electronics, maintaining a comfortable indoor temperature and air quality.

Solar Decathlon Europe objectives are consistent with the European Union Goals for 2030 and have demonstrated to be effective in making students, professionals and the general public aware of the importance of energy savings. This constitutes the most immediate and cost-effective way of addressing the European energy challenges of sustainability, guaranteeing supply sources and competitiveness. The SDE participating houses will present solutions that contribute to reach the EU average targets for 2030: saving 25% of primary energy consumption, reducing 40% of greenhouse gas emissions and producing 27% of energy from renewable resources.

Undoubtedly, the Solar Decathlon Europe brings prestige and raises the visibility of the selected participating universities as they are part of the small group of top institutions that will compete in the world's most important Solar Housing event. One of the main characteristic elements of the European edition of the Solar Decathlon is its emphasis on sustainability, innovation and research. Participating Teams work not only to develop and build their houses, but also to enhance the systems' integration and generation of knowledge on sustainable construction.

Solar Decathlon Europe offers students a unique opportunity for learning, taking theory and putting it into practice, and doing so through a case study. Students working on the project will be challenged to test their capacities for innovation, and their abilities to design and build an energetically self-sufficient solar housing unit. The projects are developed by multidisciplinary Teams, giving the students the opportunity to learn not only about technical issues but also about teamwork, communication skills, sustainable lifestyle and socio-economic issues in order to ensure the viability of their project.

### **The official language for the SDE21 Competition is English.**

## sde21 rules

The Solar Decathlon Europe Rules are designed to meet the SDE21 Organisation objectives and to promote a fair and interesting competition among Teams. The Rules for the Solar Decathlon Europe 2021 are based on the previous versions of the Competition. However, there are some changes concerning the Deliverables and contests, adding more emphasis on urban sustainability, energy efficiency, mobility, innovation and research aspects as well cultural dissemination. This “SDE21 Rules” document describes what each team needs to know to be competitive in the Solar Decathlon Europe. It includes five sections:

### **Section 1.0 General Rules**

Includes Rules related to the general aspects of the Competition, describing the SDE21 Organisation, the participating Teams, the site, the housing units, the final phase of the event, and the general conditions.

### **Section 2.0 Contests**

In this section, the SDE21 contests and sub-contests are defined, including scoring distribution, the contests evaluation criteria and the different procedures.

### **Section 3.0 Deliverables**

This includes detailed information concerning all the documents, drawings and other materials that the Teams must submit to the SDE21 Organisation along with the submission dates and format requirements.

### **Section 4.0 SDE Building Code**

This Code primarily exists to protect the Teams and public health and ensure safety. Compliance with the SDE Building Code is a prerequisite for participation in the Competition.

### **Section 5.0 Appendixes**

This contains complementary information to the Rules.

### **The information included in the present document may change!**

Details or complementary information will be added in the future.  
All modifications will be clearly indicated in updated editions of the SDE21 Rules.

# definitions

## GENERAL DEFINITIONS

### Assembly

Period of time between the arrival of trucks and the beginning of the contests on SDE Solar Village.

### Communication Materials

All printed or electronic publications designed to convey information supporting the Competition goals. Please refer to the Graphic Chart & Brand Manual.

### Competition

All aspects of the Solar Decathlon Europe 2021 related to the 10 contests and the scoring of those contests, along with the project development of the Competition houses.

### Competition Calendar

The timetable establishing the dates of the final phase of the Competition and the daily activities assigned.

### Competition House

Complete assembly of physical components installed on SDE Solar Village, in compliance with the SDE21 Rules.

### Contest

The Solar Decathlon Europe competition consists of 10 separately scored contests, each containing one or more sub- contests. See General Contest Information on Page 33.

### Contest weeks

Period of days on SDE Solar Village when some or all contests are active.

### Decision

The Rules Officials' interpretation or clarification of a Rule.

### Disassembly

Period of time between the conclusion of public tours and the completion of SDE Solar Village clean-up.

### Electric and Photovoltaic Chart – Interconnection Application

Form submitted by the team's electrical engineer to the Site Operations Coordinator, which provides the technical details needed to determine the suitability of the team's electrical and photovoltaic systems for interconnection to the village grid. This form is part of the Electric and PV Chart and Checklists document.

### Electric and PV Chart and Checklists

Document that includes the "Electric and Photovoltaic Chart", "Electric System Design Checklist", "Photovoltaic Checklist" and "Electrical Storage System Checklist". It must be completed and submitted by Teams from Deliverable 3 onwards.

### Event

Activities that take place on SDE Solar Village including, but are not limited to, registration, assembly, inspections, contests, special events, public exhibits, and disassembly.

### Event Sponsor

An entity selected by the SDE21 Organisation to support the project and help to ensure its success.

### Final phase of the SDE Competition

The period of days including assembly, disassembly and contest week periods.

### Graphic Chart & Brand Manual

A document that describes, defines and illustrates how the SDE's visual identity elements, when used correctly, can help to create consistent and memorable communications programmes and actions, thus building a distinct personality for the SDE brand. This document guides you in how to present the brand in various visual media such as print, internet and broadcast.

### Grid-Tie Assembly

Period of time during assembly after the house has been connected to the village grid (interconnected).

### Inspection

Each of the inspections realized to all the Competition Houses on SDE Solar Village<sup>fr</sup> verifying compliance with the SDE21 Rules. See Rule 11.6 Inspections.

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**Inspections Card**

Official card indicating the Teams' inspections' status.

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**Jury**

Group of individuals selected by the SDE21 Organisation to make evaluations on a specific aspect of each team's project according to SDE contests.

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**Penalty Referee**

Individual, appointed by the SDE21 Organisation, to examine and assess the team's faults, and propose to the Competition Manager all penalties according to respect of the Rules. They shall determine the severity of Rules infractions, classify them as minor or major and report them to the Competition Manager. Penalty Referee shall be independent of the SDE21 Organisation and shall have a nationality other than the nationality of the competing Teams.

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**Project**

All activities related to the Solar Decathlon Europe 2021 in from the initial meetings through to the conclusion of the event.

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**Protest Resolution Committee**

Group of individuals selected by the SDE21 Organisation to resolve team protests during the Competition. The Protest Resolution Committee consists of people who are familiar with the project, but not part of the SDE21 Organisation or the Teams.

---

**Public Exhibit**

Areas of the Competition site open to the public during designated hours.

---

**Rule**

Principle or regulation governing conduct, action, procedure, arrangement, etc., for the duration of the project.

---

**Scored Period**

Any period of time during which a particular measured contest is in progress.

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**Scoring Server**

Digital application that collects data from the central data logger server, includes forms for manually entering jury and task- based sub contest results, and calculates composite scores.

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**SDE21 Workspace Area for Teams (SDE21 WAT)**

SDE21 WAT is the official communication tool of the Competition. See Rule 2.4.1 SDE21 Workspace (SDE21 WAT).

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**Solar Decathlon Europe Building Code**

A set of design and construction standards set forth and enforced by the Solar Decathlon Europe Building Official for the protection of public health and safety during the event.

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**SDE Solar Village**

Competition Site, where the Teams' houses are assembled along with the common areas needed for the Competition development.

---

**Speed Peer Review**

A platform for exchange and knowledge to raise awareness and to try and solve problems. Teams make five-minute presentations of their solar house projects in front of their peers. They synthesize their concepts, learn from the other Teams projects and from each other.

---

**Stand-Alone Assembly**

Period of time during assembly before the house has been interconnected to the village grid.

---

**Sub-Contest**

An individually scored element within a contest.

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**(Juried) Sub Contest**

Sub Contest based on jurors' assessment.

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**(Measured) Sub Contest**

Sub Contest based on task completion or measured performance.

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**Village Grid**

Bi-directional, AC electrical network system installed on the Competition site which will constantly and individually measure the contribution and consumption of electrical energy of each house.

## **SDE21 ORGANIZATION FUNCTIONS AND ROLES**

The following roles and functions are to be implemented into a clear organisational chart. In each instance, one specific individual must carry definitive responsibility for each function.

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### **Communication Manager**

This manager is the organiser responsible for the project’s public outreach, communication activities and special events.

---

### **Competition Direction**

Competition Director is the organiser responsible for the management of the Competition and responsible for mobilizing all of the necessary resources for the achievement of its objectives, with decision-making authority in aspects related to the scope, planning, Rules and quality of the Competition.

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### **Competition Manager**

Enforcing the Rules and stating its content, conducting a fair and compelling competition, assigning penalties and scoring.

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### **Competition Strategies Management**

Planning, coordinating and controlling all the activities related to the competition.

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### **Competition Coordination**

Organizing and supervising the Deliverable reviews, and planning, coordinating and controlling the activities relate with the Competition.

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### **Event Organisation**

The designated SDE21 organising committee is responsible for the organisation of the SDE21 Competition, in cooperation with the Energy Endeavour Foundation and supported by the U.S. Solar Decathlon Organisation from the U.S. Department of Energy (DOE).

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### **HS Coordination**

Evaluating the Teams’ Health and safety plans and consequently developing the Competition’s Health & Safety Plan and supervising the houses’ assembly and disassembly works at the SDE Solar Village.  
See Rule 52.4.4 Relationship with the SDE HS Area.

---

### **Infrastructures Management**

Planning, execution, development and control of all the activities related to the assembly, functioning and disassembly of SDE Solar Village.

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### **Inspection**

Carrying-out the house’s inspection and filling out the corresponding Inspection Card, according to the SDE Building Code.

---

### **Monitoring & Scoring Management**

Monitoring & Scoring Manager is the organiser responsible for the instrumentation system, monitoring and scoring of the Competition.

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### **Jury Manager**

Organiser, liaison between the SDE21 Organisation and the jury, responsible for accompanying the jury during the house visits, the deliberation process and the evaluation reporting and reports to the Competition Manager.

---

### **Observer**

An organiser assigned by the Competition Manager to observe team activities during the contest week.  
An Observer reports observed Rules infractions to the Rules Officials and records the results of specific contest tasks, but does not provide interpretations of the Solar Decathlon Europe Rules. Competition Area.

---

### **Office Services Manager**

Organiser responsible for planning, coordinating, and directing a broad range of services that allows the SDE21 Organisation to operate efficiently. Office Services Area.

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### **Organiser**

Solar Decathlon Europe employee, subcontractor, or observer working on the project.

---

### **Press & External Communications Coordinator**

Organiser responsible for communication issues between the internal and external parties of the Solar Decathlon Europe, acting as proxy between the participating Teams and the media.

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#### **Project Manager**

Organiser responsible for the management of the project and responsible for mobilizing all of the necessary resources for the achievement of the objectives, with the final decision-making authority in all the aspects related to the scope, planning, costs, quality, resources, communication, risks, sponsorship, and acquisitions of the project.

---

#### **Public Events Coordinator**

Organiser responsible for planning, coordinating, executing and developing all the public activities and events related to the Competition and for the public outreach of the project. Communications Area.

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#### **Rules Official**

Organiser authorized to interpret the Rules. The Competition Manager is the lead Rules Official and reports to the Rules Officer at the EEf.

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#### **SDE21 Organisation**

The SDE21 Organisation is a joint SDE21/EEF group consisting of a supervisory board, the SDE21 Organisers and the divisions according to the organisation chart. See SDE21 Organisation Chart on Page 12.

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#### **SDE21 Organisers**

Individual The appointed group responsible for the implementation and execution of the divisions described in the organisation chart. See SDE21 Organisation Chart on Page 12.

---

#### **Scorekeeper**

Individual selected by the SDE21 Organisers to operate and maintain the scoring server during the Competition. Competition Area.

---

#### **Site Operations Coordinator**

Organiser responsible for the evaluation of the Teams' Site Operations plans, consequently developing the Competition site operation plan and the coordination and supervision of the houses' assembly and disassembly works at SDE Solar Village. Infrastructures Area.

---

#### **Social Media & Marketing Coordinator**

Organiser responsible for managing the social media platforms and producing the official SDE multimedia files (videos, photos, presentations, etc.). This coordinator is also responsible for administrating the SDE Website, working efficiently under the direction of the Energy Endeavour Foundation.

---

#### **Sponsorships and Exterior Relations Coordinator**

Organiser responsible for developing and implementing a long-range corporate giving strategy, to identify, cultivate, solicit and steward relationships with business supporters, fostering a strong worldwide awareness and support. Communications Area.

---

#### **Staff**

Individuals working for the SDE21 Organisers on the project.

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#### **Universities Relations Coordinator**

Organiser responsible for the communication with the participating Teams, helping them through the project development. Competition Area.

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### **TEAM MEMBERS**

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#### **Communications Coordinator**

Team member responsible for the team's communications with the media and for developing all the communications materials (please refer to the Graphic Chart & Brand Manual), including updating information concerning the communications activities through the SDE21 WAT; works in conjunction with the SDE21 Organisers to coordinate the team's interactions with the media.

---

#### **Contest Captain**

Team member responsible for the team's primary strategies and coordination of Tasks Contests; is also responsible for demonstrating the compliance of equipment and appliances with the Rules.

---

#### **Decathlete**

Team member who is an enrolled student –undergraduate or post graduate studies, at a participating school or has graduated from a participating school within 12 months of the beginning of assembly.

---

#### **Electrical Engineer**

Team member responsible for completing the Electric and PV Chart and Checklists and working in conjunction with the SDE21 Organisation electrical engineer to interconnect the house to the grid on SDE Solar Village. Must be a licensed professional, which approves and signs the house's electrical systems (drawings and specifications).

---

**Faculty Advisor**

Team member who is the lead faculty member and primary representative of a participating school in the project; also provides guidance to the team on an as-needed basis throughout the project. Responsible for signing the official document certifying the compliance of the codes of the country of origin.

---

**HS Team Coordinator**

Team officer who is responsible for developing and enforcing the team's Health & Safety Plan during the Competition phases, assembly and disassembly of the houses. See Rule 52.4.1 Team members in charge of Health and Safety.

---

**Instrumentation Contact**

Team member collaborating with the SDE21 Organisers' instrumentation team to develop a plan that accommodates the equipment used to measure the performance of the home during the Competition.

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**Project Architect**

Team member responsible for the architectural design effort; license not required.

---

**Project Engineer**

Team member responsible for the engineering design effort; license not required.

---

**Project Manager**

Team member responsible for the planning and execution of the project.

---

**Safety Officer**

Team member responsible for the safety measures observance during the event. See Rule 52.4.3 Safety Officers.

---

**Site Operations Coordinators**

Team members responsible for developing and enforcing the Teams' Site Operations Plan during the Competition phases, assembly and disassembly of the house.

---

**Student Team Leader**

Student team member responsible for the coordination among the team. Ensures that official communication from the SDE21 Organisers are routed to the appropriate team member(s).

---

**Structural Engineer**

Team member responsible for approving the house's structural systems; license required.

---

**Team Crew**

Person who is integrally involved with a team's project but is unaffiliated with the participating schools; contractors, volunteers, and sponsors are examples of team crew.

---

**Team Member**

Enrolled student, recent graduate, faculty member, or other person who is affiliated with one of the participating schools and is integrally involved with a team's project activities; Decathletes, Faculty Advisors, and involved staff from participating school are all considered team members.

# section I.0\_ general rules

## Rule 1\_SDE21 Organisation

### 1.1 SDE Authority

The stewardship of Solar Decathlon in Europe has been assigned to the Energy Endeavour Foundation (EEF) by the United States Department of Energy (US DOE). The EEF organises a juried Call for Cities which results in the designation of a bidding municipality as Host City for the SDE in 2021. The SDE21 Organisers along with the EEF and the US DOE will elect a jury to recommend Teams to be selected from the SDE21 Call for Teams. See Chart 1.

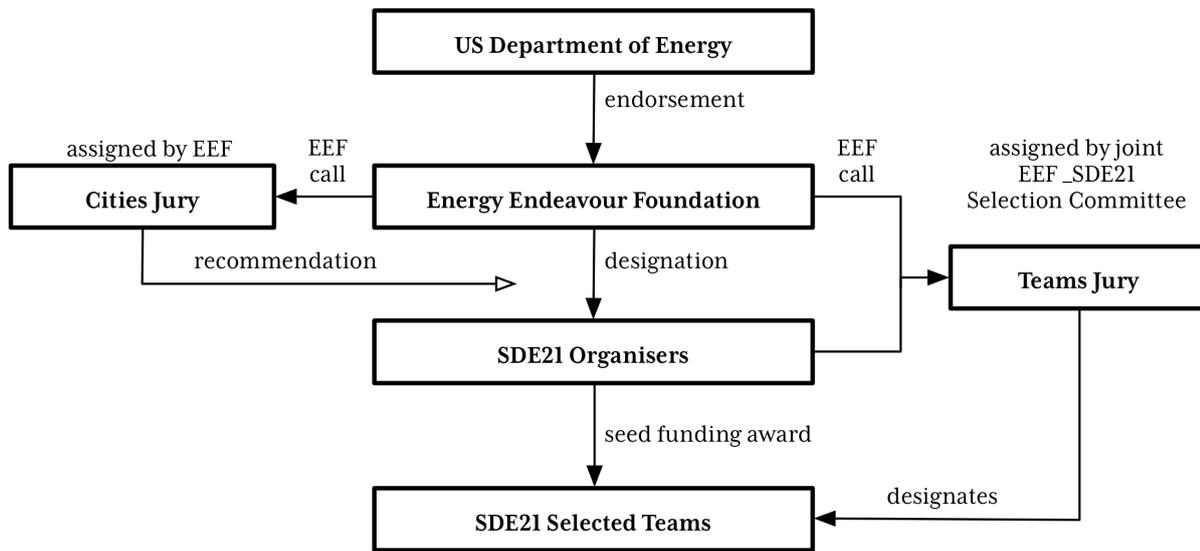


Chart 1. Solar Decathlon Europe Authority

### 1.2 SDE21 Organisation Chart

The SDE21 Organisation is structured as follows:

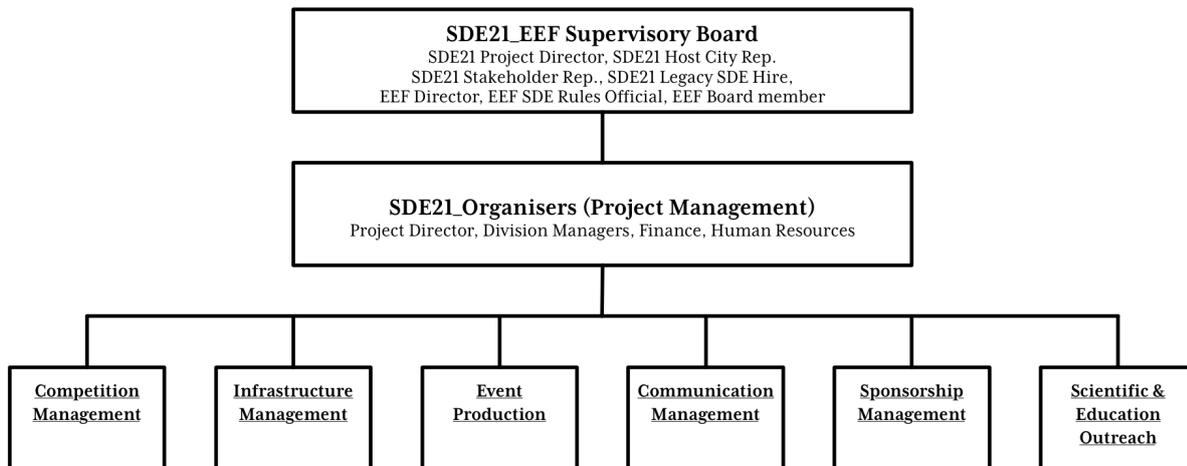


Chart 2. Organisation Chart

### 1.3 Decision Chart

For the SDE21 edition, the following authority structure will be used for making decisions and solving problems:

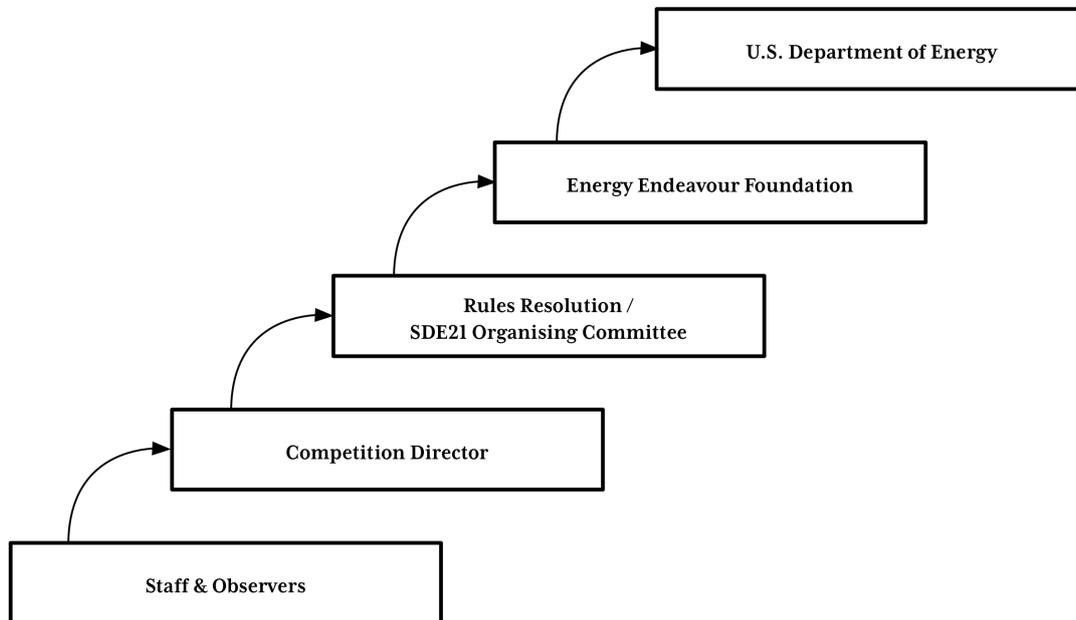


Chart 3. Authority Decision Chart

## Rule 2 \_ Administration

### 2.1 Precedence

If there is a conflict between two or more Rules, the Rules having the later date takes precedence.

### 2.2 Violations of Intent

A violation of the intent of a Rule is considered a violation of the Rule itself.

### 2.3 Effective Date

The latest version of the Rules posted on the SDE21 Workspace Area for Teams (SDE21 WAT) and dated for the year of the event are the Rules in effect.

### 2.4 Official Communication

It is the team's responsibility to stay continuously updated with all the official project communications. Official communication between the Teams and the SDE21 Organisers will occur preferably through one or more of the following:

#### 2.4.1 SDE21 Workspace (SDE21 WAT)

Workspace Area for Teams (SDE21 WAT): is the main communication tool for the Competition Teams. Appendix A for SDE21 WAT will be issued with future versions of the SDE21 Rules. The SDE21 WAT is the key communication platform between the Teams and the SDE21 Organisation. The SDE21 WAT is a secure educational website, which is accessible only for the participating Teams. All the team members must be registered.

The primary usage of SDE21 WAT will be to:

- Post and receive all official communications;
- Update all team and event calendars;
- Request and receive information or clarifications;
- Submit questions;
- Upload and download files.

Appendix A will provide further information about the SDE21 WAT.

**Note: The SDE21 WAT location (URL) will be determined before the team selection.**

### 2.4.2 Email

For expediency and to protect confidentiality, the SDE21 Organisers may choose to communicate with Teams via team members' email addresses and the SDE21 WAT Email (wat@solardecaathlon.eu). The content of the communications sent to this email address will remain confidential, unless the team grants permission to the SDE21 Organisation to divulge the content of these communications to the other Teams. However, most official communication will occur via the SDE21 WAT.

**Note: The SDE21 Official email for communication will be determined before the team selection.**

### 2.4.3 Conference calls

SDE21 Organisation may invite the Teams to participate in a conference call. Invitations and instructions for participation in conference calls will be provided via the SDE21 WAT.

### 2.4.4 Meetings

#### 2.4.4.1 Before the Event

Two workshops will permit the Teams and SDE21 Organisers have an in-person meeting. Notification of the date and agenda of this meeting will be made via the SDE21 WAT.

#### 2.4.4.2 Before the Assembly Phase

SDE21 Organisers will meet with the Teams to talk about Health and Safety and Site Operation.

#### 2.4.4.3 During the Event

Morning meetings are held on a daily basis throughout the event at SDE Solar Village. It is mandatory that at least two team members assist at these meetings, preferably the Faculty Advisor and the Student Team Leader. Other team officers may also assist, for example Safety Officers, Contest Captains or Communication Coordinators. Team members can bring any doubt, necessity or announcement to the meeting. Attendants are responsible for sharing the meeting information, decisions and announcements with the other team members.

### 2.4.5 Postings at Headquarters

During the event, a bulletin board (or other venue for posting information) may be established at event headquarters. Teams will be notified via the SDE21 WAT if such a venue is established and the purpose for which it has been established.

### 2.4.6 Decisions on the SDE21 Rules

The decisions on the Solar Decathlon Europe Rules are interpretations of the SDE21 Rules contained in this document. The Energy Endeavour Foundation appoints Rules Officials who safeguard the integrity of the SDE Competition through the SDE21 Rules. SDE21 Organisers may ask for changes or clarifications to the SDE21 Rules by making an official request to the Rules Officials. When the Rules Officials make a decision that may, in their opinion, directly or indirectly affect the strategies of all Teams, the Rules Officials will add the decision to the Solar Decathlon Europe Rules. The SDE21 Organisers will then notify the Teams of the changes via the SDE21 WAT.

**Exception: if such a notification would unfairly reveal the strategies of one or more Teams, the SDE21 Organisers may, depending on the circumstances, refrain from notifying the decision to all Teams.**

### 2.4.7 Self-Reporting

Teams shall self-report definite or possible Rules infractions that have occurred or may occur. The Rules do not address every possible scenario that may arise during the Competition. Therefore, a team considering an action that is not explicitly permitted by the Rules should ask a Rules Official for an official decision before proceeding with the action. If the team does not ask for an official decision, it puts itself at risk of incurring a penalty.

The Competition Director and Competition Manager will act with discretion when determining the penalty for a Rules infraction. Rules infractions observed by Rules Officials and SDE21 Organisers, i.e., not self-reported by the team, may be subject to more severe penalties than self-reported Rules infractions.

### 2.4.8 Penalties

#### 2.4.8.1 Rules Infractions

Teams committing Rules infractions are subject to one or more of the following penalties, depending on the severity of the infraction:

- Point penalty applied to one or more contests;
- Disqualification from part of, or all of, one or more sub-contests;
- Disqualification from the Competition.

**Note: Disqualification from the Competition requires prior notice to the team and an opportunity for the team to make a written statement on its own behalf.**

#### 2.4.8.2 Late or Incomplete Submission

Point penalties will also be applied to Teams not fulfilling all the Deliverables' requirements:

- for late submission: from 15 min after the deadline till 48 hours after - up to 0.5 points;
- from 48 hours after the deadline until 1 week later - up to 2.0 points;
- for contents missing<sup>more</sup> than 5 % of the content required missing - up to 2.0 points

**Note: In case any participating team delivers more than 1 week after the deadline or / and with more than 25% of the content required missing, the SDE21 Organisation reserves the right to decide to apply a larger penalty, considering the special conditions of each particular case.**

#### 2.4.8.3 Infractions during the Assembly / Disassembly Phases

During assembly period, penalties points will be applied to Teams not respecting:

- Safety on construction site (see Rule 45 \_ Site Operations Plan, Rule 46 \_ Health & Safety Report and Documents, Rule 51 \_ Building Codes , and Rule 52 \_ Health and Safety)
- Construction site cleaning and waste management (See Rule 4.11 Site Cleaning and Waste )

#### 2.4.8.4 Daily Tasks during the Competition Week

Teams must do all the daily tasks followings the Competition Calendar. Penalties will be assigned to the Teams if they do not comply with this requirement. Teams must report to the Competition Manager if they have any problem that makes it impossible to do the daily tasks.

#### 2.4.8.5 Penalty Referee

Individual, appointed by the SDE21 Organisation, to examine and assess the team's faults, and propose to the Competition Manager all penalties according to respect of the Rules. They shall determine the severity of Rules infractions,

classify them as minor or major and report them to the Competition Manager. Penalty Referee shall be independent of the SDE21 Organisation and shall have a nationality other than the nationality of the competing Teams.

#### 2.4.8.6 Applying Penalties

The Competition Manager is solely authorized to apply point penalties or disqualify a team from the Competition or from part of, or all of, one or more sub-contests for Rules infractions.

#### 2.4.8.7 Penalties Notification

The Competition Manager shall notify all Teams via the SDE21 WAT when a penalty has been assessed against any team. The notification shall include the identity of the team committing the infraction, a brief description of the infraction, including its severity, and the nature of the penalty, giving the Teams the opportunity to protest, see Rule 2.4.9 Protests. Penalties points related to safety, construction site cleaning and waste management will be announced day by day to each team.

#### 2.4.9 Protests

Official written protests may be filed by Teams for any reason during the Competition event. A filing fee of up to 10 points may be assessed to the team filing the protest if the protest is deemed by the protest resolution committee to be frivolous. Teams are encouraged to communicate with the Rules Officials in an attempt to resolve issues and complaints before resorting to the protest process. Protests should be filed only if the team and the Rules Officials are not able to resolve the dispute themselves; or if the team or the Rules Officials are too busy to engage in discussions that may result in resolution of the dispute without a protest. Protests must be submitted between 9 a.m. and 7 p.m., and within 24 hours of the action being protested. The final opportunity to file a protest is 5 minutes following the conclusion of the final sub contest on the final day of the Competition weeks.

**Exception: The results of one or more sub-contests may be announced during the final awards ceremony.**

**The results of sub contests announced during the final awards ceremony may not be protested.**

The protest shall be submitted to the Competition Manager in a sealed envelope. It shall include the name and signature of the Faculty Advisor, the current date and time, an acknowledgement that a 10-point filing fee will be assessed, a clear description of the action being protested, and a succinct description of the protest.

#### 2.4.10 Protest Procedure

The protest resolution procedure follows:

- The Competition Manager convenes the Protest Resolution Committee.
- The Competition Manager submits the sealed envelope containing the team's written protest to the Protest Resolution Committee. Unless the Competition manager is called by the committee to testify, he is not permitted to read the protest until after the protest resolution committee has submitted its written decision.
- The Protest Resolution Committee opens the envelope and reads the protest in private. No appearance by SDE21 Organisers or team members is authorized during the Committee's private deliberations. No right to counsel by SDE21 Organisers or team members is authorized.
- The Protest Resolution Committee notifies the Competition Manager if it would like to call any individuals for testimony. The Competition Manager notifies individuals called for testimony. The committee may call the Competition Manager for testimony.
- Testimony is provided by individuals called by the committee.
- The Protest Resolution Committee notifies the Competition Manager of its decision and indicates how many points shall be assessed as a filing fee. The decision of the Protest Resolution Committee is final, and no further appeals are allowed.

- If the decision involves changes to a team’s score or a refund of some, or all, of the filing fee, the Competition Manager notifies the Scorekeeper of the changes, and the Scorekeeper applies the changes to the scoring server.
- The Competition Manager posts a copy of the written protest and decision on the SDE21 WAT.

## Rule 3 \_Participation

### 3.1 Entry

The project is open to Colleges, Universities, and other post-secondary educational institutions. Entry is determined through a proposal process. All proposals are reviewed, scored, and ranked. Based on the quantity and quality of proposals, a limited number of twenty Teams will be selected for entry in the Competition. Universities that have taken part in previous editions of the Solar Decathlon in United States or Europe are welcome to submit their proposal to participate in the Solar Decathlon Europe 2021. However, as houses and projects of the previous editions of the Solar Decathlon will not be able to participate, Teams will have to submit a new design proposal.

### 3.2 Team Officers and Contact Information

Each team must provide contact information for the Team Officers listed in Table 2 Team Officers and must keep the contact information current through the duration of the project. If a team’s internal officer titles do not exactly match those listed in Table 2, each team shall still provide the contact information for the person fulfilling each of the areas of responsibility described (See Definitions on Page 10). Teams must provide the contact information for one and only one person in each officer position; this individual is responsible for forwarding information to any “co-officers,” as necessary. An individual may have multiple officer titles. The requested information must be included in the Press Kit (please refer to Rule 30.1.2 Press Kit for further details). The Solar Decathlon Europe 2021 is intended to be a primarily student-run project. The only team officer who must be a faculty member is the Faculty Advisor. The structural and electrical engineers may be a post-graduate student, faculty member or working professional. It is highly recommended to filling other team officer positions with students.

Table 2. Team Officers

| Title                            | Name |
|----------------------------------|------|
| Faculty Advisor                  |      |
| Project Manager                  |      |
| Project Architect                |      |
| Project Engineer                 |      |
| Structural Engineer              |      |
| Electrical Engineer              |      |
| Student Team Leader              |      |
| Health & Safety Team Coordinator |      |
| Safety Officers                  |      |
| Site Operations Coordinators     |      |
| Contest Captain                  |      |
| Instrumentation Contact          |      |
| Communications Coordinator       |      |
| Sponsorship Manager              |      |

### 3.3 Safety

Each team is responsible for the safety of its operations, and each team member and crew shall work in a safe manner at all times during the project. See Rule 52 \_ Health and Safety for further information.

### 3.4 Conduct

Improper conduct will be not tolerated. Improper conduct may include, but is not limited to, improper language, unsportsmanlike conduct, unsafe behaviour, distribution of inappropriate media, plagiarism or cheating.

### 3.5 Use of Likeness, Content, and Images

Team members and team crew agree to the use of their names, likenesses, documents, audiovisuals and / or graphics, in any communication materials issued by the SDE21 Organisers, partners, event supporting institutions and event sponsors. For the Competition dissemination, SDE21 Organisers, event supporting institutions and event sponsors, may use the Teams' information (content and images). Please refer to the Graphic Chart & Brand Manual. SDE21 Organisers and event sponsors will make all reasonable efforts to credit the sources of content and images, although they may be published without credit. All materials provided by Teams to the SDE21 Organisation including, but not exclusively, the mandatory Deliverables, must belong to the participating Teams, or the Team must have been authorized by owners of materials subject to intellectual property regulations, such as background music or third-party images. Therefore, the Teams must submit the SDE21 Dissemination Authorization (available through the SDE21 WAT) conveniently signed by the Faculty Advisor, with each audiovisual file.

**Exception: If a team submits content or images that it would like to be kept confidential, it should make that request, with an explanation, in writing to the recipient of the content or images. Every effort will be made to honour requests for confidentiality. All confidentiality requests expire at the date of the end of the SDE21 competition.**

### 3.6 Withdrawals

If a participating team, during the project development, considers withdrawing from the Competition due to any reason, they must communicate it to the SDE21 Organisation before making its final decision. The SDE21 Organisation will try to help the Team through any problem. However, if the Team pursues to withdraw from the Competition, they must notify their decision to the Competition Director with a letter signed by the Faculty Advisor. All written withdrawals complying with the previous items are final.

## Rule 4 \_ SDE Solar Village

### 4.1 SDE Solar Village Specifications

SDE Solar Village specifications will be communicated through the SDE21 WAT, including a detailed plan drawing indicating its limits, accesses, lots, and circulation areas. The perimeter of SDE Solar Village will be limited by setting out accesses, the allotted lots, established limits and internal paths. The SDE21 Organisation will provide general lighting of SDE Solar Village, as well as the supply of water, workspaces for each team with Wi-Fi connection, access to private cafeterias and public toilets.

### 4.2 Civil Liability

Each team is financially responsible for any damage it causes in and to the Competition site. Therefore, Teams must contract Compulsory Insurance for SDE Solar Village.

### 4.3 Lot Conditions and Attribution

The lots size is 20.0 m by 20.0 m. In order to unload / load trucks and place cranes, an Operations Area of 20.0 m by 10.0 m will be available next to each lot during assembly / disassembly phases. Once the SDE Lot attribution is defined by a drawing lots process, the SDE21 Organisation will notify the Teams of the specific conditions for each lot. Teams must design and plan all their site operations accordingly. For exceptional reasons beyond the SDE21 Organisation, the lots size may vary.

In SDE Solar Village, lots' perimeters will be clearly defined and signposted. Teams may not go beyond these limits under any circumstances. Lots must be cleaned and re-established to its original conditions once the assembly and disassembly process is over.

As storage, unloading, assembly and disassembly will take place inside the lot's limit during the established period of time, each team will use part of their lot for storage and unloading during the Assembly and Disassembly Phases. The Operations Area will have to be freed during the Competition. The SDE21 Organisation will provide all Teams with a secondary storage area for materials and equipment not in used during the Competition.

#### 4.4 Footing

Low-impact footings without ground excavation nor penetration shall be used to support all house and site components located on the Competition site. Therefore, Teams have to provide repartition plates and removable footings systems. As vertical elevation change may exist across the lot design, each team should plan for adaptable footings systems (e.g. hydraulic jacks, sandboxes, adaptable scaffolding, screw-footings ...) in order to absorb differences between 40 and 60 cm. Footings shall be designed to comply with the soil bearing pressure criteria specified in the Solar Decathlon Europe Building Code. See 51.7.5 Load bearing pressure for further details. Once the foundation has been laid out during the assembly, Teams shall notify it to the appropriate Inspector in order to verify compliance. The assembly may not continue until this inspection has been passed.

#### 4.5 Respect of the Assembly Plan

Construction phase is integrated into the Competition. Indeed, respect of an assembly plan submitted by each team can result in bonus points according to Table 3. The SDE21 Organisation has the authority to determine the bonus points to apply at the end of the assembly period.

*Table 3. Table of maximum bonus for respect of assembly and safety plan.*

| <b>Actions</b>  | <b>Bonus points</b> |
|---|---------------------|
| Respect of safety plan on construction site                           | 10                  |
| Respect of planned deadline for wind-and-water tight                  | 5                   |
| Respect of planned deadline for electrical connection to village grid | 5                   |
| Respect of planned deadline for house delivery                        | 5                   |

#### 4.6 Assembly Period Video Recording

For safety purposes, audiovisual-support for competition and communication, cameras will be installed by the SDE21 Organisation in order to record the entire assembly period. Images remain property of the SDE21 Organisation who can use them to verify safety conditions and communication purposes. Teams waive all rights of property to the SDE21 Organisation but have access to images through SDE21 WAT in order to produce communication documents for the Engineering & Construction jury (refer to Rule 16.4 Evaluation Criteria (Jury Scoring) or any other team-specific use.

#### 4.7 Construction Equipment

##### 4.7.1 Cranes and other Auxiliary Machinery

The crane necessary for loading and unloading during assembly and disassembly phases will be provided by the SDE21 Organisation. The participating Teams will only have to pay the crane's use hours' cost in accordance with the costs indicated by the SDE21 Organisation. The SDE21 Organisation will administer the use of the crane to guarantee its maximum efficiency, attending to the needs of each team. To facilitate the loading and unloading, the elements of the house and the materials must be as "palletable" as possible. As far as possible, the crane's or alternative means' use will be administered with assigned turns.

The exclusive use of these may be possible in two specific cases:

- With the university's express request, under the SDE21 Organisation approval;
- For cranes' use incompatibility.

The exclusive use of the elevating machinery is an option that depends on the Teams' resources and planning.

##### 4.7.2 Other Machinery

The specialized company chosen by the SDE21 Organisation will provide auxiliary resources for the elevation and movement of the houses and their constitutive elements (forklift, cherry-picker, scaffolding...). Teams will be offered special rental conditions for material available in a catalogue.

#### 4.8 Access and Circulation of Heavy Vehicles

##### 4.8.1 Meeting Point

This is an allocated space close to the SDE Solar Village planned to park all heavy vehicles prior their entrance to the construction site. Upon arrival, truck-mounted cranes, trailers, semi-trailer trucks, etc. must be parked in a specific Meeting Point.

##### 4.8.2 Access of Heavy Vehicles

Vehicles parked in the Meeting Point will be called in, one after the other, to guarantee the orderly entry into SDE Solar Village, always through established paths and following the SDE21 Organisation's schedule.

### 4.8.3 Entrance Order

The SDE21 Organisation, in accordance with the Site Operations Plan of SDE Solar Village, will determine a strict entry order of the Teams' trucks to access SDE Solar Village and proceed to unload. This order will be done considering the trucks' order established in each Team Site Operations Plan. The above-mentioned entry of heavy vehicles will be realized only and exclusively in the specific periods established in the Competition Calendar. Only light vehicles will access SDE Solar Village after this deadline, with the authorization and coordination of the SDE21 Organisation.

### 4.8.4 Heavy Vehicles Circulation

Vehicles will have to respect internal circulations which will be laid out for vehicles. Circulation of these vehicles will be generally limited to the designed circulation paths. However, under special circumstances approved by the Site Operations Coordinator, trailers and semi-trailers may be driven on the Competition Site.

### 4.8.5 Vehicles at SDE Solar Village

Only one vehicle/transport per team will be permitted at a time in SDE Solar Village. The rest of the vehicles/transport will have to wait for the previous one to leave SDE Solar Village. This process will be coordinated between the persons in charge of the Site Operations Plan of the Village and those in charge of each team.

## 4.9 Electrical Power During the Assembly and Disassembly Phases

Generators are not permitted to power auxiliary equipment and construction lights necessary during assembly and disassembly. Electrical power will be available during the assembly and disassembly phases on each team's lot in a specific Construction Site Box. Provided power will be limited and monitored.

## 4.10 Lighting in the Competition Site

Teams are responsible for maintaining the adequate interior and exterior lighting levels during the assembly and disassembly phases. General lighting of lots will be provided by the SDE21 Organisation during the assembly, disassembly and grid tied phases. Construction lighting devices remain in charge of each team during assembly and disassembly phases.

## 4.11 Site Cleaning and Waste Management

### 4.11.1 Site cleaning

Teams are responsible for maintaining their clean construction site, lot and adjacent areas. Teams must respect all the SDE21 Organisation indications in relation to site cleanliness. Stock areas and work areas: Teams must respect the stock and work areas. In cases of doubt, Teams must consult the Site Operation Coordinator.

### 4.11.2 Waste Disposal

During assembly and disassembly, Teams must take their waste products to the disposal areas available in SDE Solar Village according to separated wastes collection Rules. General lighting of lots will be provided by the SDE21 Organisation during the assembly, disassembly and grid tied phases. Construction lighting devices remain the responsibility of each team during assembly and disassembly phases.

### 4.11.3 Liquid Disposal

The release or disposal of water or other liquids in SDE Solar Village must be realized according to the SDE21 Organisation.

### 4.11.4 Penalties Related to Site Cleaning and Waste Management:

Depending on the degree of the fault, the SDE21 Organisation may apply point or time penalties (stopping the work), or both. Penalties will be applied according to Table 4 Maximum Penalties for waste management and construction site cleaning.

*Table 4. Maximum Penalties for waste management and construction site cleaning.*

| <b>qualification of fault</b>           | <b>points penalty up to</b> |
|---|-----------------------------|
| Not cleaning construction area          | 5                           |
| Not respecting stock and work areas     | 5                           |
| Incorrect waste throw in waste disposal | 5                           |

## 4.12 Working System

Each team has to appoint a Site Operation Coordinator, who will be responsible for coordinating team's site operations. (Rule 3.2 Team Officers and Contact Information).

Assembly and disassembly phases will be clearly indicated in the Competition Calendar.

During the assembly and disassembly phases, Teams may work 24 hours per day, always complying with the working shifts established by the Health and Safety officials. Please refer to Section 4.0, Rule 52.4.6 for further details regarding working shifts and requirements according to Health & Safety regulations.

#### 4.13 Transport

Every team is responsible for the transport of its house, the house's contents, tools and equipment to the Solar Village. See other logistics issues in Rule 11.5 Logistics.

Teams will have to consider the dimensional aspects, suggesting the maximum load to be “palletable”.

Exceptional road transports are not permitted.

SDE21 Organisation suggests that the participating Teams contact transport companies during the development phase of the project to guarantee compliance with the freight transport Rules. Special attention must be paid to Customs regulations by those Teams not from the European Union.

**Note: Transportation requirements according to the Host City's local laws will be made available before team selection.**

## Rule 5 \_ Solar Envelope

### 5.1 Solar Envelope Dimensions

To protect a neighbour's right to the sun, the housing unit and all site components on a team's lot must stay within the solar envelope shown in Figure 1. The solar envelope shape is a truncated pyramid whose basis measures 20 m x 20 m and whose centred top section measures 10 m x 10 m while located at a 7-meter height.

The official height of a site component or set of contiguous site components is the vertical distance from the finished floor level of the house main entrance (which must be accessible to disabled people according to the law standards of the Host City. See Rule 51.1 General Criteria) to the highest point of the site component(s). This height must be clearly indicated in the Project Drawings. Small weather stations, antennas, air vents, and other similar components may be specifically exempted from the compliance of solar envelope if all of the following conditions are met:

- The team makes a request to the SDE21 Organisation for an exemption.
- The team can prove to the SDE21 Organisation's satisfaction that the component is not significantly restricting a neighbours' right to the sun.

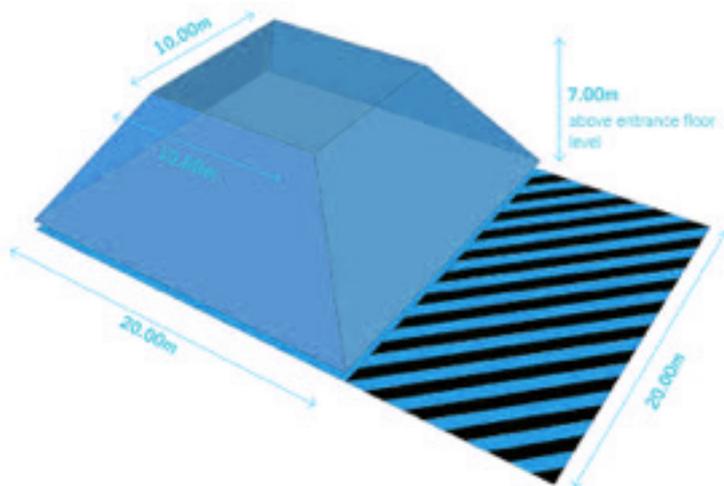


Figure 1. Solar Envelope Dimensions

### 5.2 Operations Area

Next to the Teams' lots there will be a space designated as Operations Area, coloured with blue and black lines in Figure 1. The Operations Area will be only available during the assembly and disassembly phases.

Their position as alleys and pedestrian path.

## Rule 6 \_Project Extents

### 6.1 Design Approval

#### 6.1.1 Structural Design Approval

Each team must submit structural drawings and calculations that have been signed and stamped by a qualified licensed professional. By signing and stamping the structural drawings and calculations, the licensed professional certifies that the structural provisions of the Solar Decathlon Europe Building Code have been met by the design, and that the structure is safe to be used and visited by the general public, if it is constructed as was designed. The licensed professional must sign and stamp the structural drawings and calculations of the house and all site components that might pose a threat to public safety if they fail.

#### 6.1.2 Electrical and Photovoltaic Design Approval

Each team must submit electrical drawings and calculations that have been signed and stamped by a qualified licensed professional. They will include the conventional electrical installation as well as the photovoltaic installation. By signing and stamping the electrical drawings and calculations, the licensed professional certifies that the electrical provisions of the Solar Decathlon Europe Building Code have been met by the design, and that the electric system is safe to be used and visited by the general public, if it is constructed as was designed. The licensed professional must sign and stamp the electrical drawings and calculations of the house and all site components that might pose a threat to public safety if they fail.

#### 6.1.3 Codes Design Compliance

Each team must submit a document, certifying compliance with the country of origin codes, signed by the faculty advisor. By signing this document, the Faculty Advisor certifies that the house complies with all the codes of the country of origin, therefore the house is safe to be used and visited by the general public if it has been built as designed.

### 6.2 Maximum Architectural Footprint

**The architectural footprint as defined below cannot exceed 150.0 m<sup>2</sup>.**

#### 6.2.1 Footprint

The footprint includes the entire area within the defined building perimeter (including the house and the site components) as well as active systems simulating urban systems set outside of the Measurable Area (see Rule 6.3 Measurable Area).

#### 6.2.2 Terraces

Ground floor terrace (deck, platform, etc.) and site components lower than 1.0 m are not included in the architectural footprint.

#### 6.2.3 Open Spaces

For “open spaces” adjacent to the house perimeter: if there are elements of the “open space” which visually continue the house lines or geometric, the total area of these “open space” will be included in the architectural footprint. (“Open space” are patios and other unroofed spaces adjacent to the house perimeter).

#### 6.2.4 Observed Footprint

The maximum observed footprint of each component during jury tours, public hours, or contests is included in the architectural footprint of record. For example, if a team deploys a motorized awning during public hours to demonstrate its operability, then the additional footprint attributable to the deployed awning is included in the architectural footprint of record. Teams should anticipate this by integrating the deployed awning area in the 150.0 m<sup>2</sup> maximum footprint area.

#### 6.2.5 Component Approval

Teams planning to use particular components must submit their proposal to the SDE21 Organisation. The SDE21 Organisation will evaluate individual proposals and designs and determine if its use does or does not signify a competitive advantage. Consequently, the component will be approved, and established the area included in the architectural footprint (the entire area projected or exclusively its elements).

### 6.3 Measurable Area

The measurable area, as defined below, shall be at least 45.0 m<sup>2</sup>, but shall not exceed 70.0 m<sup>2</sup> for one story houses and 110.0 m<sup>2</sup> for multi-story housing units.

### 6.3.1 Measurable Area Definition

Covered and constructed area remaining when walls, columns, stairs shaft, under 1.80m high spaces, and closets or any other storage or technical element built from floor to ceiling, are excluded. Interior surfaces of walls defining the building's thermal envelope form the measurable area perimeter. All primary living areas shall be located within the measurable area. If the building has convertible or moveable components, the maximum and minimum measurable areas during live presentations or shown in printed media presented by the team during jury visits, public exhibits or contests counts towards the maximum and minimum measurable areas of record respectively.

### 6.3.2 Multi-story Housing Units

The largest of the two floors shall not exceed 70.0m<sup>2</sup> of measurable area. Concerning general public (including disabled persons) access to possible 2nd floor, the regulations of the Host City applies. (See Rule 51 \_ Building Codes )

### 6.3.3 Entrance and Exit Routes

The main entrance may be placed on any side of the house. However, an accessible route leading to and from the main street of SDE Solar Village to and from the main entrance of the house shall be provided.

**Possible Exception: Pending the approval of the SDE21 Organisation, Teams on “corner lots” may modify the exit route so that it empties onto a “cross street.” Teams requesting this option shall provide an alternate site plan in the Construction Documents that shows an exit to the cross street.**

**The alternate site plan will be considered if the team ends up on a corner lot.**

Teams shall clearly illustrate and label the entrance and exit routes between solar envelope “property lines” and house entrance/exit in the project drawings and the Competition Site. Teams are responsible for providing a walkable surface from their lot limit to the starting point of their ramp(s) and stairs

## 6.4 Project's Minimum Requirements

To participate in the 10 Contests of the Competition, Teams' projects must include, at minimum, the following:

- Appliances \_ See Rule 23 \_ Contest 9: House Functioning for specific details;
- Workstation, desk or table to work or study at home with a computer (desktop or laptop);
- Interior public area for dinners \_ See Rule 23 \_ for further details;
- Interior public areas of the house (at least living room and kitchen) shall be open to Public Exhibit; complying with Accessibility requirements (See Rule 51 \_);
- Bedroom or a bed area;
- Accessibility requirements (See Rule 51 \_);
- Interior and Exterior Lighting – See Rule 12.7 Interior & Exterior Lighting.

## 6.5 Competition Prototype Alternates

Teams must present project alternates adapted to the Host City's climate conditions for the Competition. All modifications shall be clearly indicated as such in the various documentation materials.

# Rule 7 \_ Energy

This Rule applies during the grid-tie assembly but not during the stand-alone assembly.

## 7.1 Energy Sources

Global solar radiation incident upon the lot and the energy in small primary batteries (see 7.4 Batteries for limitations) are the only sources of energy that may be consumed in the operation of the house without the requirement of subsequent energy offsets, once the Contest week has started. All other energy sources, such as AC grid energy, consumed in the operation of the house must be offset by an equal or greater amount of energy produced, or “regenerated,” by the house.

**Note: For safety reasons, the use of hydrogen (production, storage and use) is not allowed.**

## 7.2 Village Grid

The SDE21 Organisers shall provide the village with an electric power grid that provides AC power to or accepts AC power from the houses. The SDE21 Organisers shall provide the necessary service conductors and connect the conductors at the utility intertie point. A team must notify the SDE21 Organisers if its house operates with an AC service other than 50Hz, 230V (phase- neutral). The Low Voltage grounding means that the system of the electricity distribution grid in SDE Solar Village follows a TT configuration (Note: the LV grounding means that the system characterizes the grounding mode of the secondary MV/LV transformer and that the method of grounding includes the installation frames).

This aspect should be carefully taken into account when designing the grounding methods of the house and photovoltaic system (see grounding methods requirements in the IEC standard and local regulations mentioned in Rule 51.8.2.6 **Earthing**). There will be a General Distribution Box in each of the lots with the necessary protections for the electrical connection to the General grid of SDE Solar Village. Each team has the responsibility of reaching the General Distribution Box with the conduits. In any case, conduits will be left in the general connection box of the lots and the connection will be made by an authorized technical expert of the SDE21 Organisation. The individual branch must have a section of 3x16 mm<sup>2</sup>, insulation 0.6/1 kV and be halogen free.

The team is responsible for calculating the house electrical grounding necessities. The SDE21 Organisation will execute the grounding system of SDE Solar Village with buried plates grounding connection points; in this way, each house will have one connection point, both for the electrical consumption (AC, alternate current) and for the electrical generation (photovoltaic system).

### 7.3 PV Technology Limitations

Bare photovoltaic cells must be commercially available to all Teams by the beginning of the Final Phase of the SDE21 Competition (June 2021). Custom-designed PV modules will be permitted, provided that the manufacturer demonstrates that the PV modules have been manufactured in accordance with the relevant applicable standards (e.g. IEC 61215 for crystalline silicon terrestrial PV modules and IEC 61646 for thin-film terrestrial PV modules).

Encapsulated photovoltaic modules must be commercially available to all Teams by the beginning of the Final Phase of the SDE21 Competition (July 2021). Substantial modification of the crystal structure, junction, or metallization constitutes manufacture of a new cell and is not allowed. Photovoltaic installation size connected to the house is limited to 5 kWp. In order to help the public to visualize Teams working in an urban symbiotic situation are allowed to install more PV than 5kWp, but they won't be allowed to connect to the house more than 5 kWp of PV panels. The PV installation that will be connected to the house during the Competition (PV panels, inverters, wiring, etc.) must be clearly indicated in the project drawings, one-line diagram and in the Electrical & PV Chart and checklists (see Rule 48 \_ Electrical and PV Design Systems Information). If technologies different from Photovoltaic are used for electricity generation, the limit of 5 kWp mentioned in the Rule 7.1 Energy Sources applies to the aggregate of electricity generation installations (Photovoltaic and non- Photovoltaic).

### 7.4 Batteries

The use of primary (non-rechargeable) batteries (no larger than “9V” in size) is limited to smoke detectors, remote controls, thermostats, alarm clock backups, and other small devices that typically use small primary batteries. For hard-wired battery bank, Teams must discuss the SDE21 Organisation in order to apply for specific Rules. The inverter to be used together with the battery bank must be designed for operation in a grid type TT (see Rule 7.2 Village Grid), this characteristic will be properly justified in the corresponding technical document. Maximal storage capacity of the battery bank (on site and integrated in mobility equipment) is 6 kWh. Nominal power of the battery bank inverter is limited to 5000 VA. (Note: nominal power of the inverter is the maximum output power on the AC side without time limitations / constraints). Hard-wired battery banks have to respect specific electrical requirements, particularly concerning connections with the photovoltaic installation.

At the beginning of the Competition phase, battery banks must be completely discharged. The SDE21 Organisers shall approve the use of small “stand-alone” (i.e., non “plug-in”) secondary batteries on a case-by-case basis. “Plug-in” (non-hard-wired) devices with small secondary (rechargeable) batteries that are designed to be recharged by the house’s electrical system (e.g., a laptop computer), shall be connected to the house’s electrical system whenever the devices are located in the house or on the house site. (They shall not be recharged in a system outside the house).

**Exception: Devices that are not used in the house functioning at any time during the contest week, like TV screens for public tour communication, team members’ personal computers, portable electronic devices used for mobile communication, such as cell phones and PDAs, are permitted on site without having to be plugged into the house’s electrical system. However, if a team uses any of these devices as a remote control of the house’s equipment or house’s systems, or as an active element in the house’s system, penalties can be applied by the SDE21 Organisation.**

### 7.5 Connection of the Houses to SDE Solar Village Grid

#### 7.5.1 Procedure

Once the final electrical inspection (including photovoltaic systems) has been approved, the houses will be officially connected to SDE Solar Village grid. The Electrical Energy Balance of the houses at the beginning of the Competition will be zero. From the approval of the final electrical inspection to the beginning of the contests (Contest Week), in the electrical panels of the houses only the circuit breakers of the household appliances, the independent circuit breaker for contest 6.9 (Home Electronics) and the lighting circuit breakers can be activated. The houses officially connected to the grid will not be allowed to use any thermal energy storage active system or conditioning active system until the beginning of the measured contests (during the Contest Week).

### 7.5.2 For Houses with Electricity Storage Systems

The SDE21 Organisation may ask the Teams which have the intention to use batteries to comply with some specific requirements in order to be allowed to use them during the Competition. In relation to the houses using batteries, once the designs of the electrical systems (including photovoltaic systems) have been approved, the SDE21 Organisation will let them know if they must comply with any specific requirement before the beginning of the measured contests.

## 7.6 Thermal Energy Storage

Thermal energy storage devices located outside of the footprint shall be fully shaded from direct solar radiation.

## 7.7 Desiccant Systems

Teams must communicate to the SDE21 Organisation if they are planning to incorporate a desiccant system. If a desiccant system is used, it must be regenerative. To ensure that the desiccant has been fully regenerated by the conclusion of the Electrical Energy Balance contest, the desiccant material or device must be easily measurable. In most cases, the material or device will be measured prior to and at the conclusion of the Electrical Energy Balance contest. In some cases, the measurement at the conclusion of the Electrical Energy Balance contest will not be necessary. At the conclusion of the Electrical Energy Balance contest, the weight of the desiccant material or device shall be less than or equal to its initial weight. Some desiccant systems with very low moisture storage capacities may be exempt from this requirement.

**Exemptions will be granted on a case-by-case basis.**

## 7.8 Humidification Systems

If a team is intending to use a humidification system, it must notify the SDE21 Organisation for approval of the system's characteristics, and the corresponding certifications of the different elements.

## 7.9 Heat Sink

Dedicated heat sinks are not subject to the requirements of Rule 6.2 or Rule 7.6.

A component that may, at different times, perform as either a heat-sink or a heat source and shall comply with Rule 7.6. If such a component does not comply with Rule 7.6, it shall comply with Rule 6.2.

# Rule 8 \_ Liquids

## 8.1 Containers Locations

Liquids supply and waste containers shall be located outside of the measurable area.

Liquids solar storage, hot water, or other thermal storage tanks may be located within the measurable area.

Liquids supply and waste tank(s) or container(s) shall be fully shaded from direct solar radiation.

## 8.2 Water Delivery

The procedure and associated requirements for water delivery is as follows:

The SDE21 Organisation will supply non-potable water for the contest purposes.

Every team must have all the necessary means required by the SDE21 Organisation for this end.

Construction Documents must clearly indicate the fill location(s), quantity of water requested at each fill location, container(s) dimensions, diameter of the opening(s) and clearance above the tank(s).

All openings must be easily accessible. Teams are responsible for distributing water within their houses.

This includes all necessary pumps, tanks, lines, valves, etc. SDE21 Organisation will establish the water supply calendar before the Competition. The supply in any other moment will be under express request, approval and supervision of the SDE21 Organisation. Moreover, water storages must be completely empty at the beginning of the Competition phase.

## 8.3 Water Removal

The procedure and associated requirements for water removal is as follows:

- Construction Documents must clearly indicate the removal location(s), quantity of water to be removed from each removal location, tank dimensions, diameter of the opening(s) and clearance above the tank(s).
- All openings shall be easily accessible.
- The water removal will be always under express request, approval and supervision of the SDE21 Organisation.

#### **8.4 Team Provided Liquids**

A team may provide its own liquids for the following purposes:

- Personal hydration;
- Food preparation;
- Thermal mass (quantity limited by soil bearing pressure limit and Rule 4.4 Footing; see Rule 8.8 Thermal Mass for restrictions);
- Hydronic system pressure testing;
- Small volumes of glycol, deionized water, or other working fluids for thermodynamic systems using working fluids other than non-potable water;
- Assembly (e.g., hydraulic fluid), finishing (e.g., paint), and cleaning (e.g., mineral spirits).

#### **8.5 Greywater Reuse**

In SDE Solar Village, Teams providing greywater treatment system may reuse greywater for irrigation and cleaning. Greywater reuse systems shall comply with Rule 9.2 and Rule 51.8.3.2.

#### **8.6 Rainwater Collection**

A team may collect rainwater that falls on its site and use it in or as any of the following:

- Irrigation source;
- Water feature;
- Heat sink;
- Heat source (only if it is fully shaded or located within the house measurable area, or both).

#### **8.7 Evaporation**

Water may be used for evaporation purposes.

#### **8.8 Thermal Mass**

Teams may use liquids as thermal mass. The thermal storage containers shall be filled and sealed before their arrival on the Competition site and shall remain sealed until they are removed from the Competition site by the Teams. Thermal storage containers shall be isolated, i.e., the contained liquid shall not circulate to other containers or systems.

#### **8.9 Greywater Heat Recovery**

Heat may be recovered from greywater as it flows from the drain to the waste tank. “Batch-type” greywater heat recovery is prohibited.

## **Rule 9 \_Vegetation Placement**

#### **9.1 Vegetation Placement**

The use of potted vegetation is permitted. All potted vegetation must comply with Rule 4.5 and Rule 4.8. Vegetation may be moved around the lot until the beginning of the contest week, after which it shall remain stationary until the conclusion of the contest week unless the construction documents clearly show how some or all vegetation is designed to be moved as part of an integrated system.

#### **9.2 Watering Restrictions**

Greywater, that may possibly contain organisms that may go septic, shall not be used to water vegetation.

## **Rule 10 \_ Monitoring**

#### **10.1 Introduction**

A significant part of the scoring of the Competition consists on the measurement of different items and on the correct performance of various tasks. The Monitoring system is responsible for controlling these measurements. All sensors, wiring, tripods and the rest of the material necessary for these tasks will be provided by the SDE21 Organisation. Monitoring is structured in two independent areas, Electrical and Instrumentation, as shown in [Chart 3](#).

##### **10.1.1 Electrical**

Responsible for the monitoring of Contest 4: Electrical Energy Balance, evaluating the houses' electrical energy self-sufficiency provided by solar active technology and their electricity use intensity.

### 10.1.2 Instrumentation

Specifications about the instrumentation will be defined before team selection. Table 5 Monitoring Types is a guide for the kinds of Instrumentation and Monitoring expected in the SDE21 Competition.

**Note: Further information regarding the monitoring system of the SDE21 Competition will be available through the SDE21 WAT, Official Communications, Rules & Related Documentation, Monitoring Contests' Procedures Presentation and Technical Monitoring Procedures Document.**

There are two types of monitoring: Continuous Monitoring and Monitoring Tasks, depending on whether the measurements are continuous or task-based. Table 5 shows which measurements belong to each group. This instrumentation is responsible for the monitoring of Contest 8: Comfort Conditions and Contest 9: House Functioning, by locating sensors where appropriate.

Table 5. Monitoring Types

| Monitoring           | Type       | Contest               | Calculation                                       |
|----------------------|------------|-----------------------|---|
| Electrical           | Continuous | 10. Energy Balance    | 10.1 Load consumption / surface area              |
|                      |            |                       | 10.2 Positive electrical balance                  |
|                      |            |                       | 10.3 Temporary generation-consumption correlation |
|                      |            |                       | 10.4 House adjustment to network load state       |
|                      |            |                       | 10.5 Power peaks                                  |
| Instrumentation      | Continuous | 8. Comfort Conditions | 8.1 Temperature                                   |
|                      |            |                       | 8.2 Humidity                                      |
|                      |            |                       | 8.3 Indoor quality air CO2                        |
|                      |            |                       | 8.4 Indoor quality air VOC                        |
|                      |            |                       | 9.1 Refrigerator                                  |
|                      | Task       | 8. Comfort Conditions | 9.2 Freezer                                       |
|                      |            |                       | 8.5 Lighting                                      |
|                      |            | 9. House Function     | 8.6 Acoustics                                     |
|                      |            |                       | 9.3 Clothes Washer                                |
|                      |            |                       | 9.4 Clothes Dryer                                 |
|                      |            |                       | 9.5 Dish Washer                                   |
| 9.6 Home electronics |            |                       |   |
|                      |            |                       | 9.7 Oven  |
|                      |            |                       | 9.8 Cooking                                       |
|                      |            |                       | 9.9 Hot water draws                               |
|                      |            |                       | 9.10 Dining                                       |
|                      |            |                       | 9.11 Water  |

## 10.2 SDE Sensor Location and Wire Routing

A summary of the sensor's location and wire routing is provided in this section. Extended information is included in the Technical Monitoring Procedures Document. This document is available through the SDE21 WAT, Official Communications, Rules & Related Documentation.

### 10.2.1 Instrumentation

The SDE21 Organisation will supply a list of all the SDE instrumentation devices necessary for the Monitoring System of the houses.

### 10.2.2 Sensors Location

The location of sensors is determined by the SDE21 Organisation, on the basis of Deliverable #3 Projects Documents.

### 10.2.3 Wire Routing

As sensors will be wired, there has to be a route for running wires from each sensor location to the data logger. The Teams are responsible for provide a wire routing that permits a quick and easy installation and removal of the SDE Instrumentation wires. This route must be clearly detailed in Construction Documents (Deliverable #4). This easy installation is mandatory to ensure that the house is monitored in order to enter the Competition. These wires and sensors are installed temporarily for the contest week.

### 10.2.4 Feed-through

All devices used for the monitoring will be located indoors in a specific monitoring panel room. Houses must provide feed-through to pass the power and Ethernet wires from the exterior to the interior of that room.

## 10.3 Instrumentation Plan and Approval

Teams must submit instrumentation drawings showing the location of the SDE sensors, meters, and the wire routing. Teams must have the Instrumentation Plan approved by the SDE21 Organisation to be able to participate in the Final Phase of the Competition. The procedure is as follows:

### 10.3.1 Before the Final Phase of the Competition

The SDE21 Organisation determines and indicates location of the sensors on the basis of Project Documents included in Deliverable #3. Teams must include the wire routing and Monitoring Panel in a Preliminary Monitoring Plan delivered to the SDE21 Organisation two weeks after sensors' location definition sent by the SDE21 Organisation. The SDE21 Organisation examines this document and eventually asks for modifications before approval of the Final Monitoring Plan. The approved Final Monitoring Plan is included in Construction Documents (Deliverable #4). Final minor changes can be allowed by the SDE21 Organisation after submission of Updated Construction Documents (Deliverable #5).

### 10.3.2 “In situ” During the Assembly Period

The SDE21 Organisation Monitoring & Scoring team responsible for the monitoring and scoring system implementation will check the spaces provided for the wiring (channels, paths, holes, etc.). If these construction elements are physically not available as indicated in the approved Construction Documents penalties can be applied by the SDE21 Organisation. Teams will make the adjustments necessary so that the instrumentation system can be safely and robustly installed by the SDE21 Organisation. SDE21 Organisation will mark the location of the sensors. SDE21 Organisation will install the monitoring panel, power it and check that everything is correctly installed. The SDE21 Organisation will wire the sensors to the monitoring panel. The SDE21 Organisation will verify the operation of the sensors. Teams are responsible for the monitoring system integrity during competition phase.

## 10.4 Blower Door test

In the interest of research purposes, a blower-door test can be conducted for each house to control airtightness value. This test would respect the EN13829 norm. The objective would be to corroborate values announced in Project Documents for those teams who are considering airtightness as necessary in their thermal strategies.

## 10.5 Real life conditions experimentation

The SDE21 Organisers are currently working on the definition of a real-life condition process using prototypes during the Competition (24 hours / day).

# Rule 11 \_ The Event

## 11.1 Registration

All Solar Decathlon Europe participants, attending the Final Phase of the Competition, must register through the online registration site, which will be available closer to the event. For special cases only, registration will be on-site. Due to safety concerns, the different categories of participants will have different types of access (such as restricted areas or during restricted times). The following Rules apply to registrants:

### 11.1.1 All Registrants

Each event participant must register individually. Group registrations are not allowed. When registering, event participants must complete all required information and forms before access to the event is allowed.

### 11.1.2 SDE21 Organisers, Team Members and Jurors

Will be required to provide a photo that will be kept on file and used for security purposes. In order to avoid delays, the SDE21 Organisation encourages using the online registration site and submitting the completed forms, information, and photos prior to the event. Once the SDE21 Organisation receives all the information required, forms, and photos, an event security ID will be issued to all individuals and must be visible at all times.

### 11.1.3 Staff and Team Crew

Will be required to provide a photo that will be kept on file and used for security purposes.

### 11.1.4 Visiting Media

Must check in at event headquarters and will be required to provide a photo which will be kept on file and used for security purposes.

## 11.2 Use of the Solar Decathlon Europe 2021 Logo

All communication materials produced by or in collaboration with the Teams, before, during and after the Competition, must refer prominently to the project as the Solar Decathlon Europe 2021 and shall credit the Solar Decathlon Europe as indicated by the SDE21 Organisers. This includes all the materials and / or means in which companies and / or institutions refer to their collaboration with one or more Teams by using their logo(s). The SDE21 Graphic Chart & Brand Manual includes specific instructions for this use. Please refer to this document. The Solar Decathlon Europe 2021 shall be recognized wherever Teams' logos are used. The possible combinations between SDE21

and Teams' logos shall be described in the team's visual identity manual (see Rule 38.1.5 Visual Identity Manual), and must comply with the SDE21's Graphic Chart & Brand Manual (available through the SDE21 WAT).

### 11.3 Teams' Sponsors and Supporting Institutions

Teams' Sponsors & Supporting Institutions are a very important aspect of the SDE21 Competition. For this purpose, each participating Team may select the companies and / or institutions that best serve the development of their purposes. However, both (the participating team, and the team's sponsors and supporting institutions) will have to comply with the SDE21 Rules and look over its fulfilment by third parties.

The relationship between SDE21 and Teams' sponsors will always be done through the team's sponsorship contact. The SDE21 Organisation will not have direct contact with the Teams' sponsors. Teams' sponsors and supporting institutions may be recognized with text, logos, or both, but the text and logos must appear in conjunction with the Solar Decathlon Europe 2021 logo (SDE21), the Energy Endeavour Foundation logo, and the Event Supporting Institutions and Main Event Sponsors. However, all these possible combinations must comply with the SDE21's Graphic Chart & Brand Manual (available through the SDE21 WAT). Please refer to that document for specific co-branding usage of the SDE21 and EEF brands. The Solar Decathlon Europe 2021, the Energy Endeavour Foundation logo are available through the SDE21 WAT and / or <http://solardecathlon.eu/sde-graphicchart-brandmanual-logos-download/>. The Event Supporting Institutions and Main Event Sponsors logos will be available through the SDE21 WAT.

**Teams may include the logo of their Teams' supporting institutions and sponsors in the following:**

#### 11.3.1 Before the Competition

In any documentation, while fulfilling the following SDE21 Rules requirements regarding use and size.

#### 11.3.2 During the Competition at SDE21 Solar Village

Commercial or technical advertising in the house's interior is forbidden, except for the following cases:

##### 11.3.2.1 Panels

On the explanatory panels located inside the lot but on the houses' outside, on the waiting areas. Logos must not be bigger than 10% of the total panel surface and included inside a vertical or horizontal strip. See Rule 12.1.1 Normal Operation, Rule 12.4 Public Tour, and Rule 38.3 Public Tour Description.

##### 11.3.2.2 Website

In the Teams' website and / or other services for mobile devices that Teams may provide, included in the Sponsorship's section. Additionally, it may be included inside a vertical or horizontal strip, with a maximum size of 10% of the screen's total surface. See Rule 29 \_ Team Website.

##### 11.3.2.3 Brochures

On the informational brochure, handout or any other object that may be given to the public- See Rule 12.1.1 Normal Operation, Rule 12.4 Public Tour, and Rule 38.3 Public Tour Description.

##### 11.3.2.4 Uniforms

On the back of the decathletes' uniforms. See Rule 11.4 Team Uniforms.

##### 11.3.2.5 Components

Off-the-shelf components that feature a built-in manufacturer's logo are acceptable and do not need to comply with the SDE21 and team's logo requirements.

##### 11.3.2.6 Vehicles

In any vehicle and/or material, only during assembly and disassembly phases,

##### 11.3.2.7 Audiovisual

In the team's Audiovisual #2, (see Rule 28.4.2 Audiovisual #2.).

##### 11.3.2.8 Houses

Houses cannot be named after their sponsors, and house logos cannot directly refer to their sponsor's corporate identity ("Direct reference" is subject to the SDE21 Organisers' interpretation).

##### 11.3.2.9 Teams

Teams may name house's areas after their sponsors, however, any reference to these spaces must comply with SDE21.

##### 11.3.2.10 Communication Materials

Communication materials or other products that exist largely for the recognition of sponsors are prohibited. "Other products" include but are not limited to signs, exhibits, posters, plaques, photos, wall art, and furnishings.

## 11.4 Team Uniforms

- During contest week, workshops and special events specified by the SDE21 Organisers, all team members present on the Competition site or the site of a special event shall wear uniforms representing their team.
- Uniforms will help to identify team's members quickly and easily and will be composed of a series of wearable items.
- On the front part of Teams' uniforms (jacket, shirt, hat or another wearable item), only the combined version of the team's logo and the SDE21's logo may be visible.
- On the back part of Teams' uniforms (jacket, shirt, hat, or other wearable item), team sponsor logos may be visible only if complying with the logos Rules requirements.
- A built-in clothing manufacturer logo may be visible on the front or back of the team uniform, or both or none of them.
- Since the SDE Solar Village is a public space, Teams should maintain a dress code required for public areas.
- Each team will determine its uniforms' colour(s) in Deliverable #1 and for the first Workshop (location & date TBD). Two options are to be proposed. In case of a too great similarity between two Teams, the SDE21 Organisation will request a second choice. The objective is to avoid visual uniformity and facilitate SDE21 communication.
- Uniforms design will be evaluated by the Communication jury. Please refer to the Graphic Chart & Brand Manual.

## 11.5 Logistics

- Each team is responsible for the transport of its house, the house's contents, and all necessary tools and equipment, and shall be responsible for any damage to or loss of such items.
- Each team is responsible for procuring all necessary equipment, tools, and supplies.
- Each team is responsible for transportation, accommodations, lodging, food, and beverages (including drinking water).
- Each team is responsible for making its own reservations and arrangements and for covering all necessary costs.

## 11.6 Inspections

Each project shall be inspected for compliance with these Rules and the Solar Decathlon Europe Building Code. Teams shall notify the appropriate inspector when they are ready for an inspection. When two or more Teams request an inspection simultaneously, the order of inspections shall be determined in a drawing. Spot checks for compliance shall take place throughout the Final Phase of the SDE21 Competition.

The Competition Manager shall check each team's inspection status, as indicated on the team's official inspection card, to determine which houses are eligible to participate in the contest. All final inspections shall be passed by the end of the inspectors' workday for a team to be eligible to participate in the following day's contest.

**Exception: Jury visits will proceed as scheduled regardless of a team's inspection status. However, jurors may be aware of the team's inspection status and may consider it in their evaluations.**

Because open, partially functioning houses are preferable to closed, fully functioning houses, the SDE21 Organisers will direct the inspectors to require that an unsafe condition be corrected so public tours can occur even if, as a consequence, the house is ineligible for participation in the contests.

# Rule 12 \_ Contest Period

## 12.1 Project Occupancy

### 12.1.1 Normal Operation

Under normal circumstances, when the occupancy Rule is in effect, no more than six people may be located in the housing unit at any one time.

### 12.1.2 Occupancy Rule Notification

Toward the end of each day during Contest Week, the SDE21 Organisation shall post a message on the SDE21 WAT message board indicating the hours during which the occupancy Rule is in effect the following day.

### 12.1.3 Suspension

The house occupancy Rule is automatically suspended whenever the Comfort Zone contest measurements are suspended.

### 12.1.4 Dinner Party

During the Dinner Party, the house occupancy Rule is automatically suspended. See Rule 23.5.10 Sub-contest: Dining.

### 12.1.5 Authorized Entry

Jurors, observers, official competition photographers and writers, and others with authority to enter a house as an organiser are not counted in the number of house occupants.

### 12.1.6 Remains in Effect

Rule 12.1 remains in effect when jury walkthroughs and contest tasks are occurring simultaneously, unless it has been suspended by Rule 12.1.2 or Rule 12.1.3 above.

## 12.2 Project Operators

Only Decathletes are permitted to operate the housing unit and participate in the contest during contest week. All competition-related communications on the Competition site shall be between the SDE21 Organisers and decathletes.

## 12.3 Late Design Changes

The final project assembled on the Competition site shall be consistent with the design and specifications presented in the construction documents. If there are known inconsistencies between the final project and the construction documents, the team is strongly encouraged to document these inconsistencies and submit the documentation to the SDE21 Organisation as soon as possible after the inconsistency is known. The SDE21 Organisation will then submit this documentation or a summary of the documented inconsistencies to the respective juries and inspectors at the appropriate time. If undocumented inconsistencies are discovered during inspections, the SDE21 Organisation will compile a summary of the inconsistencies and submit the summary to the respective juries at the appropriate time.

## 12.4 Public Tour

During Contest week, houses will be open to public tours during the times specified in the Competition Calendar. Teams are required to provide an accessible route to all areas of the house and site that are available to the public during exhibition hours. Teams are permitted to produce and distribute only one informational brochure or handout. Nevertheless, those might be different for each of the target groups. No other handouts are permitted to be distributed. The handout material and its properties, like its recyclability, content and creativity, will be positively evaluated. Teams shall develop signage that complements public tours by informing visitors about the team project and engaging visitors waiting in line. Only SDE21 Organisers-approved vendors may provide food and beverage to the general public on the Competition site. The SDE21 Organisation will inform all Teams of the specific location of the access to each lot before the Lot Selection.

## 12.5 Additional requirements

### 12.5.1 Target Group Presentations

Although Teams have to design only one route for all public, they may plan different explanations for each of the target groups: General public, professionals (architects, engineers, technicians and specialized press), undergraduates, teenagers and children, as well as considering long and short tours, attending to the number of public waiting.

### 12.5.2 Waiting Line Management

Teams will have to manage the waiting lines during public tours, and therefore design a specific waiting area inside the lot and include any entertainment activity. Information panels and / or equivalent electronic equipment (always using the house's energy) may be installed in this area.

### 12.5.3 Route Planning

Teams are encouraged to plan their route according to the accessibility requirements (see Rule 51 \_ Building Codes) trying to avoid any difficult point, such as crossing of ways, narrowing, etc. If avoiding the difficult point is not possible, Teams will have to explain how these difficult points (as well as turns, entrance and exit accesses...) are solved (see Rule 38.3 Public Tour Description for further details concerning the information required).

### 12.5.4 Disabilities

Public tours and explanations must take into account those people with sensorial or motor disabilities and will design them according to "Total Accessibility Criteria". Therefore, Teams will have to plan all the necessary actions or systems to let them follow the same visit as the rest of the public, without any information loss, neither being split up or given special attention. However, only once the public tour and explanations have finished, wheelchairs and strollers / push chairs (and people accompanying them) may have a different exit from the rest of the public.

### 12.5.5 Public Access

During public tours, Teams must provide access to the public areas of the house (at least living room and kitchen). If the house has two different levels, and the planned public tours include visiting both levels, access must be granted for disabled people by means of mechanical elements (lifts). Moreover, as it is mandatory to show the rest of the house, Teams may make use of other means (such as models, videos, mirrors, drawings, photos, virtual reality solutions) for this end.

### 12.5.6 Augmented / Virtual Reality

Augmented reality systems and / or any other electronic systems to enrich the public visit are permitted, beyond those provided for people with sensorial disabilities. All auxiliary electric / electronic systems used during public tours (such as screens, beamers, audio guides, fans, music players) must be powered by the house's energy.

### 12.5.7 Other Considerations

When planning their communication strategy during the Final Phase of the SDE21 Competition, Teams must consider the following aspects:

- Most of the visitors coming to SDE Solar Village will be native speakers of the host country.
- Due to the climatic conditions in the Host City, Teams are encouraged to plan shading areas, elements and / or devices inside their lot for the public waiting.

### 12.6 Housing Units' Use During Event and Impound Periods

The SDE21 Organisation is currently working on the definition of a real-life condition process using prototypes during the Competition (24 hours / day). This process will be determined in Rules next edition. However, each house can be impounded under the direct supervision of the SDE21 Organisers during a specific period of time. Team Members and Team Crew are not allowed to occupy, move, or conduct maintenance on any part of the house during the Impound.

### 12.7 Interior & Exterior Lighting

Houses will have to keep all interior and exterior house lights on during specified periods of time. See the Competition Calendar for the specified periods. All the dimmers shall be adjusted to their highest positions and all other lighting control equipment shall be disabled or overridden so that the controlled lamps are fully and continuously on during the specified periods. In case of technical problems, Teams may notify them to the observer before turning selected lamps on or off, in order to avoid point penalties.

### 12.8 Safety During the Event

Each team is responsible for the safety of the general public during the tours of their house.

### 12.9 Housing Units Configuration for Jury Tours

Teams shall show the juries all possible configurations of the house during the jury tours. House configurations that could affect the outcome of contests but were not seen by the jury during their tours, are prohibited during contest week. Some examples of reconfigurable features are the following:

- A significant movable component, such as a room, wall, or bed;
- Shading devices, such as retractable awnings or operable shutters;
- Towel-drying locations;
- Window coverings that may obstruct views or reduce light levels.

If there is insufficient time to do a live reconfiguration during jury tours, Teams may use some other method, such as photographs or video, to show all reconfigurable features in their various configurations.

Reconfigurable features that will not actually be reconfigured at any time during contest week need not be reconfigured during jury tours. All plug-in or portable appliances that may be used during contest week shall be in their fully deployed locations and configurations during jury tours. Also, be aware that juries may request that plug-in, portable, or hard-wired appliances be turned on so they can evaluate noise levels or other characteristics of the appliances that may not be evident when the appliance is off.

### 12.10 Teams Activities at SDE Solar Village

Only SDE approved activities are permitted at SDE Solar Village.

Teams wishing to hold any kind of activity not specified in the Competition Calendar, in their homes, lot or any other area of SDE Solar Village, must request the SDE21 Organisation for approval.

These include any event co-organized by Teams and governments/supporting institutions/sponsoring companies from official receptions to product presentations. Further information regarding the procedure for requesting approval to the SDE21 Organisation is available through the SDE21 WAT. The SDE21 Organisation has the authority to reject or approve any request, and may issue a conditional approval or suggest a change of date or time.

### 12.11 Evaluation Period

During the two consecutive days indicated in the Competition Calendar the participating houses will be allowed to use only "passive cooling or heating". For purposes of the Competition "passive" means any form of strategy that does not rely on a "thermodynamic cycle" or on internal heat or cool production devices. The use of pumps and fans are allowed, but electrical heaters, chillers (air conditioner), heat pumps and other equipment that include a thermodynamic cycle are not allowed during the passive evaluation period. Batteries are not permitted. Therefore, Teams will have to plan passive strategies for keeping their house's comfort conditions.

The consumption of heating, cooling, ventilation and hot water systems (Ev) will be monitored to verify that Teams are respecting the Rules regarding the passive period. Penalties will be applied to the Teams that do not follow the passive period Rules. The Passive Evaluation Period will run from Monday 15th of July, 00:01am to Wednesday 17th of July, 08:00am. See Table 6.

*Table 6. Provisional Schedule of Events*

| <b>Dates</b>                 | <b>Events</b>                |
|------------------------------|------------------------------|
| 1-2 June 2021                | Truck Arrival                |
| 3-14 July 2021               | Assembly                     |
| 15 July 2021                 | Rest Day                     |
| 16 July 2021                 | Opening Ceremonies           |
| 17 – 31 July 2021            | Competition Days             |
| 31 July 2021                 | Closing Ceremonies           |
| 1 August - 29 August 2021    | Optional Extended Exhibition |
| 30 August – 3 September 2021 | Disassembly                  |

## **12.12 Impact Assessment**

In the aftermath of the disassembly phase, the SDE21 Organisers conducts an impact assessment of the SDE21 event and extended exhibition. The objective of this assessment is to share, extend and implement best practices and lessons learned toward all industry-related stakeholders and sectors: academic, professional, societal, governmental etc.

Final Jury evaluations and Teams' final impact assessments will be considered for this purpose. As such, the Teams' impact assessments are of great value, and Teams are urged to follow Rule 39 with great attention.

## section 2.0 contests

### Rule 13 \_ General Contest Information

The Solar Decathlon Europe competition consists of 10 separately scored contests. Each of these contests in the Competition may consist of several sub-contests and different assessment criteria. The team with the highest total points at the end of the Competition wins the Competition.

#### 13.1 Contest Structure

The ten contests of the Decathlon are as follows:

- Architecture
- Engineering & Construction
- Energy Efficiency
- Communication & Social Awareness
- Neighbourhood Integration & Impact
- Innovation & Viability
- Circularity & Sustainability
- House Functioning
- Comfort Conditions
- Energy Balance

### Rule 14 \_ General Competition Criteria

#### Scoring options

In the SDE21 Competition there are three different ways to earn points:

- Jury evaluation;
- Task completion;
- Monitored performance.

#### 14.1 Jury Scoring

A multidisciplinary jury, composed by internationally renowned experts in their various fields, will use their experience and knowledge for the evaluation of the houses. The scorings will be done following the evaluation criteria and guidelines developed by the SDE21 Organisation for these contests. The Juries will be selected by the SDE21 Organisation and the Energy Endeavour Foundation, considering their academic and professional histories related to the evaluated contests. There will be 7 different juries:

- Architecture jury;
- Engineering & Construction jury;
- Energy Efficiency jury;
- Communication & Social Awareness jury;
- Neighbourhood Integration & Impact jury;
- Innovation & Viability jury;
- Circularity & Sustainability jury.

See Table 7 Jury Overview.

Table 7. Jury Overview

| Jury                               | Time Commitment for Deliverables Review (per team) | Relevant Deliverable for Review   | Time Commitment for visits to each house |
|------------------------------------|--|---|--|
| Architecture                       | 45 minutes   | Drawings<br>Architecture Design Narrative<br>Innovation Report<br>Audiovisual presentation<br>Architecture Brief Report   | 30 minutes                               |
| Engineering & Construction         | 45 minutes   | Drawings<br>Engineering and Construction Design Narrative<br>Innovation Report<br>Audiovisual presentation<br>Assembly Videos<br>Engineering and Construction Brief Report                                    | 30 minutes                               |
| Energy Efficiency                  | 45 minutes   | Drawings<br>Energy Efficiency Design Narrative<br>Innovation Report<br>Thermal Simulation results<br>Thermal and Environmental Evaluation (TEE)<br>Audiovisual presentation<br>Energy Efficiency Brief Report | 30 minutes                               |
| Communication & Social Awareness   | 45 minutes   | Website<br>Communication Plan and Press Kit<br>Innovation Report<br>Audiovisual presentation<br>Guided Public Tour and materials<br>Communication and Social Awareness Brief Report<br>Speed Peer Review      | 30 minutes                               |
| Neighbourhood Integration & Impact | 45 minutes   | Drawings<br>Neighbourhood Integration & Impact Report<br>Audiovisual presentation   | 30 minutes                               |
| Innovation & Viability             | 45 minutes   | Drawings<br>Innovation & Viability Report<br>Audiovisual Presentation   | 30 minutes                               |
| Circularity & Sustainability       | 45 Minutes   | Drawings<br>Sustainability Report<br>Innovation Report<br>Thermal and Environmental Evaluation (TEE)<br>Audiovisual presentation<br>Sustainability Brief Report   | 30 Minutes                               |

## 14.2 Review Phases

### 14.2.1 First Phase: Documents Review

The Deliverables outlined in table 4 review give the juries the opportunity to study the projects, to familiarize with, and to explore the specific technical details of each of them.

### 14.2.2 Second Phase: House Visits

The visits take place during the Contest Week in SDE Solar Village, giving the juries the opportunity to visually verify the information previously delivered and raising any question or clarification directly to the decathletes that the jury may consider appropriate.

### 14.2.3 Third Phase: Deliberation

The deliberation is the process where the different members of the same jury bring ideas together, sharing their opinions regarding the previous phases.

#### 14.2.4 Fourth Phase: Scoring

Justification. Juries will provide a written feedback to each Team explaining the scoring assigned and the evaluation criteria considered.

#### 14.3 Task Completion Scoring

Teams will obtain points for successfully completing the requested tasks. The carrying out of each task will be controlled by an observer, who will register the results and his remarks in the “observers’ logs”. The scoring is based on the approach to the goal predetermined in the contests.

#### 14.4 Monitored Performance Scoring

During the Contest week, the house will be continuously monitored and specific measurements will also be made. The scoring is based on the approach to the goal predetermined in the contests.

#### 14.5 Official Scoring

Participating Teams and the general public will have access to all the information related to the monitoring of the houses, as well as to the scoring, tables, different measurements results, scoring periods, etc. See Table 8.

Table 8. Solar Decathlon Europe 2021: Points distribution.

| No. | Contest/Sub-contest Name                          | Contests | Sub Contests | Assigned by           |
|-----|---|----------|--------------|-----------------------|
| 1   | Architecture                                      | 100      |              | Jury                  |
| 2   | Engineering & Construction                        | 100      |              | Jury                  |
| 3   | Energy Efficiency                                 | 100      |              | Jury                  |
| 4   | Communication and Social Awareness                | 100      |              | Jury                  |
| 5   | Neighbourhood Integration & Impact                | 100      |              | Jury                  |
| 6   | Innovation and Viability                          | 100      |              | Jury                  |
| 7   | Circularity and Sustainability                    | 100      |              | Jury                  |
| 8   | Comfort Conditions                                | 100      |              |                       |
|     | 8.1 Temperature                                   |          | 40           | Monitored performance |
|     | 8.2 Humidity                                      |          | 20           | Monitored performance |
|     | 8.3 Indoor Air Quality – CO2                      |          | 10           | Monitored performance |
|     | 8.4 Indoor Air Quality - VOC                      |          | 5            | Test                  |
|     | 8.5 Lighting                                      |          | 15           | Test                  |
|     | 8.6 Acoustic                                      |          | 10           | Test                  |
| 9   | House Functioning                                 | 100      |              |                       |
|     | 9.1 Refrigeration                                 |          | 5            | Monitored performance |
|     | 9.2 Freezing                                      |          | 5            | Monitored performance |
|     | 9.3 Clothes Washer                                |          | 5            | Task + Monitored      |
|     | 9.4 Clothes Drying                                |          | 5            | Task Completion       |
|     | 9.5 Dishwashing                                   |          | 10           | Task + Monitored      |
|     | 9.6 Oven  |          | 5            | Task + Monitored      |
|     | 9.7 Hot Water Draws                               |          | 20           | Task Completion       |
|     | 9.8 Cooking                                       |          | 5            | Task Completion       |
|     | 9.9 Home Electronics and House Automation         |          | 10           | Task + Monitored      |
|     | 9.10 Dinner                                       |          | 20           | Guests evaluation     |
|     | 9.11 Water Balance                                |          | 10           | Direct reading        |
| 10  | Energy Balance                                    | 100      |              |                       |
|     | 10.1 Load consumption per surface area            |          | 30           | Monitored performance |
|     | 10.2 Positive electrical balance                  |          | 15           | Monitored performance |
|     | 10.3 Temporary Generation-Consumption Correlation |          | 20           | Monitored performance |
|     | 10.4 House adjustment to network load state       |          | 20           | Monitored performance |
|     | 10.5 Power peaks                                  |          | 15           | Monitored performance |

## 14.6 Awards

During the Final Phase of the Competition, the following awards will be given to Teams:

### 14.6.1 Overall Awards

In the Final Award Ceremony, the Competition Overall Award will be granted. Team with the highest total points at the end of the Competition wins the Overall Competition Award. There will also be awards for the Teams with the second and third overall higher scores.

### 14.6.2 Contests Awards

Each of the ten Contests will be individually rewarded. There will be one first, one second and one third prize for each contest. Juries will have to award only one team per position. As an extraordinary circumstance juries will be able to grant the third place to two different Teams. Any other possibility will not be possible for Jury Contests.

### 14.6.3 Special Awards

In addition to the Competition Awards, other prizes or recognition may be granted to Teams who have an outstanding performance in the areas evaluated outside of the Competition. The SDE21 Organisation will inform the Teams about these SDE21 Extra-Competition Awards.

## Rule 15\_ Contest 1\_Architecture

### 15.1 Objectives

To assess the coherence of the design, the flexibility of space, the integration of technologies in architecture and the incorporation of bioclimatic strategies. To assess the general coherence of the projects and its alternates in relation with spatial and socio-economic environment of each team's country.

### 15.2 Assessment

The Deliverables relative to the project, especially the Construction Documents, as well as the on-site evaluation of the house.

### 15.3 Evaluation Procedure

A multidisciplinary jury of renowned architects specialized in the different areas of this contest.

### 15.4 Evaluated Concepts

The architecture will be assessed as: “the conceptual organisation of space in relation to technologies sustaining it and the reflection over the future of housing according to the context (cultural, social, and spatial) of each team's country, in accordance with the following parameter and concepts:

#### Jury scoring:

- Proposal's coherence;
- Perceptive evaluation, “in situ” verification;
- Positive evaluation of the proposal considering spatial and lighting design.

### 15.5 Evaluation criteria

#### Jury scoring:

- Proposal's coherence: Clarity in the conception of space and concepts. Synthetic, essential, simple and radical proposals will be assessed positively.
- Perceptive evaluation: “in situ” verification: How architectural design intentions have been achieved in the constructed house.
- Positive evaluation of the proposals considering:
- Innovative Spatial Design: the use of expansion-transition areas, making the best use of space, transformable or multi-use spaces.
- Lighting Design: the lighting quality for the space definition and the comfort provision evaluating both day and night specific needs. The suitable use of lighting highlighting the house values will also be assessed.
- Materials use: coherence of the use of matter and materials with the architectural concept and the local resources available in the environmental context of each project.
- How the project and its alternates bring a relevant proposal regarding the cultural and environmental context of each project.

### 15.6 Scoring

A total of 100 points will be awarded by the corresponding jury for this contest.

## Rule 16 \_ Contest 2 \_ Engineering & Construction

### 16.1 Objective

To assess the construction and engineering systems design merit and implementation. Teams will have to demonstrate the higher level of functionality of the house structure, envelope, electricity, plumbing and solar system design and construction, its safety, viability and adequate integration of them in the project.

### 16.2 Assessment

The Deliverables relative to the project, in particular the Construction Documents, as well as the on-site evaluation of the house.

### 16.3 Evaluation Procedure

A multidisciplinary jury of engineers and/or architects specialized in the different areas of this contest.

#### Concepts to be evaluated (Jury scoring)

- Assembly period coordination and management;
- House's Structure;
- Constructive design of the house;
- Plumbing System Design and Construction;
- Electrical System Design and Construction;
- Solar System Design and Construction;
- Building Integrated Solar Active Systems.

### 16.4 Evaluation Criteria (Jury Scoring)

#### 16.4.1 Assembly Period Coordination and Management

The construction phase will be an integral part the Competition. During the assembly period on-site, construction work of houses will respect the Site Operation Plan (timeline, logistic, zoning, waste management, etc.), always valuing adequacy between the Teams' objectives and means. To help jury evaluation, the team will compile the entire 24h / 24 webcam recording of each house assembly phase in an audiovisual presentation of maximum 2'.

#### 16.4.2 Houses Structure

Concept and resolution, typology, hypothesis, calculations, etc. will be assessed.

#### 16.4.3 Constructive Design of the House

Constructive solutions for envelope, interior divisions, and finishes, as well as the acoustic performance of the adopted solutions.

#### 16.4.4 Plumbing and Electrical Systems Design and Construction

Concept, dimensioning and resolution of the different systems facilities and active services of the house, as well as equipment selection and its suitability considering the house's needs. The house water conservation will be positively evaluated considering low flow and water saving fixtures, greywater system, treatment and / or water reuse.

#### 16.4.5 Solar System Design and Construction

Functionality, design, implementation, robustness, and economic value of solar systems.

#### 16.4.6 Solar Electricity Production

Concerning solar electricity production systems, the following items will be considered:

##### 16.4.6.1 Analysis of the Electrical Production Simulation:

A detailed report about the electrical energy production of the household will be prepared for typical generation conditions of the Host City and consumption conditions corresponding to the final phase of the Competition. See Rule 36.6 Solar Thermal Design.

##### 16.4.6.2 Technical Documentation for Photovoltaic Installations

Quality of the solar photovoltaic systems will be assessed, in particular compliance with the international standard IEC 60634-7-712 ("Electrical installations of buildings - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems"). See Rule 36.5 Photovoltaic (and other electricity producing solar) Systems Design.

#### 16.4.7 Thermal Solar Systems

Concerning thermal solar systems, the following items will be considered:

##### 16.4.7.1 Solar Thermal System Design and Construction:

The jury will evaluate the suitability of the solar thermal system regarding each project's particular needs. The use of the solar thermal installation for purposes other than domestic hot water, such as support for HVAC systems will be also positively evaluated, as well as the final implementation of the installation in relation to the information included in the technical documents.

#### **16.4.7.2 Building Integrated Solar Active Systems (BIPV – Photovoltaic, BIT – Thermal, BIPVT – Photovoltaic and Thermal)**

The Solar Active Systems installation will be evaluated based on a perfect integration in the house. It will be considered that “building integration” exists when the modules are elements of the house’s architectural composition.

### **16.5 Scoring**

A total of 100 points will be awarded by the corresponding jury for this contest.

## **Rule 17 \_ Contest 3: Energy Efficiency**

### **17.1 Objective**

To encourage excellence in systems and house design, while looking for reduction of energy consumption, and assessing the functionality and efficiency of all the house components. Teams must demonstrate to what degree the house design and its systems contribute to enhance the energy efficiency of the house.

### **17.2 Assessment**

The Deliverables relative to the project, in particular on the Construction Documents and the Thermal and Environmental Evaluation (TEE), as well as the on-site evaluation of the house.

### **17.3 Evaluation Procedure**

A multidisciplinary jury made up of engineers, architects or specialists in the different disciplines will evaluate this contest.

### **17.4 Evaluated Concepts (Jury scoring)**

- Efficiency of the house’s envelope;
- Efficiency of passive or mostly passive systems;
- Efficiency of the active systems (heating, cooling, ventilation, lighting and hot water);
- Energy analysis of the house and annual consumption estimation;
- Embodied energy analysis;
- Efficiency of the appliances and energy saving mechanisms;
- Efficiency increase due to the house management;
- Efficiency in housing and transport coupling.

### **17.5 Evaluation Criteria (Jury Scoring)**

#### **17.5.1 Efficiency of the House’s Envelope**

Construction of the house envelope, related to the energy efficiency of its materials and adopted solutions. Efficiency of passive or mostly passive systems.

#### **17.5.2 Efficiency of HVAC Systems**

Concept, dimensioning and resolution of the HVAC systems facilities, passive and / or active strategies of the house will be evaluated, as well as its efficiency to fulfil the house’s needs.

#### **17.5.3 Energy Analysis of the House**

Effective communication and synthesis of the team’s design and analysis process, focusing on the application of engineering principles, modelling, simulations and creative solutions. An overall description of the project geometric, envelope, air-tightness and any singular element that could contribute to the house energy efficiency. The influence of simulations in the decisions and changes to the house design will be evaluated, as well as the needs calculations, the thermal loads and the energy consumption of the house. See Rule 37.1.2.

#### **17.5.4 Simulated Thermal Evaluation**

Each house will be evaluated thanks to a specific tool of buildings thermal simulation (to be determined) in order to compare each house performances on a common basis, as a decision-support tool. Teams will be allowed to propose specific scenario (ventilation, annual comfort temperature and humidity, occupancy, internal gains). This evaluation will help the jury to evaluate projects in their original local environment.

#### **17.5.5 Embodied Energy Analysis**

To evaluate the embodied energy, the water consumption and the residue generation of the construction process, a specific analysis will be proposed. The structure flexibility and possibilities for being reused, adapting to future technological changes will also be evaluated.

### 17.5.6 Efficiency of the Appliances

The appliances selections due to its technical specifications, according to the house's dimensions and foreseen use. The inclusion of energy savings method will be positively evaluated.

### 17.5.7 Efficiency Increase due to House Management

Strategies designed (human or automatically controlled) for a contribution to the energy saving of the house will be evaluated through their influence on inhabitant's awareness raising and good habits development, daily tasks ease, building compartment efficiency.

### 17.5.8 Efficiency of Housing and Transport Coupling

To evaluate the relevance and efficiency of the coupling habitat and vehicle. How the electricity building production provides energy to the vehicle, and how the vehicle can be used as energy storage for building.

## 17.6 Scoring

A total of 100 points will be awarded for this contest in the Competition.  
20 points will be specifically allocated to the evaluation of housing and transport coupling.

## Rule 18 \_ Contest 4: Communication & Social Awareness

### 18.1 Objective

To assess the team's communication capacity to find creative, effective and efficient ways (adapted to each target group, avoiding any exclusion) of transmitting the Competition relevant topics (sustainability, innovation and energy efficiency) as well as those ideas that define the team's and project's own identity. Measurable Criteria (LH)

### 18.2 Assessment

Communication and Social Awareness contest will be assessed on the Deliverables relative to the project, as well as all the actions developed throughout the whole project development until the Competition in the Solar Village. These include the different events organized (activities involving interaction with the public, i.e. Public Tours) and the material submitted (information transmission by any mean: audiovisual, electronic, written, etc. such as a documentary, media impacts or web sites). The jury will also assess how Teams have planned to share their experience and put it to good use after the event and what will be the prototype's second life

### 18.3 Evaluation Procedure

A jury of communication professionals shall assign an overall score to the Team's communications plan, dissemination actions and its core message. The following fundamental criteria will be considered during the evaluation procedure:

- Effectiveness
- Efficiency
- Creativity

### 18.4 Evaluated Concepts

**The jury will evaluate the following aspects of the team's communication activities.**

**Please note that these concepts will be further defined in a later version of the Rules, before team selection.**

- Communication Plan;
- Copywriting;
- Visual Communications Materials, (digital & print);
- Sponsorship Actions;
- Public Tour;
- Speed Peer Review Presentation;
- Social Media Activities.
- Other activities contributing to energy literacy and awareness.

### 18.5 Evaluation Criteria (insert Measurable criteria...)

#### 18.5.1 Effectiveness

Clarity of the chosen message and its effective presence in the communication actions.  
Adequacy of the solutions designed for each target group and its pedagogic adaptation.

#### 18.5.2 Efficiency

The audience reached compared to the resources invested. This assessment will not be only quantitative, as certain groups or geographic scopes require a greater effort.

### 18.5.3 Creativity

A consistent development of the team's Visual Identity and its viability into any context without losing its essence. Originality, copywriting and artistic value of the actions will also be considered.

### 18.6 Scoring

A total of 100 points will be awarded for this contest in the Competition.

## Rule 19 \_ Contest 5: Neighbourhood Integration & Impact

### 19.1 Objective

The contest is designed to accentuate the integration of the house design into its context. In particular, the value created and added to the community by the renovation will play a particular role. This may be by providing surplus electrical power, advanced roof geometries, new balconies, additional sunspaces, communal winter gardens, increased accessibility, flexibility for social issues (reflecting social demographics of changing sizes of tenants/families, etc.)

The objective is to evaluate the relevance of the housing unit's proposal and its localization in the neighbourhood regarding the social and urban contexts chosen by Teams in the context they have chosen. To evaluate the economic strategy and the associated mode of production and transportation in relation with this context, the jury needs to understand the different mutualisation modes and community organisation whatever the urban context chosen by the Teams (dense urban context or individual houses in the landscape).

In this sense, several points are identified:

- To study different types of urban development with an eye to multifamily, collective housing buildings for dense urban context; or to study the possibilities of grouping houses in order to generate coherent communities for less dense areas.
- To evaluate the coherence of a mobility strategy associated with the proposal and its economic viability (including a public transportation impact if involved in the strategy).
- To develop housing solutions with an adapted or innovative production process regarding the local building industry.
- To identify and justify the integrative impacts of the project, emphasizing the attraction capacity for potential users.
- To evaluate the proposed strategies to identify communal investments needed to implement the house concept.

### 19.2 Assessment

The Deliverables relative to the project, as well as the on-site evaluation of the house in the SDE Solar Village

### 19.3 Evaluation Procedure

A multidisciplinary jury made up of urban planners, sociologists, architects, developers and building industry professionals. The assessment will be made based on the technical aspects and grading the responsiveness and suitability of the Team's proposal to positive impact in neighbourhood.

### 19.4 Evaluated Concepts

- Inspiring ideas of integration into the landscape, into the neighbourhood, to improve social opportunities, and economic and environmental benefits;
- The relationship among the building, neighbouring buildings, other close buildings, and the neighbourhood in total;
- Estimation of the social cohesion provided by the concept;
- Intergenerational interaction;
- Communal involvement.

### 19.5 Evaluation Criteria

#### 19.5.1 Integration

Inspiring ideas of integration into the landscape, into the neighbourhood, to improve social opportunities, and economic and environmental benefits

Jury will assess how the proposal arrange territory, articulates the city and improves its density and habitability, how it contributes to sustainable mobility, efficiency of public transport, and how it integrates into the smart city, how contribute to resilience of cities and communities, impacting positively on the improvement of the whole efficient city.

#### 19.5.2 Interaction

How articulate the relationship among our buildings, other close buildings, and neighbourhoods. Jury will assess synergies enabled from interoperability and how buildings must be integrated into the future smart city, impacting on the efficiency of social, economic, and environmental global approaches, defining how we must exchange key information among our building, through our BIM database and our management systems (CAFM, IWMS, BEMS), and

neighbourhood, with updated information from its environment (weather conditions, district information-Performance GIS, energy uses-SCADAS, utilities information). This interoperability should integrate users' behaviour and should meet both city and users' necessities. This interoperability should improve transportation, urban mobility, urban services, the efficient management of energy, the integration of distributed generation, emergencies, resilience of cities and communities.

### 19.5.3 Proposal of Key Performance Indicators (KPI's) to be Exchanged

Jury will assess what kind of information and Key performance indicators (KPI's) must be exchanged with the surrounding buildings and the neighbourhood to improve the overall efficiency of the system, with not just energy aspects, but also with other urban services, transports, emergencies, resilience of cities and community's issues.

## 19.6 Scoring

A total of 100 points will be awarded by the corresponding jury for this contest.  
The jury will award points specifically allocated to the evaluation of the mobility strategies.

## Rule 20 \_ Contest 6: Innovation & Viability

### 20.1 Objective

To evaluate the innovation degree of the proposal in the preceding contests, focusing on emergent or radical and revolutionary changes in the house, in its systems or in its components, which increase its added value and/or improve its performance and efficiency. Furthermore, Teams must demonstrate not only their innovative potential, but also proposals are social, technical and economically feasible.

### 20.2 Assessment

Jury will assess the different Deliverables relative to the project, as well as the assembly and the functioning of the house in SDE Solar Village.

### 20.3 Evaluation Procedure

**Six juries will evaluate this contest as an independent concept.**

#### Concepts to be evaluated

- Innovation in Architecture;
- Innovation in Engineering and Construction;
- Innovation in Energy Efficiency;
- Innovation in Communication and Social Awareness;
- Innovation in Neighbourhood Integration & Impact;
- Innovation in Circularity & Sustainability.

Each of the six components of this Innovation jury will have to detail its scoring, write and transmit it to the Competition manager, at the same time they define the scoring for their own contest. Besides this evaluation provided by six previous juries, a specific seventh Affordability, Cost-Effective Strategies & Viability jury will assess every proposal from a holistic approach, evaluating affordability, cost-effective strategies and its contribution to decision making process, and market viability.

### 20.4 Evaluation Criteria

Jury scoring

#### 20.4.1 Innovation in Architecture

Evaluating to what degree, the proposed solutions and those built by the Teams, provide new spatial and functional concepts, new languages in the formal use of materials, use of textures, and the appropriate use of light.

#### 20.4.2 Innovation in Engineering and Construction

Evaluating the innovation concepts in the house's structure, building services (plumbing, electrical and photovoltaic), design, and construction, as well as in the acoustic performance of the adopted solutions.

#### 20.4.3 Innovation in Energy Efficiency

Evaluating the active and passive innovative technological contributions maximizing the energy efficiency of the house; innovative ways to improve the hydrothermal, environmental, illumination and acoustic efficiency of the house, thus promoting the liveability of the house, as well as facilitating the perfect functioning of the house and its equipment will be assessed.

#### 20.4.4 Innovation in Communication and Social Awareness

Assessing all of the novel initiatives proposed by the Teams to attract the attention of the general public as well as disseminating clear messages such as the need for the responsible use of energy and natural resources, the sustainable construction and the use of renewable energy.

#### 20.4.5 Innovation in Neighbourhood Integration & Impact

Holistic approaches and inspiring proposals will be assessed by this Jury to provide new and innovative ideas about how the relationship among buildings and neighbourhoods must be tailored, and what kind of key information must be exchanged to improve global energy efficiency, improving city services performance, mobility, city resilience, ...

#### 20.4.6 Innovation in Circularity & Sustainability

Assessing new approaches to improvement of Sustainable Facility & city Management evaluating new knowledge, innovative methodology and sustainable assessments open source tools to improve economic, social, and environmental performance in buildings integrated into the smart city and contributing to the European Sustainable Development objectives for the built environment.

#### 20.4.7 Affordability, Cost-Effective Strategies & Viability

Assessing the novelty of the proposals for industrialized houses, especially those that can be adapted to multifamily buildings; new attractive formulas that improve the perception of the users and industry towards these typologies of housing, thus favouring their future commercialization; New ways of business, promotion and commercialization of the product; financial conditions for renting, integration of project in social housing policies, target market's identification, way of "selling" the product, methods and means to reach the potential buyers, economic impact of energy- saving features and equipment pooling, economic impact of renewable energy systems investments and pay-back, maintenance costs, economic impact of mobility strategies,...., will be evaluated according to the projects agenda. One of the more important challenges in Europe is to enhance Energy Buildings retrofitting from cost-effective strategies based on Commission Delegated Regulation (EU) No 244/2012 of January 16<sup>th</sup>, supplementing Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings. So, cost-effective strategies, and its justification, affordability, and Market viability are key issues to be evaluated by the jury.

### 20.5 Scoring

A total of 100 points will be awarded by the corresponding juries for this contest: Architecture (10 pts), Engineering and Construction (10 pts), Energy Efficiency (10 pts), Communication and Social Awareness (10 pts), Neighbourhood Integration & Impact (10 points), Sustainability & Circularity (10 pts), and Affordability, Cost-Effective Strategies & Viability (40 points).

## Rule 21 \_ Contest 7: Circularity & Sustainability

### 21.1 Objective

To evaluate the skilful and the environmental sensibility of the Teams (house design, techniques, systems and components) to attain the maximum reduction of negative environmental impact, during the house components manufacturing, the construction phase, the building's live and demolition.

### 21.2 Assessment

Deliverables relative to the project, in particular in the Sustainability Report and the Environmental Evaluation (TEE), as well as the assembly and functioning of the house in SDE Solar Village.

### 21.3 Evaluation Procedure

A multidisciplinary jury of professionals specialized in the different areas of this contest.

### 21.4 Evaluated Concepts

This contest will be evaluated in a cross-cutting manner in the other juried contest (Architecture, Engineering and Construction, Energy Efficiency and Urban design, Transportation and Affordability) based on the sustainability merits of the project in the following aspects:

- General Concept;
- Urban Design Integration including Transportation;
- Passive Bioclimatic Strategies;
- Construction systems;
- Sustainability in Engineering and Construction;
- Materials Selection;
- Active systems and equipment;
- Solar systems;
- Water;
- Solid Waste;
- Life Cycle Analysis;
- Circularity and Circular Economy approach.

## **21.5 Evaluation criteria**

### **21.5.1 General Concept and Sustainability**

Relation of the general concepts of the house and urban proposal with the sustainability will be evaluated, as well as what the Team understand by Sustainable Build Environment and how this understanding is reflected in their project.

### **21.5.2 Urban Integration, Transportation, and Affordability**

Relevant applied urban strategies of the project will be assessed, and how the density solution contributes to the environmental, economic and social sustainability. In relation with the transportation, the evaluation includes the transportation strategies and its relation with housing energy efficiency, and with the urban design proposal. Factors that influence the sustainability of the production of the houses and the economic viability of industrialization will be also assessed.

### **21.5.3 Passive Bioclimatic Strategies and Daylight**

Passive and hybrid design strategies. The success in the selection of the passive strategies will be assessed. The followings elements will be analysed: house envelope, glazing, daylight use, space planning, heating and cooling strategies, thermal energy storage systems, natural ventilation, exterior design and semi-passive conditioning systems.

### **21.5.4 Sustainability in Engineering and Construction**

To evaluate the Life-Cycle, the water consumption and the residue generation of the construction process, from the materials manufacturing (including energy) to the final set up (selective demolition plan, reusability). The structure flexibility and possibilities for being reused, adapting to future technological changes will also be evaluated, as well as the adequacy of the systems selected according to the house's needs. Positive impact of the selected construction systems in elements related with the sustainable construction as water use, solid waste, time, etc.

### **21.5.5 Materials Selection**

Selection of the materials will be evaluated taking account their LCA, if there can be reused or recyclable, incorporated energy, incorporate CO<sub>2</sub>, durability and necessity of maintenance. Usage of green materials, renewable, recyclable, reusable materials. Assess of embodied energy and incorporated CO<sub>2</sub> in the materials selection criteria.

### **21.5.6 Active Systems and Equipment**

Success in the selection of HVAC system, DHW, artificial lighting and appliances and their energy efficiency, Building Energy Management Systems and Demand Management, and its contribution to the sustainability of the project will be evaluated. To evaluate the means considered to reduce energy demands, the degree of local self-supply and adjustment strategies of the temporary correlation generation-consumption. To evaluate the active strategies and systems which improve hydrothermal efficiency, artificial lighting efficiency, acoustic performance and air quality, minimizing the associated energy consumption to the proposed solution. The high efficiency equipment (heating, cooling and ventilation, among others) maintenance will also be evaluated. To evaluate the high efficiency of the electric appliances selected for each house. Assessment of BEMS, CAFM, or IWMS, to improve demand energy management, or to improve efficient building operation.

### **21.5.7 Solar Systems**

Evaluation of these systems will include the energy recovery time, CO<sub>2</sub> emissions and design characteristics as their accessibility, integration (BITPV), and efficiency of the implemented system.

### **21.5.8 Water**

Evaluation includes the water management cycle, water saving, re-collection, conservation, treatments and reuse.

### **21.5.9 Solid Waste**

Evaluated in three periods: waste management during construction phase, project use building operation and associated waste collection and management, and waste, recycling, and reusing possibilities at the end of life.

### **21.5.10 Life Cycle Analysis**

Whole building assessment will be evaluated. LCA must be carried out using the tool and instructions indicated in the Thermal and Environmental Evaluation (TEE) Information Guide.

### **21.5.11 Circularity and Circular Economy approach**

Relying on system-wide innovation, and how it aims to redefine products and services to design waste out, while minimising negative impacts. Jury will assess the Circular model approach defined by Teams to build economic, natural and social capital, underpinned by a transition to renewable energy sources.

## **21.6 Scoring**

A total of 100 points will be awarded by the jury for this contest.

## Rule 22 \_ Contest 8: Comfort Conditions

### 22.1 Objective

To assess the capacity for providing interior comfort through the control of temperature, humidity, acoustic, lighting and the quality of the interior air.

### 22.2 Assessment

The collected data by the SDE21 Organisation’s monitoring system during the Competition period and the measures realized “in situ” in SDE Solar Village.

### 22.3 Evaluation Procedure

This contest is based on the measurements realized on the house during the Competition Week.

### 22.4 Evaluated Concepts

- Temperature;
- Humidity;
- Natural Lighting;
- Air quality –CO2;
- Air quality –VOC;
- Acoustic performance.

### 22.5 Evaluation Criteria

#### 22.5.1 Sub-contest 5.1: Temperature

The interior temperature will be constantly measured. Two temperature sensors will be located in the two main rooms of the house. In case it is necessary a third temperature sensor will be installed. All available points are earned at the conclusion of each scored period by keeping the time-averaged interior dry bulb temperature between 23°C to 25°C. See the Competition Calendar for the schedule of scored periods.

Reduced points are earned if the indoor temperature keeps between 21 °C and 23°C, or between 25°C and 27°C.

Reduced points values are scaled linearly, as shown in Figure 2.

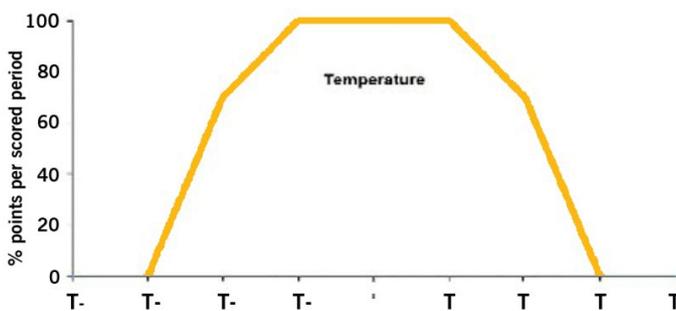


Figure 2. Temperature sub-contest points distribution

Table 9. Temperature Calculations

|                 |       |   |             |   |       |
|-----------------|-------|---|-------------|---|-------|
| Full Points:    | 23 °C | ≤ | Temperature | ≤ | 25 °C |
| Reduced Points: | 21 °C | < | Temperature | < | 23 °C |
|                 | 25 °C | < | Temperature | < | 27 °C |
| No Points:      |       |   | Temperature | ≤ | 21 °C |
| No Points:      |       |   | Temperature | ≥ | 27 °C |

### 22.5.2 Sub-contest 5.2: Humidity

The relative humidity will be constantly measured. A humidity sensor will be located next to a temperature sensor. All available points are earned at the conclusion of each scored period by keeping the time-averaged interior relative humidity between 40% and 55% during the scored period. See the Competition Calendar for the schedule of scored periods. Reduced points are earned if the time-averaged interior relative humidity keeps between 25% & 40%, or between 55% & 60%. Reduced points values are scaled linearly, as shown in Figure 3.

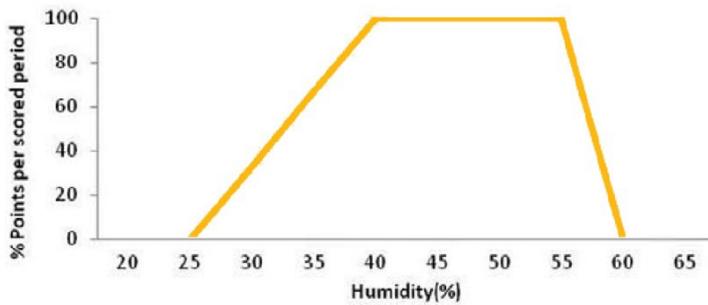


Figure 3. Humidity sub-contest points distribution

Table 10. Humidity Calculations

|                 |     |   |                   |   |     |
|-----------------|-----|---|-------------------|---|-----|
| Full Points:    | 40% | < | Relative humidity | < | 55% |
| Reduced Points: | 25% | < | Relative humidity | < | 40% |
|                 | 55% | < | Relative humidity | < | 60% |
| No Points:      |     |   | Relative humidity | < | 25% |
| No Points:      |     |   | Relative humidity | > | 60% |

### 22.5.3 Sub-contest 5.3: Air quality – CO<sub>2</sub>

The content in CO<sub>2</sub> in the air will be constantly measured. In most cases, CO<sub>2</sub> sensors will be located next to temperature sensors. All available points are earned at the conclusion of each scored period by keeping the content in CO<sub>2</sub> below 800 ppm during the scored period. See the Competition Calendar for the schedule of scored periods. Reduced points are earned if the content in CO<sub>2</sub> is between 800 ppm and 1200 ppm. Reduced points values are scaled linearly, as shown in Figure 4.

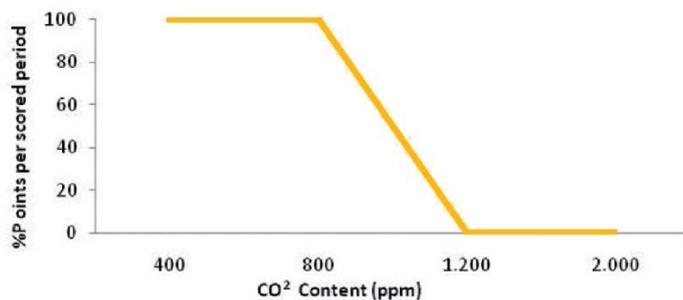


Figure 4. CO<sub>2</sub> sub-contest points distribution

Table 11. CO<sub>2</sub> Calculation

|                 |         |   |                         |   |          |
|-----------------|---------|---|-------------------------|---|----------|
| Full Points:    |         |   | CO <sub>2</sub> content | < | 800 ppm  |
| Reduced Points: | 800 ppm | < | CO <sub>2</sub> content | < | 1200 ppm |
| No Points:      |         |   | CO <sub>2</sub> content | > | 1200 ppm |

### 22.5.4 Sub-contest 5.4: Air Quality – VOC

The formaldehyde concentration will be measured punctually. An instantaneous air sampling will be performed in the main room of the house. They will be implemented in the morning, before the opening of the houses. During the contest two air samplings will be performed on two different days. See the Competition Calendar for the schedule of sampling. All available points are earned by keeping formaldehyde concentration below 30 µg/m<sup>3</sup>. Reduced points are earned if the formaldehyde concentration is between 30 µg/m<sup>3</sup> and 50 µg/m<sup>3</sup>. Reduced points values are scaled linearly, as shown in Figure 5.

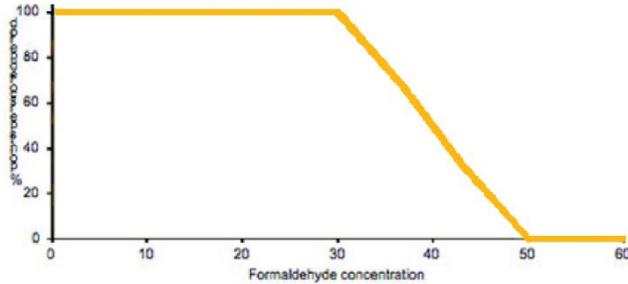


Figure 5. VOC sub-contest points distribution

Table 12. Formaldehyde Calculation

|                 |                      |   |                            |   |                      |
|-----------------|----------------------|---|----------------------------|---|----------------------|
| Full Points:    |                      |   | Formaldehyde concentration | < | 30 µg/m <sup>3</sup> |
| Reduced Points: | 30 µg/m <sup>3</sup> | < | Formaldehyde concentration | < | 50 µg/m <sup>3</sup> |
| No Points:      |                      |   | Formaldehyde concentration | > | 50 µg/m <sup>3</sup> |

### 22.5.5 Sub-contest 5.5: Natural Lighting

The natural lighting level measurements will take place at the scored period in the Competition Calendar. Photometer(s) will be located in the living room. Light intensity of the area will be measured according to the spectral levels defined by the SDE21 Organisation. All available points are earned by keeping the Daylight Factor, ratio lighting level / exterior (direct and indirect) lighting above 4% during measurement periods (cloudy sky). See the Competition Calendar for the schedule of scored periods. Reduced points are earned if the ratio is between 2,5% and 4%. Reduced points values are scaled linearly, as shown in Figure 6. The measurement point height is 0.9m and the minimum distance to a window is 2m. Direct light-emitting devices and direct sunrays are not permitted on the sensor.

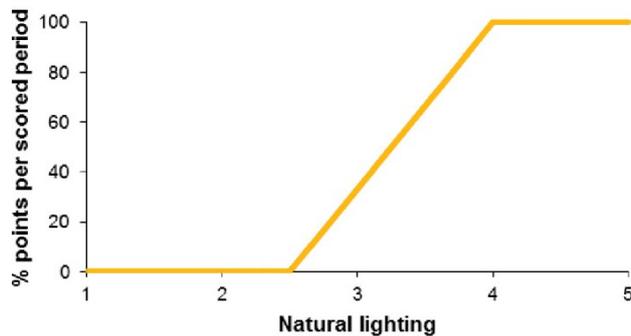


Figure 6. Natural Lighting sub-contest points distribution

Table 13. Daylight Calculation

|                 |       |   |                 |   |       |
|-----------------|-------|---|-----------------|---|-------|
| Full Points:    |       |   | Daylight factor | > | 4 %   |
| Reduced Points: | 2,5 % | < | Daylight factor | < | 4 %   |
| No Points:      |       |   | Daylight factor | < | 2,5 % |

### 22.5.6 Sub-contest 5.6: Audible Environment and Acoustic Performance

As the Solar Decathlon Europe 2021 competition intends to encourage neighbourhood impact, each team has to anticipate the audible neighbourhoods (the circulation of human sounds and acoustic sources between collective housings, from the inside to the outside and conversely) and the circulation of sounds in the interior of the housing, for example when someone wants to sleep while others want to do something else.

These two descriptions of living comfort cannot be measured in the SDE21 site, but they have to be discussed in the Architecture Design Narrative Report presenting the local development of the project on the site chosen by the team. This discussion will present coherent quantitative value based on a detailed study of the project.

The acoustic performances that will be measured on site, in the Solar Village, are:

- The sound insulation from the outside
- The reverberation time in the living room
- The sound level of the HVAC system and all other active systems (inside measurement).

#### 22.5.6.1 1) Facade airborne sound insulation.

The measurement will be done according to the global method proposed in the ISO 140-5:1998.

The sound insulation  $D_{ls,2m,nT}$  (dB) values for each of the 1/3 octave bands will be calculated between 100 Hz and 5 kHz.  $D_{ls,2m,nT,w}$  (dB) will be calculated according to ISO 717-1:1996 will be used as assessment parameter. All available points are earned at the conclusion of all the houses' sound measurements by having an acoustic value equal or above 42 dB. Reduced points are earned if the acoustic value is between 30 dB and 42 dB. Reduced points values are scaled linearly, as shown in Figure 7.

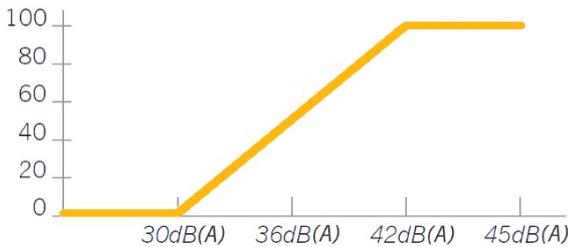


Figure 7. Sound insulation sub-contest points distribution

Table 14. Acoustic Calculations

|                 |       |   |                 |   |       |
|-----------------|-------|---|-----------------|---|-------|
| Full Points:    |       |   | Acoustic values | > | 42 dB |
| Reduced Points: | 30 dB | < | Acoustic values | < | 42 dB |
| No Points:      |       |   | Acoustic values | < | 30 dB |

#### 22.5.6.2 2) Reverberation time with the mobile furniture in the living room will be measured

The reverberation time is measured according to the ISO 3382-2:2004.

All available points are earned if the reverberation time is equal or below 0,8 second. Reduced points are earned if the reverberation time value is between 0,8 and 1,2 second. Reduced points values are scaled linearly, as shown in Figure 8.

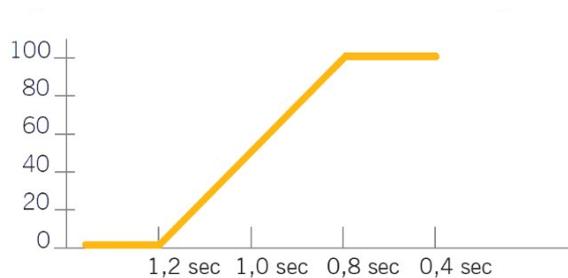


Figure 8. Reverberation sub-contest points distribution

Table 15. Acoustic Reverberation Calculations

|                 |         |   |                 |   |          |
|-----------------|---------|---|-----------------|---|----------|
| Full Points:    |         |   | Acoustic values | < | 0,8 sec. |
| Reduced Points: | 0.8 sec | < | Acoustic values | < | 1,2 sec. |
| No Points:      |         |   | Acoustic values | > | 1,2 dB   |

### 22.5.6.3 Sound level of HVAC and active systems (inside measurement)

The measurement of the sound level produced by all HVAC and active equipment in the bedroom (or the space for the sleep) will be done according to the ISO 10052: 2004.

The sound level measurements must be performed in accordance to ensure interior comfort in the most demanding conditions. They will be done with all technical equipment in operation (for example the air dehumidifier) and for the nominal air flow (looking for comfort desired). The value of the air flow must be provided at the time of measurement and in the "specifications ventilation". All dispositions must be taken to allow control of this flow by the operators (provision of one or more measurement points on the sleeves, depending on the configuration of the network). This requirement is also to be added to the specifications "ventilation".

All available points are earned at the conclusion of the sound measurements by having an acoustic value equal or below 25 dB(A). Reduced points are earned if the acoustic value measured inside is between 25 dB(A) and 35 dB(A). Reduced points values are scaled linearly, as shown in Figure 9.

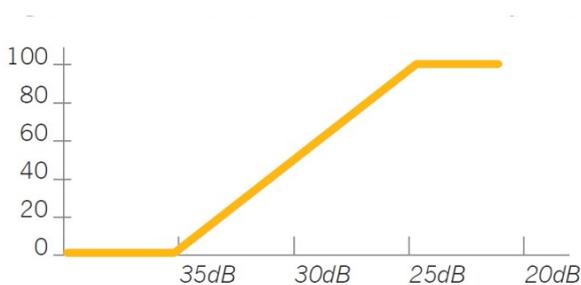


Figure 9. HVAC Sound level points distribution

Table 16. HVAC Acoustic Calculations

|                 |          |   |                 |   |          |
|-----------------|----------|---|-----------------|---|----------|
| Full Points:    |          |   | Acoustic values | < | 25 dB(A) |
| Reduced Points: | 25 dB(A) | < | Acoustic values | < | 35 dB(A) |
| No Points:      |          |   | Acoustic values | > | 35 dB(A) |

### 22.5.7 Passive Evaluation Period

During the two consecutive days indicated in the Competition Calendar the participant houses will be allowed to use only "passive cooling or heating". For purposes of the Competition "passive" means any form of strategy that not relying on a "thermodynamic cycle" or on internal heat or cool production devices. The use of pumps and fans are allowed, but electrical heaters, chillers (air conditioner), heat pumps and other equipment that include a thermodynamic cycle are not allowed during the passive evaluation period. Therefore, Teams will have to plan passive strategies for keeping their house's comfort conditions.

### 22.5.8 Scoring

A total of 100 points will be awarded for this contest in the Competition.

## Rule 23 \_ Contest 9: House Functioning

### 23.1 Objective

To evaluate the house functionality and the efficiency of the selected appliances, in order to maximize the performance of the house, while complying with the demanding standards of present day society. This contest tries to reproduce the average energy use in a modern home. The SDE21 Organisation wants to encourage Teams to think about innovative solutions meeting all appliances required performances. That is why evaluation will concern results rather than means.

## 23.2 Assessment

The collected data by the SDE21 Organisation’s monitoring system during the Competition week, the measurements realized “in situ” in SDE Solar Village, and the successful completion of tasks.

## 23.3 Evaluation Procedure

The evaluation will be based on the measurements realized on the house during the Competition Week and on the corresponding tasks completion, with the exception of the Dinner Sub-Contest in which each guest team shall assign an evaluation to the host team after each dinner party.

## 23.4 Evaluated Concepts

### 23.4.1 Monitored Performance Scoring

- Refrigeration
- Freezing

### 23.4.2 Tasks Completion Scoring

- Clothes Washing
- Clothes drying
- Dishwashing
- Oven
- Hot water draws
- Cooking
- Home electronics and automation

### 23.4.3 Guests Scoring

- Dinner

### 23.4.4 Monitored Performance (Direct Reading)

- Water Balance
- Important notes:

**To participate of the houses functioning sub-contest, Team must use appliances and equipment that comply with the requirements stated in the Rules 23.5 Evaluation .**

**Appliances’ characteristics, specifications and user manuals must be included in the Project Specifications - Section 5 as stated in Rule 49 . Information submitted in this section must show that appliances and equipment comply with the Rules requirements.**

## 23.5 Evaluation Criteria

### 23.5.1 Sub-contest: Refrigeration

In order to simulate real life of the refrigerator the SDE21 Organisation will provide a load of water at ambient temperature that will be changed according a scenario to be determined. Moreover, the refrigerator has to be used for storage of all food and beverages used during the dinner contest. All available points are earned at the conclusion of each scored period by keeping the time-averaged interior temperature of the refrigerator between 1.0°C and 4.5°C during the scored period. A temperature sensor will be located inside the volume and will be continuously measuring. Reduced points are earned if the time-averaged interior refrigerator temperature is between 0.0°C and 1.0°C or between 4.5°C and 5.5°C. Reduced point values are scaled linearly, as shown in Figure 10. Refrigerator volume shall be a minimum of 170 litres. Refrigerator must be used to store food and beverages.

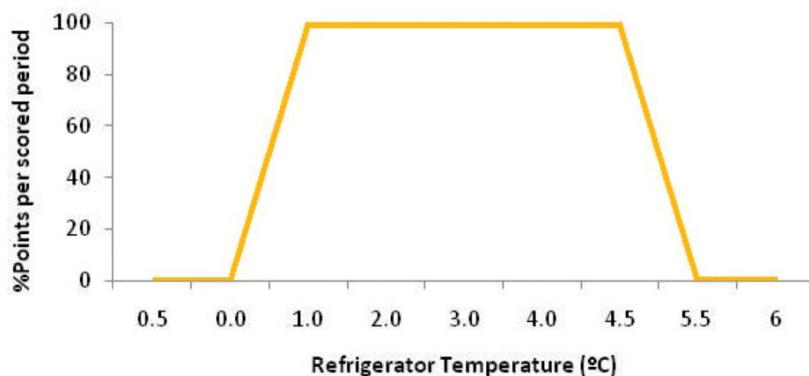


Figure 10. Refrigerator sub-contest points distribution

Table 17. Refrigeration calculation

|                 |        |   |             |   |        |
|-----------------|--------|---|-------------|---|--------|
| Full Points:    | 1.0° C | < | Temperature | < | 4.5° C |
| Reduced Points: | 0.0° C | < | Temperature | < | 1.0° C |
|                 | 4.5° C | < | Temperature | < | 5.5° C |
| No Points:      |        |   | Temperature | < | 0.0° C |
| No Points:      |        |   | Temperature | > | 5.5° C |

### 23.5.2 Sub-contest: Freezing

In order to simulate real life of the freezer the SDE21 Organisation will provide a load of water at ambient temperature that will be changed according a scenario to be determined. Moreover, the freezer may be used for storage of all food and beverages used during the dinner contest. All available points are earned at the conclusion of each scored period by keeping the time-averaged interior temperature of the freezer between -29.0°C and -15.0°C during the scored period. A temperature sensor will be located inside the volume and will be continuously measuring. Reduced points are earned if the time-averaged interior temperature is between -34.5°C and -29.0°C or between -15.0°C and -9.50°C. Reduced points are scaled linearly, as shown in Figure 11. Freezer volume shall be a minimum of 57 litres.

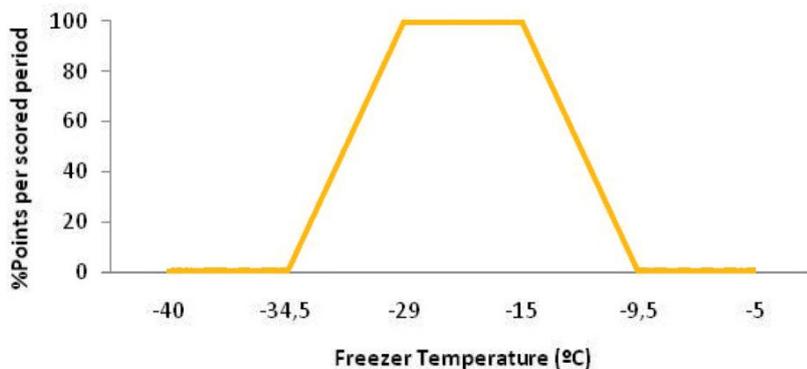


Figure 11. Freezer sub-contest points distribution

Table 18. Freezer Contest Calculation

|                 |          |   |             |   |          |
|-----------------|----------|---|-------------|---|----------|
| Full Points:    | -29° C   | < | Temperature | < | -15° C   |
| Reduced Points: | -34.5° C | < | Temperature | < | -29° C   |
|                 | -15° C   | < | Temperature | < | -9.5° C  |
| No Points:      |          |   | Temperature | < | -34.5° C |
| No Points:      |          |   | Temperature | > | -9.5° C  |

### 23.5.3 Sub-contest: Clothes Washing

All available points are earned for washing laundry by running a clothes washer through one or more complete, uninterrupted, “Normal” (or equivalent) cycle within a specified period of time, during which a temperature sensor placed inside the clothes washer must reach 40°C at some point in the cycle. The sensor will be continuously measuring during the washer cycle. Reduced points are earned if the temperature sensor reaches 36°C but does not reach 40°C. Reduced points are scaled linearly as shown in Figure 12. A load of laundry is defined as six organiser-supplied bath towels (approx. 2.5 kg). The clothes washer shall operate automatically and have at least one wash and rinse cycle. One or more complete, uninterrupted, “Normal” (or equivalent) cycle(s) in an automatic clothes washer shall be used to wash the laundry. Drying function in a combination washer/dryer shall be disabled until the completion of the wash cycle. Cycle “interruption” includes the adjustment of supply temperature or flow in a manner not anticipated by the manufacturer or addressed in its operation manual. Cycle completion shall be confirmed by the observance of an audible or visible signal. The SDE21 Organisers will consult the operation manual to identify appropriate cycle settings. “Normal” or “regular” settings shall be selected, if available. Otherwise, settings most closely resembling typical “Normal” or “regular” settings shall be selected. Only water may be used for clothes washing. No other kind of soap or similar products may be used during the contest. See Figure 12.

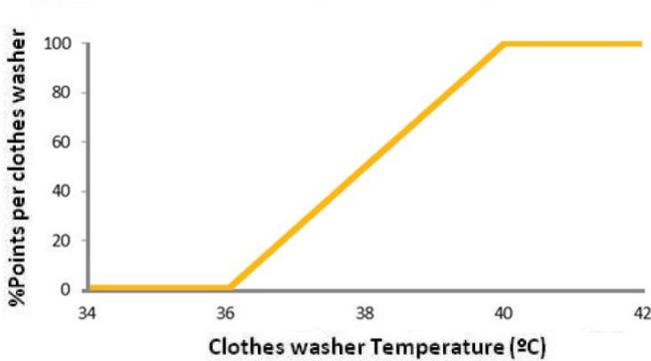


Figure 12. Clothes-washing sub-contest points distribution

Table 19. Clothes-washing Calculation

|                 |       |   |             |   |       |
|-----------------|-------|---|-------------|---|-------|
| Full Points:    | 40° C | < | Temperature |   |       |
| Reduced Points: | 36° C | < | Temperature | < | 40° C |
| No Points:      |       |   | Temperature | < | 36° C |

### 23.5.4 Sub-contest: Clothes Drying

All available points are earned by returning a load of laundry (defined as six organiser-supplied bath towels) to a total weight less than or equal to the towels’ total weight before washing. Clothes drying shall be completed within a specified period of time. Reduced points are earned if the “dry” towel weight is between 100.0% and 110.0% of the original towel weight. Reduced point values are scaled linearly, as shown in Figure 13. A load of laundry is eligible for clothes-drying points only if the load experienced a complete, uninterrupted cycle in an automatic washing cycle. However, scoring points in the Clothes Washer sub-contest is not a prerequisite for scoring points in the Clothes Dryer sub-contest.

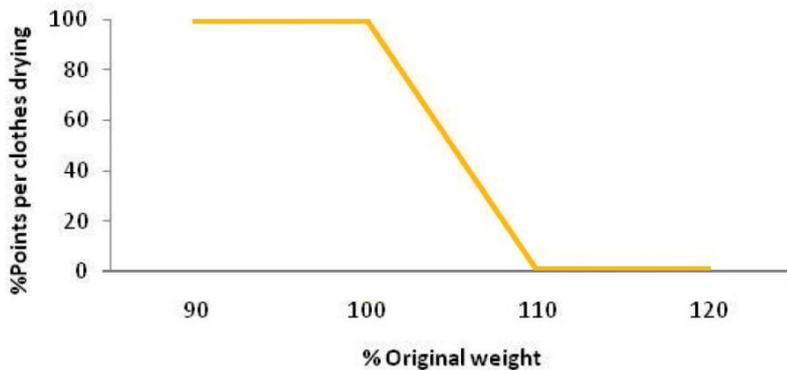


Figure 13. Clothes-dryer sub-contest points distribution

Table 20. Clothes-dryer Calculation

|                 |      |   |        |   |      |
|-----------------|------|---|--------|---|------|
| Full Points:    |      |   | Weight | < | 100% |
| Reduced Points: | 100% | < | Weight | < | 110% |
| No Points:      |      |   | Weight | < | 110% |

### Clothes Drying Method

Teams must specify the clothes drying method or methods that they plan to use during the Competition. Clothes drying methods are: active drying (e.g. drying machine drying), passive drying, (e.g., on a clothes line), or combined (any combination of active and passive drying). The use of Dryer machines (or any other active dryer system) is not mandatory, since the team can decide to use only a natural dryer system. Teams that plan to use drying machines or other commercial clothes drying systems must submit to the SDE21 Organisation their technical information at stated in Rule 49. Teams planning to use any custom made or non-commercial active or semi-passive drying system must submit drawings and explicative documentation and drawings of the proposed system. Additionally, an agency or external professional must certify that the proposed solution is safe and do not represent any risk for the users or the house visitors. All drying systems that Teams plan to use during the completion must be clearly shown in the project drawings. To use any drying method that require the clothes to be visible (such as on a clothes lines), in addition to include its information in the drawings, Teams must show the drying place to the Architecture and NII juries.

#### 23.5.5 Sub-contest: Dishwashing

All available points are earned by running a dishwasher through a complete, uninterrupted, “Normal” (or equivalent) cycle within a specified period of time, during which a temperature sensor placed inside the dishwasher must reach 49.0°C at some point during the cycle. The sensor will be continuously measuring during the washer cycle.

Reduced points are earned if the temperature sensor reaches 43.0°C but does not reach 49.0°C.

Reduced points are scaled linearly, as shown in Figure 14. The dishwasher shall operate automatically, have at least one wash and rinse cycle, and have a minimum capacity of six place settings according to the manufacturer’s specifications. If the dishwasher has a heated drying option, this option shall be disabled. Cycle “interruption” includes the adjustment of supply temperature or flow in a manner not anticipated by the manufacturer or addressed in its operation manual. Cycle completion shall be confirmed by the observance of an audible or visible signal. SDE21 Organisers will consult the operation manual to identify appropriate cycle settings. “Normal” or “regular” settings shall be selected, if available. Otherwise, settings most closely resembling typical “Normal” or “regular” settings shall be selected. Dishwasher may be run empty, partially loaded or fully loaded; the load may be soiled or clean.

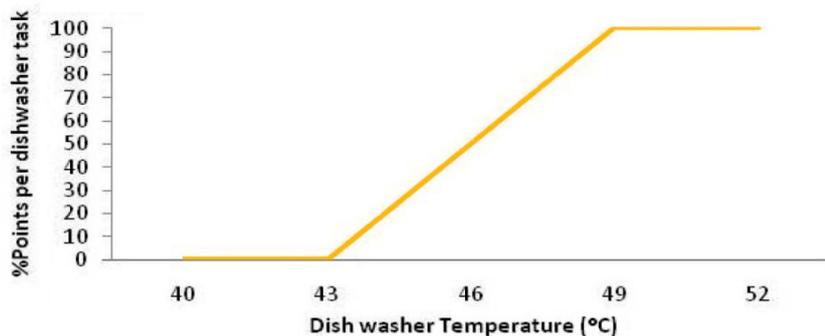


Figure 14. Dishwasher sub-contest points distribution

Table 21. Dishwasher Calculation

|                 |       |   |             |   |       |
|-----------------|-------|---|-------------|---|-------|
| Full Points:    | 49° C | ≤ | Temperature |   |       |
| Reduced Points: | 46° C | < | Temperature | < | 49° C |
| No Points:      |       |   | Temperature | ≤ | 43° C |

#### 23.5.6 Sub-contest: Oven

All available points are earned at the conclusion of each scored period by keeping the oven temperature above or equal to 220°C during specified scored periods. A temperature sensor will be located inside the oven and will be continuously measuring every time it is turned on. Reduced points are earned if the time-averaged interior oven temperature during specified scored periods is between 180°C and 220°C. Reduced points are scaled linearly, as shown in Figure 15. The oven volume published in the manufacturer’s specifications shall be a minimum of 55 litres.

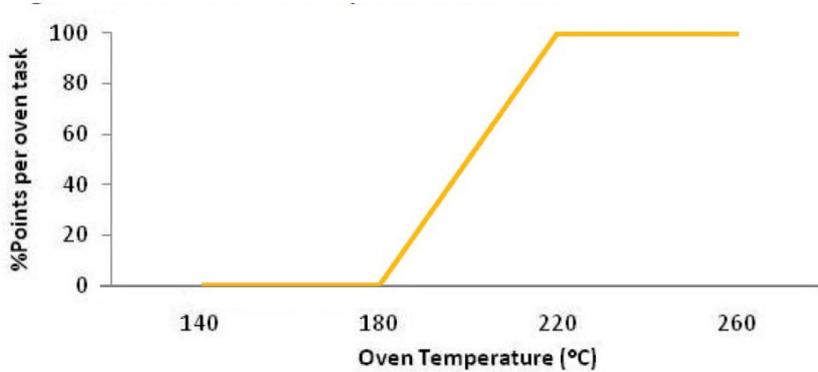


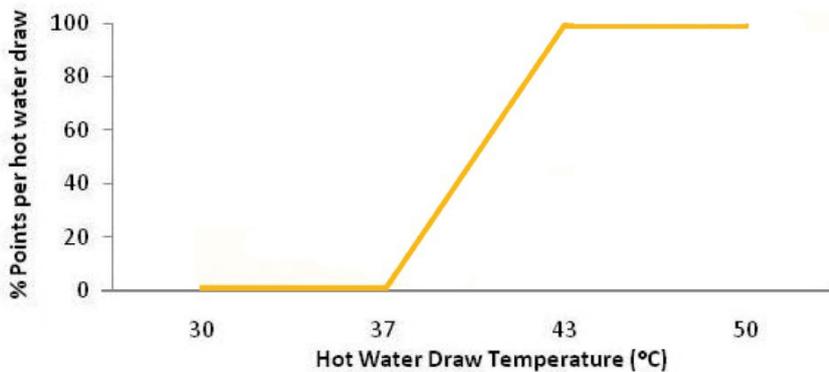
Figure 15. Oven sub-contest points distribution

Table 22. Oven Calculation

|                 |       |   |             |        |        |
|-----------------|-------|---|-------------|--------|--------|
| Full Points:    |       |   | Temperature | $\geq$ | 220° C |
| Reduced Points: | 46° C | < | Temperature | <      | 49° C  |
| No Points:      |       |   | Temperature | $\leq$ | 43° C  |

### 23.5.7 Sub-contest: Hot water draws

Hot water draws will occur during the times specified in the Competition Calendar. For each draw, at least 50 litres



of hot water shall be delivered in 10 minutes to qualify for points. All available points are earned by delivering an average temperature of at least 43°C. An average temperature below 37°C earns no points. For temperatures between 43°C and 37°C, points are scaled linearly, as shown in Figure 16. These hot water draws are designed to simulate most of the washing and bathing tasks that would take place in a typical day. The schedule of hot water draws will most likely vary from one day to the next, just as it does in a typical home. The maximum number of hot water draws for one day will not exceed three, but they may occur consecutively. Hot water will be drawn from the shower. For that, it is necessary to connect a hose in the shower, Teams are responsible for provide the fitting to accept the SDE21 Organisers hose and replace their showerhead prior perform this task. For information about the hose connection requirements please refer to the Technical Monitoring Procedures Document.

Figure 16. Hot water sub-contest points distribution

Table 23. Hot water calculation

|                 |       |   |             |        |       |
|-----------------|-------|---|-------------|--------|-------|
| Full Points:    |       |   | Temperature | >      | 43° C |
| Reduced Points: | 37° C | < | Temperature | <      | 43° C |
| No Points:      |       |   | Temperature | $\leq$ | 37° C |

### 23.5.8 Sub-contest: Cooking

All available points are earned by using a kitchen appliance to evaporate 2.3 kg of water within a specified period of time. Reduced points are earned if between 0.5 kg and 2.3 kg of water are vaporized. Reduced point values are scaled linearly, as shown in Figure 17. Any kitchen appliance may be used, but it must operate in its Normal configuration as it is vaporizing the water. The water shall be evaporated in a single pot and the starting water weight shall be at least 2.75 kg.

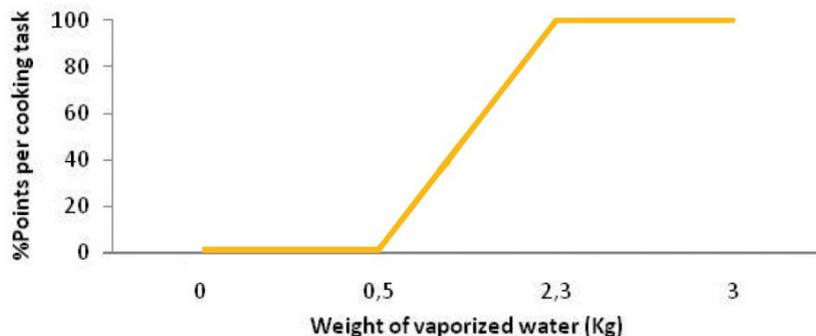


Figure 17. Cooking sub-contest points distribution

Table 24. Cooking Calculation

|                 |        |   |        |   |        |
|-----------------|--------|---|--------|---|--------|
| Full Points:    |        |   | Weight | ≥ | 2.3 kg |
| Reduced Points: | 0,5 kg | < | Weight | < | 2.3 kg |
| No Points:      |        |   | Weight | ≤ | 0,5 kg |

### 23.5.9 Sub-contest: Home Electronics

All available points are earned for operating a computer, TV and a DVD player (or video player equipment) during specified periods of time. See Event Calendar for details regarding the number of points per home electronics task and the time periods designated for home electronics tasks. The TV shall be a minimum of 27 in. (68.6 cm) according to the manufacturer’s stated display size. The computer display shall be a minimum of 17 in. (43.2 cm) according to the manufacturer’s stated display size. The computer may be a notebook, laptop, or desktop computer. The computer and video displays shall be able to be operated simultaneously and controlled independently of each other. The video player function may be integrated in the TV. For these cases as when the video player is a separated equipment, during the whole Home Electronic periods, the TV must be presenting a video. Functions of “Screensaver”, “Stand by”, or another mode that reduces the energy consumption of these devices have to be disabled during this sub-context period. The brightness of TV and computer displays shall be set to at least 75% of maximum. Observers will conduct spot checks to verify that the displays brightness is at the required level.

### 23.5.10 Sub-contest: Dining

Each team shall host three dinner parties during contest week. Dinner parties will feature a pair of guest decathletes from three neighbouring houses, and each pair of guest decathletes shall assign a score to the host team after each dinner party. To maintain consistency of this sub-contest, guest Teams shall use the scoring chart that the observers will give to them (one per guest team) when entering the house for the dinner party. The guests must give the chart back to the observer, once completely filled out at the end of the dinner. Each guest team shall assign a score to the host team after each dinner party. The quality of the meal, atmosphere, and overall experience needs to be considered in the evaluation as excellent, very good or good. c). There will be 8 messmates, 2 hosts and 6 guests (2 per team). Each host team shall prepare dinner for guests and team members. Non-decathletes are prohibited from preparing the meal or instructing decathletes in any way on the Competition site. All meals have to be prepared in the houses with fresh ingredients stored in the refrigerator. Take-out and prepared over-the-counter food items are not permitted. Meals have to contain at least one main hot dish. The meal shall be served and eaten in the conditioned space at the eating area designated in the Construction Documents. Before and after the dinner portion of the party, the host team is permitted, but not required, to serve hors d’oeuvres and/or beverages, which may be served outdoor. Teams are required to submit detailed dinner party menus to the SDE21 Organisers. The SDE21 Organisers will review each menu for compliance. If corrective actions are required to meet all safety requirements, a team must submit an updated version of the menu. See Rule 42 \_Dinner Party Menu).

Teams hosting dinner parties shall comply with the following safety requirements:

- The use of fire for cooking is prohibited.

- All water used for cooking and drinking shall be drinking water purchased in sealed containers.
- All dishes and cookware shall be washed with hot water and soap and rinsed prior to use.
- Normal domestic wastewater may go into the wastewater tank.
- All beverages and food must be stored properly and according to the instructions on the packaging, e.g., beverages and foods marked “refrigerate after opening” must be refrigerated appropriately after opening.
- To help prevent allergic reactions among dinner party guests, Teams shall create a list of ingredients for each of the items being served at each meal. Common food allergies include milk/dairy products, eggs, peanuts, tree nuts (walnuts, cashews, pecans, etc.), fish, shellfish, soy, and wheat. See Rule 42 \_ Dinner Party Menu.
- Outdoor cooking and grilling equipment may be incorporated into the Competition house, but the use of such equipment is prohibited on the Competition site because of fire safety reasons.

### 23.5.11 Sub-contest: Water Balance

To complete a whole house functioning, water management takes an important part of the process.

Therefore, water consumptions of participating houses will be measured during competition.

Scoring. The scoring will be calculated using the meter’s initial value (beginning of the Competition phase) and the end value (end of the Competition phase). Team with the lowest water consumption will achieve the maximum points. The points for the rest of the Teams will be determined linearly in relation to the water consumed by the winning team. SDE21 Organisation will perform a daily reading of the meters in order to verify the functioning of the measuring system. In relation with the water meters Teams must take into account the following:

- Water meters will be supplied by the SDE21 Organisation.
- Water meters’ model and size will be announced to the Teams by the SDE21 WAT. Its selection will be in accordance to the European Union Directive MID. (The typical length of water meters is about 150 mm, without taking into account connecting parts.)

Water meters will be installed between the water pump and the water distribution circuit of the house.

The nominal diameter of the inlet and outlet of meters is 15 mm. Teams will choose upstream and downstream pipes compatible with the meter inlet and outlet diameters. If the pipes diameters are not compatible, Teams must provide the required connection fittings to perform the adaptation. The team should provide two valves, one upstream and the other one downstream the meter. These valves will allow shutting (closing) the water flow, if there are any problem with the meters. Water meters should be accessible, and its location must permit easy reading of their measurements. Teams must submit a drawing showing where and how they plan to locate the meters. They must also include details showing that the meter is accessible and including valves, connections and any other necessary fitting. Meter location must be approved by the SDE21 Organisation.

## 23.6 Scoring

A total of 100 points will be awarded for this contest in the Competition.

# Rule 24 \_ Contest 10: Energy Balance

## 24.1 Objective

To evaluate the houses’ electrical energy self-sufficiency, electrical energy efficiency and their own solar energy consumption. Assess homes’ energy consumption and energy balance. Assess network load management and limitation of peak power.

## 24.2 Assessment

The collected data of the different electric energy flows, by the SDE21 Organisation’s monitoring system during the Competition period.

## 24.3 Evaluation Procedure

The evaluation of this contest is based on the electric energy measurements.

## 24.4 Concepts Evaluated (Monitored Performance Scoring)

- Load consumption per surface area;
- Positive electrical balance;
- Temporary generation- consumption profile patterns correlation;
- House adjustment to network load state;
- Power peaks.

## 24.5 Evaluation Criteria

### 24.5.1 Sub Contest 4.1: Load Consumption per Surface Area

This contest aims to evaluate the electrical energy efficiency of the houses fulfilling comfort conditions and functions. Some consumptions depend on the surface of the house as heating, cooling and ventilation and others are fixed as the appliances. In order to not penalize the houses smaller areas, the consumption of houses is estimated using the following formula:

$$E_L = \frac{E_V}{A} + \frac{E_F}{C}$$

Where:

- EV = the consumption of heating, cooling, ventilation and hot water systems
- EF = the consumption of appliances, lighting and home automation systems
- C = average of measurable area of all projects
- A = measurable area of the house, defined in Rule 6.3 Measurable Area.

EF value will be determined using a specific electricity meter. This meter will be located in the house electricity panel. Teams must leave a 95-mm free space in a DIN rail to place this meter. The space designed for this meter must be close to the independent line dedicated to the appliances, lighting and the home automation systems of the house.

See: Technical Monitoring Procedures document available later on the SDE21 WAT. All available points will be earned by the house with the lowest energy consumption. Houses which consume equal to or more than 2.5 times the energy of the house with the lowest consumption., will receive zero points as shown in Figure 18. The rest of the houses will receive points in a linear manner depending on the energy consumption.

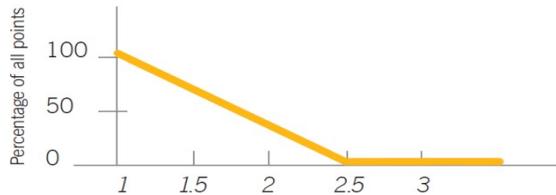


Figure 18. Load Consumption sub-contest point distribution

**Note: Teams who, in order to reduce energy consumption, intentionally do not try to maintain comfort conditions by disconnecting or not fully using active systems integrated in their project, could be disqualified in this sub-contest. Passive strategies are nevertheless encouraged.**

### 24.5.2 Sub Contest 4.2: Positive Electrical Balance

This sub-contest will evaluate the degree of self-supply of the house or electrical energy balance during the Competition week. For a house to have a positive annual electrical energy balance the following relationship must occur:

$$E_{G\_yearly} - L_{c\_yearly} \geq 0$$

Where:

- EG\_yearly represents the electrical energy generated throughout a whole year and
- LC\_yearly represents the electric loads' consumption throughout a whole year.

Since the Competition takes place in July, production during this period is greater than the annual average. To take this into account, the balance must be in excess at the end of the Competition.

This excess to be reach depends on the installed power. The point distribution is represented by Figure 19.

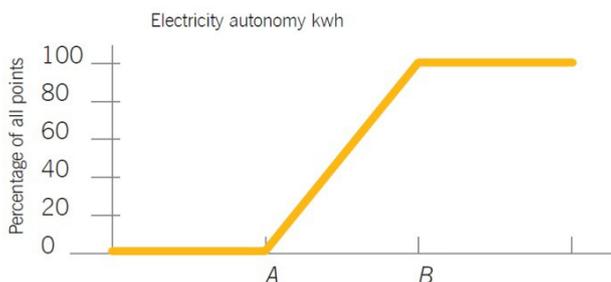


Figure 19. Positive electrical balance sub-contest points distribution

Table 25. Electrical Autonomy Calculations

|                 |       |   |                      |   |       |
|-----------------|-------|---|----------------------|---|-------|
| Full Points:    |       |   | Electricity autonomy | ≥ | B kWh |
| Reduced Points: | A kWh | < | Electricity autonomy | < | B kWh |
| No Points:      |       |   | Electricity autonomy | ≥ | A kWh |

Quantities A and B depends on the installed power

$$B = X - 5 \times 56$$

$$A = B - 20 \times 5$$

Where X = Team’s installed photovoltaic power in kWp.

**Notes:**

- Teams who, in order to reduce energy consumption, intentionally do not try to maintain comfort conditions by disconnecting or not fully using active systems integrated in their project, could be disqualified in this sub contest.
- Passive strategies are nevertheless encouraged.  
56 kWh is the excess to produce for 12 days in June to be equivalent to the annual average. This value is calculated with an optimal orientation and inclination for a 5 kWp installation in the Solar Village.

**24.5.3 Sub Contest 4.3: Temporary Generation-Consumption Correlation**

One of the main advantages of distributed solar generation is that electricity is consumed in the same place where it is generated. This reduces the need for transmission lines and minimizes electricity transport losses. This effect is maximized if electricity is consumed at the same time as it is generated. This contest will evaluate the temporary correlation between the photovoltaic generation and the electricity demand during the Competition week (daytime periods still to be determined). This correlation is the following:

$$E = \frac{E_{G,L}}{E_L}$$

Where:

$E_{G,L}$  is the electricity generated and simultaneously consumed by the loads, and  $E_L$  is the electricity consumed by the loads. If batteries are included the following equation applies:

$$E = \frac{E_{GG,LL} + E_{BBBBB,LL}}{E_{LL}}$$

Where:

$E_{Bat,L}$  is the electricity supplied by the batteries to the loads. The measurement period for this sub- contest is still to be determined. Points will be awarded according to the following expression:  
Points obtained =  $\inf\{E;1\} \times 25$

**Notes:**

- $E_{G,L}$  will only be measured during the daily intervals in which all houses are free of shadows, but  $E_L$  will be measured 24h/24.
- Remember that the energy stored in the batteries can only be from the solar electrical source. Therefore, any excess on the batteries coming from the grid will not be taken into account.

**24.5.4 Sub Contest 4.4: House Adjustment to Network Load State**

The competition evaluates how the houses solicit the power grid to which they are linked. Indeed, a grid is not equally solicited throughout the day, and one of the challenges of the future is to reduce peak load on the network. Habitants must be able to manage their interaction with the network according to its general state of stress. They must use the minimal energy when the network load is at its maximum. To assess houses’ energy consumption management ability at certain time of day, the network maximum load period is simplified to a single consumption peak from 8:00 PM to 10:00 PM (see Figure 20 )

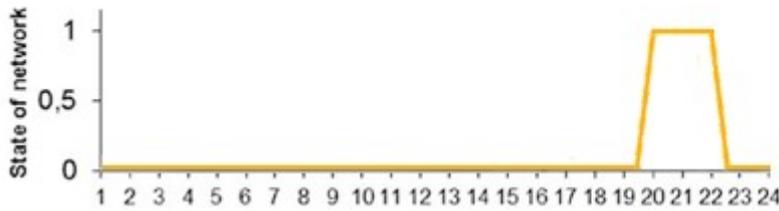


Figure 20. House Adjustment to Network

An evaluation indicator will be calculated according to the following equation:

$$Y_p = (E_p(t) - E_c(t)) \times F(t)$$

Where:

- $E_p(t)$  = Energy produced at time (t)  $E_c(t)$  = Energy consumed at time (t)
- $F(t)$  = function representing the network load, shown above

If energy is sent over the network between 7:30 PM and 10:30 PM, points are won, proportionally to the amount sent. If energy is taken from the network between 7:30 PM and 10:30 PM, points are lost in proportion to the amount called. Team with the highest score wins 100% of the points, the team that has the fewest wins 0, and then the points are distributed linearly.

**Note: Teams who intentionally do not try to manage their consumption during peak period could be disqualified in this sub contest.**

#### 24.5.5 Sub Contest 4.5: Power Peaks

Avoiding power peak loads on the electrical grid is an important aspect of energy load management.

The power peak loads on the network will be monitored. The amount of energy consumed from SDE Solar Village grid ( $E_c$ ) and the amount of energy produced and delivered to the grid ( $E_p$ ) by each team will be monitored on a regular cycle of 60 seconds. For each team, the instantaneous power consumed will be calculated using this formula:

$$P(t) = [E_c(t+60sec) - E_p(t+60sec)] / 60sec$$

Each day (from 00:00 to 23:59), for each team, the maximum value of  $P$  will be recorded:  $Sup [P(t)]$

with  $t \in [00:00; 23:59]$ . At the end of the Competition period, the arithmetic mean of these daily maximum values will be calculated for each team. The scoring will be scaled linearly from 0 points to 15 points (team with highest mean value of  $Sup [P(t)]$  to team with lowest mean value of  $Sup [P(t)]$ ) as shown in Figure 21.

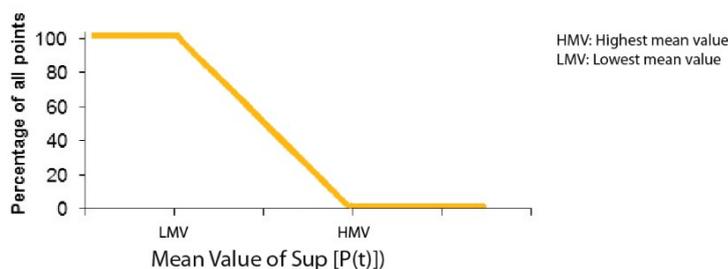


Figure 21. Power Peaks sub-contest points distribution

Table 26. Mean Value of Supply Calculations

|                 |     |   |                          |   |     |
|-----------------|-----|---|--------------------------|---|-----|
| Full Points:    | LMV | = | Mean value of Sup [P(t)] |   |     |
| Reduced Points: | LMV | < | Mean value of Sup [P(t)] | < | HMV |
| No Points:      |     |   | Mean value of Sup [P(t)] | = | HMV |

## 24.6 Scoring

A total of 100 points will be awarded for this contest in the Competition.

## section 3.0 Deliverables

The Solar Decathlon Europe seeks to promote modern technologies as part of creating resource responsible buildings and construction. To this end, the SDE also promotes innovation in the design, assembly and management of buildings using digital applications that support efficient, long-lasting information about buildings and cities. As part of the SDE21 house design assessment and Solar Village management, the SDE21 Organisers expect to implement digital submission and review processes that employ Building Information Modelling (BIM) and associated technologies. Teams are expected to manage BIM models of their individual houses that will be incorporated into a BIM model of the Solar Village through a common platform (tbd).

The SDE21 participating teams will submit seven separate sets of deliverables. The deliverables are intended to document the progress of their design development, their compliance with the SDE21 Rules and building codes, and to indicate the potential performance of their house designs. The SDE21 Organisers expect to leverage Building Information Modelling to streamline the review process and to enable digital simulation technologies to verify or indicate compliance and performance. The SDE21 Organisers are also expected to manage this information to allow other technologies such as virtual reality (VR) to be employed for dissemination purposes.

Teams are encouraged to manage a single BIM model (or set of models) to manage the information about their houses. The following description of the deliverables are expected to be 'extracts' or 'views' taken from the source BIM model. The SDE21 Organisers do not prescribe software to do this, but insist that any BIM model conform to the Industry Foundation Classes (IFC) standard (ISO 16739:2013).

## Rule 25 \_ Schedule of Deliverables

Table 27. *Schedule of Deliverables (exact dates tbd).*

|                         |  |                       |
|-------------------------|--|-----------------------|
| <b>Deliverable #1</b>   | <b>Schematic Design Documentation &amp; Dissemination Materials</b>      | <b>31 / 03 / 2020</b> |
| Electronic File         | Press Release #1   |                       |
| Electronic File         | Project Manual #1  |                       |
| Electronic File         | Project Drawings #1  |                       |
| URL                     | Preliminary Web page   |                       |
| <b>Deliverable #2</b>   | <b>Design Documentation &amp; Dissemination Materials</b>                | <b>30 / 06 / 2020</b> |
| Electronic File         | Press Kit and Press Release #2   |                       |
| Electronic File         | Project Manual #2  |                       |
| Electronic File         | Project Drawings #2  |                       |
| Electronic File- CD/DVD | Audiovisual #1 - (5 min. presentation of project)                        |                       |
| URL                     | Web page   |                       |
| <b>Deliverable #3</b>   | <b>Design Development Documentation &amp; Dissemination Materials</b>    | <b>31 / 10 / 2020</b> |
| Electronic File         | Press Kit and Press Release #3   |                       |
| Electronic File         | Project Manual #3  |                       |
| Electronic File         | Project Drawings #3  |                       |
| Electronic File         | Electric and PV Chart and Checklists                                     |                       |
| Electronic File         | Workshop Documentation   |                       |
| Electronic File- CD/DVD | Audiovisual #2 (updated version of Audiovisual #1)                       |                       |
| Model                   | Architectural Model  |                       |
| Electronic File         | Thermal and Environmental Evaluation (TEE) data and documents #1 (1)     |                       |
| <b>Deliverable #4</b>   | <b>Construction Documentation &amp; Dissemination Materials</b>          | <b>31 / 01 / 2021</b> |
| Electronic File         | Press Kit and Press Release #4   |                       |
| Electronic File         | Project Manual #4  |                       |
| Electronic File         | Project Drawings #4  |                       |
| Electronic File         | Electric and PV Chart and Checklists (Updated)                           |                       |
| Electronic File         | Thermal and Environmental Evaluation (TEE) data and documents #2         |                       |
| Electronic File         | SDE Solar Village Visiting Guide information                             |                       |
| Electronic File         | Design Approval Documents  |                       |
| <b>Deliverable #5</b>   | <b>Updated Construction Documentation &amp; Dissemination Materials</b>  | <b>31 / 03 / 2021</b> |
| Electronic File         | Press Kit and Press Release #5   |                       |
| Electronic File         | Project Manual #5  |                       |
| Electronic File         | Project Drawings #5  |                       |
| Electronic File         | Electric and PV Chart and Checklists (Updated)                           |                       |
| Electronic File         | Thermal and Environmental Evaluation (TEE) data and documents #3         |                       |
| Hard Copies             | Design Approval Documents  |                       |
| <b>Deliverable #6</b>   | <b>Design Adjustments Documentation &amp; Dissemination Materials</b>    | <b>31 / 05 / 2021</b> |
| Electronic File         | Press Kit and Press Release #6   |                       |
| Electronic File         | Project Manual #6  |                       |
| Electronic File         | Project Drawings #6  |                       |
| Electronic File         | Electric and PV Chart and Checklists (Updated)                           |                       |
| Electronic File         | Jury Reports   |                       |
| Electronic File- CD/DVD | Audiovisual #3 - (5 min. presentation of final project)                  |                       |
| Hard Copies             | Design Approval Documents  |                       |
| <b>Deliverable #7</b>   | <b>As Built Documentation &amp; Dissemination Materials</b>              | <b>31 / 10 / 2021</b> |
| Electronic File         | Press Kit and Press Release #7   |                       |
| Electronic File         | Project Manual #7  |                       |
| Electronic File         | Project Drawings #7  |                       |
| Electronic File         | Electric and PV Chart and Checklists                                     |                       |
| Electronic File         | SDE21 Official Dissemination Materials                                   |                       |
| Electronic File         | Thermal and Environmental Evaluation (TEE) data and documents #4 (Recap) |                       |

## Rule 26 \_ Deliverable Submission Instructions

Each team should follow the defined schedule in sending the Deliverables in the stipulated format, at the specific due dates and following the guidelines of the SDE21 Organisation. Although official languages of the SDE21 Competition communication will be in the local language(s) and English, for scientific dissemination reasons, all the Deliverables are in English. Only the Constructions Specifications, to be included in the Project Manual, may be in another language, in case they are not available in English or the SDE21 local language(s).

In the SDE21 Competition, there are two different ways for submitting the Deliverables: shipped or electronic; depending on the materials or documentation required. Deliverables are considered to be on-time if, they are accessible on the SDE21 WAT or in the case of physical objects, received by the SDE21 Organisation in their offices on the respective due date by 5:00 P.M (local time). Teams not sending the Deliverables on time, or not fulfilling with all the content requirements, will be subject to penalties. Please refer to Rule 2.4.8 for further details. All the Deliverables submitted are property of the SDE21 Organisation.

### 26.1 Shipped Submission

Requested hard copies of documents, along with the models are the only Deliverable materials required to be sent to the address of the designated SDE21 Organisers:

TBD: <<Solar Decathlon Europe 2021 postal address>>

Teams do not submit physical copies of any other Deliverables.

### 26.2 Electronic Submission

All electronic files shall be uploaded to the SDE21 WAT Deliverable area. Teams wishing to reduce file upload times may archive electronic files in ZIP files. Please verify that files in ZIP archives can be extracted using standard extraction software. For further details please refer to the SDE21 WAT guidelines.

#### 26.2.1 Computer Generated File Requirements

Any and all electronic files generated from a computer (drawings, specifications, renderings, etc.) shall be submitted as a PDF meeting the following criteria:

- Embed all fonts.
- Maintain a minimum resolution of 300 dpi.
- The different sections shall be indicated with bookmarks
- Whenever possible, utilize the “Save As” or “Export” to PDF functions within a CAD, 3-D rendering, or illustration application to produce a PDF.
- Utilizing the native application’s PDF functions usually produces a smaller, cleaner PDF with fonts defined and illustrations and drawings retained as vector objects.
- Available options for PDF creation vary between applications. Be sure to always select the option to embed all fonts and keep image compression at a minimum of 300 dpi.
- If there are colour options, choose no conversion if available. If not, select RGB conversion as that will typically yield a smaller file than CMYK.
- If an application does not support a ‘direct-to-PDF’ function, create a postscript file by printing to a postscript printer with the “print to file” option selected. Use this postscript (.ps or .prn) file to create a PDF using Acrobat Distiller’s high-resolution job settings.
- Creating a PDF from scans, or by outputting the drawings into a raster image format (.jpg, .tiff, .png, .gif, etc.) and then creating a PDF from the images, is NOT ACCEPTABLE.
- All-raster PDFs are large files at 300dpi, are of unacceptable quality at lower resolutions, and are not scalable without degradation.
- Logos must be submitted in vector format (eps) using Adobe Illustrator software in CMYK so in 4 colours, no additional colour: no 5th colour and no Pantone! Teams must include the name, phone number and e-mail of the person submitting the logo.

#### 26.2.2 Multimedia File Requirements

- Teams may submit photographs, graphics or videos in each Deliverable, to complete the information submitted or give further details.
- Photographs shall be submitted in the native format of the camera, such as JPEG or RAW, if available. Every file conversion or image resampling from the original results in image degradation, so keep conversions to a minimum.
- Colour photos must be in RGB, 8-bit colour.
- For multimedia files to be properly credited, the following information shall be included in each file’s metadata or in a text file accompanying the files:
  - Name, phone number, and e-mail of person submitting the file
  - Multimedia file editor’s name and affiliation.
- For photographs, please indicate date and location



**Table 29.** *List of Deliverable Abbreviations*

| Deliverable Number | Electronic Documentation Name                                      | Abbreviations |
|--------------------|--|---------------|
| Deliverable #1     | Press Release #1   | PR#1          |
|                    | Project Manual #1  | PM#1          |
|                    | Project Drawings #1  | PD#1          |
| Deliverable #2     | Press Kit #2   | PK#2          |
|                    | Press Release #2   | PR#2          |
|                    | Project Manual #2  | PM#2          |
|                    | Project Drawings #2  | PD#2          |
|                    | Audiovisual #1   | AV#1          |
| Deliverable #3     | Press Kit #3   | PK#3          |
|                    | Press Release #3   | PR#3          |
|                    | Project Manual #3  | PM#3          |
|                    | Project Drawings #3  | PD#3          |
|                    | Electrical and PV Chart and Checklists #1                          | ELEC#1        |
|                    | Thermal and Environmental Evaluation - data and documents #1       | TEE#1         |
|                    | Audiovisual #2   | AV#2          |
|                    | Workshop Documentation   | WD            |
| Deliverable #4     | Press Kit #4   | PK#4          |
|                    | Press Release #4   | PR#4          |
|                    | Project Manual #4  | PM#4          |
|                    | Project Drawings #4  | PD#4          |
|                    | Electrical and PV Chart and Checklists #2                          | ELEC#2        |
|                    | SDE Solar Village Visiting Guide information #1                    | GUIDE         |
|                    | Thermal and Environmental Evaluation - data and documents #2       | TEE#2         |
|                    |  |               |
| Deliverable #5     | Press Kit #5   | PK#5          |
|                    | Press Release #5   | PR#5          |
|                    | Project Manual #5  | PM#5          |
|                    | Project Drawings #5  | PD#5          |
|                    | Electrical and PV Chart and Checklists #3                          | ELEC#3        |
|                    | Thermal and Environmental Evaluation - data and documents #3       | TEE#3         |
| Deliverable #6     | Press Kit #6   | PK#6          |
|                    | Press Release #6   | PR#6          |
|                    | Project Manual #6  | PM#6          |
|                    | Project Drawings #6  | PD#6          |
|                    | Electrical and PV Chart and Checklists #4                          | ELEC#4        |
|                    | Audiovisual #3   | AV#3          |
|                    | Jury Reports   | JURY          |
| Deliverable #7     | Press Kit #7   | PK#7          |
|                    | Press Release #7   | PR#7          |
|                    | Project Manual #7  | PM#7          |
|                    | Electrical and PV Chart and Checklists #5                          | ELEC#5        |
|                    | Project Drawings #7  | PD#7          |
|                    | SDE21 Official Dissemination Materials                             | ODM           |
|                    | Thermal and Environmental Evaluation - data and documents #4 Recap | TEE#4         |
| Any Deliverable    | Multimedia files   | MUL           |

## 26.2.4 Documents Formatting Requirements

### 26.2.4.1 Project Drawings and Hard Copies Drawings

ISO “A3” (297 mm X 420 mm) sheet size Packaged into a single PDF file (see Rule 26.2 Electronic Submission)  
 Consistent with the Project Drawings Structure & Contents (see Rule 30.4 Structure & Contents guideline)

### 26.2.4.2 Project Manual and Hard Copies Manual

ISO “A4” (210 mm X 297 mm) sheet size Packaged into a single PDF file (see Rule 26.2 Electronic Submission)  
 Consistent with the Project Manual Structure & Contents (see Rule 30.5)

### 26.2.4.3 Press Kit & Press Release

ISO “A4” (210 mm X 297 mm) sheet size Packaged into a single PDF file (see Rule 26.2 Electronic Submission)

### 26.2.4.4 Revision and Evaluation Criteria

The Deliverables will be reviewed by the SDE21 Organisation during the previous phases of the Competition in order to verify the Rules compliance. Moreover, the SDE21 Organisers are to help the Teams to understand the Rules and comply with them.

Specific juries of each contest will evaluate the delivered documentation by the Teams following their criteria, guidelines and basic parameters previously established in the SDE21 Rules.

## Rule 27 \_ Deliverable Phases

The primary objectives of each Deliverable are as follows:

#### *Deliverable #1\_*

- To verify the work that the Teams are generating.
- To verify any aspect or design which does not comply with the Competition Rules.

#### *Deliverable #2\_*

- To obtain additional information and update the documentation sent in Deliverable #1 based on the requirements made by the SDE21 Organisation.

#### *Deliverable #3\_*

- To obtain additional information and update the documentation sent in Deliverable #2 based on the requirements made by the SDE21 Organisation.
- To assure that the documentation is in compliance with the Solar Decathlon Europe Building Code and the Solar Decathlon Europe Rules.

#### *Deliverable #4\_*

- To have all the necessary information to define the Construction of SDE Solar Village.
- To foresee all the elements required for the above purpose.

#### *Deliverable #5\_*

- To obtain additional information and update the documentation sent in Deliverable #4 based on the requirements made by the SDE21 Organisation.
- To organize the documentation being sent to the Juries, and to not have any Teams' documentation mistaken.

#### *Deliverable #6\_*

- To update Deliverable #5 with the late design changes that might have occurred.
- To make sure that the final project assembled on the Competition site is consistent with the design and specifications presented in the construction documents.

#### *Deliverable #7\_*

- To have the “as-built” drawings and specifications of the participating houses, with an extensive description of the details and specifications.

### 27.1 Schematic Design Documentation

The primary objective of Deliverable #1 is to verify the work that the Teams are generating among the various fields to develop in the project. It is also designed to identify, as soon as possible, any aspect or design which does not fit or match with the sense of the Competition. As of Deliverable #2, the documentation includes a short audio-visual presenting the Teams' strategies. In the Schematic Design Documents, the project must be defined as a functional machine, demonstrating the advances, targets and goals of their original proposal, in compliance with the Solar Decathlon Building Code and the Solar Decathlon Europe Rules, or at least the intention and corresponding degree of accomplishment. Therefore, it is not mandatory for this Deliverable to provide all the data for each section included in the Project Manual, nor in the Project Drawings, nor in the Communication Plan.

**Note: The proposals sent with this Deliverable can be subject of complete revisions by the Teams in following Deliverables.**

### 27.2 Dissemination Materials

Deliverables of the SDE21 Competition are intended to compile materials from every participating team, in order to start organizing different events and activities, to contribute to the ongoing SDE objective of disseminating knowledge and project results, with an ultimate goal of raising awareness and energy literacy. Dissemination Materials will be verified for compliance with SDE21 Rules. The materials submitted by the participating Teams in each Deliverable will be used by the SDE21 Organisation for the different dissemination activities planned. Please refer to the Graphic Chart & Brand Manual.

### 27.3 Design Development Documentation

At this stage of the Competition, projects will have to include an extensive description of the Project details and specifications, of the materials, constructive systems, equipment, footing, structural and trades report, and details drawing. Teams will have to consider all the remarks made by the SDE21 Organisation in the previous Deliverable, and design and plan accordingly. This Deliverable will be used to prepare the sessions that are going to be held during the Workshop in the Host City. Therefore, Teams are encouraged to submit more specific documentation, in order to receive much more detailed feedback, apart from submitting the Workshop Documentation specifically required.

### 27.4 Construction Documentation

Deliverable #4 aims to have all the necessary information to define the Construction of SDE Solar Village, and to foresee all the elements required for that purpose.

The Construction Documentation the following important functions:

- The Construction Documents shall demonstrate compliance with the Solar Decathlon Europe 2021 Building Code and the Solar Decathlon Europe Rules so that the inspectors will be able to grant final on-site approval by simply verifying that the constructed project on the Competition site was accurately represented by the Construction Documents.
- The Construction Documents shall clearly describe team's proposed assembly and disassembly procedures. The SDE Site Operations Coordinator will review the Teams' procedures to identify and address potential conflicts among the Teams. Each team is encouraged to consult the SDE Site Operations Coordinator as the relevant sections of the Construction Documents are being developed.
- The Construction Documents shall include all the information needed to generate an accurate, detailed cost estimate and to efficiently construct the building as the design team intended it to be built. The Construction Documents must be exhaustive because the design team shall assume that the contractor has had no prior communication with them, has no prior knowledge of the design, and has little or no experience building high-performance residences.

### 27.5 Update Construction Documentation

The objective of Deliverable #5 is to obtain additional information and update the documentation sent in Deliverable #4 based on the requirements made by the SDE21 Organisation, including changes and design adjustments from the last Deliverable.

**Note: Deliverable #5 is the most important Deliverable of the SDE21 Competition before the Final Phase of the SDE21 Competition.**

This Deliverable is planned in order to organize the documentation being sent to the Juries, and to not have any Teams' documentation mistaken. Since the juries have a very limited opportunity to evaluate the constructed projects on the Competition site, the Construction Documents provide the only means for a team to give a detailed presentation of its project to the juries. In the weeks leading up to contest week, each juror shall evaluate sections of the Teams' Construction Documents relevant to the juror's respective area of expertise.

### 27.6 Design Adjustments Documentation

As stated in Rule 12.3 Late Design Changes “, The final project assembled on the Competition site shall be consistent with the design and specifications presented in the construction documents”.

The Design Adjustments Documentation Deliverable will be opened to the participating Teams from the day after Deliverable #5 due date. Therefore, if there is any change in your project, after Deliverable #5 – Updated Construction Documentation, you must send it to the SDE21 Organisation, as soon as possible. The corresponding missing and/or revised information will be passed on to the building inspections group, who will verify that the constructed house corresponds to the house design, at the Competition Site, and will not penalize your team for any incongruity. However, there will be neither feedback nor revision done if Teams do not request it specifically. Please do not send the complete documentation again, but just the part of it being changed, attaching to the documents a brief description of the changes that have taken place. Deliverable #6 also includes SDE Solar Village Documentation, with information required to prepare SDE Solar Village Visiting Guide and the Jury Reports.

### 27.7 As Built Documentation

The objective of Deliverable #7 is to have the “as-built” drawings and specifications of the participating houses, with an extensive description of the details and specifications of the materials, constructive systems, equipment, structure, plumbing, HVAC, etc. Teams must record any changes of the Project Documentation during the fabrication, construction or assembly process and reflect them in the As-built Documents. Deliverable #7 is the last Deliverable of the SDE21 Competition, and it will be issued after the Final Phase of the SDE21 Competition, so it will define the house as it was built in SDE Solar Village, as well as the Team's strategy during the Contest Week. This Deliverable includes all documents and data required for the Thermal and Environmental Evaluation as specified in the TEE Information Guide, see Rule 30.7 SDE Solar Village Documentation. These documents compile the projects' technical data that will be the base of the future SDE web scientific database.

## Rule 28 \_ Shipped Deliverable Material

### 28.1 Hard Copies

- Electric Drawings and Calculations (see Rule 6.1.2 Electrical and Photovoltaic Design Approval)
  - Structural Drawings and Calculations (See Rule 6.1.1 Structural Design Approval)
- Certificate of Country of origin Code compliance (See Rule 6.1.3 Codes Design Compliance).

### 28.2 Architectural Model

Teams must submit an architectural model of their houses to the SDE21 Organisation within Deliverable #3. The detail level will be chosen by the team, according to the model scale and to their competition strategy. The model will be metric scale 1:25, base dimensions of 80 cm x 80 cm. It is possible to include lighting in the model but the SDE21 Organisation may not guarantee that it will be switched on in all the exhibitions. The model must be built and packaged with appropriate materials, in order to withstand handling and transportation. Along with the model, a methacrylate display case, 5 mm thick must be included, following the indications given by the SDE21 Organisation. Models will be shown in fairs and events around the world during 2018 and 2021, representing and explaining the SDE21 project. To make transportation and exhibition assembly easier, and contribute to the exhibition homogeneity, models will be sent with the display case inside a plywood box, according to the design proposed by the SDE21 Organisation. Teams may replace their model by shipping the new model to the address specified in Rule 26.1 Shipped Submission, only after having communicated that decision to the SDE21 Organisation via the SDE21 WAT, and specified if they wish to have the old model back to their university (at the university's expenses) or being discarded by the SDE21 Organisation.

### 28.3 Project Description Poster

Teams must submit a poster describing their project. This poster will be shown with the model in exhibitions, or independently in events, to disseminate the SDE21 Competition. The requirements for the model, display case and poster design and packaging will be specified through the SDE21 WAT. The project description poster may be updated whenever the Team wishes to, after having communicated that decision to SDE21 Organisation via the SDE21 WAT.

### 28.4 Audiovisual

#### 28.4.1 Audiovisual #1.

For Deliverable #2, Teams must produce an audiovisual presentation to reveal the goals of the Teams, describe their projects, the technologies to be used and the corresponding sustainable concepts applied. These audiovisuals will be used for the SDE21 Competition dissemination.

#### 28.4.2 Audiovisual #2.

For Deliverable #3, Teams must produce an updated version of their Audiovisual#1. For Deliverable #6, Teams must produce an audiovisual presentation to show their final achievements, explain their houses, the technologies used and the sustainable concepts applied. These audiovisuals will be used for dissemination during and after SDE21 competition. The Audiovisuals #1 and #2 may be replaced at any time after having communicated that decision to SDE21 Organisation via the SDE21 WAT. The SDE21 Organisers will verify compliance with the SDE21 Rules and replace revised audiovisual material as soon as possible.

#### 28.4.3 Technical Requirements

- Maximum length: 5 minutes
- Language: English. Other spoken languages might be used in punctual interventions, but they must be subtitled or dubbed in English.
- A written version of all spoken parts must be provided as an appendix to the SDE21 Organisation in English.
- Additionally, Teams may send a translated version in the local or any other language(s).
  - Video Format: Full HD 1080p or 1080i (1920×1080 px).
  - Encoding: Mp4 compression H.264. Frames per second: 25 or 29.97 fps Minimum Bitrate: 4000 (more is better)
  - Audio Encoding: MP3 (MPEG-1 Audio Layer 3) or other with Frequency: 44.8 or 44.1 KHz.
  - Number of channels: 2 channels stereo Minimum Bitrate: CBR or VBR 128kb/s
- Recognition of all team sponsors and supporting institutions must be limited to a maximum of 1 minute or 20% of the total time (whichever is less).

## Rule 29 \_ Team Website

Please refer to the Graphic Chart & Brand Manual.

### 29.1 Preliminary Website

A preliminary Web site URL to a site consisting of at least three pages shall be submitted with Deliverable #1. The sites should offer then, at least, basic information about the university or universities that support the team, as well as the webmaster, communications, and sponsorship manager contacts. SDE21 logo must be included and linked to the Competition's webpage.

### 29.2 Website

The final URL for the team Web site shall consist of considerably greater content than the Preliminary Web site submitted and must comply with the following requirements. The SDE21 Organisation will continuously monitor the team's websites, asking for those changes necessary to comply with the Competition's Rules and proposing improvements on them. The final Web site URL shall be evaluated by the Communications Jury during the Competition.

#### 29.2.1 Encoding

Teams' websites must comply with the W3C encoding guidelines, as well as the international accessibility standards WCAG 2.0 (<http://www.w3.org/WAI/guid-tech.html>). Websites have to pass the W3C test for HTML 4.01 Transitional or XHTML 1.0 Transitional (<http://validator.w3.org/>). File names do not contain uppercase letters, spaces, or special characters (e.g., &or \$). Forms include text labels that correspond with form controls and mark-up to associate the two. Equivalent alternatives are provided for all multimedia. Pages requiring an applet or plug-in must provide a link to a page where the applet or plug-in can be downloaded.

#### 29.2.2 Compatibility

The website will be compatible with the current web browsers both PC and mobile (*responsive* web design). Pages must display correctly (e.g., no horizontal scrolling is necessary to view the full width of the page) in 1024 x 768 resolution (800 x 600 resolution is also acceptable). The website will be accessible by mobile devices such as smart phones and tablets. If that would be not possible an alternative dedicated version must be developed, in a way that users are diverted automatically by an automatic device detection system. That website will be compatible with the most popular mobile systems.

Other:

- Scripts/applets/dynamic pages (CGI, JavaScript, Java, etc.): Every script works correctly in the standard browser set.
- Content produced by scripting languages is accessible or has an accessible alternative.
- Pages requiring applets or plug-ins must provide a link to an accessible page where they can be downloaded. If a timed response is required, the user can request more time to complete an operation.
- Back button functionality is not impaired.

#### 29.2.3 Style

It must have an attractive design that invites navigation. With contents that will make it dynamic, combining images and / or videos / demos that accompany the text. Page information conveyed with colour is also available without colour, and foreground and background colours provide sufficient contrast. Graphic style is consistent throughout the site. Basic elements of content include the objective of the page and its identification with its creator, which must be clear from the beginning. A brief description (with the possibility of extending it) of the key identification data: who, what, description, objectives, etc. It is recommended that it be regularly updated.

#### 29.2.4 Language

The entire website's content must be available in English, and optionally, in any other language. It is recommended to publish a shortened version in the team's mother language and in the Host City's local language(s).

#### 29.2.5 URL

Teams must have their own internet domain, using either a geographical (.es, .fr etc.) or a generic .com or .org one.

#### 29.2.6 Contact

At a minimum, an e-mail contact to the Webmaster is provided as a graphical or text link on the home page of the site. Additionally, the webpage will include a press and a sponsorship contact.

#### 29.2.7 Sponsors' Recognition

Teams' websites will contain a specific section where supporting institutions and sponsors will be named or represented by their logos, linking to their websites. We encourage Teams to ask those institutions and business to put the combined version of SDE21 + team logo, with the "Team sponsor" or equivalent heading, in their homepages, linking to the website of the team which they are supporting.

### 29.2.8 SDE21, EEF Branding & SDE21 Organisation Recognition

The SDE21 logo must appear in every section of the web, linking to the SDE21 Competition (URL TBD) specifying “participating team”. Moreover, the SDE21 Organiser’s logos (level 2) must appear in these situations foreseen by the SDE21 Graphic Chart & Brand Manual. Please refer to this document. Teams’ website must include a section for the publication of all the Press Releases that the SDE21 Organisation sends to the Teams. In this same section, Teams may include any complementary information they find appropriate (for example, news and blogs).

### 29.2.9 Advertising

Advertisements are forbidden in team’s websites. Sponsor’s logos may be freely placed but commercial messages are not allowed.

### 29.2.10 Current Legislation Compliance

Contents as images, files or codes employed in programming, have to be copy left authorized to Teams or owned by them. If forms or any kind of user information storage is enabled, it must comply with team’s (or it server’s) country law.

## Rule 30 \_ Electronic Deliverable Documents

### 30.1 Press Release & Press Kit

The SDE21 Organisation will use the information provided by the Teams in the Press Release and Press Kit for dissemination of the SDE21 Competition. Therefore, this will be the part of every Deliverable.

#### 30.1.1 Press Release (PR)

The Press Release is meant to provide the most synthetic interpretation of key information related to the Team project. It should explain the most fundamental ‘bites’ of information, sufficient to attract the interest of a journalist for follow-up reporting, broadcasting or publication. The Press Release must be under 2 pages and must follow the following structure and contain the following contents:

- **Team logo, lead university logo & corresponding branding principles as specified in SDE Graphic Chart & Brand Manual.**
- **Headline & sub-headline: sum it up in approx. 15 words.**
- **City, Dateline (i.e. Budapest, 06\_07\_18).**
- **Key texts: a few paragraphs, 600 words max, including:**
  - i. Catch intro: a powerful, engaging first sentence(s).
  - ii. Quote(s): the human factor as enticement.
  - iii. Description (body text): use a compelling tone to describe the who, what, where, when, why & how of your project.
  - iv. About your Team: key info that reveals the essence or values that you embody through your project.
  - v. Contact: name, phone, email, social media links & (eventually) a link to your downloadable Press Kit.
  - vi. Targets: a short list of media channels that you are aiming to reach.
  - vii. Keys: words that can lead in search functions.
  - viii. Links: lead your reader toward your website or other sources of additional info.
  - ix. Images: key images / visuals, 3 max.

#### 30.1.2 Press Kit (PK)

A Press Kit is often also referred to as a ‘media kit’, a well-structured compilation or package of information to be distributed to those interested in your project, notably the press or media. While it is important to provide specific information, it is equally important and highly advisable to curate and produce well-written, streamlined information for all sections in the Press Kit. In the context of the SDE21 Deliverables, the Press Kit will be obligatory in upcoming Deliverables and must include of the following information:

##### 30.1.2.1 Press Release

Each set of Deliverables should include the most recent Press Release (see Rule 30.1.1). Please include all previous Press Releases chronologically in each set of Deliverables.

##### 30.1.2.2 List of Team Members

Team Officers, students, teachers and other collaborators indicating their studies / specialty. Moreover, students shall specify the university course they are attending, and teachers and other collaborators shall mention their degree, research field and teaching areas, making special emphasize in those aspects, which the team consider most relevant. Please keep this information updated within each Deliverable and make sure to include all the Team Officers (please refer to Rule 3.2 Team Officers and Contact Information).

### 30.1.2.3 Project Description

Teams must include an essay from 500 to 1500 words, explaining the progress made in the project, as well as updated information on the dissemination activities realized since the previous Deliverable. The target publics for these documents are international mass media journalists, so it is important to use a clear structure, and include complete, updated and easy to understand information. Among others, Teams should focus on:

#### 30.1.2.4 Team's Organisation and Objectives

#### 30.1.2.5 Project Development and Current State

#### 30.1.2.6 House Description and Relevant Items (technologies, materials, etc.).

#### 30.1.2.7 Dissemination Activities and Current Impact.

#### 30.1.2.8 Collaborating Institutions and Sponsoring Companies.

Short description of each of them, identifying their field of work and defining the collaboration established with the team. Please keep this information updated within each Deliverable.

#### 30.1.2.9 Project Images

Within each Deliverable, Teams must provide new, high quality images (300 dpi .jpg) all free of rights, for their publication in printed or online media and / or television. These images must reveal the progress of the project. Images can include: sketches / drawings, renderings, working models, interesting devices in the project, pictures of parts of the house, of the daily work of the Team and of the dissemination activities. An updated group photo of all the Team members must be included with each Deliverable. These images must be included in the Press Kit and submitted also as independent multimedia files (complying with Rule 26.2 Electronic Submission requirements). Teams must keep the requested information updated from one Deliverable to the next. Additionally, Teams may include any other material they wish the SDE21 Organisation to use for the SDE21 Competition dissemination, which complements the aforementioned information. The Teams' Press Releases will be published through the SDE21 website.

The Press Release and corresponding elements that appear in the Press Kit can contribute to the content that will be developed for the Sponsorship Manual. The Press Release and corresponding Press Kit will be made public for SDE21 dissemination activities.

## 30.2 Project Drawings Structure & Contents

### 30.2.1 Drawings formatting guideline

As stated in Rule 26.2.4 Documents Formatting Requirements, the Project Drawings must be consistent with the SDE Project Drawings formatting Structure & Contents guideline. In order to have the Drawings of the Deliverables organized and named, it involves the basic principles to follow. It is not necessary to include all the Drawings mentioned. In case there are particular drawings that do not fit in this Structure & Contents guideline, those must be located where appropriate (you may ask the SDE21 Organisation through the SDE21 WAT, if necessary). If you have drawings corresponding to two different sections, put it in the most general one and use reference notes to indicate their final location.

### 30.2.2 Drawings Code

To name the drawings a code will be used. The code is as follows:

2-3 letters; letters indicate the corresponding block –GE-General;AR-Architecture;IN-Interiors;etc.

3 numbers; numbers rank each block into three different levels: First digit establishes the sub-blocks (plan, section, elevation, etc.). Second digit identifies the different items existing inside each sub-block (footing, first floor, etc.);

Third digit lists the specific drawings inside each item. e.g.: The drawing AR-104 –correspond to: AR to the Architectural block, 1 to the Elevation sub-block 0 to the Site item, 4 to the specific drawings – Southern Elevation

Therefore, as each team, depending on their project and its particular characteristics, may need of more or less drawings inside concrete sections, the last number is left for the specific drawings each team considers.

## 30.3 Drawings general requirements

The Drawing Structure & Contents guideline must be followed. Teams must include dimensions and graphic scales in all scale drawings and North indication in all plans. Project Drawings and Project Manual need to be clearly understood as independent documents. Readers should not have to juggle the two documents in order to access and understand the information.

**Note: It is not mandatory for each Deliverable to provide all the data for each section included in the Project Drawings. However, the drawings related to the emphasized items for a specific Deliverable should be included.**

## 30.4 Structure & Contents guideline

### 30.4.1 General (GE)

- GE-001 Cover sheet
- GE-101 Sheet List. (This is the “table of contents” or “index”. It is not too useful in a bookmarked PDF, but it is essential in printed copies.)
- GE-201 General Symbols. (Define symbols and list notes used throughout the entire drawing set.)
- GE-211 General Abbreviations. (List of abbreviations used throughout the entire drawing set).
- GE-301 Urban Project Location (Location and analysis of the urban area)
- GE-310 Urban Proposal Explanation (Include graphics and notes to briefly explain proposal main aspects)
- GE-320 Existing Building drawings and analysis (only in case of refurbishing)
- GE-330 Competition Dwelling (Illustrate with drawings and brief notes the relation between the urban proposal, existing building (if apply) and the Competition house)
- GE-401 Exterior Renderings.

### 30.4.2 ARCHITECTURAL (AR)

- AR-001 SDE Solar Village Plan. (Site plan including the lot location inside the “SDE Solar Village”).
- AR-002 Site Plan
- AR-011 Solar Envelope (Site Plan and Site Elevations. Show the Solar Envelope geometry)
- AR-014 Architectural Footprint (Site Plan. Highlight the footing area with a shade over the plan and indicate its size)
- AR-017 Measurable Area (Floor plan(s). Highlight the measurable area with a shade over the plan and indicate its size)
- AR-021 Floor Plan
- AR-031 Roof Plan
- AR-041 Reconfigurable features. - (Plan showing the exterior moveable components, the Solar Envelope and the Architectural Footprint).
- AR-051 Measurable Area. (Show compliance with Rule 6.3 Measurable Area)
- AR-101 Site Elevation. (Site elevations showing Solar Envelope and Architectural Footprint compliance).
- AR-111 Building Elevations
- AR-201 Longitudinal Sections
- AR-211 Transversal Sections
- AR-301 Window Schedule and Details (Included thermal transmittance)
- AR-311 Door Schedule and Details (Included thermal transmittance)
- AR-321 Floor Construction Details (Included thermal transmittance)
- AR-331 Roof Construction Details (Included thermal transmittance)
- AR-341 Wall Sections and Construction Details (Included thermal transmittance)
- AR-351 Partitions Details

### 30.4.3 Bioclimatic Analysis (BA)

#### Please refer to Note 1.

- BA-001 Local Climate Analysis (identify appropriate passive strategies)
- BA-011 Bioclimatic drawings (passive design strategies drawings and explanations)

### 30.4.4 Interiors (IN)

- IN-001 Floor
- IN-101 Reflected ceiling
- IN-201 Elevations
- IN-301 Furnishings
- IN-401 Kitchen Plan (Furniture and Appliances)
- IN-411 Kitchen Elevations (Furniture, Appliances and Details)
- IN-501 Bathroom plan (Fixtures and Accessories)
- IN-511 Bathroom Elevations (Fixtures and Accessories)
- IN-601 Interior Renderings

### 30.4.5 Structural (ST)

- ST-001 Foundation Plan and Details
- ST-011 Structural Floor Plan(s)
- ST-021 Structural Roof Plan
- ST-101 Structural Longitudinal Sections
- ST-111 Structural Transversal Sections
- ST-201 Structural Blow ups
- ST-301 Structural Details

### 30.4.6 Fire Protection (FP)

- FP-001 Fire Protection. (Detection, alarm, suppression and egress).

### 30.4.7 Plumbing (PL)

**Please refer to Note 2**

- PL-001 Plumbing Plan. Supply and removal (cold and hot water)
- PL-011 Greywater
- PL-021 Drain /Waste / Vent
- PL-101 Schematic diagram
- PL-201 Supply and removal Isometric (cold and hot water)
- PL-211 Greywater Isometric
- PL-221 Drain/Waste/Vent Isometric

### 30.4.8 Solar Water Heating (SW)

- SW-001 Plan
- SW-101 Isometric

### 30.4.9 Mechanical (ME)

- ME-001 HVAC distribution Plan
- ME-011 HVAC equipment
- ME-021 Heating
- ME-031 Cooling
- ME-041 Ventilation
- ME-101 Mechanical room elevation
- ME-201 HVAC System Schematic drawings
- ME-211 Heating mode Schematic drawings
- ME-221 Cooling mode Schematic drawings
- ME-231 Controls
- ME-301 Isometric Distribution

### 30.4.10 Electrical (EL)

**Please refer to Note 3**

- EL-001 Grid Interconnection
- EL-201 DC wiring diagram
- EL-301 Power plan
- EL-401 Lighting plan
- EL-501 One-line Diagram
- EL-601 AC Circuit layout

### 30.4.11 Photovoltaic System (PV)

**Please refer to Note 4**

- PV-001 Photovoltaic system: general
- PV-011 Photovoltaic system: DC circuits
- PV-021 Photovoltaic system: AC circuits
- PV-031 Photovoltaic system: grounding system

### 30.4.12 Telecommunications and Building Automation System (BAS)

- BAS-001 Wiring plan
- BAS-101 Schematic diagram
- BAS-201 Equipment

### 30.4.13 SDE Instrumentation Drawings (ID)

**Please refer to the Technical Monitoring Procedures Document.**

- ID-001 General Monitoring
- ID-002 Monitoring panel room
- ID-003 Electricity meters' topology
- ID-004 Electricity meters' connection
- ID-005 House appliances

### 30.4.14 Site Operations (SO)

**Please refer to Rule 45 \_ Site Operations Plan**

- SO-001 Trucks Shipment
- SO-101 SDE Solar Village
- SO-102 Lot plan
- SO-201 Phases

### 30.4.15 Health and Safety(HS)

Please refer to Note 5

- HS-001 Health and Safety in the lot and surroundings
- HS-101; Health and Safety during the Outside Logistic
- HS-201 Health and Safety during the Inside Logistic
- HS-301; Health and Safety during load / unload.
- HS-401 Health and Safety during assembly / maintenance / disassembly.

### 30.4.16 Public Tour (PT)

Please refer to Note 6

- PT-001 Site accessibility
- PT-101 House tour floor plan
- PT-201 House Tour General Information

Notes:

1. **In the Bioclimatic Design Analysis drawings, Teams must include a list of passive and hybrid strategies used in the houses during heating and cooling periods. They must also include drawings and explanatory notes of the day and night strategies of both heating and cooling periods. Teams with houses in mild climates must clarify if the selected strategies apply during the day and night, or the whole year.**
2. **Include a note indicating that the house toilet(s) will not be installed in SDE Solar Village, see Rule 51.8.3.1.**
3. **The ELECTRICAL (EL) drawings must include electrical layouts, a detailed electrical components information and complete electrical diagrams of the conventional electrical installation showing all elements and protections (including those of the interface between the Photovoltaic system and the electricity distribution network). The One-line diagram of the electrical installation must include battery charger, inverter charger and photovoltaic installations as well as the locations of the SDE electric meters. For more information about the SDE meters' requirements please refer to the Monitoring Procedures document.**
4. **The PHOTOVOLTAIC SYSTEM (PV) drawings must include electrical diagrams describing all components (equipment), wiring and protections. The general diagram of the photovoltaic system (PV-001) shall include the interface with the electrical installation of the house and the electrical distribution network. Drawings reference numbers indicated show the minimum drawings required for approval. Additional drawings can be included, provided that they are placed on the corresponding sub-section, for example: for details of DC circuits, new drawings with reference numbers PV-012, PV-013, up to PV-019 can be added; the same applies to details of the PV system as a whole (new drawings: PV-002 to PV-009), AC circuits (PV-022 to PV-029) and Grounding system (PV-031 to PV-039).**
5. **HEALTH AND SAFETY (HS) Please refer to Rule 52.2.3 HS Report.**
6. **PUBLIC TOUR (PT) The tour must be illustrated and explained in detail; drawings must show the points in which the decathletes will make their explanations and specify the information that it will explain in each point. The location of the waiting line and the number of people by tour must be indicated. Drawings must include furniture, objects and all possible obstacles in the proposed route. They also must include accessibility-related information, e.g. widths of ramps, steps, doors and narrow areas in the tour route, wheelchair turning circles. If there are any movable elements which are going to be shown to the visitors, include a sketch of the moving mechanisms and measures adopted to assure the safety of the visitors. Add explanatory notes as needed.**

## 30.5 Project Manual Structure & Contents

As stated in Rule 26.2.4.2, the Project Manual must be consistent with the SDE21 Project Manual formatting and guidelines provided below. In order to have the Project Manual of the Deliverables organized and named, it is important to adhere to the basic principles illustrated in the Project Manual Structure & Contents. In case there are particular sections which do not fit in this Structure & Contents guideline, those must be located where appropriate (you may ask the SDE21 Organisation through the SDE WAT, at this email address [wat@solardecahlon.eu](mailto:wat@solardecahlon.eu), if necessary). If there is information that corresponds to two different sections, please put it in the most general one and make the appropriate reference to its corresponding location. The SDE21 Project Manual Contents & Structure are as follows:

Table 30. Project Manual Structure

|   |                  |
|---|------------------|
| <b>Cover Sheet</b>                                      |                  |
| <b>Summary of Changes</b>                               | <b>Rule 31 _</b> |
| <b>Table of Contents</b>                                | <b>Rule 32 _</b> |
| <b>Rules Checklist</b>                                  | <b>Rule 33 _</b> |
| <b>Contests Support Documents</b>                       | <b>Rule 34 _</b> |
| <b>Architecture Design Narrative</b>                    | <b>Rule 35 _</b> |
| <b>Engineering &amp; Construction Design Narrative</b>  | <b>Rule 36 _</b> |
| <b>Energy Efficiency Design Narrative</b>               | <b>Rule 37 _</b> |
| <b>Communication Plan</b>                               | <b>Rule 38 _</b> |
| <b>Neighbourhood Integration &amp; Impact Report</b>    | <b>Rule 39 _</b> |
| <b>Innovation &amp; Viability Report</b>                | <b>Rule 40 _</b> |
| <b>Circularity and Sustainability Report</b>            | <b>Rule 41 _</b> |
| <b>Dinner Party Menu</b>                                | <b>Rule 42 _</b> |
| <b>Contest Week Tasks' Planning</b>                     | <b>Rule 43 _</b> |
| <b>Cost Estimate and Project Financial Summary Cost</b> | <b>Rule 44 _</b> |
| <b>Site Operations Plan</b>                             | <b>Rule 45 _</b> |
| <b>Health &amp; Safety Report and Documentation</b>     | <b>Rule 46 _</b> |
| <b>Detailed Water Budget</b>                            | <b>Rule 47 _</b> |
| <b>Electric and Photovoltaic Chart</b>                  | <b>Rule 48 _</b> |
| <b>Project Specifications</b>                           | <b>Rule 49 _</b> |
| <b>Structural Calculations</b>                          | <b>Rule 50 _</b> |

## Notes

- Teams must follow the SDE21 Project Manual Structure & Contents which will be made available on the SDE21 WAT.
- In order to rationalize the Team's strategies, technical decisions must be justified by parametric studies and calculations. Figures and diagrams should highlight most relevant findings or results.
- Concerning only Contest Support Documents, the jury will attach greater importance to quality of information rather than to quantity.
- Jurors will be focusing specifically on their corresponding sections, since it is recommended that Teams systematically introduce a brief, synthetic project recapitulative at the introduction to each section including your project statement & its local context.
- In order for the Juries to quickly understand the project, put the relevant information into the Project Manual and place the support documents (Calculations, Software outputs, data sheets, etc.) into Appendices, using reference notes to indicate their location.
- Electrical & PV Chart Checklists must be submitted as four separate MS Word documents, see Rule 48.1 Electrical and PV Chart and Checklists.

## 30.6 Workshop Documentation

Referring to a sentence (to be prepared) in the chart regarding SDE21 & EEF branding, within the context of the documentation / dissemination material (LH)

### 30.6.1 Team Brochure

Public SDE21 Workshop Dissemination Brochure: Teams must submit the following information, which will be used for the SDE21 Workshop Dissemination Brochure:

- Text: Include the name of the house, of the team, and of the university. Also, a brief description of the project, of approximately 200 words, explaining its main goals and innovative elements. This text will be published in the Host City's local language(s) and English, both versions being provided by the Teams.
- Images: three photographs for the public dissemination of the project:
- House's render: 1 high quality rendering (minimum 300ppp .jpg) or vector (.eps or .pdf).
- House's Plan, vertical and cross sections: 1 clean vector file of the vertical section, plan and cross section, scaled 1/500 - 1/1000 (.eps or .pdf).
- Other relevant image: 1 high quality picture of the project (.jpg minimum 300ppp, or vector .eps or .pdf).

### 30.6.2 Team project poster:

- Teams must submit a poster describing their project. This poster will be shown with the model in exhibitions, or independently in events, to disseminate the SDE21 Competition. The requirements for the poster design will be specified through the SDE21 WAT.
- The project description poster may be updated whenever the Team wishes to, after having communicated that decision to SDE21 Organisation via the SDE21 WAT.

### 30.6.3 Team description poster:

- Teams must submit a poster describing their team’s organisation. This poster will be shown with the model in exhibitions, or independently in events, to disseminate the SDE21 Competition. The requirements for the poster design will be specified through the SDE21 WAT.
- The Teams’ description poster may be updated whenever the Team wishes to, after having communicated that decision to SDE21 Organisation via the SDE21 WAT.

## 30.7 SDE Solar Village Documentation

SDE Solar Village Documentation will include two types of documentation: Information to prepare SDE Solar Village Visiting Guide and Jury Reports.

### 30.7.1 Information to prepare SDE Solar Village Visiting Guide

Teams must submit information and material regarding their project, in order to prepare the Visiting Guide, which will be given to all professional visitors attending SDE Solar Village. Therefore, to have enough time to produce the “SDE Solar Village Visiting Guide” it is extremely important to follow the indications given, as the descriptions and images must be exactly as specified. The requirements for this item, as well as a layout example of this SDE Solar Village Visiting Guide, is available through the SDE21 WAT.

Professional visitors must be able to understand the basic layout and characteristics of the team’s project with just a brief reading of this guide thus making it mandatory to give information, which is as precise and accurate as possible. Teams must submit the required documentation in the Host City’s local language(s) and English, languages in which will be published

the “SDE Solar Village Visiting Guide”.

**Note: Please refer to the related information available through the SDE21 WAT for the specific due dates for the Information to prepare SDE Solar Village Visiting Guide.**

### 30.7.2 Jury Reports

Teams must submit a brief report or summary for each one of the six Juried contests. These briefings intend to make juror’s revision easier by giving them a short summary per participating team. Before the Event begins, these reports will be given to the members of the juries associated with each of the contest activities. The jurors use the reports and the documents submitted by the Teams to preview what they would be evaluating at the Event. Each Jury will assign points to its Contest and to the Innovation Contest. Therefore, apart from other relevant information, Brief Report must include a section which describes the project’s innovative aspects on its corresponding topic.

The following reports must be submitted:

- Architectural Brief Report;
- Engineering and Construction Brief Report;
- Energy Efficiency Brief Report;
- Communication and Social Awareness Brief Report;
- Neighbourhood Integration & Impact Brief Report;
- Innovation & Viability Brief Report;
- Circularity & Sustainability Brief Report;
- Affordability, Cost-Effective Strategies & Viability Brief Report.

Jury Brief Reports give the Teams the opportunity to emphasize the most important aspects of their proposal regarding the corresponding contests. Moreover, the following requirements must be met:

- The length, including all text, figures, tables or equations, may be no more than 4 pages (A4 sheets or 8.5 in. x 11 in) per juried contest.
- The body text and captions must be in 11 pt. (or larger) font size.
- These documents will be published on the SDE website after the official award ceremony in order to provide first-hand information to share within the scientific community.

## 30.8 Thermal and Environmental Evaluation (TEE)

Thermal and environmental evaluation (TEE) of projects will be conducted by the SDE21 Organisation during the design phase. This evaluation aims at studying projects by taking into account the region of origin of each team in relationship to weather data, bioclimatic design, energy opportunities, materials availability or environmental data. TEE Reports has two main parts: Energy Efficiency Evaluation and Environmental evaluation. These reports will be provided to juries Energy Efficiency and Sustainability in addition to the monitored measurements recorded during the Competition phase. Documents and data submitted by the Teams will be part of the SDE21 web scientific database in free access after the Competition.

### 30.8.1 TEE Information Guide

TEE Information Guide helps Teams to compile the right information to perform the energy efficiency and environmental evaluations. In order to comply with the TEE requirements, Teams must read and follow the instructions of the TEE Information Guide. This guide provides information about the followings documents:

- Simulation Input Data (SID)
- 3D drawing of the house (3DD)
- Local Weather Data File (LWF)
- Water consumption calculator (WCC)
- SDE21 template
- Construction materials (CM)

All these documents and any other information required in the TEE Information Guide must be completed and submitted by Teams from the Deliverable 3 onwards. TEE Information Guide and the related documents can be downloaded from SDE21 WAT.

### 30.8.2 Energy Efficiency Evaluation

The energy efficiency evaluation is based on the information that Teams include in the Simulation Input Data (SID), project drawings and the local weather data. Dynamic Thermal Simulation (DTS) will allow us to evaluate the following performance indicators: heating needs, cooling needs and thermal comfort

Simulation Input Data (SID) is a form that compiles the houses' technical data.

The SID form includes the followings sections:

- General Information
- Exterior Envelope
- Interior Envelope
- Openings
- Scenarios
- Engineering Systems
- Production Systems
- Other equipment

Unconventional systems efficiencies should be calculated and justified by a detailed technical note provided separately by the Teams. These technical notes must include a description of the system efficiency in the local context and in competition context, calculation method and assumptions made.

### 30.8.3 Environmental Evaluation

SDE Environmental evaluation is based on the houses Life Cycle Assessment (LCA). LCA is a methodology used to determine the environmental impact of a product (or a system) over a life cycle. TEE Information Guide explains the SDE21 LCA goals, scope, methodology and tool that must be used. Teams must follow the Guide's instructions and submit the required data and documentation.

## 30.9 SDE21 Official Dissemination Materials

The SDE21 Official Dissemination Materials will be used for the SDE Official Book, among other publications in magazines, brochures, webs, etc. Details to be determined. As per all communications actions, please refer to the Graphic Chart / Brand Manual for style guidelines.

## Rule 31 \_ Summary of Changes

Changes and additions to the Project Drawings and Project Manual listed in the Summary of changes will be reviewed. Anything not listed here is assumed to be unchanged from the previous version of the Project Drawings and Project Manual and will not be reviewed. As always, an important question to ask before submitting is, "Will the information be easy for the reviewers and jurors to find?"

## Rule 32 \_ Table of Contents

Most users of the document will be reviewing it electronically and will navigate using the PDF bookmarks and hyperlinks. For the benefit of the reviewers and jurors, Teams must use the basic bookmarking structure and section titles supplied by the SDE21 Organisation. Remember that some users will print the document, so make sure that the printed version is also easy to navigate, i.e., clearly numbered sections and/or pages are essential. Also remember to design the margins appropriately. For example, the SDE21 Rules PDF document is intended for electronic and printed viewing, so we included PDF bookmarks and hyperlinks, as well as margins and end-of-section blank pages designed for double-sided, spiral-bound, portrait printing. A similar approach is recommended for the Project Manual. It might be a good idea to do a "test print" of some or all of the document to make sure everything prints successfully and looks OK in a 3-ring binder.

## Rule 33 \_ Rules Checklist

SDE21 Rules Checklist is intended to make revisions easier. Participating Teams must fill in each of the aspects required, specifying the drawing or section where included

Table 31. SDE21 Rules checklist.

| Rule Description                                | Content Requirement(s)   | Drawing(s)/ Report(s) |
|---|--|-----------------------|
| 3.2 Team Officers and Contact Information       | Team officer's contact information completely fulfilled in Table 1 (SDE21 WAT)   |                       |
| 4.3 Lot Conditions and attribution              | Drawing(s) showing the storage and unloading areas and corresponding load's calculations   |                       |
| 4.3 Lot Conditions                              | Calculations showing the structural design remains compliant even if there is a level difference, and drawing(s) showing shimming methods and materials to be used in case |                       |
| 4.4 Footings                                    | Drawing(s) showing the locations and depths of all ground penetrations on the Competition site   |                       |
| 4.4 Footings                                    | Drawing(s) showing the location, contact area and soil-bearing pressure of every component resting directly on the ground  |                       |
| 4.7 Construction Equipment                      | Drawing(s) showing the assembly and disassembly sequences and the movement of heavy machinery on the Competition site and specifications for heavy machinery               |                       |
| 5.1 Solar Envelope Dimensions                   | Drawing(s) showing the location of all house and site components relative to the solar envelope  |                       |
| 6.1 Structural Design Approval                  | Structural drawings and calculations signed and stamped by a qualified licensed professional   |                       |
| 6.1 Electrical and Photovoltaic Design Approval | Electrical and Photovoltaic drawings and calculations signed and stamped by a qualified licensed professional  |                       |
| 6.1 Codes Design Compliance                     | List of the country of origin codes complied, properly signed by the faculty advisor   |                       |
| 6.2 Architectural Footprint                     | Drawing(s) showing all information needed by the Rules Officials to digitally measure the architectural footprint  |                       |
| 6.2 Architectural Footprint                     | Drawing(s) showing all the reconfigurable features that may increase the footprint if operated during contest week   |                       |
| 6.3 Measurable Area                             | Drawing(s) showing the Measurable Area   |                       |
| 6.4 Entrance and Exit Routes                    | Drawing(s) showing the accessible public tour route, specifying the entrance and exit from the house to the main street of SDE Solar Village                               |                       |
| 7.3 PV Technology Limitations                   | Specifications and contractor price quote for photovoltaic components  |                       |
| 7.4 Batteries                                   | Drawing(s) showing the location(s) and quantity of stand-alone, PV-powered devices and corresponding specifications  |                       |
| 7.4 Batteries                                   | Drawing(s) showing the location(s) and quantity of hard-wired battery banks components and corresponding specifications  |                       |
| 7.6 Thermal Energy Storage                      | Drawing(s) showing the location of thermal energy storage components and corresponding specifications  |                       |
| 7.7 Desiccant Systems                           | Drawing(s) describing the operation of the desiccant system and corresponding specifications   |                       |
| 7.8 Humidification systems                      | Specifications for humidification systems and corresponding certifications of the different elements.  |                       |
| 8.1 Containers locations                        | Drawing(s) showing the location of all the water tanks   |                       |
| 8.2 Water Delivery                              | Drawing(s) showing the fill location(s), quantity of water requested at each fill location, tank dimensions, diameter of opening(s) and clearance above the tank(s)        |                       |
| 8.3 Water Removal                               | Drawing(s) showing the quantity of water to be removed from each fill location, tank dimensions, diameter of opening(s) and clearance above the tank(s).                   |                       |
| 8.5 Greywater reuse                             | Specifications for greywater reuse systems   |                       |

|   |  |
|---|--|
| 8.6 Rainwater Collection  | Drawing(s) showing the layout and operation of rainwater collection systems  |
| 8.8 Thermal Mass  | Drawing(s) showing the locations of water-based thermal mass systems and corresponding specifications  |
| 8.9 Greywater Heat Recovery                                       | Specifications for greywater heat recovery systems.  |
| 9.1 Placement   | Drawing(s) showing the location of all vegetation and, if applicable, the movement of vegetation designed as part of an integrated mobile system   |
| 9.2 Watering Restrictions   | Drawings showing the layout and operation of greywater irrigation systems  |
| 10.2 SDE Sensors' Location and wire routing                       | Drawing(s) showing the location of bi-directional meters, metering box, sensors, cables and feed-through to pass the instrumentation wires from the interior to the exterior of the house        |
| 11.2 Use of the SDE21 Logo  | artwork, and content of all communications materials, including signage (please refer to the Graphic Chart & Brand Manual)   |
| 11.3 Teams' sponsors & Supporting Institutions                    | Drawing(s) showing the dimensions, materials, artwork, and content of all communications materials, including signage (please refer to the Graphic Chart & Brand Manual)                         |
| 11.4 Team Uniforms  | Drawing(s) showing the artwork, content and design of the team uniform (please refer to the Graphic Chart & Brand Manual)  |
| 12.4 Public Tour  | Drawing(s) showing the public tour route, indicating the dimensions of any difficult point, complying with the accessibility requirements  |
| 23.0 Contest 9: Drying Method                                     | Drawing(s) showing the clothes drying method and the place where the clothes will be dried.  |
| 23.0 Contest 9: House Functioning                                 | Appliances and corresponding technical specifications (Appliances and Home Electronic Equipment specifications and user manuals).  |
| 36.5 Photovoltaic systems design                                  | Specifications of PV generators, inverters, wiring, cables, protections, earthing systems, interface with the electricity distribution network on  |
| 36.5 Photovoltaic systems design                                  | Inverters' certificates  |
| 36.5 Photovoltaic systems design                                  | Maintenance plan for PV generators, supporting structure, inverters, wiring, cables, protections, circuit breakers in case of fire and earthing system. Fire protection systems for PV DC wiring |
| 36.5 Photovoltaic systems design                                  | The corresponding table "design summary" must be filled out  |
| 51.3 Fire Safety  | Specifications for Fire Reaction of Constructive elements, extinguishers and fire resistance of the house's structure.   |
| 51.3 Fire Safety  | Drawings showing compliance with the evacuation of occupants' requirements and fire extinguishers location   |
| 51.4 Safety against falls   | Specifications of compliance with the slipperiness degree classes of floors included in House tour   |
| 51.4 Safety against falls   | Drawing(s) showing compliance with conditions for uneven flooring, floors with different level, Restricted Areas stairs, Public Areas Staircases, Restricted Areas Ramps and Public Areas Ramps  |
| 51.4 Safety for avoiding trapping and impact risk                 | Drawing(s) showing compliance with conditions for avoiding trapping and impact risk  |
| 51.4 Safety against the risk of inadequate lighting               | Specifications for level of illumination of house tour areas light fittings  |
| 51.5 Accessibility for People with Disabilities and Special Needs | Interior and exterior plans showing the entire accessible tour route   |
| 51.6 Structural Safety  | Specifications for the use of dead loads, live loads, safety factors and load combinations in the structural calculations  |
| 51.7 Electrical and PV Systems                                    | Complete the "Electrical System Design PV Chart and Checklist".  |
| 51.7 Electrical and PV Systems                                    | Specifications of the wiring, channels, panels and protections of the electrical installation  |
| 51.7 Electrical and PV Systems                                    | One-line electrical diagram and drawings showing the grounding, execution and paths  |

## Rule 34 \_ Contests Support Documents

The Contest Support Documents will be used to justify the Teams' strategies towards the 10 contests of the Competition, as well as describing the projects objectives in the different aspects considered in each of the Contests. The following Rules describe the specific content required for each Contest Support document. The Contest Support Documents must be presented in the following order:

- Architecture Design Narrative - See Rule 35 \_
- Engineering & Construction Design Narrative - See Rule 36 \_
- Energy Efficiency Design Narrative - See Rule 37 \_
- Communications Plan - See Rule 38 \_

### Neighbourhood Integration & Impact Report - See Rule 39 \_

- Innovation & Viability Report - See Rule 40 \_
- Circularity and Sustainability Report - See Rule 41 \_

#### Notes:

**Juries appreciated the Teams' capacity of synthesis and the clarity of the text.**

**In case that the information required in one support document has been already mentioned elsewhere in the Project Manual, and the team decides do not repeat it, the section where it is located must be clearly indicated.**

## Rule 35 \_ Architecture Design Narrative

### 35.1 Architectural Concepts

Teams must include in this section a summary of their Urban Design strategies; detailed description must be included in the NI&I Report (See Rule 39 \_). Urban aspects in this report must explain the global design strategy and must address local and spatial housing organisation issues. Teams must include a complete description of the architectural concepts taken into consideration in the project design. Therefore, it is necessary to explain the process, from the primitive idea up to the final project design. In the same way, the project materials and construction shall be described, as well as all the concepts and architectural elements included. Moreover, the concepts, which will be evaluated in accordance with the criteria established in Contest 1 – Architecture, must be included. Teams must include in this section a summary of their Urban Design strategies; detailed description must be included in the NI&I Report (See Rule 39 \_). Urban aspects in this report must explain the global design strategy and must address local and spatial housing organisation issues.

### 35.2 Summary of reconfigurable features

This summary will be used before, during, and after jury tours to verify that the team complies with Rule 6.2. Be sure to include references to relevant drawings and/or specifications. If you are not sure whether something is considered a "reconfigurable feature", include it in this summary, just in case. The Competition Manager will review the summary and notify the team if any of the listed items are not considered "reconfigurable features".

### 35.3 Lighting Design Narrative

The lighting design narrative shall describe both the use of natural and artificial lighting, to fulfil the house light needs. The calculations of the lighting systems and the energy efficiency shall be included. The lighting quality for the space and comfort definition will be positively assessed, evaluating the night and day specific needs. The lighting use to highlight the house's architectural values will be also evaluated.

## Rule 36 \_ Engineering & Construction Design Narrative

The engineering design narrative shall include a description of the following aspects:

- Structural design
- Constructive design
- Systems design: plumbing, electrical and photovoltaic
- Electrical Production Simulation

### 36.1 Structural Design

Teams shall explain the structural design of the project, from the initial premises to its consequent project development, describing the materials used, its objectives and the main reasons for the final adopted solution. The calculations are to be included in the Structural Calculations section in the Project Manual.

## 36.2 Constructive Design

Teams shall explain the constructive design of the house, from the initial premises to its consequent project development, describing the materials used, its objectives and the main reasons for the final adopted solution, as well as explaining the acoustic performance of the adopted solutions (defined as follows):

Acoustic performance of the adopted solutions: Materials, characteristics, calculations, simulation (with reverberation time). The report contents are: Estimate indoor reverberation time: In order to complete the reverberation time estimation, you must include the most significant internal coating materials absorption coefficients and the calculations carried out. The reverberation time may be estimated theoretically or through acoustic simulation. The absorption coefficients and the reverberation time must be shown for the following frequencies: 125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz. The specifications and technical data of all the materials are to be included in the Construction Specifications section in the Project Manual.

## 36.3 Plumbing System Design

Teams shall submit a general description of the design criteria adopted for the plumbing system of their house. Moreover, a detailed description of the plumbing systems shall be provided, including detailed calculations of the needs. Teams must describe the water cycle of the house, explaining the recycling and/or reuse of rainwater, greywater, etc. Details shall be included of the accessibility of the installation for maintenance and repair tasks, the effectiveness of the insulation and the control systems.

## 36.4 Electrical System Design

Teams shall submit a general description of the design criteria adopted for the electrical system of their project. Moreover, a detailed description of the electrical systems of the project, shall be included, including detailed calculations of the needs and expected energy contribution by the installation. Details shall be included of the accessibility of the installation for maintenance and repair tasks, the effectiveness of the insulation and the control systems.

### 36.4.1 Information to demonstrate code compliance

To demonstrate code compliance, from Deliverable #3 onward, Teams must complete and submit the "Electrical System Design Checklist". Additionally, Teams must furnish in the Project Manual all necessary information to evaluate the conformity of their proposals (certificate of compliance, calculus, etc.) The "Electrical System Design Checklist" is part of the "Electric and PV Chart and Checklists" document. See more details in Rule 48 \_.

## 36.5 Photovoltaic (and other electricity producing solar) Systems Design

### 36.5.1 Written Documentation

A document about the solar Photovoltaic system (and other electricity producing solar systems) must be written, containing at least the following aspects:

- General description of the Photovoltaic system (and other electric solar systems) and design criteria followed.
- Design and specifications of: Photovoltaic generator(s) (including characteristics of the Photovoltaic modules used), inverter(s), batteries (in case existing), cables and wiring methods, protection, earthing system, interface with the electricity distribution network.
- Maintenance plan, with specific recommendations for the different components: Photovoltaic modules/generator(s), supporting structure, inverter(s), cables and wiring methods, protections and earthing system, etc.
- Inverters certificates, which demonstrate compliance with the requirements stated for grid interconnection (Rule 51.8.2.4 **Over/under voltage and frequency**; Rule 7.4 for the battery bank inverter, if applicable).

### 36.5.2 Information to Demonstrate Code Compliance

To demonstrate code compliance, from delivery#3 onward, Teams must complete and submit the "Photovoltaic Checklist" and "Electrical Storage System Checklist". Additionally, Teams must furnish in the Project Manual all necessary information to evaluate the conformity of their proposals (certificate of compliance, calculus, etc.) The "Photovoltaic Checklist" and "Electrical Storage System Checklist" are part of the "Electric and PV Chart and Checklists" document. See more details in Rule 48 \_ Electrical and PV Design Systems Information.

### 36.5.3 Electrical Energy Balance Simulation

A detailed report about the electrical energy balance of the household will be prepared for typical generation and consumption conditions. It must include at least the following aspects:

#### 36.5.3.1 Introduction

Description of the methodology for the estimate of the electrical production and the environmental benefits.

#### 36.5.3.2 Loads

List of the electric loads (house-hold appliances, lights, etc.) used in the household, including the main technical characteristics given by the manufacturer, and the estimated consumption for their use during the Contest Week.

[Note: it is recommended to make experimental measurements with the idea of obtaining information as realistic as possible. See Rule 24 \_Contest 10: Energy Balance.

### 36.5.3.3 Photovoltaic Description

A description of the PV (and other electric solar) system description: brief summary explaining PV generator(s) (types of modules and wiring), inverter(s) and batteries (in case existing). Further detailed information (e.g. characteristics) to include in the Project Manual, Contest Support Documents, Engineering and Construction Narrative, Photovoltaic System Design

### 36.5.3.4 Description of the Tools used for the Simulations.

These could be commercial software or tools created by participating Teams, in which case the algorithms used must be included.

#### Results of the simulations:

- The electrical energy balance analysis consists of an annual, monthly and contest week estimates of the electricity demand by the electric loads, the electricity generated by the photovoltaic installation and the electricity extracted from the electricity grid (in case the solar generation is not enough). A critical analysis of the results must be included.
- An Energy Payback Time analysis (time needed for the PV installation to generate the energy used to construct all of its components, for typical solar radiation and temperature conditions of Paris) as well as the CO2 reduction associated to a standard year of use must be included. (More information is available in the website of the International Energy Agency – Photovoltaic Systems Programme - Task 10 – [www.iea-pvps.org](http://www.iea-pvps.org), report IEA-PVPS-T10-01:2006).

#### Simulations Requirements:

- The simulations will be done in an hourly base.
- For the electrical energy balance simulation of the PV installation, solar radiation and temperature data from a Typical Meteorological Year of Paris will be used (file “PARIS-TMY.csv”). Teams may use other weather data files, provided that they indicate the reference.
- For the electricity demand, the average consumption for the whole contest week will be considered as a constant consumption for the whole year. For the contest week simulation, the consumption profile of each day will be used.
- Monthly and yearly results, as well as the results corresponding to the Contest week, will be presented, both in numeric and graphical forms.

#### Format Requirements

- There are no restrictions on the simulation tools that can be used for this analysis, but all such tools should be clearly identified.

## 36.6 Solar Thermal Design

Teams must include detailed need estimations and expected contribution of the system, and information about the supporting structure, storage system, backup energy source, the accessibility of the installation for maintenance tasks, the effectiveness of the insulation and control systems. Moreover, the cost of the installation shall be clearly indicated.

## 36.7 Building Integrated Solar Active Systems

Building-Integrated Solar Active Systems (BIPV, BIT, BIPVT) are materials that are used to replace conventional building materials in parts of the building envelope such as the roof, skylights, or facades. They are increasingly being incorporated into the construction of new buildings as a principal or ancillary source of electrical power, although existing buildings may be retrofitted with these modules as well. The advantage of integrated solar active systems over more common non-integrated systems is that the initial cost can be offset by reducing the amount spent on building materials and labour that would normally be used to construct the part of the building that these modules replace. Teams shall explain the house “Building Integrated Active Solar System” concept and selection criteria, how the active solar systems fulfil energetic and aesthetical functions, and the economic impact of the integration in the house’s design, according to the following items:

- Aesthetical Integration: How the “Building Integrated Active Solar Systems” enhance the house’s aesthetical values.
- Constructive Solution: Quality and consistency of the constructive details, and how adapted are the modules to the structure, to the modularity and to the other conventional materials of the house,
- Energy Balance positive impact: Impact of the integrated modules in the cooling and the heating loads, and how it may affect the energy balance of the house.
- Additional properties: Conformity of the systems performing architectural functions, like weather protection, thermal insulation, noise protection, modulation of daylight etc., always considering the functioning requirements of the systems.
- Maintenance: Specific conditions for operating, maintaining and repairing the systems.
- Cost of the installation: including its economic justification considering the savings for replacing conventional materials, electrical energy production and possible extra energy saving costs by the influence of the systems integration in the house general performance (architectural function).

## Rule 37 \_ Energy Efficiency Design Narrative

### 37.1 Technical Project Summary

From Deliverable #3 and onwards, Teams must fill up the Technical Project Summary Table twice with the house's technical characteristics:

One for the local context and one for the Solar Village/Competition context.

Teams must fill up these two tables entirely even if they do not have the final data/information yet.

Data/information in these tables should be represented in two ways:

- In black: the real value;
- In blue: a goal/hypothesis when the final data is not yet calculated, known or available.

If needed, Teams may include reference to the location of the technical data. The technical data should not be detailed in this section. These tables intend to be an identity card of the houses technical characteristics. Data of the Technical Project Summary must be updated in each Deliverable as required. Data of the Technical Project Summary must be in concordance with the Simulation Input Data (SID), see Rule 30.8 Thermal and Environmental Evaluation (TEE).

The main goal of the Competition is to have positive-energy efficient houses in their local context.

From Deliverable #3 and onwards, Teams must submit the Comprehensive Energy Analysis and Discussion Report, consisting of three sections. In the first two sections (section I & section II) Teams will describe the way simulations influenced the project design of the house, the house final design and simulation, and results. These two sections only relate with the local context of your project

Table 32. Technical Project Summary Table

| 1. Project Dimensions  | Data | Location of detailed information in PM/PD |
|--|------|---|
| Gross area (m2)  |      |   |
| Net floor area (m2)  |      |   |
| Conditioned Volume (m3)  |      |   |
| <b>2. House envelope</b>   |      |   |
| Insulation types and thickness (m)   |      |   |
| Walls area (m2) and Thermal Transmittance (W/m2.K)                               |      |   |
| Floor area (m2) and Thermal Transmittance (W/m2.K)                               |      |   |
| Roof area (m2) and Thermal Transmittance (W/m2.K)                                |      |   |
| Glazing area (m2) and Thermal Transmittance (W/m2.K)                             |      |   |
| Glazing Solar gain (SHGC)  |      |   |
| <b>3. HVAC Systems</b>   |      |   |
| Heating system   |      |   |
| Energy Production Equipment  |      |   |
| Type   |      |   |
| Model  |      |   |
| Heating Capacity   |      |   |
| Heating Efficiency   |      |   |
| Cooling Capacity   |      |   |
| Cooling Efficiency   |      |   |
| Terminal Unit  |      |   |
| Type   |      |   |
| Model  |      |   |
| Refrigerant (Type)   |      |   |
| Heat Recovery Ventilation or Energy Recovery Ventilation                         |      |   |
| Type   |      |   |
| Model  |      |   |
| Efficiency   |      |   |
| <b>4. Domestic Hot Water</b>   |      |   |
| System (Type, capacity)  |      |   |
| Solar thermal Collectors   |      |   |
| Type   |      |   |
| Area (m2)  |      |   |
| <b>5. Electrical Energy production</b>   |      |   |
| PV Modules (Type)  |      |   |
| PV panels area (m2)  |      |   |
| Installed PV power (kWp)   |      |   |
| Estimated energy production (kWh/year) (Include the information of all PV types) |      |   |

|  |  |
|--|--|
| <b>6. Energy consumption</b>   |  |
| Estimated energy consumption (kWh/year)  |  |
| Estimated electrical consumption per conditioned (kWh/year per m2)   |  |
| Energy Use Characterization (% of total energy consumption)  |  |
| Heating (%)  |  |
| Cooling (%)  |  |
| Ventilation (%)  |  |
| Domestic Hot Water (%)   |  |
| Lighting (%)   |  |
| Appliances and Devices (%)   |  |
| <b>7. Energy Balance</b>   |  |
| Estimated energy balance (kWh/year)  |  |
| Estimated CO2 emissions (Tn/year) (Include the calculation in the Project manual and indicate its location here) |  |
| <b>8. List of Singular and Innovative materials and systems</b>  |  |
| TBD  |  |

### 37.1.1 Section I – Influence of Energy Analysis on House Design and Competition Strategy

The objective of this report is to summarize the schematic energy analysis supporting the development of the team's original project design and to demonstrate how simulations have been a design tool. Teams have to make it clear in this section the reasons why they decided to conduct simulations and the questions they were trying to find answers to. During the period of time since the first analysis until the final Deliverable of the construction project, it is likely that Teams have continued to use energy analysis tools and techniques to iteratively “fine-tune” the housing unit design, to develop detailed system designs, and perhaps even to develop competition strategies. In this section, the Teams must describe how the energy analysis was used to improve the project thermal performance and its energy efficiency since the previous Deliverable. Discussion should highlight key features of the house design that were affected by energy analysis and simulation results. This section will have the following structure:

#### Introduction

- Energy analysis objectives and methodology
- Climate data and weather Analysis
- Team energy strategy

#### Influence of the energy analysis in the project design

- (Project design optimization)

#### Influence of the energy analysis in the HVAC systems

- (Conditioning Systems optimization)

### 37.1.2 Section II – Projected Performance of Final Housing Unit Design (Minimum requirements)

This section will have the following structure:

#### Housing unit and Systems' Description

- Overall description of the project geometric, envelope, air-tightness and any singular element that could contribute to the house energy efficiency.
- Passive design strategies and Energy efficiency measures (EEM) analysed (EEM is a design, operation or technology change for the purpose of reducing energy consumption)

#### House, Appliances and HVAC Simulations (Annual simulation)

- Brief simulation descriptions, tools used (capabilities and limitations).
- Housing unit modelling assumptions, including internal gains, occupancy behaviour patterns, ventilation and comfort temperature.
- Housing unit energy loads. A summary table with the list of appliances and their corresponding consumption should be included.

#### Results and Discussions

- Housing unit energy performance on both, whole-house basis and system-by-system basis. Heat gains and losses by the building envelope.
- Predicted indoor temperatures in passive analysis.
- Appliances and HVAC systems selection criteria and description of the final design that minimizes the energy consumption and optimizes the comfort conditions.
- Predicted heating and cooling loads and appliances and HVAC energy demand.

**Notes:**

- Monthly and yearly results will be presented in both, numeric and graphical form.
- Team could include parametric of CFD studies realized for a house system or element optimization. Specific simulation related with a singular component of your project, experimental works or any other information that have helped the team in the house energy performance optimization.
- Appliances represent a major part of the total energy consumption. Teams should detail in this report the way they intend to minimize this consumption.
- Appliances' detailed characteristics and specifications must be appearing in the Project Specifications – Section 5 “Appliances and Home Electronic Equipment specifications and user manuals”, see Rule 49 \_ Project Specifications.

### **37.1.3 Section III – Adaptations made by the Team in the House for the Prototype in the Solar Village**

**House Adaptation**

In this section, Teams must underline the adaptations they have carried out in their houses for the Competition in the Solar Village. Indeed, houses designed for specific local contexts are not always suited for the Host City's climate and the prototype needs to be adapted. Teams have to be very clear about design elements or systems that have been added to their houses specifically for the Competition in the Solar Village.

**House, Appliances and HVAC Simulations**  
(two competition weeks in the Solar Village)

## **Rule 38 \_ Communications Plan**

Please refer to the Graphic Chart & Brand Manual.

### **38.1 Introduction**

Communication is one of the main strategies in any activity done by Teams and is made up of five basic elements: source, message, media, receptor and response. The first thing to consider is the message intended, the image to disseminate, the specific audience and the means with which to reach these audiences. As communication planning is a systematic process that cannot be left to improvisation or intuition, Teams must develop a Communication Plan, identifying the message(s) to transmit, adapting it to the different target groups.

Some of the basic activities that have to be carried out are the following:

- Analyse the starting point situation;
- Establish objectives, such as the questions “what do we want to achieve?”;
- Decide for whom is the communication for is meant;
- Think about the fundamental message to transmit;
- Determine the appropriate actions to convey the specific messages for specific audiences;
- Fix the budget for communication actions;
- Set timing, milestones and resources in a plan;
- Choose the means and the frequency to use them adequately;
- Develop a media plan;
- Measure the impact.

#### **38.1.1 Planning Process**

A plan is the result of an entire process, and it attends to the specific needs of each team. The Communications Plan is the document that articulates the communicative policy of a project and orients it towards materializing its vision of the future. Carrying out the correct planning for the communication implies an analytical and methodical process from which a rational choice of the objectives to be achieved can be deduced. It also means the selection of possible alternatives for action in order to be able to achieve them. It is most likely that no two Teams will have identical needs, which is why it is important to be able to count on the support and assessment of people trained in the subject (professionals or students with communication skills) to design a communication plan which is adjusted to the needs, resources and objectives of each team. These people could be:

- Students and Teachers of advertising, visual communication, journalism, marketing or public relations.
- Communications Department of the Faculty
- Consultants or Communications Agencies, Creative Directors, Art Directors, Copywriters, Graphic Designers
- Teachers and students of Graphic Design, Multi-media & Interactive media, Web Designers.

#### **38.1.2 Communications Plan Content**

The Communication Plan is the result of the above described process. Consisting of the following documents, it must be updated within each Deliverable, explaining the project development and progress.

#### **38.1.3 Communication Project**

Defines the message and establishes the target public and the specific approach to each of these groups, with calendar dates and planning, as well as budget for all these actions, filling in one single descriptive page for each action.

#### **38.1.4 Public Tour Description**

Describes the communication strategy which will be used for showing the project to public in SDE Solar Village.

### 38.1.5 Visual Identity Manual

Defines the “personality” of the project, establishing the physical and visual identity of the project for media appearances and communications tools.

### 38.1.6 Sponsorship Manual

Includes the information and advantages offered to sponsors and those interested in joining the Team’s project.

### 38.1.7 Material for the Project Dissemination

Teams shall send an Appendix to the Project Manual, including all the communication material generated up to the moment of the Deliverable.

### 38.1.8 Speed Peer Review

The Speed Peer Review is the live 3.5-minute presentation of the team objectives and house concept to the entire solar village at the start of the Competition.

## 38.2 Communications Project

The Communication Project must be submitted in Deliverable #3 and onwards, explaining the team’s intentions, plans and activities already realized to disseminate the project during its development. However, in Deliverable #6, Teams must only describe what was actually realized and document the results.

The Communication Project must include the following aspects:

### 38.2.1 Abstract

Synopsis of the Plan: 1 –2 pages

### 38.2.2 Analysis of the Situation

Includes the information necessary to understand and put in context the Plan, defining its strategy, stating the introduction, and broadly setting out the conclusions of the analysis, describing the most relevant factors. Teams may also include a SWOT plan (Strengths, Weaknesses, Opportunities and Threats).

### 38.2.3 Definition of the Communications Objectives

Includes the team’s goals aimed to achieve with the Communication Plan. There could be a single objective, which encompasses everything proposed by the Plan. However, it is much more common, to have a main objective supported by other specific objectives, which cover other areas; media dissemination, finding sponsors, awareness.

### 38.2.4 Identification of the Target Groups

Identify the groups of people to whom the team’s communication is addressed. It is clear that one of the target groups will be the communications media, although they are not the final target group. A correct and precise definition of each target group is essential when identifying messages and channels of communication appropriate to achieve our objective. At least Teams must consider the SDE target groups: children, teenagers, young people, Professionals and General Public. Regarding the means of communication, in order to make the information distribution process easier, it will be helpful to draw up lists, identifying to whom the Team must address its project.

### 38.2.5 Message/s Establishment

In general, our communication’s strategy will revolve around an axis message. However, when dealing with different target groups, it is also necessary to define the main message to transmit specifically to each of these groups.

### 38.2.6 Actions’ Description

Describe all the activities to be carried out during the project development. Teams are encouraged to include a timetable (where, at a simple glance, you can schematically have a complete panorama of the work to be carried out), and a budget (including the cost of each action and each element used). For example: cost of brochures, insertions in the press, communications agency fees or similar, merchandising costs, etc.

For classifying the actions, Teams may use the following structure:

### 38.2.7 Previous to the Competition

- addressed to three different scopes: university, city and country; and for the target groups identified. Nevertheless, international activities may be included.
- Team’s participation in events organized by themselves, or by others.
- Information on the project produced in any format, by the Teams or by third parts, from an article in a newspaper up to a collaboration with an art creator.

### 38.2.8 During the Competition

- Speed Peer Review presentation
- Public tours
- Leaflets / objects to be given to the public
- Audiovisual #2, to be shown at SDE Solar Village.

### 38.2.9 Tracking Table of the Communication Actions

Teams must include a table defining the following actions: Project appearances in national media (from the Team's country of origin) and / or international media if identified. All the materials generated for the team's dissemination, either done on Teams' or third parts' stands, different than media ones. Events organized or with confirmed celebration in the future. Teams must include the latest version (including ALL the information, not only that added after the latest Deliverable) of the tracking tables of the communication actions in each Deliverable.

### 38.3 Public Tour Description

Teams must describe the route proposed for the Public Tours at SDE Solar Village, from Deliverable #3 and onwards, indicating: access and exit of the lot (it must be located in the main road side); access and exit of the house; where the waiting lines will be formed, and controlled; the housing unit tour itself (a single route for all visitors). Teams must submit drawings showing the route and contouring: intersection paths' circle diameter, width of doors, corridors, crossings and narrow paths, demonstrating compliance with the accessibility requirements stated in Rule 51 \_ Building Codes Application. A complete visit description is required, indicating the stops established along the visit and how will the house's highlights be explained (if different explanations are planned for the different target groups, please include a brief description of each). Moreover, Teams must explain the types of visits' routes (if there is one decathlete going along with the visitors or if they are positioned in specific points), the time length, the languages available and the number of people per group. Teams intending to realize live demonstrations of the project's mobile elements (in case existing), must include sketch/s showing the adopted measures in order to guarantee public safety. If Teams plan any measure for sensorial or motor disabled, it must also be described. Teams must plan entertainment animation for the public while waiting the line (indicate any type of activity planned and its organisation). In order to verify compliance with the Rules, Teams will have to submit, before the final phase of the Competition, the design of the brochure (or) handout (or any other) object to be given out to the visitors. Please refer to Rule 12.4 Public Tour for further details. In the same way, any additional information sources must be described, indicating its format (such as posters or electronic means), location and content.

**Note: All this information may be explained either with drawing/s and/or on a written document.**

### 38.4 Team Visual Identity Manual

The first thing to be taken into account is the "personality" of the team that wants to be reflected in the Teams' image of the brand. Once it is defined, it is important to consider the following aspects at the time of developing the brand (branding):

- Simplicity – that it is legible, inviting & accessible to read
- Practical – that it can be used in any kind of media
- Consistent – in all of the elements that are used
- Unique - that it does not resemble any other brand
- Memorable – that it is easy to remember and identify
- Reflexive – that it reflects the objectives and values set out
- Connective – that it connects with the audiences to whom it is directed
- The way a company is perceived is through its corporate image. The corporate image might consist of one or more elements, which together or independently, achieve the same function, accentuate the behaviour and the soundness of the company's identity, as well as determining its characteristics and values.
- Teams must submit to the SDE21 Organisation in Deliverable #3 and onwards, a PDF version of the manual and an annex .eps, including the vector graphic versions of all the different components. The manual must be consistent with the SDE21 Organisation's manual, which will be available in the SDE21 WAT, and will include the design of, at least:
  - Name of the house and of the team.
  - Team's logo in its three possible versions (isolated, combined with the SDE21's logo, and combined with the team's supporting institutions and sponsors, in vector graphic format, and coloured and grey scale variations). Please refer to the Graphic Chart & Brand Manual.
  - Rules of use and possible compositions, including a legend or lotto, slogan or baseline, if intended.
  - All the Team's supporting institutions and sponsors' logos
  - The chosen typography with all variants used in the communication materials.

**Note: In each Deliverable, the Visual Identity Manual must be updated, containing all the information submitted in the previous Deliverables, as well as the developments realized. Before the final phase of the Competition, Teams must also include their uniforms design, in order to verify compliance with the SDE21 Rules.**

### 38.5 Sponsorship Manual

The sponsorship manual shall include:

- **Supporting institutions and companies' tracking:** consisting on a list of sponsoring/collaborating institutions and companies indicating their names, field of work and type of collaboration with the team, as well as the contact details of Team member in charge of the communication with the company or entity: full name, telephone and e-mail address. This contact information will be used by the SDE21 Organisation in order to assess the companies' implication impact in the Competition in their R&D (Research&development) activity in an international professional network. This information must be included from Deliverable #3 onwards.
- Presentations used to raise sponsorships

## Rule 39 \_ Neighbourhood Integration & Impact Report

Neighbourhood Integration & Impact Report must include the team's global strategy approach and must address population, geographical and urban development issues. This report must include the following sections:

- Urban Design Strategy
- Improvement of social opportunities, and economic and environmental benefits
- Individual or collective housing building concept
- Transportation and Mobility Strategies
- Integration into neighbourhoods including the relationship between the building, and neighbourhood infrastructure
- Proposal of Key performance indicators (KPI's) to be exchanged
- Affordability strategies that is described in the
- Innovation & Viability Report

This report must be submitted from the Deliverable #1 onwards.

### 39.1 Neighbourhood Integration Strategy

### 39.2 Transportation and Mobility Strategies

Teams must demonstrate how their location strategies and associated transportation systems can reduce both costs and energy impact of their proposals. They must describe how different kinds of transportation means are used according to what use. They must indicate how they take into account all generations and population classes. They should indicate how they imagine that energy resources produced by the project can meet living and transportation needs. They also have to explain how the project addresses the housing & transportation correlation issue as it affects the inhabitants.

### 39.3 Integration into neighbourhoods. Relationship between our building, and neighbourhood

Teams must demonstrate how synergies enabled from interoperability and how buildings must be integrated into the future smart city, impacting on the efficiency of social, economic, and environmental global approaches, defining how we must exchange key information among our building, through our BIM database and our management systems (CAFM, IWMS, BEMS,...), and neighbourhood with updated information from its environment (weather conditions, district information-Performance GIS, energy uses-SCADAS, utilities information). This interoperability should integrate users' behaviour and should meet both city and users' necessities. This interoperability should improve transportation, urban mobility, urban services, the efficient management of energy, the integration of distributed generation, emergencies, resilience of cities and communities, ...

### 39.4 Proposal of Key performance indicators (KPI's) to be exchanged

Teams must what kind of information and Key performance indicators (KPI's) must be exchanged with the surrounding buildings and the neighbourhood to improve the overall efficiency of the system, with not just energy aspects, but also with other urban services, transports, emergencies, resilience of cities and communities...

## Rule 40 \_ Innovation & Viability Report

### 40.1 Objective

The objective of the innovation report is that the Teams reflect in a document, in a systematic and organized way, all those innovative elements or systems, used for the design, development, construction and management of the proposals. Teams must demonstrate not only their innovative potential, but also proposals are social, technical and economically feasible.

## 40.2 Contents index and structure

The report structure shall correspond to the following index, including all elements that refer to the innovation of the proposal. In case that the required documentation has been already mentioned in another section of the Deliverable, it is not mandatory to incorporate again this information in the report but must be clearly indicated in which section of the Deliverable it is located.

### 40.2.1 Innovation

#### 40.2.1.1 Innovation in Architecture

New spatial and functional concepts at all scales (urban scale, building scale, living unit scale), new languages in the formal use of materials, use of textures, and the appropriate use of light. See Rules 15.1, 15.5, 23.1 and 23.5.

#### 40.2.1.2 Innovation in Engineering and Construction

Innovation concepts in projects' structure and construction systems as well as the innovation in the houses' services (plumbing, electrical, photovoltaic, etc.) See Rules 16.1, 16.5, 23.1 and 23.5.

#### 40.2.1.3 Innovation in Energy Efficiency

The active and passive innovative technological contributions maximizing the energy efficiency of the project; innovative ways to improve the hydrothermal comfort, air quality and daylight, as well as facilitating the perfect functioning of the project, and innovative aspects of house's systems, appliances and equipment. Innovation concepts in house functioning. Innovative concepts in coupling building and mobility solutions. See Rules 17.1, 17.5, 23.1 and 23.5.

#### 40.2.1.4 Innovation in Communication and Social Awareness

New initiatives proposed to attract the attention of the general public as well as specific public. See Rules 21.1, 21.5, 23.1 and 23.5.

#### 40.2.1.5 Innovation in Neighbourhood Integration & Impact

Inspiring proposals to provide new and innovative ideas about how the relationship among buildings and neighbourhoods must be tailored, and what kind of key information must be exchanged to improve global energy efficiency, improving city services performance, mobility, city resilience, etc. See Rules 22.1, 22.5, 23.1 and 23.5.

#### 40.2.1.6 Circularity & Sustainability

New approaches to improve Sustainable Facility & city Management evaluating new knowledge, innovative methodology and sustainable assessments open source tools to improve economic, social, and environmental performance in buildings, integrated into the smart city, and contributing to the European Sustainable Development objectives for the built environment. See Rules 23.1, 23.5, 24.1 and 24.5.

### 40.2.2 Viability

#### 40.2.2.1 Affordability

Teams must develop and defend affordable solutions in order to meet market demands and support the integration of project in social housing policies. Affordability will be one of the issues assessed by juries.

#### 40.2.2.2 Cost-Effective Strategies

Teams must define the decision-making process (specially in energy retrofitting proposals) based in cost-effective strategies. One of the more important challenges in Europe is to enhance Energy Buildings retrofitting from cost-effective strategies based on Commission Delegated Regulations, (Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings).

#### 40.2.2.3 Industrialization and Market viability

Defending the novelty of the proposals for industrialized houses, especially those that can be adapted to multifamily buildings; new attractive formulas that improve the perception of the users and industry towards these typologies of housing, thus favouring their future commercialization; New ways of business, promotion and commercialization of the product

#### 40.2.2.4 Other viability issues

Besides the precedent aspects, other viability issues can/must be addressed, as technical viability, ecological and environmental viability, urban viability, social viability, etc.

## Rule 41 \_ Circularity and Sustainability Report

### 41.1 Objective

The objective of the sustainability report is that the Teams reflect in a document, in a systematic and organized way, those elements related to the sustainability of the proposals, in such a way that they can be visualized as a whole and make a holistic vision possible as to how this variable has been integrated into the work that has been developed. Team must take into account that the sustainability evaluation will be done in the houses local context.

## 41.2 Contents Index and Structure

The Report must include the elements that relate the design proposal with the sustainability. The arguments may be based on the economic, social and environmental issues. The Report must contain the following sections:

### 41.2.1 General Concept of the Project and Sustainability

The relation of the general concepts of the house architecture and urban proposals with the sustainability must be briefly described. In this introductory section, Teams must explain what they understand by Sustainable Build Environment and how their understanding is reflected in their proposal at urban and dwelling scales.

### 41.2.2 Neighbourhood Integration, Transportation and Infrastructure

Briefly describe the project urban integration concepts in relation with the sustainability. Include the most relevant applied neighbourhood strategies, e.g. the reduction of the urban heat island effect or the way in which the team density proposal improves the sustainable conditions. Also, explain how the high-density solution fits with the social and economic sustainability. Teams must explain their strategies toward transportation and its relation with housing and energy efficiency. Public, low impact and energy efficiency transportation solutions associated to house, urban design proposal and project location. Teams shall describe the flexibility of the structure and possibilities for being reused, adaptability to future technologies, as well as the maintenance requirements. Additionally, the factors that directly influence the sustainability of the production of the houses and the economic viability of industrialization must be also explained.

### 41.2.3 Passive & Bioclimatic Strategies

This section must include the justification of the bioclimatic strategies (passive design strategies) selected and its relation of the sustainable construction. The functioning of the used strategies must be explained with figures or drawings. Some aspects to consider are:

#### 41.2.3.1 Project's Envelope

Justify the used building envelope types.

#### 41.2.3.2 Glazing

Justify the orientations, types and sizes of the house's openings.

#### 41.2.3.3 Daylight

Justify the selected daylight strategies (to ensure the optimal use of daylight and controls to provide sufficient but evenly distributed light).

#### 41.2.3.4 Space Planning

Justify the interior spaces distribution (according their heating and cooling requirements, and the use of thermal buffer spaces).

#### 41.2.3.5 Passive Heating Strategies

Justify the use of direct and indirect solar gains.

#### 41.2.3.6 Passive Cooling Strategies.

Justify the use of the selected cooling strategies, e.g. shading devices, natural ventilation, with night ventilation, evaporative cooling and night radiation.

#### 41.2.3.7 Thermal Energy Storage.

Justify the use of sensible or latent thermal energy storage systems (if applicable).

#### 41.2.3.8 Ventilation:

Justify the selected passive ventilation strategies.

#### 41.2.3.9 Hybrid or Semi-Passive System

Justify the selected semi-passive systems.

#### 41.2.3.10 Exterior Design

Explain how the exterior design solutions improve the microclimate around the dwelling and contribute with the dwelling sustainability.

### 41.2.4 Sustainability in Engineering and Construction

Justify the construction system used and its implications with the sustainable construction, including elements such as energy consumption, solid waste, water use, construction time, social and economic aspects.

### 41.2.5 Materials Selection

Justify the materials selection in relation with the sustainable construction. Include the finding of the LCA of the materials used (see the section 3 of the TEE Information guide and the Rule 30.6) and highlight the following aspects:

#### 41.2.5.1 Green Materials

Specify the presence of renewable, recyclable, reusable materials. Also, indicate the content of toxic substances.

#### 41.2.5.2 Embodied Energy

Calculation of the energy incorporated in the materials of the project, which can establish an energy / constructed m<sup>2</sup> factor.

#### **41.2.5.3 Embodied CO<sub>2</sub>.**

Calculation of the CO<sub>2</sub> incorporated in the materials of the project, which can establish a CO<sub>2</sub>/constructed m<sup>2</sup> factor.

#### **41.2.5.4 Maintenance Plan**

Describe the necessary tasks and the frequency of tasks.

#### **41.2.6 Active Systems and Equipment**

Justify the selected equipment and active systems (appliances, artificial lighting, hot water and HVAC systems), making reference to their contribution in the house energy efficiency and sustainability. Justify usage of BEMS, CAFM, or IWMS to improve demand energy management, or to improve efficient building operation

#### **41.2.7 Solar Systems**

Regarding the solar facilities, the documentation will reflect the relation of the system used with sustainability and must include at least following elements:

##### **41.2.7.1 Energy Recovery Time**

Calculation of the time that the PV system has to operate to recover the energy, and associated generation of pollution and CO<sub>2</sub>, that went into making the system. The annual calculations must be done with the local solar radiation and air temperature.

##### **41.2.7.2 CO<sub>2</sub> Emissions**

Calculation of the CO<sub>2</sub> emissions savings associated to a year of functioning, as well as the CO<sub>2</sub> emissions savings associated to the PV panels' production.

##### **41.2.7.3 Accessibility**

Describe how provide necessary maintenance.

##### **41.2.7.4 Integration (BITPV)**

Describe your strategy for Building Integration Thermal and Photovoltaics.

##### **41.2.7.5 Efficiency of the implemented system**

Describe how you foresee the global efficiency of your Solar Systems, estimated losses, and these have been minimised.

#### **41.2.8 Water**

Justify the water management strategies, as well as water saving and treatment systems. This section must include:

- Project' general water use, management and conservation concept
- Strategies for the reduction of consumption
- Re-collection system
- Treatment of waste water
- Greywater system
- Recycling, reuse
- Rain water use
- Expected final water consumption, including the comparison between this consumption and the consumption of a similar dwelling in the local context.

#### **41.2.9 Solid Waste**

Briefly explain the solid waste strategy of the project, including the following sections:

##### **41.2.9.1 Construction Phase Assessment**

Specify the final destination of the materials involved in the construction process. Include the percentages (in mass) of the solid waste final destination. The final materials destination may be garbage tip, an incineration system, reuse or recycling.

##### **41.2.9.2 Management of Domestic Waste**

Description of the solutions contemplated for the management of the domestic waste from the house.

##### **41.2.9.3 Building Operation and Maintenance**

Specify the proposed solution to manage the domestic waste from the house, and material that need to be replaced during the use of the project.

##### **41.2.9.4 End of Life Assessment**

Specify the final destination of the waste generated in during the disassembly or demolition works, once the project has come to the end of its useful life. Recycling and reusing possibilities at the end of life.

#### **41.2.10 Life Cycle Analysis**

The argument of this section must include the findings of the assessment carried out using the tool and instructions indicated in the Thermal and Environmental Evaluation (TEE) Information Guide, see Rule 30.8. The use of the same LCA methodology and tool permit compare the participating houses on a common basis.

#### **41.2.11 Circularity and Circular Economy approach**

To define products and services to design waste out, while minimising negative impacts. Approach to Circular model to build economic, natural and social capital, underpinned by a transition to renewable energy sources.

**Note: In case that required documentation has been already included in another section of the Deliverable, it is not mandatory to incorporate again this information in this report but must be clearly indicated in which section of the Deliverable it is located.**

## Rule 42 \_ Dinner Party Menu

Teams will have to submit the dinner menu, indicating:

- Name of the courses and drinks
- List of ingredients and quantities per course
- Food preparation
- Enclosing an image of every course
- Cost evaluation of the menu
- Energy consumption for cooking evaluation
- Nutrition data compared to guest needs
- Local content of ingredients (according to local context)

## Rule 43 \_ Contest Week Tasks' Planning

In the general timetable of actions Teams will include the planning given by the SDE21 Organisation for the realization of the tasks sub-contests during the Contest Week. This timetable will help the team and the SDE21 Organisation to provide the resources needed and plan it in advance.

## Rule 44 \_ Cost Estimate and Project Financial Summary

Teams will have to submit the Cost Estimate and the Business and Fund-Raising Plan, including updated information and details, from one Deliverable to the next. This section should provide a clear understanding of the costs associated with the project and the need for fund raising, how that fund raising is planned, and whether there are available or obtainable equipment, instrumentation, and facilities.

### 44.1 Business and Fund-Raising Plan

Teams are required to submit plans that describe their overall project, including a projected budget and fund-raising plan. The plan should include a description of each team's interactions with other departments involved in fund raising (e.g., the school's development office), identify key sponsors, and describe the means by which these sponsors may be reached.

### 44.2 Cost Estimate and Project Summary Budget

Teams must provide complete, current, and accurate cost or pricing. A project summary budget is required according with the price cost proposal form (available in the SDE21 WAT). The following guidelines help Teams fill in the cost estimate table.

#### 44.2.1 Direct Materials

Direct materials are normally purchased parts, purchased items or services (e.g., welding, minor fabrication etc.), raw materials, standard commercial items, interdivisional transfers at other than cost, etc. All direct materials should be identified separately on an attached sheet with the quantity, unit price, and total amount provided.

Further, price/cost proposal should indicate whether the unit price for each direct material item was determined and documented using written vendor quotes, catalogue prices, prior invoices, engineering or shop estimates, or some other method with an explanation provided. Provide supporting documentation (cost or pricing data) such as the written vendor quotes, copies of the catalogue page indicating the price, or prior invoices for all direct material items.

#### 44.2.2 Material Overhead

If accounting system includes material overhead, propose such indirect costs in this area. Indicate the rate(s) used and provide an appropriate explanation.

#### 44.2.3 Direct Labour

Direct labour should indicate the hours, hourly rate, and total for each individual or category of labour proposed.

#### 44.2.4 Labour Overhead and Fringe Benefits

If accounting system includes labour overhead, propose such indirect costs in this area. Indicate the rate(s) used and provide an appropriate explanation. If fringe benefits are not included in direct labour and are not a portion of the labour overhead, identify fringe benefits in this area and provide the same type of information concerning fringe benefits as required for labour overhead.

#### 44.2.5 Lower-tier Subcontractors

Identify each proposed lower-tier subcontractor and obtain a cost proposal containing the same information and in the same format from each proposed lower-tier subcontractor. Consultants: Identify each proposed consultant and the estimated budget of their services.

#### 44.2.6 Other Direct Costs

Include any direct costs not covered by one of the other cost elements in this area. A detailed list of each cost item including description, and estimated budget is required. An example of this type of costs could be general and administrative expenses, indirect expenses, security activities and services, cost of models, communications costs etc.

#### 44.2.7 Travels and Costs for Final Phase in the Host City.

The travels costs will be, for some universities, an important chapter of their budget. It must be defined the number of team members and the unit cost estimated of travels, transports, expenses allowance, lodging accommodations and miscellaneous expenses.

#### 44.2.8 Insurance Policies

According with the MOU (Memorandum of Understanding) that will be signed between the SCHOOL or UNIVERSITY and the SDE21 ORGANIZATION, “their respective officers, directors, employees, agents, contractors, subcontractors, and representatives (the “Released Parties”) from any and all claims, losses, expenses, and demands, including those resulting from injury or death to any person or damage to any property, arising from the SCHOOL or UNIVERSITY’s work on or participation in the Event or any activities incidental thereto”. Liability Insurance costs, transport insurance, accidents and medical insurances, must be included in the estimated budget of the project.

Additionally, Teams will have to clearly specify the **Total Construction Cost of the House**, indicating the items exclusively corresponding to the construction process and materials. Teams may do so underlining the items in the above-mentioned cost estimate or elaborating a Construction Cost Budget apart.

**Note: All costs are calculated including Value Added Taxes (VAT). Local expenses are calculated with local VAT rate. Expenses in the host country are calculated with national VAT rate.**

## Rule 45 \_ Site Operations Plan

### 45.1 Objective

The Site Operations Plan (SOP) is an executive document for planning, specific for each team, in which they must take into account all of the activities, resources, needs and deadlines. The Plan has to guarantee the assembly and disassembly of the house with logic, order and total safety. Every team must hand in its Plan to the SDE21 Organisation, who will draw up the general Site Operations Plan of SDE Solar Village that will harmonize the needs of all Teams and avoid interference. The SDE21 Organisation will revise all of the Site Operations Plans of the Teams to verify their efficiency and identify possible conflicts between them.

The SDE21 Organisation will develop a general Site Operations Plan of SDE Solar Village; based on the information sent by the Teams in their Site Operations Plan. This is why it is very important for the plans to be as specific as possible. The SDE21 Organisation draws all competing Teams’ attention on the fact that this document acquires a specific value in the Competition process since Assembly Phase is part of the Construction Contest evaluation. Teams need to provide the jury with a clear and well-illustrated SOP in order to score points in this contest.

### 45.2 Content & Structure

The Site Operations Plan will be required from Deliverable #3 onwards and will have to comply with all the requirements specified in Rule 4 \_ SDE Solar Village. Information will be updated and specified along with the project development, including further details in each Deliverable. The plan consists of the Site Operations report (to be included in the Project Manual) and the Site Operations drawings (to be included in the Project Drawings). The Site Operations report must include at least the following sections:

*Table 33. Site Operations Plan Contents Structure*

|   |   |
|---|---|
| 1.0 General data                          | This part must describe general data, aim and deciding factors.   |
| 2.0 Site Operations Coordinators          | Names and contacts of each Site Operations Coordinator (One per construction working team).   |
| 3.0 Logistic outside of SDE Solar Village |   |
| 3.1 Trucks route                          | Map and brief description of the trucks route.  |
| 3.2 Trucks specifications and shipments   | This part must include for each truck the type of vehicle, order of entry, dimensions, load per axle of each vehicle, turn ratios, specifications of the load to be transported (including dimensions and weights of all the elements) and machinery use for unloading. |
| 4.0 Logistic in SDE Solar Village         |   |
| 4.1 Infrastructures                       | Description of all the infrastructures that will be installed on the lot during the assembly and disassembly phases.  |
| 4.2 Construction working teams            | Construction site working team's composition, including one Site Operation Coordinator in each team.  |
| 4.3 Phases description                    | Description of all phases of assembly and disassembly process. For each phase, it must include at least working teams' members, necessary timing and necessary machinery.   |
| 4.4 Waste management                      | Description of the team waste management strategy.  |
| 5.0 Assembly / Disassembly schedules      | Schedules summarizing all assembly and disassembly processes. Must appear: all assembly and disassembly phases, trucks presence, cranes presence and working teams on site.   |
| 6.0 Equipment requirement Chart           | Teams must fill in this file, available in the SDE21 WAT.   |
| 7.0 Assembly & Disassembly Chart          | Teams must fill in this file, available in the SDE21 WAT  |
| 8.0 Site Operations Chart                 | Teams must fill in this file, available in the SDE21 WAT  |

The Site Operations drawings must include at least the following sections:

*Table 34. Site Operations Sections*

|                          |   |
|--------------------------|---|
| SO-001 Trucks shipment   | Trucks drawing including shipment view.   |
| SO-101 SDE Solar Village | Must include a brief description of SDE Solar Village using the drawings that will be given to the Teams by the SDE21 Organisation, technical and spatial constraints of the Village and the way to solve them will be identified. Must include at least truck route into SDE Solar Village and waste disposal areas that will be used by the team. |
| SO-102 Lot plan          | Must include at least lot accesses, loading/unloading area with the truck footprint, the crane footprint and the stock area(s).   |
| SO-201 Phases            | 3D graphics illustrating the assembly and the disassembly phases. Must show the construction evolution and for each phase, crane, trucks and stocks positions.  |

**Note: These documents will be evaluated by the Engineering and Construction jury for the construction contest.**

## **Rule 46 \_ Health & Safety Report and Documents**

The Health & Safety Report, as well as the Health & Safety Specific Terms and Conditions Document, are part of the HS Plan of the project. Please refer to Rule 52 \_ Health and Safety for further details.

## **Rule 47 \_ Detailed Water Budget**

The water budget information may either be split between the Project Drawings and this section of the Project Manual or provided entirely in the Project Drawings. If the information is split, make sure this section of the Project Manual is clearly referenced on the relevant drawing sheet(s).

## Rule 48 \_ Electrical and PV Design Systems Information

The Electric and PV design system information have two parts the One-line Diagram and the Electrical and PV Chart and Checklists. These documents permit verify regulation compliance and prepare the monitoring system for the Electrical Energy Balance contest. The Electric and PV design system documents have direct relation with the information in the Project Manual. However, they are not part of the Project Manual. As stated in the Rule 30.4.10, the one-line diagram must be included in the Electrical drawings. The Electrical and PV Chart and Checklists must be submitted as an independent document, see more details in Rule 48 \_ Electrical and PV Design Systems Information.

### 48.1 Electrical and PV Chart and Checklists

Teams must complete and submit the "Electrical and PV Chart and Checklists". This is a document that includes the "Electrical and Photovoltaic Chart", "Electrical System Design Checklist", "Photovoltaic Checklist" and "Electrical Storage System Checklist". "Electrical and PV Chart and Checklists" will be included in an Appendix. Teams must use the MS Word template which will be available in the SDE21 WAT. Completed "Electrical and PV Chart and Checklists" documents must be sent as an independent document along with other Deliverable documents (Project Drawings, Project Manual, etc.) from Deliverable #3 onwards. These documents must be submitted as four independent MS Word files. In addition to complete the chart and checklists, Teams must include in the Project Manual all necessary information to evaluate the conformity of their proposals (certificates of compliance, calculus, etc.). Teams must locate the required information indicated on the checklists. Teams that do not send the required documents and information will not be allowed to include the following elements: DC Loads, hard-wired battery bank and battery inverter, and special grid voltage and/or frequency, fire protection on DC side.

## Rule 49 \_ Project Specifications

The following structure organizes all the different divisions of the project construction specifications. If there are no specifications under a particular division, simply delete that division's bookmark EVERY specification shall be clearly referenced on one or more relevant sheet(s) in the Project Drawings. Hyperlinks between references in the drawings and corresponding specifications in the Project Manual is greatly appreciated, but certainly not required because current software does not seem to facilitate this level of construction document integration. Develop a clear, consistent method to differentiate competition house specifications (and drawings) from competition house alternate specifications (and drawings). See Rule 6.5 Competition Prototype Alternates for more information about alternates.

- Structure
- Foundation
- Structural floors and sections
- Architecture
- Enclosure
- Openings
- Partitions
- Finishes
- Furnishings
- Systems Installations
- Fire Suppression
- Plumbing
- HVAC
- Electrical
- Solar Systems – Photovoltaic and thermal
- Telecommunications and Building Automation
- Safety Information
- Fire Safety table (Template will be available in the SDE21 WAT)
- Safety in Use table (Template will be available in the SDE21 WAT)
- Appliances and Home Electronic Equipment specifications and user manuals

### **Appliances and Home Electronic Equipment (specifications and user manuals).**

#### **This section must be submitted from Deliverable #4 and onwards, and must include:**

- The “Appliances and Home Electronic Equipment Tables” (filled out by the Team). In these tables, Teams will include all the appliances and equipment that they plan to use for the Contest 6 House Functioning, indicating the compliance with the requirements stated on Rule 23.5 Evaluation Template of these tables will be available on the SDE21 WAT.
- Appliances specifications and user manuals. With the technical specifications, Teams will justify the Rules compliances related with capacity, volume, as well as other important information as their energy consumption and energy class (label). The user manual help to know the appliances general characteristic and cycles options.
- C). Home electronic equipment basic specifications and user manuals. With the technical specifications, Teams will justify the Rules compliances related display sizes, as well as other important information as their energy consumption and energy class (label). The user manual help to know the appliances general characteristic and display brightness setting (Rule 23.5 Evaluation ).

#### **Notes:**

- Only include the sections of the appliances’ user manuals related with the appliances general characteristics, cycles and energy consumption.
- From the TV and Computer display user manuals, only include the sections related with their general characteristics, energy consumption and display brightness setting.
- If there are not English versions of the manuals or specifications, Teams must include copy of the documents in the original language and an English translation of the parts that justified the Rules compliance.
- Teams intending to use energy saving programs during the Final Phase of the SDE21 Competition must communicate it to the SDE21 Organisation.
- As stated in Rule 23.5 Evaluation , SDE21 Organisers will define the appliances’ cycles that will be used during the Competition.

## Rule 50 \_ Structural Calculations

Structural calculations include the houses and all site components (terraces, railings, ramps, stairs, etc.). These calculations must comply with the requirements stated in the Rule 51.3.1.1 Structure reliability. For structural aspects not covered by the SDE Building Code the structural designer will use requirements stated in their local Building Code.

As required in Rule 6.1.1 Structural Design Approval, a qualified licensed professional must certify that the structural provisions of the Solar Decathlon Europe Building Code have been met by the design, and that the structure of the house, terraces and all site component is safe to be used and visited by the general public, if it has been built as designed. Each team must submit structural drawings and calculations that have been signed and stamped by this qualified licensed professional, and the Team is responsible for construct and assembly their houses following these signed structural documents.

If there are any change in the house or site component that require an adjustment or modification of the signed structural design or details, a qualified licensed professional must certify that the new or revised structural solution met the SDE Building Code structural requirements and it is safe to be used and visited by the general public.

In the case that structural requirements of the local Building Code are more restrictive than the SDE Building Code, it is recommended that the Team follow their local Build Code (the most restrictive one). In that way, the house will can be assembled in SDE Solar Village and also in the Team's country.

### 50.1 Structural calculations justification

The structural calculations justification must have the following sections:

#### Justification

The justification of the adopted structural solutions, including a description of the house bearing system and the list of codes used for the design and construction.

- A description of the materials and its resistant properties.
- Actions carried out. Particularly, the different wind hypothesis of pressure/suction over the envelope will be detailed making use of sketches.
- Loads combinations made and safety factors used. Loads considerations during the house transportation, assembly and disassembly.
- Calculations model's) description, identifying the software (program object and application field), indicating the adopted simplifications, the methodology of the analysis done, specific models of singular areas where traditional material resistant theories can't be applied, edging or supporting conditions, type of connections, etc.
- Tensional and distortional verification results, explaining the representation of the software or calculations results obtained, indicating the phases or hypothesis in which dreadful efforts are produced, and covering all the different phases (transport, assembly and use).
- Deflection calculations and tabulated results. Applicable expansion, contraction, and crack-control measures.
- Superficial footing design, indicating soil bearing pressure of each footing (For further details, please refer to Rule 4.4).
- Structural fire resistance justification, according to the team's country of origin national codes.

**For materials not being considered in the Rules, Teams must submit a document signed by a competent technician. This document justifies the resistant properties of the materials and the design, from a structural safety point of view, considering the actions indicated in their national codes.**

## section 4.0: sde building code

**NOTE: Rules in this section are provided in this version of the SDE21 Rules only for reference. These will be updated to reflect the building codes and safety laws of the host country before the Team Selection takes place.**

Although there is some degree of overlap between the two, it is important to note some crucial distinctions between the Solar Decathlon Europe Rules and the Solar Decathlon Building Code. The Rules primarily exist to promote a fair and interesting competition. The Building Code primarily exists to protect the public health and ensure safety. Failure to comply with the Rules may result in official warnings, penalties point, or disqualification from the Competition. Failure to comply with the Building Code may prohibit the participation of the house in any aspect of the overall competition. Therefore, compliance with the Building Code is a prerequisite for participation in the Competition.

### Rule 51 – Building Codes Application

**The SDE Building Codes will be revised prior to team selection to adhere to European & the Host City's local laws and regulations.**

#### 51.1 General Criteria

Due to the international character of the Competition, it has been decided that the participating universities will use the Building Code and Regulation of their country for the designing the houses. All the participating countries have similar regulations developed with recognized reliability and safety. The only exception that will be made to the above is concerning health and safety, in which case the European Community or local regulations will be applied. Each team shall submit a certificate assuming the compliance of the country of origin codes signed by the faculty advisor. By signing this document, the faculty advisor certifies that the house complies with all the codes of the country of origin, and so the house is safe for the public to enter if it has been built as designed. Teams are responsible for complying with the European Union or the Host City's Building Code regarding Health and Safety. Technical revision of the proposals will include a risk analysis of the different proposals, evaluated neutrally, making those suggestions and recommendations deemed necessary to guarantee the safety of the people in accordance with local regulations.

#### 51.2 Applicable Codes

The Solar Decathlon Europe Construction Code includes an extracted selection of the most significant safety aspects that the local construction regulations enforce to. The following regulations have been adopted as a reference for the drawing up of the Solar Decathlon Europe Building Code.

##### 51.2.1 General Construction Regulation in Hungary

###### 51.2.1.1 Applicable codes

- Hungarian Government Decree 211/2012 (VII. 30.) amending the 253/1997 (XII. 20.) Government Decree about the National Requirements of Building and Town Planning (Building Code)
- Act LXXVIII of 1997 on the formation and protection of the built environment

###### 51.2.1.2 Electrical regulation

- Act LXXXVI of 2007 on Electricity
- Government Decree No. 382/2007. (XII.23.) of the Government on the Procedures of the Authority Licensing Construction in the Electricity Sector

###### 51.2.1.3 Accessibility of disabled people

Housing and public buildings:

- Act XXVI of 1998 on the Rights and Equal Opportunities of Persons with Disabilities
- Hungarian Government Decree 211/2012 (VII. 30.) amending the 253/1997 (XII. 20.)
- Governmental Decree about the National Requirements of Building and Town Planning (Building Code)

#### 51.3 Fire Safety

Housing and public buildings:

- Act XXXI of 1996 on Fire Protection, Rescue and Fire Service
- Decree 54/2014. (XII.5) of Ministry of Interior on National Fire Prevention Rules

#### 51.3.1.1 Structure reliability

- Hungarian standard MSZ EN 1990:2011 - Eurocode: Basis of structural design
  - Hungarian standard MSZ EN 1991-1:2005 (Eurocode 1 parts 1-1 to 1-7) and Hungarian National Appendix associated.
- Depending on materials used:
- Eurocodes 2, 3, 4, 5, 6 or 9, Hungarian National Appendix associated,
  - Hungarian recommendations on EC2 application.

#### 51.3.1.2 Hungarian technical building codes, including:

- Hungarian Governmental Decree 211/2012 (VII. 30.) amending the 253/1997 (XII. 20.) Governmental Decree about the National Requirements of Building and Town Planning (Building Code)
- Act LXXVIII of 1997 on the formation and protection of the built environment

The building is meant to be representative of a single-family housing unit, and since it will be open to the public in general, in accordance with the regulations contained in the Building Code, the following will be taken as the scope of applications: single-family home and public building concurrency. As only a part of the buildings will be visited in the guided public tour, two different code requirements have been established: Public Areas – Parts of the buildings which form part of the guided tour.

Restricted Areas: Parts of the buildings of exclusive use by the participants and accessible for the juries.

## 51.4 Fire Safety

The valid Fire Safety Regulation in Hungary is the OTSZ (National Fire Regulation 5.0) 54/2014 (XII. 5.) BM decree. For the prototype buildings at SDE21 competition – although they could be regarded as temporary buildings – must follow the Rules related to the permanent buildings, as they should be a typically used solutions for both professionals and citizens.

There will be two workshops in 2018 to prepare the Competition, and there will be lectures about the main important features of fire regulation in Hungary as well as opportunity for personal consultation of the university teams.

The right understanding of the OTSZ – however it is available in English – needed practice in fire regulation field. To help the preparatory phase we summarize below the most important requirements related to the prototype buildings. The Hungarian requirements is based the European Fire Regulation with some national specialties / provisions.

The requirements are valid for both two options:

#### Category 1

New roof on a rectangular one storey building represent a vast majority of Hungarian detached houses

#### Category 2.

Rooftop apartment based on two level of containers (about 5 m height) representing a multi storey building renovation on an 8mx10 m steel joist platform.

### 51.4.1 Requirements

**The requirements for category 1 are written bold, and for category 2 are written in italic.**

#### (1) Structures

- the loadbearing walls and its bracing should be at least **D\*\***, **REI 30\***; *D*, *REI 60*
- the loadbearing columns and its bracing should be at least **D\*\***, **R 30\***; *D*, *REI 60*
- the interior and ceiling slabs should be at least **D\*\***, **REI 30\***; *D*, *REI 45*
- the loadbearing structure of the roof slabs and its over 60 kg/m<sup>2</sup> should be at least **D\*\***, *REI 15\**
- the building envelope of the roof (up to 60kg/m<sup>2</sup>) should be at least **D\*\***, *REI 15\**
- the loadbearing structure and covering of the stairs of escape routes inside the building should be at least **D\*\*\***, **R30 \***
- the material of the loadbearing structure of the open stairs in escape routes should be **Al\*\*\***
- the floor covering should be minimum **Dfl - sl \*\*\***
- in escape route the wall covering (and inside acoustic and heat insulation) **B-s2**, the vertical covering over the head (and its acoustic and heat insulation, and its open wires) should be at least **B-s2**, **d0**, **g0**; **B2ca-s2**, **d0**, **g0**
- the raised floors in escape route should be minimum **D\*\*\*** *REI 15\**

#### (2) The roof covering should be at least **Broof(t1)\*\*\*\***

(3) If the roof space is built in, between the rooms and the roof structure an envelope should be erected which meet the requirement of the roof structure (**REI 15\***).

(4) In the built-in attic area, the roof structure need not to be covered if the component fire performance meet the requirements of the roof loadbearing structure (**D\*\*\***, **REI 15\***) and the joints are suitable for the required fire resistance.

(5) The fire propagation between the living area and the unused part of the roof should prevent during the time of the requirement of the loadbearing slab.

(6) Built in roof situation the insulation should be of **Al-E\*\*\*** reaction to fire class,

(7) Reaction to fire class of the thermal insulation and the waterproofing membrane should be **Al-E\*\*\*** for roof structures with a maximum weight of 60 kg/m<sup>2</sup> and waterproofing system should have a fire classification of **Broof(t1)\*\*\*\***

(8) The transparent part of the roof light must be minimum **D d0\*\*\***

(9) The load bearing structure of the roof (carpentry) should be at least **D d0\*\*\***

(10) in category 2 the fire propagation on facade requirement is **Th ≥ 45 minutes**

**Explanations:**

\* fire resistance class according to EN 13501-2

\*\* detailed requirements are given in the Decree 54/2014. (XII.5) of Ministry of Interior on National Fire Prevention Rules (OTSZ).

\*\*\* Reaction to fire class according to EN 13501-1

\*\*\*\* Fire class according to EN 13501-5

**51.5 Safety in Use**

**51.5.1 Safety Against Falls**

**51.5.1.1 Slipperiness of the floors.**

In order to avoid the risk of slipping, floors included in house tours shall comply with the following degrees of slipperiness:

*Table 35. Required floor classes depending their location*

| Location and floor characteristics  | Class (*)                           |
|---|-------------------------------------|
| Dry interior areas  |                                     |
| Surface's slope less than 5%  | T2, R10                             |
| Surface's slope equal to or greater than 5%. Stairs included.   | T3, R10                             |
| Humid interior areas, such as building entrances from the outside (direct access to restricted areas excluded), roofed terraces, bathrooms, toilets, kitchens, etc. |                                     |
| Surface slope less than 5%  | T4, R11                             |
| Surface slope equal to or greater than 5%. Stairs included.   | T5, R11                             |
| Exterior areas  | T5, R11                             |
| Floors are classified according to their resistance as follows:   |                                     |
| Floor classification in accordance with the angle of inclination  |                                     |
| Class   | Demand for the angle of inclination |
| R9  | 6 - 10                              |
| R10   | 11 - 19                             |
| R11   | 20 - 27                             |
| R12   | 28 - 35                             |
| R13   | ≥35                                 |

Floor classification in accordance with the Pendulum Test Value

| Class | Demand for the Pendulum Test Value, PTV |
|-------|---|
| T1    | 0 - 19                                  |
| T2    | 20 - 34                                 |
| T3    | 35 - 39                                 |
| T4    | 40 - 44                                 |
| T5    | ≥ 45                                    |

The Slip Resistance of Pedestrian Surface value used to justify the use of floors is determined according to the test method described in standard CEN/TS 16165 (<https://standards.cen.eu/>)

Thus, it is necessary to protect dry/interior areas from exterior areas with effective carpets, eventually in a closed entrance.

Floor classification in accordance with the Pendulum Test Value

| Class | Demand for the Pendulum Test Value, PTV |
|-------|---|
| T1    | 0 - 19                                  |
| T2    | 20 - 34                                 |
| T3    | 35 - 39                                 |
| T4    | 40 - 44                                 |
| T5    | ≥ 45                                    |

The Slip Resistance of Pedestrian Surface value used to justify the use of floors is determined according to the test method described in standard CEN/TS 16165 (<https://standards.cen.eu/>)

Thus, it is necessary to protect dry/interior areas from exterior areas with effective carpets, eventually in a closed entrance.

#### 51.5.1.2 Uneven flooring.

With the exception of restricted or exterior areas, in order to limit the risk of falling, as a consequence of tripping or stumbling, the floor should meet the following conditions: It must have no imperfections or irregularities which have more than 5 mm difference in level. The projected pavement elements, isolated and small (i.e. door locking devices) shall not be projected from pavement more than 20mm, and projections of more than 6 mm at its opposing sides, in the direction of the circulation of the people must not form an angle of more than 45°. In interior circulation areas, the floor shall not have perforations or holes through which a sphere of 20 mm diameter may pass. Areas of circulation may not have a single step, or two consecutive ones, with the exception of areas that are not part of the house tour.

#### 51.5.1.3 Differences in the floor level.

In order to limit the risk of falling, there will be protective barriers in differences in level, holes and openings (both horizontal and vertical), balconies, windows, etc. where the difference in the floor level are more than 400 mm, except when layout makes falling improbable or when a barrier is incompatible with the intended use.

#### 51.5.1.4 Restricted Areas stairs.

Stairs from non-public areas shall comply with the following conditions (in accordance with Hungarian Building Code):

- The clear width of the tread shall be at least 0.80 m.
- When handrail encroaches on the foot plate, the width of the stairway is measured at the base of the handrail.
- In absence of riser, successive steps must be overlapping each other by 15° from vertical.
- The riser shall be 0.17 m maximum, and the tread at least 0.26 m considering that 2 risers+1 tread should be equal 60-64 cm. The tread area is measured on each step.
- In curved stairs, the tread is measured on the stair's axis when it is 1.20 m wide. If the stairs width is bigger, the tread will be measured at a distance of 0.60 m of the narrowest side. In addition, the tread will measure at least 0.05 m in the narrower side and 0.44 m in the wider side.
- Stairs will have handrails on at least one side. Handrails' height must be 0.95m. Handrails are to be longer than stair flights without creating a barrier to the horizontal circulation. And handrails will distinguish from walls by means of a special lighting or visual contrast.
- If the stair has no wall on one side, then a protective barrier must be set up. This protective barrier may act as a handrail. The height must be 0.95 m. In case of intermediate landing this height should be 1.00 m

#### 51.5.1.5 Public Areas Staircases.

Public stairs must comply with:

- All steps must have the same riser and all steps from straight stretches of stairs will have the same tread. The width of the tread shall be at least 1200mm. All steps must have riser. Successive steps could overlap each other by 15° from vertical.
- In straight stretches of stairs, the tread will measure at least 300 mm. In the straight stairs or curved stairs, the riser will be at least 150 mm maximum. In curved stairs, the tread will measure at least 300 mm at a distance of 600 mm from the inside edge.
- Each flight will have at least 3 steps and cover 1.80 m maximum in height without intermediate landing. The clear width of the flight will be at least 1.20 m, and obstacle free.
- Stair landings arranged in flights on a staircase in the same direction will have at least the stair width, and 1200 mm length measured from its axis.
- Stairs will have handrails on both sides. Handrails' height must be 0.95 m. Handrails are longer than stair flights and exceed the first and last riser of a distance equal to a tread dimension. And handrails will distinguish from walls by means of a special lighting or visual contrast.
- Treads should be highly visible and high contrasted for dim-sighted persons. Especially in stair landings, a visual and tactile floor covering must raise visibility at a distance of 500 mm from the first step.

#### 51.5.1.6 Ramps.

According to Hungarian Building Code 66. § ([https://net.jogtar.hu/jr/gen/hjegy\\_doc.cgi?docid=99700253.KOR](https://net.jogtar.hu/jr/gen/hjegy_doc.cgi?docid=99700253.KOR)), all access to public buildings have to comply with the following:

- All public access must be horizontal and even. When a difference in height cannot be avoided an inclined surface with a slope inferior to 5% has to be created. Slope values are exceptionally tolerated:
  - up to 8% for a length inferior or equal to 2.12 m,
  - up to 10% for a length inferior or equal to 1.50 m.
- A resting landing is considered necessary at the lower and the upper part of any ramp, whatever its length can be. For any ramp with a slope higher than 5%, a resting landing is required every 9m. Resting landings must integrate in the geometry of the ramp and must provide a minimal 1.50 m length. Ramps which change direction on landings 1.50 m x 1.50 m rectangular free space should be provided to manoeuvre the wheelchair.
- When it cannot be avoided a 20mm difference of level of the ramps' surface can be tolerated. This unevenness must present rounded or chamfered edges. This maximum unevenness can exceptionally be 40 mm if the difference of level presents, on its complete height, a slope inferior to 33%. Curved ramps should be avoided to minimise hazards.
- Ramps minimal width must be 1.20 m. In order to facilitate cross-ways an accessible ramp should be 1.80 m wide at least or should have appropriate space provided on intermediate landings to wheelchair users pass each other.

- When narrowing cannot be avoided a local reduction to a minimal width comprised 0.90 can be exceptionally accepted. Water evacuation must be provided. In all cases, transversal slope will be no more than 2%. Manoeuvring spaces must be laid out on each side of each doors, besides bathrooms, showers and toilets doors. A manoeuvring space is characterized by a free-space circle of 1.50 m dimension in diameter.
- Ramps assigned to disabled people, shall have continuous handrails on both sides. Free edges must have skirting boards of elements for side protection of at least 100 mm high.
- Safety for avoiding trapping and impact risk

#### **51.5.1.7 Impact due to fixed elements.**

The clearance height in house tour areas will be at least 2 200mm. The height of the threshold of the door will be at least 2 040 mm. Fixed elements projecting from facades and located in circulation areas will be at least 2 200mm in height. In house tour areas, walls preferably shall not have projected elements which do not start from the ground. Any objects projecting more than 100 mm between 300 mm and 2100 mm above ground level into an access route should be clearly visible and needs to be detectable with a cane.

#### **51.5.1.8 Impact due to opening elements.**

In public tour areas, doors on the sides of the hallway shall be arranged so that the sweep of the door does not invade the hallway and leaves a circular free-space of 1.50 m in diameter on both side of the door.

#### **51.5.1.9 Impact due to fragile elements and not very perceptible elements.**

Glazed (glass) walls and fully glazed doors shall be clearly marked with visual indicators. Large glazed areas close to circulation spaces could be mistaken for openings. Uninterrupted visual indicators of at least 75 mm height with a difference in light reflectance values of minimum 60 to the background shall be placed at a height of 900 mm – 1 000 mm and 1 300 – 1 400 above floor level. An additional visual indicator placed at a height of 100 mm – 300 mm is recommended.

#### **51.5.1.10 Trapping.**

In order to restrict the risk of trapping produced by a manual sliding door, sliding on the surface of the wall, the distance to the nearest fixed element will be at least 200 mm.

#### **51.5.1.11 Safety against the risk of inadequate lighting**

In house tour areas, light fittings must provide a minimum illumination level of 20 lux for exterior areas and of 200 lux for interior areas.

## **51.6 Accessibility for People with Disabilities and Special Needs**

### **51.6.1 Access to the interior of the building.**

The route of the house tour must be accessible. At least one entrance to the interior must be free of architectonic barriers and obstacles that block the access. Public tour routes, which communicate main road access to the house, and traffic areas between interior public spaces, must meet the following specifications:

- Circulations will be adapted for handicapped people; the volume of its development will be continuous, made up of the length of the route, and an area of 1.20m wide perpendicular to the floor. The only exception permitted is narrowing with the maximum length 0.50 m and minimum width of 0.90 m.
- Level differences must be solved by means of ramps, in accordance with Rule 51.4.1-Ramps. Steps are not permitted.
- In the Public Tour Route, where there are turns of 180°foreseen, the minimum unobstructed area available shall inscribe a circle of 1.5 m of diameter.
- In the Public Tour Route, the minimum width of the doors will be 90 cm, providing there is an unobstructed space for the movement of the doors of 1.50\*1.50 rectangular free space, both before and after them. A manoeuvring space of not less than 550 mm shall be provided between the leading edge of a door and a wall that is perpendicular to the doorway. This space is necessary to permit opening of the door by a wheelchair user or a walking frame user. This requirement does not apply where automatic doors are provided.

## **51.7 Structural Safety**

### **51.7.1 Dead loads.**

The dead load to consider consists of the weights of structural elements, enclosures, dividing elements, partitions, all carpentry types, coatings, fillings, fixed equipment and all permanent loads. In general, the dead load characteristic value of the constructive elements will be determined as its mean value, between its nominal dimensions and its specific mean loads.

Dead load of (moveable) partitions can be considered as uniformly distributed loads and can be added to imposed loads.

### **51.7.2 Imposed loads.**

Imposed loads characteristics values

The imposed load includes all the forces (weights) that vary within the building's normal operation cycle. Uniform load and localized loads for Use category - Housing are used (Use Class A). The following table includes the loads to apply:

Table 36. Imposed Loads List

| Use sub-category | Uniform load qk [kN/m <sup>2</sup> ] | Localised load Qk [kN] |
|------------------|--------------------------------------|------------------------|
| Floors           | 2,0                                  | 2,0                    |
| Stairs           | 3,0                                  | 3,0                    |
| Accessible roofs | 3,0                                  | 3,0                    |

(Hungarian standard MSZ EN 1991-1-1 ([www.mszt.hu](http://www.mszt.hu)) and its Hungarian National Appendix (NA) attached to the standard)

According to Hungarian standard MSZ EN 1991-1-1 and its National Appendix (NA) handrail, parapets or catchments of terraces, oriels, balconies or stairs must resist a uniformly distributed horizontal force, applied at 1.20 m or, in case being located below this height, over the element's superior edge. The value of this force will be 0.5 kN/m for restricted areas (Use Class A, Class B and Class C1) and 1.0 kN/m for public areas (Use Class C2-C4 and Class D).

Uniformly distributed loads of (moveable) partitions depend on their dead load as follows: qk = 0,5 kN/m<sup>2</sup> for partitions with a dead-load of ≤ 1,0 kN/m, qk = 0,8 kN/m<sup>2</sup> for partitions with a dead-load of ≤ 2,0 kN/m and qk = 1,2 kN/m<sup>2</sup> for partitions with a dead-load of ≤ 3,0 kN/m.

Wind factors and wind loads for houses and multi-storey buildings must be compliant with Hungarian standard MSZ EN 1991-1-4 ([www.mszt.hu](http://www.mszt.hu)) and its Hungarian National Appendix (NA) attached to the standard.

Snow factors and snow loads for houses and multi-storey buildings must be compliant with Hungarian standard MSZ EN 1991-1-3 ([www.mszt.hu](http://www.mszt.hu)) and its Hungarian National Appendix (NA) attached to the standard.

### 51.7.3 Safety factors. Safety factors that must be considered

Ultimate Limit State Design

Partial Safety Factors for Strength of Materials

Table 37. Safety Factors of Materials

| MATERIAL         | FACTOR   |
|------------------|--|
| Concrete         | $\gamma_C = 1,50$  |
| Corrugated steel | $\gamma_S = 1,15$  |
| Structural steel | $\gamma_{M0} = 1,05$ (plasticity)  |
|                  | $\gamma_{M1} = 1,05$ (instability)   |
|                  | $\gamma_{M2} = 1,25$ (last resistance, material and joints)  |
|                  | $\gamma_{M3} = 1,1$ (sliding resistance of ELS pre-stressed screw joints)  |
|                  | $\gamma_{M3} = 1,25$ (sliding resistance of ELU pre-stressed screw joints)   |
|                  | $\gamma_{M3} = 1,4$ (sliding resistance of pre-stressed screw joints and almond shaped holes or with over measure) |

The following safety factors will be considered for the calculation of the design loads:

Table 38. Safety Factors of Design Loads

| ACTION                                  | ADVERSE           | BENEFICIAL                                 |
|---|-------------------|--|
| Dead Load                               | $\gamma_G = 1,35$ | $\gamma_G = 1,00$ for STR and 0,90 for EQU |
| Imposed Load, Wind Loads and Snow Loads | $\gamma_Q = 1,50$ |  |

### 51.7.4 Load Combinations. -

The following ELU load combinations, corresponding to normal control, will be considered: Loads denomination:

- Gk: Dead load and self-weight
- Qk: Imposed loads (Q1 Determinant variable action) Permanent or transitory situation:
  - $1.35 G + 1.50 Q1 + \sum 1.50 \psi_{0,i} Q_{k,i}$

This hypothesis will be considered for the following situations depending on the determinant imposed load.

- Imposed use
- Wind in direction 1
- Wind in direction 2
- Snow

In addition, the following combination factors will be considered for the calculation combinations determination:

Table 39. Calculation Combinations

| ACTION   | Combination factor $\gamma_0$ |
|--|-------------------------------|
| Walkable roofs imposed load of use                         | 0,70                          |
| Roofs only accessible for maintenance imposed loads of use | 0,00                          |
| Stories imposed loads of use                               | 0,70                          |
| Wind   | 0,60                          |
| Snow   | 0,50                          |

### 51.7.5 Load bearing pressure

Will be defined at a later stage.

### 51.7.6 Exterior and Interior impacts resistance

No special requirements.

## 51.8 Electricity and Photovoltaic System

### 51.8.1 Grid Interconnection

The Photovoltaic system will be connected to the electricity distribution network following a single-phase configuration (connection to the phase and neutral).

The interface between the Photovoltaic system and the electricity distribution network shall comply with the international standard IEC 61727 (Photovoltaic (PV) systems - Characteristics of the utility interface), that regulates the grid interconnection of low-power electricity generation installations- Photovoltaic systems up to 100 kW to Low Voltage electricity distribution networks).

### 51.8.2 UTILITY COMPATIBILITY

#### 51.8.2.1 Voltage, current and frequency

Nominal voltage and frequency in Hungarian Low Voltage distribution networks are:

Voltage: 230 V (phase-neutral). Frequency: 50 Hz.

#### 51.8.2.2 Normal voltage operating range

Normal voltage operating range is defined by the following limits:

Over voltage: 230 V +10%; Under voltage: 230 V – 15%

#### 51.8.2.3 Normal frequency operating range

Normal frequency operating range is defined by the following limits: Over frequency: 50 Hz +0.5 Hz -

Under frequency: 50 Hz – 2 Hz

#### 51.8.2.4 Over/under voltage and frequency

The photovoltaic system shall disconnect from the utility system (grid) whenever voltage or frequency are outside the specified ranges. To this aim, an automatic switch will be used to guarantee protection against over/under voltage and frequency. This switch can be integrated in the inverter, in which case it shall comply with the Hungarian Low Voltage Electro-Technical Regulation. These protections will be sealed by the local utility, regardless whether they are integrated in the inverter or not. Over/under voltage and over/under frequency are defined by the following limits and maximum trip times (maximum time limits below which the protections must be activated):

Overvoltage and maximum trip time: equal or over 230+10% = 253 V and 1.5s Undervoltage and maximum trip time: equal or under 230-15% = 195.5 V and 1.5s Overfrequency and maximum trip time: equal or over 50+ 0.5 = 50.5 Hz and 0.5s Underfrequency and maximum trip time: equal or under 50-2 = 48 Hz and 3 s

#### 51.8.2.5 Response to utility recovery

The photovoltaic system shall automatically reconnect to the utility system whenever the voltage and frequency have recovered to within the specified nominal ranges. If over frequency protection is activated, reconnection to the utility system will be only done when frequency reaches a value less or equal to 50 Hz.

#### 51.8.2.6 Earthing

Earthing of the photovoltaic system equipment shall be done without disturbing the earthing of the utility distribution system, ensuring that no defects are transferred to the distribution network.

See Rule 4.4 Footing for Ground Penetration limits.

The photovoltaic system shall guarantee galvanic separation between the Low Voltage distribution network and the photovoltaic system, by means of an isolation transformer (included in or external to the inverters) or by any other means fulfilling the same function, based on state-of-the-art technological development. In this sense, inverters with high-frequency transformers or transformerless inverters are permitted, provided that the inverter(s) manufacturer(s) provides a certificate guaranteeing that the maximum DC current to be fed into the grid is smaller or equal than 0,5% of the nominal output current of the device(s).

Teams must include in the project documents certificates of the inverters manufacturers that demonstrate compliance with the galvanic separation requirement as well as with other requirements of the Hungarian Regulations mentioned in Rule 51.7 (for example, protections against over/under voltage and frequency).

### 51.8.2.7 Short circuit protection

### 51.8.2.8 Isolation and switching

The photovoltaic system shall include the following protection devices at the utility interface:

A general emergency switch for DC current must be set up, closed to photovoltaic system, and remote controlled from electric box of the house, near to the house general circuit breaking system. This general emergency switch must provide the isolation level required by the Hungarian Regulation. This switch will be accessible to the electricity distribution company in order to be able to perform a safe manual disconnection of the photovoltaic system.

An automatic Residual Current Device, for personnel protection against indirect contact.

### 51.8.2.9 Inverters

DC cables remain at exterior of the house as most as possible, and then enter directly in mechanical room. In the best case, inverters are positioned at exterior, on house roof. In other cases, DC cables remain only in mechanical room, in a protected path. This path must resist during 30 minutes to the fire.

A circuit breaking system is installed to switch off simultaneously all inverters. This inverters emergency circuit breaking system will be visible, near to house general circuit breaking system, and these two general switches must be identified by quoting: «Warning: presence of tension sources: 1-Distribution grid 2-Photovoltaic panels», in black letter with yellow background. Furthermore, a pictogram representing photovoltaic risk must be indicated at exterior of the house, on mechanical room door and on DC cables every 5m.

### 51.8.2.10 Electricity system.

For electrical system is understood all collection of equipment and circuits associated to a particular purpose: electrical energy production, conversion, transformation, transmission, distribution or use. The distribution systems of the supplying companies and providing a safety level at least, comparable to the one indicated above. The equivalent safety techniques application must be justified properly by the installation designer and approved by the competent Governing Body.

### 51.8.2.11 Regulation Compliance

In order to verify the regulation compliance, Teams must complete and submit the “Electrical System Design Checklist”, “Photovoltaic Checklist” and the “Electrical Storage System Checklist”. These checklists are part of the “Electric and PV Chart and Checklists” document. See details in Rule 48 \_ Electrical and PV Design Systems Information. Additionally, Teams must furnish in the Project Manual all necessary information to evaluate the conformity of their proposals (certificate of compliance, calculus, etc.).

Teams must locate the required information in the places indicated on the checklist.

## 51.8.3 Water Use

### 51.8.3.1 Plumbing installations. - Projects have to comply with:

Standard series MSZ EN 12056 ([www.mszt.hu](http://www.mszt.hu)) - Gravity drainage systems inside buildings.

Government Decree 201/2001. (X.25.) on the quality requirements of water intended for human consumption and the Rules of quality control. This decree also sets up the Rules of the approval procedure of construction products in contact with water intended for human consumption.

### 51.8.3.2 Greywater.

Water coming from bathtubs, showers, bath sinks and clothes washers is considered greywater.

As stated in Rule 8.5, greywater may be used for irrigation and cleaning. Greywater may be reused to water vegetation or for cleaning purposes if it is first processed by an approved greywater reuse system which avoids undesired organisms (see Rule 9.2 Watering Restrictions). Teams are not permitted to transport manually greywater from the tanks to the vegetation’s location or location to be cleaned. The approval of the greywater system by the SDE21 Organisers will only be effective at the Solar Village in the Host City during the public event. The greywater systems will be approved evaluating each particular case and considering the following criteria:

No black water source can be connected to a greywater storage or distribution system. Water coming from kitchen sinks and dishwashers is considered black water. As a reminder, the water closet will not be connected to the sewage disposal system during the event. This leaves bathtubs, showers, bath sinks and clothes washers as the only available sources for connection to a greywater storage/use system. As stated in Rule 8.5 only treated greywater can be reused. The greywater treatment system must be adequate for the water intended use. Teams that pretend to use any water treatment system must send the appropriate information to the SDE21 Organisation, indicating the fixtures connected to the greywater system, the pipes system and tanks and any other discharge points. A note must be included, indicating the safety label for any greywater reuse system. Additionally, they must submit documentation that certifies that the selected water treatment is safety, and the treated water does not pose a risk for human health, in their proposed use.

## Rule 52 \_ Health and Safety

**NOTE: Rules in this section are provided in this version of the SDE21 Rules only for reference. These will be updated to reflect the building codes and safety laws of the host city & country before the Team Selection takes place.**

The main objective regarding health and safety is to prevent incident or accident to occur during each phase of the Competition, including the truck delivery. As stated in Rule 3.3, “each team is responsible for the safety of its operations and each team member and team crew member shall work in a safe manner at all times during the project.” Due safety is an area of major importance for the SDE21 Organisers of the Competition; great emphasis is going to be made to confirm that the Teams are complying with:

**Planning and executing a safe process of production:** all along the project development Teams must plan and develop every single phase of the Competition considering Health and safety requirements as a must.

**The European Union and/or Hungarian law for the Prevention of Labour Risks** (Health and Safety at Work). This is absolutely mandatory, since the event is located in Szentendre. The General Coordination Plan in Hungarian (legal version) and an English translation will be available on the WAT (Official Communications/, Exchange/, Rules and related documentation/, General Coordination Plan).

### 52.1 Hungarian Applicable Regulation

The prevention of risks must be integrated during the preparation, assembly, executing, maintenance and disassembly of the Solar Decathlon Europe 2021 event. The Teams must comply with the regulations based on the International Labour Organisation (ILO) and the corresponding European directives, especially the Hungarian law for the Prevention of Labour Risks (Health and Safety at Work). Considering Health and safety (HS) in the workplace, the actions to be done during this competition are regulated by the Labour Regulation from Hungary, member of the European Union. Health and Safety Hungarian regulation focus on the analysis of risks for persons related to construction works, and the way to resolve them. Any other safety regulations (safety in use, structural safety, etc.) belong to other areas of this Competition and therefore are not included in this Rule. The workplaces and their management must comply with the applicable laws, regulations and orders, notably: Decree no. 94-1159 of December 26-1994 for all work in the workplace, in accordance with the law 93- 1418 about HS coordinator activity. Decathletes may be subject to the risk of accidents during the construction of the houses. These risks are mainly the same as those labour accidents regulated in the aforementioned Hungarian law. The same law is applicable for all the contracted staff. As a result, Rule 52 of the SDE21 Rules is based on the Health and Safety Hungarian Regulation, and it is mandatory for all the Team members. We draw your attention to the fact that each team must get organized in order to take into account the provisions resulting from the General Coordination Plan that is about Health and Safety Protection and notably the two following elements:

- For the operation’s design and implementation phases, a safety coordinator has been appointed in order to organize the Health and Safety coordination between the various participants in the workplace.
- The present document, entitled General Coordination Plan relating to Safety and Health Protection is an open- ended document that is reviewed and updated by the coordinator based on the progress of the work.

Each team must therefore take into account, in its organisation of the work, the information elements detailed in the General Coordination Plan relating to Safety and Health Protection, bearing in mind that this document may be subject to changes or additions that will be brought to your attention during the work. The General Coordination Plan will be available on the WAT (Official Communications/Exchange/Rules and related documentation/General Coordination Plan). The Hungarian version (legal version) and a translated one will be provided.

### 52.2 Reminder of the General Prevention Principles

- Avoid risks;
- Evaluate unavoidable risks;
- Combat risks at source;
- Adapt work to manpower;
- Take into account the technical evolution;
- Replace dangerous items with safe ones or less dangerous ones;
- Plan safety measures before the work begins;
- Use collective protection prior to individual ones;
- Give the appropriate instructions to the workers.

## 52.2.1 Work Phases

To comply with the two aforementioned objectives (complying with Hungarian regulation and developing a safe process) there are four different steps to be made:

- Process of analysis;
- Health and Safety Plan (HS Plan);
- Preparing for construction works;
- Construction works.

### 52.2.1.1 Step 1: Process of analysis

Safety measures must be defined as the consequence of the analysis of the assembly, maintenance and dismantling of the house. The suggested process is as follows:

**Breakdown the PROJECT** in work-units or activities. For example, foundation execution, façade assembly, installation of PV panels, etc.

**Identify the TASKS** to be developed in each work-unit, among others: transport, unloading, stock up, on- site layout, assemble, etc.

- For example, the structural tasks for a modular house will consist on:
  - Transporting the module
  - Unloading the module
  - Stocking the module
  - Making the on-site layout
  - Laying the module on site
  - Assembling the module with the rest of the structure.

**Identify the AGENTS** (human resources, machinery, materials, etc.)

that take part in each task: Following the previous example:

- The truck
- The load
- The Health & Safety Operations' coordinator responsible for managing the work
- The workers

**Identify the RISKS** associated to each task, advising of the MEASURES to take for solving them:

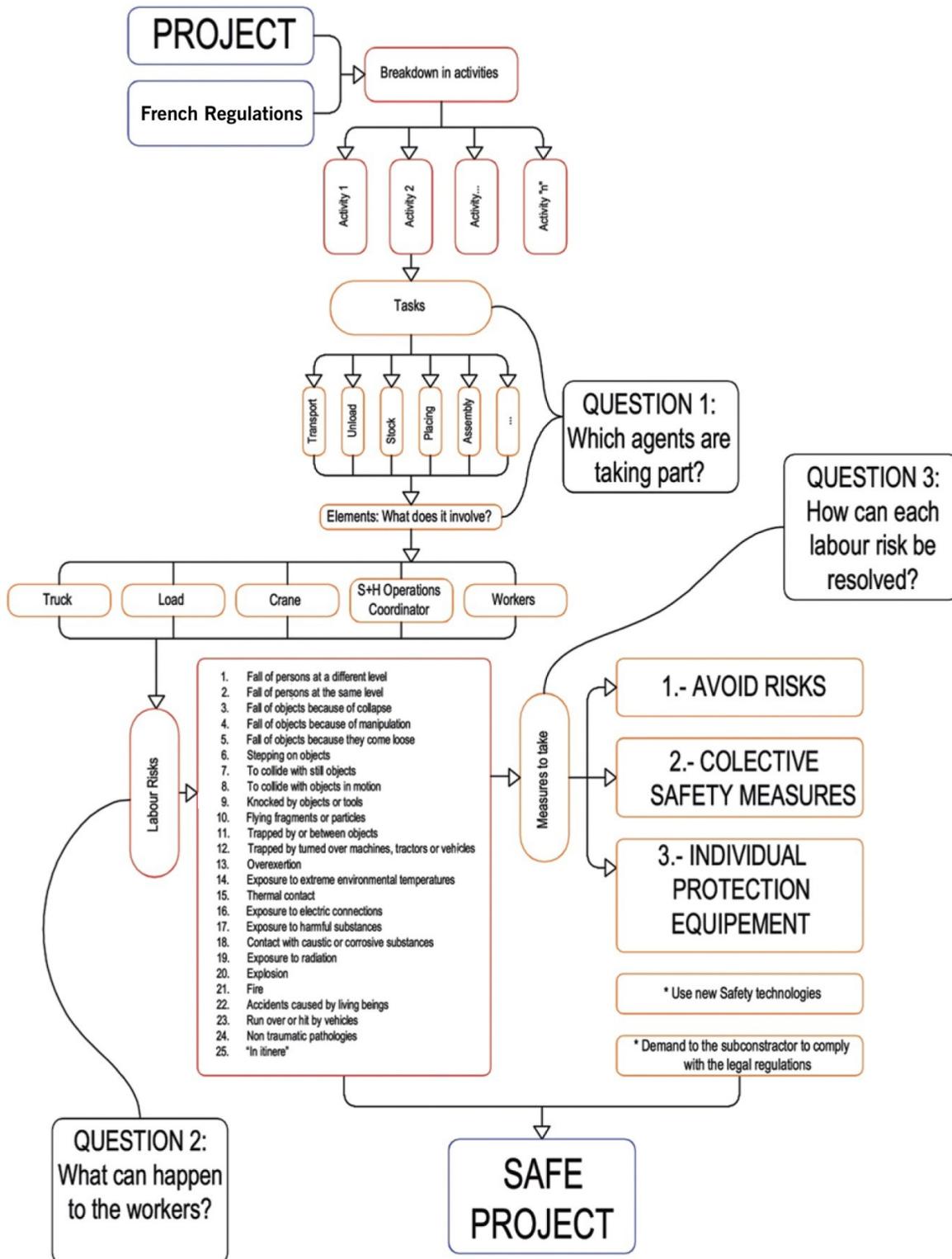
Following the previous example:

- **Task 1:** Unloading module
  - **Risk 1a:** getting knocked down by the transport truck in the working area.
  - **Solution 1a:** Certified truck driver, marking circulation ways separated from the worker's path, etc.
  - Risk 1b: ...
  - Solution 1b: ...
- **Task 2:** laying the module on site
  - **Risk 2a:** getting knocked down by the load.
  - **Solution 2a:** controlling the load with ropes from at least four opposite points, keeping workers far away from the module; Crane controller with specific license, etc.
  - Risk 2b: ... Solution 2b: ...

Figure 22 shows the Process of Analysis explained above, which aim is to answer three questions:

- Which agents (elements) are taking part? Identify the decathletes, workers, machinery, auxiliary resources, etc.
- What can/would happen to the team members? For each task, carefully examine what could cause harm to the people. Therefore, identifying the hazards, who might be harmed and how.
- How can each risk be solved? Describe the measures to be adopted to solve each risk.

Figure 22. Process of analysis of the Health and Safety Plan



The following list is based on the list of labour risks established in the Hungarian Regulation.  
For the risk Analysis, select those which may take place in every work unit.

**25 risks**

- Fall of persons at a different level
- Fall of persons at the same level
- Fall of objects because of collapse
- Fall of objects because they come loose
- Fall of objects because of manipulation
- Stepping on objects
- Colliding with still objects
- Colliding with objects in motion
- Knocked by objects or tools
- Flying fragments or particles
- Accidents caused by living beings
- Trapped by or between objects
- Trapped by turned over machines, tractors or vehicles
- Overexertion
- Exposure to extreme environmental temperatures
- Thermal contact
- Exposure to electric connections
- Exposure to radiation
- Exposure to harmful substances
- Contact with caustic or corrosive substances
- Explosion
- Fire
- Run over or hit by vehicles
- Non-traumatic pathologies
- “In itinere”

It is important to remember that the Risk Analysis must cover not only the construction process, but all the activities of the SDE21 Competition: project development, previous works at university, decathletes training, transport, assembly, maintenance during competition, disassembly, etc.

**52.2.1.2 Step 2: Health and Safety Plan**

The main objective of the Health and Safety Plan (HS Plan) is preventing and solving any incident that may arise during the construction works and must include assembly and disassembly in SDE Solar Village, maintenance during contest week, and vehicles accesses and exits to the Village.

All the HS documents will be a useful guide for the Team about the know-how to carry out the activities.

Each team will write a document called Health and Safety Plan specific to the workplace and be in charge of its practical application on site. This document will be in response to an in-depth risk analysis of all situations related notably to:

- Performance of tasks
- Joint or successive activities,
- Environment and surroundings of the workstations and jobsite,
- Direct or indirect risks for persons, property and the environment that the performance of the operation could directly or indirectly entail, etc.
- This document will be analysed by the HS Coordinator. Each team must update its HS Plan according to all observations done through the "H&S plan analysis" report.
- REMINDER OF THE LEGAL CONTENT OF THE HS Plan
- Name and address of SDE21, HS Coordinator, Prevention authorities, Team Number of workers
- Contact information of the site operation coordinator Description of works
- First aid procedure
- Name and number of first aid certificated worker
- Description of the Team's first aid kit.
- Description of hygiene conditions (toilet, changing room, restroom...) Detailed description of operating modes
- Risk assessment –risks generated by other, risks generated by environment, risks generated on other and self-generated risks
- Procedures to adapt collective protection

The HS Plan must explain and describe the aforementioned process of analysis. HS Plan will be required from Deliverable #3 onwards. Information will be updated and specified along with the project development, including further details in each Deliverable.

The plan consists of:

- Health and Safety Drawings (**HS Drawings**), to be included in the corresponding section of the Project Drawings.
- Health and Safety Report (**HS Report**), to be included in the Project Manual, in the Health and Safety Plan Section. Proper reference to drawings location should be made every time needed.
- Health and Safety Specific Terms and Conditions Document (HS Particular Conditions Document), to be included as well in the Project Manual, in the Health and Safety Plan Section.

The HS Plan must be developed according to the following explanation, updated as many times as necessary, approved and posted on the Team's lot wherever it is accessible to all persons working there and to the SDE21 Organisers.

### 52.2.2 HS drawings

HS Drawings, required in Rule 30.2, must clearly define the safety measures to adopt in every work phase. As minimum, must consist of:

- Identify the work Phases, determining the activities to be developed in each one, the risks associated and the safety measures adopted to solve them.
- Specify the Number of Team members and their corresponding task
- Collective protections to be used (position in each phase, details for its installation, etc.)
- First aid area inside the lot (first aid bag)
- Delimit the different areas inside the lot
- Determine the location of the most important elements for each work phase: movement of trucks, movement of modules (any heavy load in movement), position of crane, position of scaffolding, etc.
- Individual Protections to be used
- Signposting
- Emergency evacuation plan during the assembly and disassembly periods (corresponding to item 17 of the HS Report).
- The evacuation plan must show the procedure in case of emergency or accident, and must include at least: Drawings indicating the evacuation path
- Route to the closest health centre Procedure to follow in case of accident Emergency phones, assurance ID, etc.
- As mandatory, the Evacuation Plan must be kept visible inside the lot (using, for example, a waterproof mobile signpost) during the final phase of the Competition. Moreover, each Team member must have a copy of it and keep it with him during their working periods.

**Note: The SDE21 Organisation suggests Teams to develop the HS Drawings as assembly sketches of each unit, step by step, including all the aforementioned information for a better understanding of the adopted measures and its effectiveness.**

### 52.2.3 HS Report

The HS Report is the document that complies the application of laws about HS coordinator activity. For the SDE21 Competition, a report with the following sections will be considered compliant:

### 52.2.4 HS Template

- Health and Safety Checklist
- General data of the project
- Health and Safety Plan Objectives
- Conditions of the site where construction will take place, and interesting data related to the prevention of risks during the construction process.
- Constructive process
- Type and characteristics of the materials and elements c). Site description
- Climate description
- Accesses and paths for vehicles
- Determining factors for the house placing
- Overlaps with the affected services and other circumstances or activities of the environment, able to cause risks during the construction
- Planned activities
- Trades whose intervention is affected by the risks prevention j). Auxiliary resources planned for the construction
- Machinery planned for the construction l). Construction site installations
- Characteristics table for the stocks

### 52.2.5 Activities for risks prevention

Collective protections to use:

- Construction plan: determination of work effective timing.
- Overlaps and incompatibilities in the construction
- Number of Team members taking part in the construction
- Contracting planned
- Critical work phases for risks prevention
- Risks identification and efficacy evaluation of the adopted protections
- Location and identification of the areas where the works involving special risks will be developed.
- Risks identification and efficiency evaluation of the adopted protections

Individual protection resources to use:

- Signposting of the risks
- Safe working procedures of every Team member
- Machinery and auxiliary resources

Planned Measures in case of accident:

- First aids
- First aids bag
- Preventive medicine
- Accident victim evacuation

Risks identification for possible later works:

- Useful plans and information for possible later works
- Adopted system for the level of health and safety control during works
- Formation and information about health and safety
- Emergency evacuation plan during the assembly and disassembly periods

Annex 1: Identification of risks and evaluation of the efficiency of the adopted protections.

Annex 2: Identification of risks for possible later works.

Table 40. Health and Safety Checklist

| LEGAL CONTENTS  | LOCATION IN THE REPORT OR IN DRAWINGS |
|---|---------------------------------------|
| Name and address of SDE21, HS Coordinator, Prevention authorities, Team |                                       |
| Number of workers   |                                       |
| Contact information of the Site Operations Coordinator                  |                                       |
| Description of works  |                                       |
| First aid procedure   |                                       |
| Name and number of first aid certificated worker                        |                                       |
| Description of the Team's first aid kit.                                |                                       |
| Description of hygiene conditions (toilet, changing room, restroom...)  |                                       |
| Detailed description of operating modes                                 |                                       |
| Risk assessment – risks generated by other                              |                                       |
| Risk assessment – risks generated by environment                        |                                       |
| Risk assessment – risks generated on other                              |                                       |
| Risk assessment – self-generated risks                                  |                                       |
| Procedures to adapt collective protection                               |                                       |

HS Specific Terms and Conditions Document

For the SDE21 Competition, the following documents are required:

- A statement in which the Team commits itself to avoid or minimize the risks derived from the work process.
- A statement in which the Team commits itself to envisage the health and safety demands from all the people taking part in the project (decathletes, sub-contracted workers, etc.), and in which the Team declares to have considered those demands in the HS Plan.
- Complete technical specifications of the collective protections that shall be used.
- Complete technical specifications of the individual protections that shall be used.
- A description of the terms and conditions of the Safety Plans that each Team member has to comply with.
- A statement that all the Team members have passed specific medical examinations for the works that they will carry out and have the necessary qualifications. All Team members shall be properly identified in this statement and it shall clearly specify that all are of legal age.
- A statement that the Team has received the specific training to assemble and disassemble the house that will be exhibited, preventing unexpected risks. All Team members shall be properly identified in this statement.

For contracted staff:

- Medical examinations of the workers
- Specific training
- A statement of compliance with the Health and Safety Plan

If necessary, a specific description of the adaptation of their own procedures to the Health and Safety Plan.

Examples of the documents will be available through the SDE21 WAT.

#### 52.2.5.1 Step 3: Preparing for construction works

The third step consists on developing all the previous measures planned to prevent risks. As described in the HS Report, in order to prevent risks, all the staff shall:

- Receive the appropriate training for the tasks that they will have to carry out: using machinery, power tools, etc.
- Obtain driving licenses and the necessary certificates (or licenses) for trucks, motorized platforms and all the necessary auxiliary measures.
- Attend first-aid courses.
- Undergo medical examinations.

All the certificates and documents derived from these activities shall be included in the HS Report (section 16), and in the HS Specific Terms and Conditions Document (sections 6 and 7).

**Note: The SDE HS Area encourages all Teams to practice the assembly and disassembly processes prior to the Final Phase of the Competition in Szentendre. This training may help minimize the hazard chances at SDE Solar Village by facing real risks', having a realistic feedback and identifying improvement areas. The team training is an important safety measure.**

#### **52.2.5.2 Step 4: Construction works General requirements**

During the final phase of the Competition, Teams shall always keep in mind the measures described in the HS Plan, which are those that they have decided to assume.

The Teams shall analyse all the solutions before starting with the works in order to avoid unexpected risks. Accordingly, Teams may modify the actions described in the HS Plan. For this end, Teams have to inform the SDE HS Area immediately and wait for their approval, as any change shall at least ensure the same safety level.

During the assembly, maintenance and disassembly the Team must identify and provide all the safety and associated controls that are necessary to ensure a safe work site and activities such as:

- Providing adequate lighting to safely perform work
- Establishing work schedules/shifts to ensure Team members have adequate rest to safely work on site (see Rule 52.7.4)
- Identifying other considerations related to the work each Team member will be performing.

During the assembly, maintenance and disassembly of the houses, it is mandatory to obey all the orders and instructions given by the SDE HS Area.

Conditions for site access and working authorization

#### **SDE Health and Safety Area**

As part of the SDE21 Organisation, the SDE HS Area is the group of people in charge of Health and Safety, working to help Teams comply with the HS established objectives.

The SDE HS Area consists of:

**HS Coordinator:** Person in charge of all the Area and Director of all the works. He is the Health and Safety Coordinator of SDE Solar Village during the construction, in compliance with Hungarian Regulations.

**HS Inspectors:** People helping the HS Coordinator with the Health and Safety activities: checking out Deliverables, realizing inspections during the construction, etc. During the HS Coordinator's absences, HS Inspectors have the same authority.

**HS Observers:** As a complementary preventive measure, during the construction, the HS Area is supported by observers, which will inform of any incident taking place to the HS Coordinator. They may not give any type of orders to the Teams.

The members of the SDE HS Area will be in constant contact with the SDE HS Coordinator. In case the works involve serious and imminent risks, the HS Coordinators or HS Inspectors will have the power to stop the works because:

- A "serious and imminent labour risk" is the one which is rationally probable to take place in an immediate future and may mean a serious damage for the health of the workers.
- In case of exposition to agents susceptible to causing a serious damage to the health of the workers, it will be considered that there is a serious and imminent labour risk when an exposition to the mentioned agents is rationally probable to take place in an immediate future and would cause serious damage to health, even when they are not evident immediately.

#### **52.2.6 HS Plan Approval**

The Final HS Plan will be considered acceptable only when the SDE HS Coordinator certifies that all items are properly developed. When Teams have their HS Plan with an acceptable level, the SDE HS Coordinator will issue them a certificate of approval. Without the certificate of approval, the Team will not be authorized to assemble the house in the corresponding lot at SDE Solar Village. Once the HS Plan has been accepted, the participating Teams are responsible for making updates whenever the parameters change, and ask for a new approval. For example, if the Team did not plan to use a crane to place your house when your plan was submitted, but later on you decide that a crane will be necessary, you must update your plan accordingly, must ask for the updated HS Plan approval and wait for the SDE HS Coordinator authorization to start working.

#### **52.2.7 Construction works control**

During the Competition, the SDE HS Area will participate in daily meetings with all the Teams. The SDE21 Organisation will give specific instructions based on the activities to perform throughout the day. Therefore, according to the experience during the previous days, the actions to be repeated or avoided will be indicated. Throughout the Competition, the HS Coordinator, HS Inspectors and/or HS Observers will inspect the lots of all the Teams.

The objectives of these inspections will be:

Work with the Teams, helping them to solve any problem related with the HS Area.

Verify compliance with the HS measures.

Accordingly decide if bonus and/or penalties are to be applied

If necessary, stop the works immediately (some activities or all of the works). The HS Coordinator and HS Inspectors have the authority to stop the works.

As mandatory, Teams must post a copy of the approved HS Plan on the team's lot during the complete final phase of the Competition. The SDE HS Area members may require it at any time.

### 52.2.8 Health and Safety Bonus and Penalties

Complying with the safety measures is a prerequisite for participation in the Competition. The SDE HS Area has the authority to apply bonus, penalties and/or act on the Competition according to the following:

#### 52.2.9 Bonus

After Deliverable #5, Teams complying with the three following items will obtain **up to 5 points of bonus** for the total score of the Competition:

All the documents required for Deliverable #5 regarding Health and Safety are received on time.  
No explanations or additional documents are needed to complete the Health and Safety Deliverable.  
The SDE HS Coordinator considers that the documentation submitted by the team is complete enough to receive the certificate to work in SDE Solar Village.

#### 52.2.10 Penalties

Teams will not receive any penalty if working in safe manner and following their HS Plan. No penalties will be applied to trivial situations which are immediately corrected. However, Penalties may be applied in case of repetitive trivial situations. To avoid risks and possible penalties, if a team has any doubt concerning the HS measures to be adopted for a specific task, they must confirm with the SDE HS Officers that the planned measures are adequate and sufficient. If the HS Area detects any non-trivial HS fault the procedure will consist on:

- Order the Team to stop the works immediately.
- The HS Area will decide the number of Team members stopping (all the Team or only those involved in the fault).
- The HS Area will decide if it is necessary to solve the fault before stopping. In this case, only the minimum number of Team members necessary will resolve the fault and will leave the lot once they have finished.
- The HS Area will decide for how long the work is to be stopped.

If the HS Area stops all the works, it is absolutely mandatory to keep out of the lot for the time established. This time counting will start immediately after the last Team member called to stop is out of the lot. The Team shall wait for instructions from the HS Area to resume the works again.

In order to prevent recurrence, the SDE HS Area will meet with the Team to analyse the fault and indicate the measures to be taken to resolve this type of risk.

The HS Area will order the Team members involved in the task to immediately solve the problem.

Depending on the degree of the fault, the HS Area may apply point or time penalties (stopping the works), or both. Moreover, in case of serious fault the HS Area may recommend the SDE21 Organisation to adopt another kind of action. The penalties will be applied according to Table 41.

In case of intolerable fault, the HS Area will meet with the SDE21 Organisation to discuss the possible disqualification of the Team from the Competition.

The HS Area will fill in a report signed by the Safety Officer and the HS Area in which the degree of the fault, the details of the incident, and the measures taken, etc. are defined.

**Table 41.** *Table of Penalties*

| Grade | Qualification of fault     | Points penalty up to <sup>(1)</sup> | Time stopping up to (minutes) |
|-------|----------------------------|-------------------------------------|-------------------------------|
| 1     | Trivial                    | 1                                   | 0                             |
| 2     | Tolerable                  | 2                                   | 30                            |
| 3     | Moderate                   | 5                                   | 50                            |
| 4     | Important                  | 10                                  | 100                           |
| 5     | Intolerable <sup>(2)</sup> | 20                                  | 240                           |

Point penalties will be applied only during assembly and maintenance phases.

In case of intolerable fault, or reiterative faults that compromises the Health and Safety of students, the SDE HS Coordinator will meet the SDE21 Organisation to evaluate the need to stop the works of the Team, as well as it immediate expulsion from the Competition. The SDE21 Organisation, through the SDE HS Coordinator, has the authority to determine the grade of every fault, and the penalty to apply (type and quantity). Any economic sanction will be applied as a deduction of the economic support derived from the MOU. The Hungarian Administration, in compliance with current Laws, may impose sanctions (including economic, civil and/or penal), regardless those applied by the SDE21 Organisation.

## 52.3 Degree of the faults

### 52.3.1 Grade 1. Trivial Fault (with serious and imminent unexpected risks)

- Temporary lack of individual protections or incorrect use of them.
- Temporary incorrect work procedure.
- Temporary lack of the necessary signs. Examples:
  - Not wearing a hard hat, without works taking place in higher levels. Carrying excessive loads.
  - General signs in the entry of the lot removed and not replaced.

### 52.3.2 Grade 2. Tolerable Fault (with serious and imminent unexpected risks)

- Lack of collective protections, or ineffective ones, with tolerable risks as a consequence.
- Repetitive degree I fault.

### 52.3.3 Grade 3. Moderate Fault

- Lack of collective protections, or ineffective protections, with moderate risks as a consequence.
- Systematic degree I fault, or repetitive with moderate risks as a consequence. Not following the SDE HS area instructions, with moderate risks as a consequence.

### 52.3.4 Grade 4. Important Fault

- Lack of Collective protections, or ineffective ones, with important risks as a consequence.
- Systematic grade I fault, or repetitive with important risks as a consequence.
- Not following the SDE HS area instructions, with important risks as a consequence.

### 52.3.5 Grade 5. Intolerable Fault

- Negligent attitudes.
- Deliberate actions that cause or may cause important risks for the Team member or any other person.
- Not following the SDE HS Area orders given to the Safety Officers to resolve an expected serious and imminent risk.

## 52.4 Health and Safety Teams General Requirements

### 52.4.1 Team members in charge of Health and Safety

#### 52.4.2 HS Team Coordinator

HS Team Coordinator is the team member in charge of Health and Safety at SDE Solar Village and has the ultimate responsibility for the development and enforcement of the Team's HS Plan. Hungarian regulations identify the HS Team Coordinator as the Health and Safety Coordinator during the construction. This person is responsible for health and Safety of the whole Team: including every operation of each of the team members. This includes: students, faculties, contracted staff, etc. The HS Team Coordinator during the design process is the person who signs the HS Plan, certifying the truthfulness of the information submitted, and is responsible for every decision established in the HS Plan. In compliance with Hungarian Construction and Housing Code, it is mandatory that the HS Team Coordinator (during design and construction) has a qualified university degree, according to its responsibilities, which, among other, may be:

- Architect
- Building Engineer
- Engineer
- Technical Engineer

Moreover, it is mandatory to clearly identify the HS Team Coordinator in the HS Plan.

**Note: The SDE HS Area suggests that a Faculty or another person with authority in the team assumes the role of HS Team Coordinator, during design and construction.**

#### 52.4.3 Safety Officers

The Safety Officers are in charge of the safety measures observance. The Hungarian Regulations identify Safety Officers as preventive resources. As mandatory, Teams must designate Safety Officers and must clearly identify them in the HS Plan.

Safety Officers need to be persons with:

- Enough knowledge of the assembly/disassembly process
- Enough experience to identify risks and to look for the best way to solve them.
- Enough authority inside the team to lead the rest of the team members, and to stop the activities or all the assembly or disassembly process when necessary.

As responsible for developing and enforcing the team's Health and Safety Plan, the HS Team Coordinator (or at least one of the HS Officers) must be in the lot while any activity is being carried out inside. It is also mandatory for them to have a distinctive sign so that they can be easily identified among the members of the Team. The SDE21 Organisation will provide special hard hats for the Safety Officers and the HS Team Coordinators of all the Teams.

#### 52.4.4 Relationship with the SDE HS Area

The SDE HS Coordinator and SDE HS Inspectors will announce the orders only to the HS Team Coordinator or Safety Officers, who will be responsible for informing the rest of the Team. The HS Area will only talk to the rest of the team in case of imminent important risks. The HS Team Coordinator and/or Safety Officers will participate in daily briefings at SDE Solar Village. Moreover, they are encouraged to hold a similar daily briefing with the rest of the members of the team to inform them of the instructions given by the SDE21 Organisation.

#### 52.4.5 Contracted staff

Any contracted staff will be considered as another Team member. It is mandatory for all the contracted staff (truck drivers, crane controller, etc.) to comply with the SDE21 Rules and Hungarian Regulations. It is important to demand the contracted staff the observance of Hungarian regulations (and include them as mandatory items) before signing the contract with them. This will guarantee that all the Labour risks during the development of their work will be resolved by themselves.

SDE21 Organisation may apply penalties to the team because of the actions of their contracted staff. HS Plan must include the activities to be developed by the contracted workers following one of the two possible options:

- (Preferable): The contracted company or workers accept to comply with the HS Plan of the Team, in all the aspects concerning their work, and declare to observe the whole document. In this case, the Plan must include a statement signed by the contracted workers with their acceptance. A detailed HS Plan must include the complete description of all the works to be done. Teams shall ask the contracted staff to help them develop the Health and Safety Plan sections where the tasks in which they will be working are included.
- In compliance with the **Hungarian law for the Prevention of Labour Risks**, Teams may ask the contracted staff to develop a HS Plan with their own measures. This means: The Team makes the HS Plan

All contracted workers or employees do their own HS Plan document, with the same index, but only including the work activities that concern them. It is necessary to indicate that this document is the HS Reformed Plan from the HS Plan of the team regarding the items that concern the contracted staff.

The HS Specific Terms and Conditions Document must include a reference to these documents.

#### 52.4.6 Working Shifts and Resting

A basic measure to reduce risks is to guarantee the rest of the Team members, as a high number of accidents are due to the tiredness or lack of concentration. A strict planning of activities and shifts among the Team members, help prevent this risk and fulfil the mandatory Hungarian Regulations.

In compliance with the Local Regulation, the maximum number of working hours is 7 hours per day and worker.

Therefore, Teams are recommended to organize three working shifts of 8 hours, including 1 hour for lunch and a 15 minutes' break for each shift. Teams are also encouraged to have a specific area for having lunch or resting, or even better, to order Team members to leave the lot while resting.

The working shift regulation must be considered to decide the number of team members and/or HS Officers that will be necessary at SDE Solar Village. As stated, a HS Officer or the HS Team Coordinator must be in the lot while any activity is being carried out inside.

During the construction works, the SDE HS Area may demand Teams the daily list of Team members for every shift, as well as the schedule for each one.

#### 52.4.7 Emergency and Accident Procedures

HS Plan shall include all the information concerning this subject:

- HS Drawings: location of first aids bag, route to the health centre, planned signposting, etc.
- HS Report: Items 12, 13, 16 and 17, etc., shall indicate information like: insurance that will cover their stay in Szentendre, the health centre (in accordance with the insurance instructions), etc.
- HS Specific Terms and Conditions Document. If appropriate, when indicating the Team members' education / training, Teams shall include information about accident procedures, first aids, etc.

#### 52.4.8 Before starting

Teams are encouraged to realize an emergency training prior to the final phase of the Competition, including a visit to the health centre (in order to familiarize all the team with the fastest way to get there) in accordance with the insurance instructions.

#### 52.4.9 During the construction works

As stated, the Evacuation Plan must be kept visible inside the lot (using, for example, a waterproof mobile signpost) during the final phase of the Competition. Moreover, each Team worker must have a copy of it and keep it with him during their working periods. Regardless the HS measures of the SDE21 Organisation, every team shall have a first-aid box inside their lot. During each shift, there must be a Team member responsible for first aid, being a qualified trained person on the subject. Moreover, all the Team members are encouraged to have first-aid training.

#### 52.4.10 In case of accident

Act as described in the HS Plan: evaluation, first aid, etc. Evaluate the emergency. Take in the whole picture. Call or notify the SDE21 Organisation. If necessary, ask the SDE21 Organisation for any type of additional help. Information regarding the actions protocol in case of accident, in coordination with the SDE21 Organisation, will be available through the SDE21 WAT.

#### 52.4.11 Collective protections

All Teams shall provide every work unit with collective protections, during the assembly, maintenance and disassembly phases of the house. All team members, crew and volunteers that will use the collective protections need to be trained on their proper use, inspection, and limitations. Concerning complete technical specifications of the collective protections: in accordance with the current Hungarian Legislation, all the protection equipment, auxiliary means, machinery, etc. shall have the «CE» branding, guaranteeing their adaptation to the regulation in force.

In case of scaffolds, this premise may be exceptionally replaced by the possession of a fulfilment certificate of Rule NF, ISO or AFNOR; during their use, fulfilling Hungarian law for the Prevention of Labour Risks, which also regulates the ladders and the hanging works by means of ropes.

#### 52.4.12 Individual protection

Each team has to provide their staff (team members and crew) with protective and safety equipment, “Personal Protective Equipment” (PPE), during the assembly and disassembly phases of the house. This equipment should also be available whenever considered necessary (for example during maintenance operations). All team members, crew and volunteers need to be briefed on the proper use, inspection, and limitations of the PPE.

Concerning complete technical specifications of the individual protections: in accordance with the current Hungarian Legislation, all the protection equipment, auxiliary means, machinery, etc. shall have the “CE” branding guaranteeing their adaptation to the regulations in force. During the assembly, maintenance and disassembly phases, a minimum level of PPE is mandatory and required at all times:

- Hard hat (white or yellow colour)
- Safety glasses
- A shirt with sleeves and long trousers
- Safety boots with ankle supports.
- Reflective jacket (yellow colour)

Additional PPE or safety equipment must be used if required for the task being performed.

The SDE21 Organisation will provide specific hard hats for the following team members in order to easily identify them on the workplace:

- The Site Operations Coordinators
- The HS Team Coordinator
- The Safety Officers

Teams will have to clearly identify the crane signal person writing in black-coloured capital letters the term “BANKSMAN” on the back of the reflective jacket of the designated people.

Important reminder: only the SDE21 Organisation will use the orange colour for hard hats and reflective jackets.

Teams are not allowed to use this colour for this equipment.

#### 52.4.13 Vehicles in the SDE Solar Village

Regardless the additional measures to adopt, in order to guarantee all risks are resolved, when trucks or any other vehicle is moving in SDE Solar Village:

- The speed of the trucks will adapt to the step of a man.
- One person must walk in front of the truck.
- Another person must walk behind the truck.

These two people will have to:

- Establish the maximum speed of the vehicles;
- direct the movements of the truck;
- avoid the accidents with people, with the rest of vehicles and/or with the different elements of SDE Solar Village.

#### 52.4.14 Loads operation

Hungarian Regulation establishes specific limitations on the loads to be carried out by people. In accordance with the Hungarian law for the Prevention of Labour Risks, the maximum load to be carried out by one single person is 25 kg.

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**This version has been updated on July 2, 2018.**

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Revised with each version.

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## appendix a: sde21 wat

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To be issued with a future version after Team Selection.

## items to be revised:

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**For Internal purposes only. Suggestions for corrections can be sent to [info@solardecathlon.eu](mailto:info@solardecathlon.eu).**



Supporting Entities



*The Energy Endeavour Foundation supports the mandate, vision & objectives of the original U.S. Solar Decathlon, initiated by the U.S. Department of Energy.*

