



SOLAR DECATHLON AFRICA

THE INTERNATIONAL COLLEGIATE COMPETITION FOR GREEN BUILDINGS

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RULES



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SOLAR DECATHLON

Solar Decathlon is an international competition, which challenges collegiate teams to design, build and operate grid-connected, attractive and net-zero-energy houses. The houses use solar energy as the only energy source and are equipped with all the technically advanced building and energy technologies.

During the final phase of the competition, teams assemble their houses and they are open to the general public, while undergoing the ten contests of the competition, reason for which this event is called decathlon.

The solar-powered houses that participate in the Solar Decathlon are used as case studies. The purpose of this competition is to allow the understanding and raising the awareness of sustainable construction, and to shed the light on the importance of passive and Active solar design strategies combined to put the world in sustained pathway for decarbonized energy systems and clean environment without compromising the high-standard of living for households.

The Solar Decathlon competition began in Washington DC, USA in 2002 and has continued to be held in the U.S.A. biennially since then. The last US Solar Decathlon took place in Denver, in October 2017.



SOLAR DECATHLON AFRICA

On November 15, 2016, in the margin of COP22 in Marrakesh, the Moroccan Ministry of Energy, Mines and sustainable development; the Moroccan Research Institute in Solar Energy and New Energies (IRESEN); and the U.S. Department of Energy signed a memorandum of understanding to collaborate on the development of Solar Decathlon AFRICA, a competition that will integrate unique local and regional characteristics while following the philosophy, principles, and model of the U.S. Department of Energy Solar Decathlon. The competition will take place in September 2019.

The Solar Decathlon emphasizes, as the other editions from all over the globe, sustainability, innovation and research. The participating teams will work not only to develop and build their houses, but also to enhance the renewable energy integration, intelligent energy management and generation of knowledge on sustainable construction. The students from universities throughout Africa and around the globe have to design highly energy-efficient, solar-powered and affordable homes adapted to our African climate and location.

The competition's goal is to contribute to the knowledge and dissemination of solar and sustainable housing, with the following basic objectives:

- Raise awareness of participating students on the benefits and opportunities of renewable energies and sustainable construction and challenging them to think creatively to develop innovative solutions that contribute to energy savings.
- Educate the general public regarding responsible energy use, renewable energy, energy efficiency and available technologies to help reduce energy consumption.
- Promote the use of solar technologies, including architecturally attractive solar system integration, and enhancing the use of the solar technologies to replace conventional construction materials in the building envelope such as the roof, skylights or facades.
- Demonstrate that high performance solar homes can be comfortable, attractive and affordable.

The Solar Decathlon AFRICA will take place in the green city MOHAMMED VI of Benguerir, within the solar and green buildings R&D hub, in September 2019.



I. RULES

Rule 1: Solar Decathlon AFRICA Organization

Solar Decathlon AFRICA is organized by the Moroccan Research Institute for Solar Energy and New Energies (IRESEN) and MOHAMMED VI POLYTECHNIC UNIVERSITY (UM6P), and under the aegis of the Moroccan Ministry of Energy, Mines, and Sustainable Development and the support of U.S. Department of Energy.

1.1 Director

The Director is the organizer representing IRESEN and has the ultimate authority to ratify the rules, to veto the decisions made by the competition project manager and Rules officials if necessary, and to assist the ongoing competition. All important decisions should be stamped by the Director.

The Solar Decathlon AFRICA Director has the final decision-making authority in all aspects of the project.

1.2 Competition Project Manager

The competition Project Manager is the only rules official authorized to write and modify the Rules, and has the decision-making authority in all aspects of the Competition project.

1.3 Rules Officials

The rules officials are the only organizers authorized to interpret the rules, revise the project schedule, change a team's score, or enforce the rules as required for the fair and efficient proper conduct, operation and safety of the competition.

- a. The official version of the rules shall be the Rules on the website. Other printed, electronic, and verbal communications covering the Rules shall have the effect of the Rules unless such communications are in conflict with the official version on the website. In the case of a conflict, the official version shall govern. If there is a dispute, the organizers shall resolve the dispute in accordance with the dispute procedures contained in the official version.
- b. Printed, electronic, and verbal communications from the Rules officials shall be considered part of, and shall have the same validity as, these Rules.

Rule 2. Administration

2-1. Precedence

If there is a conflict between two or more Rules, the Rule having the later date takes precedence. If a conflict exists between two or more Rules in this document, the Competition Project Manager will determine which rule has precedence and will inform all teams of the Decision on the Rules.



2-2. Violations of Intent

The organizers have the ultimate authority in interpretation of Rules. All decisions made by IRESEN are final and there is no process for appeal. A violation of the intent of a Rule is considered a violation of the Rule itself.

2-3. Official Communications

It is each team's responsibility to stay current with official project communications. Official communications between the teams and the organizers occur through, but are not limited to, one or more of the following:

- a. Project group: Official communications suitable for viewing by all teams and organizers are posted on the Project Group. The group will host messages and files of use to the teams (the hyperlink will be shared later).
- b. Organizers and team leader's emails: For expediency and to protect confidentiality, teams and organizers may communicate directly via email. Organizers and team leaders email addresses will be listed in the project group. The content of communications sent to the organizers' email address remains confidential unless the team grants permission to the Solar Decathlon AFRICA Organization to divulge the content of these communications to the other teams. If a question has general applicability to all teams, organizers, at their sole discretion, will post the answer to the project group. The official organizers email is: sda.rules@iresen.org
- c. Shared folder: The organizers and teams will use a shared folder to transfer large files and deliverables. Instructions for using the shared folder are provided via the project group.
- d. Conference calls/ Workshops: Teams are expected to participate in regularly scheduled conference calls with the organizers. Invitations and instructions for participation in conference calls are provided via the project group.
- e. Meetings: Before the event, the teams and organizers have an in-person meeting. Notification of the date and agenda for this meeting is made via the project group. A meeting is held the day before assembly begins. Meetings will also be held on a daily basis throughout the event. Attendance is expected unless prior notice is given to the Competition Project Manager.

2-4. Stipends & Prizes Structure

IRESEN is engaged to support the 20 participating teams, retained through the request for proposals. The successful applicants will be supported by \$ 50 000 each through two phases of evaluation. The awards for the winners of competition will be determined after the end of the first phase.

At the conclusion of the competition, each participating team will earn a score between 0 and 1,000 points, calculated according to the procedures outlined in these Rules:

- a. The teams will be ranked according to their net score and will earn awards.
- b. Stipends & Prizes will be distributed by the organizers to a single entity and account, as directed by the lead team faculty advisor on official university letterhead and stamped by university leadership. The official team faculty advisor must be identified prior to the beginning of the contest period. Multiple distributions will not be accommodated.



- c. It is the sole responsibility of the team to determine any taxes or associated payments required as a result of these awards. Any distribution beyond the initial recipient is the sole responsibility of the team.
- d. Through participation in the competition, the team agrees to accept the ranking and scores determined by the organizers. The results are final. Teams may participate in the protest process described in these Rules during the times indicated. No right to counsel is authorized.

2-5. Effective Date

The latest released version of the Rules posted on the project group represents the Rules in effect.

2-6. Decisions on the Rules

“Decisions on the Rules” provides interpretations of some of the Rules modified in this document “Solar Decathlon AFRICA, section: Rules”. When Rules officials make a decision that may affect the strategies of some of the teams, the Rules officials will add the decision to the “Decisions on the Rules” and notify the teams of the addition via the project group. Precautions are taken not to unveil the strategies of any participating team.

2-7. Self-Reporting

Teams shall self-report obvious or suspected Rules infractions that have occurred or may occur:

- a. The Rules are not expected to address every possible scenario that may arise during the competition. A team considering an action that is not explicitly permitted by the Rules should ask the Rules officials for a 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.
- b. The director, the competition project manager and the Rules officials will act with discretion when determining the penalty for a Rules infraction. Rules infractions observed by organizers, i.e., not self-reported by the team, may be subject to more severe penalties than self-reporting Rules infractions.

2-8. Penalties

- a. Teams committing Rules infractions are subject to one or more of the following penalties, depending on the severity of the infraction:
 - i. Penalty points applied to one or more contests;
 - ii. Disqualification from part, or all, of one or more contests; or
 - iii. Disqualification from the competition.
- b. Penalty points will also be applied to teams not fulfilling all of the deliverables’ requirements, including missing deadlines and missing contents.
- c. The Rules officials shall report to the competition project manager any significant Rules infraction. The competition project manager determines whether a Rules infraction is significant.



- d. The director is solely authorized to apply penalty points and disqualify a team from the competition. Disqualification from the competition requires prior notice to the team and an opportunity for the team to make an oral or written statement on its behalf.
- e. The competition project manager shall notify all teams via the project group and update the competition scoring when a penalty has been assessed against any team. The notification shall include the identity of the team receiving the penalty, an indication of the specific violated rule, a brief description of the infraction, and the penalty to be applied.

2-9. Protests

- a. Official written protests may be filed by a team for any reason during the contest week. A filing fee of up to 10 points will be assessed to the team filing the protest if the protest is deemed by the protest resolution committee to be frivolous.
- b. Teams are expected to communicate with the Rules officials to resolve issues and complaints before resorting to the protest process. Protests should be filed only if the team and the Rules officials are unable to resolve the dispute themselves; or the team or the Rules officials are too busy to engage in discussions that may result in resolution of the dispute without a protest.
- c. Protests shall be submitted between 8 a.m. and 5 p.m. Moroccan Time, and within 24 hours of the action being protested. The final opportunity to file a protest is 4 p.m. Moroccan Time on the final day of contest week. Exception: The results of one or more contests will be announced during the final awards ceremony. The results of contests announced during the final awards ceremony may not be protested.
- d. The protest shall be submitted in a sealed envelope or emailed to the competition project manager at sda.rules@iresen.org . If submitted electronically, the protest shall be attached as a PDF to the email and the email subject should include, "Solar Decathlon AFRICA Protest," and the name of the team submitting the protest. The protest shall include the name of a decathlete, the date of the protest submission, an acknowledgment that a 10-point filing fee may be assessed, and a clear description of the protest.
- e. Juried contests are inherently subjective, and the opinions of a jury cannot be protested. Only factual errors or mistakes may be protested.
- f. The protest resolution committee will consist of at least three individuals with relevant expertise and knowledge of the Solar Decathlon AFRICA. At least one member of the protest resolution committee will be an employee of the IRESEN and/or UM6P.
- g. Following the receipt of a protest, the protest resolution procedure will occur as follows:
 - i. The competition project manager convenes the protest resolution committee.
 - ii. The competition project manager submits the team's protest to the committee. Unless the competition project manager is called by the committee to testify, the competition project manager is not permitted to read the protest until after the protest resolution committee has submitted its written decision.
 - iii. The committee reads the protest in private. No appearance by the competition project manager, Rules officials, or team members is authorized during the committee's private deliberations. No right to counsel by organizers or team members is authorized.



- iv. The committee shall individually call the decathlete who submitted the protest and the competition project manager for testimony to fully understand the protest. The committee may choose to call additional individuals for testimony.
- v. The committee considers the protest and notifies the director and competition project manager of its recommendation in writing. The committee shall indicate the reason for the decision, any adjustment to a team's measurement or score, and how many points shall be assessed as a filing fee, if any.
- vi. Following acceptance by IRESEN & UM6P, if the recommendation involves changes to a team's measurement or score, the competition project manager will ensure that the appropriate changes are applied to the scoring server.
- vii. The competition project manager posts a copy of the protest and decision on the project group.

Rule 3. Participation

3-1. Entry

- a. 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. Subject to the quantity and quality of proposals, twenty teams will be selected for entry.
- b. Global universities are encouraged to participate jointly with African universities. It will be positively evaluated.

3-2. Contact Information

Each participating team shall provide contact information via the project group for the team officers listed in Table 1 and shall keep the contact information current for the duration of the project. In addition, all team members are encouraged to join the official Solar Decathlon AFRICA LinkedIn group to better enable future engagements by IRESEN and its partners.

- a. If a team's internal officer titles do not exactly match those listed in Table 1 and Table 2, each team shall still provide the contact information for the person fulfilling each of the areas of responsibility described in the second column.
- b. Teams shall provide the contact information for only one person in each officer position.
- c. Faculty members are only eligible to fill the "faculty advisor" for team officer position.
- d. For a period of time, extending 5 years from the end of Solar Decathlon AFRICA competition, each student and faculty member of the participating team are encouraged to participate in an evaluation of the downstream impacts of the Decathlon. This evaluation will be performed by IRESEN-related organizations. Participation in this evaluation will involve answering an annual survey. The evaluator will use the collected survey information to assess the impact of the Solar Decathlon AFRICA. The evaluator is authorized to use the collected information solely for the purpose of developing an IRESEN and/or UM6P sponsored and managed evaluation report that presents only



results in aggregate. Information collected pertaining to individual students or alumni decathletes or individual faculty will not be reported.

Title	Responsibilities
Project manager	Responsible for the overall success of the team's entry to the project. Ensures that official communications from the organizers are routed to the appropriate team member(s).
Construction manager	Responsible for planning and executing the construction, transport, assembly, and disassembly of the house, including providing the necessary oversight on construction activities.
Measured contest officer	Serves as the primary strategist and coordinator of measured contests. Collaborates with the organizers' instrumentation team and the team's construction manager to accommodate the organizers equipment.
Health and safety officer	Responsible for developing the team's Health and Safety Plan, for providing health and safety oversight to the project, and advising the project manager and construction manager, as necessary, on project health and safety issues; responsible for the team's life safety during the event, including the fire watch, public safety within the team's solar envelope, and evacuation procedures
Faculty advisor	Serves as the lead faculty member and representative of a participating team in the project; also provides guidance to the team throughout the project.

Table 1: Team leaders

In addition to these required roles, participating teams often assign student team leaders for the following positions:

Title	Responsibilities
Architecture project manager	Responsible for the architectural design effort; license not required
Project engineer	Responsible for the engineering design effort; license not required
Electrical engineer	Responsible for electrical design: Completes the Interconnection Application and works in conjunction with the site operations manager to interconnect the house to the village grid on the competition site; license not required
Sponsorship manager	Responsible for recruiting team sponsors and for team compliance with Rule 10-3
Public relations contact	Works in conjunction with organizers to coordinate the team's interactions with the media.

Table 2: Team officers

3-3. Safety

Each team is responsible for the safety of its operations.

- Each team member and team crewmember shall work in a safe manner at all times during the project in accordance with the requirements identified in the team Health and Safety Plan and the Building Code.
- Each team shall supply all necessary personal protective equipment (PPE) and safety equipment for all of the team's workers and visitors during the project.



- c. During assembly and disassembly, a minimum level of PPE—hard hat (ANSI Z89.1 or equivalent, Type I, Class G or better), safety glasses with side shields (ANSI Z87.1 or equivalent), shirt with sleeves at least 7.6 cm (3 in) long, long pants (the bottoms of the pant legs shall, at a minimum, touch the top of the boots when standing), a Class 2 high visibility reflective vest, shirt or jacket, and safety boots (ANSI Z41 PT99 or equivalent) with ankle support—shall be worn by each team member and team crew member. Additional PPE or safety equipment shall be used if required for the task being performed.
- d. Only qualified electrical team members are permitted to work on teams' electrical systems on the competition site.
- e. Individuals under the age of 18 are not permitted to be on the competition site during assembly and disassembly.
- f. Smoking is not permitted within the competition site at any time during assembly or disassembly.
- g. Pets and other animals are not permitted on the competition site during assembly or disassembly with the exception of registered service animals.
- h. Organizers may issue a stop work order at any time during the project if a hazardous condition is identified. The duration of the stop work order is at the discretion of the organizers and additional construction time will not be provided.
- i. Failure to follow the procedures and requirements outlined in each team's approved Health and Safety Plan is considered a Rule violation subject to Rule 2-8, and violations are subject to penalty points.
- j. All electrical work on the competition site shall meet electrical lockout/tagout requirements indicated in each team's approved Health and Safety Plan.

3-4. Conduct

Improper conduct, the use of alcohol or marijuana, and the use of illegal substances are not permitted on the competition site. Improper conduct may include, but is not limited to, improper language, unsportsmanlike conduct, unsafe behavior, distribution of inappropriate media, and cheating.

3-5. Use of Likeness, Content, and Images

- a. Team members agree to the use of their names, likenesses, content, graphics, and photos in any communications materials issued by the organizers and event sponsors.
- b. Content and images (graphics and photos), and any publications in which the content and images appear, may be viewable and made available to the general public via the organizers and the event sponsors' websites with unrestricted use.
- c. The organizers and event sponsors will make all reasonable efforts to credit the sources of content and images, although they may be published without credit.
- d. 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 honor requests for confidentiality. All confidentiality requests expire at the date of the end of the Solar Decathlon AFRICA competition.



3-6. Competition Withdrawals

Any team wishing to withdraw from the project must notify the competition project manager in writing. Teams considering withdrawal are encouraged to communicate early and frequently with the competition project manager. All written withdrawals signed by the listed faculty advisor are final.

3-7. Deliverables

Teams are required to submit all deliverables associated with the project as described in III.7 Deliverables submission schedule. Penalty points are applied for non-compliance with the deadlines or for missing contents.

Rule 4. Site Operations

4-1. Damage Liability

Each team is financially responsible for any damage it causes to the competition site, except as allowed under Rule 4-3.

4-2. Construction Equipment

- a. The only construction equipment allowed will be that which has been authorized by the Solar Decathlon AFRICA organization. Team should submit a detailed plan for the construction, transportation, assembly, and disassembly of the house including all construction equipment required.
- b. Heavy construction equipment such as cranes, forklifts, bull lifts, man lifts, but not minor construction equipment such as drills, will be available for rent in the solar village. Further details will be provided in the project group.
- c. Access and circulation of heavy vehicles – Truck-mounted cranes, trailers, semi-trailer trucks, etc. will arrive and will be parked near the solar village. From there, they will be called in, following the established paths and respecting the organization's schedule.
- d. Teams must respect the internal circulation routes which will be laid out for vehicles. Only two vehicle/transportation means per team will be permitted at a time in the solar village, and both must fit either within the area defined by the team stock area and the solar envelope or parked directly adjacent to the team's solar envelope. The rest of the vehicles will have to wait for the previous ones to leave the solar village. This process will be coordinated between those in charge of the site operations plan and those responsible for each team.
- e. Teams shall not permit the use of any equipment or tools on the competition site that are not safe and/or do not comply with applicable requirements of the Occupational Safety and Health Administration (OSHA) and/or other related regulatory standards.

4-3. Ground Penetration

Ground penetration is permitted only for the approved method for tie-downs needed to meet Solar Decathlon AFRICA building code requirements. Ground penetrations should be minimized and must be



approved by the organizers. All other ground penetrations shall not be permitted. Grounding means shall be installed in accordance with the Solar Decathlon AFRICA-related Building Code.

4-4. Impact on the Competition Site

Low-impact footings shall be used to support all house and site components. All footings shall comply with the bearing pressure criteria specified in the Solar Decathlon AFRICA-related Building Code.

4-5. Electrical construction power and lighting at competition site

- a. Electrical power will be available on each team's lot in a specific construction box, and the provided power will be limited and monitored. Additional details on the construction site box will be provided on the project group.
- b. The Solar Decathlon AFRICA organization will provide access to the village grid with an electric service of AC 60 Hz, 220 V (phase-neutral), 380 V (phase-phase). All teams must design their houses with the necessary equipment to connect to the village grid.
- c. Generators are not permitted.
- d. General lighting of lots will be provided by the organization during the assembly period. This lighting will be sufficient for safety purposes. The teams should provide additional lighting systems for the evening construction work.

4-6. Spill Containment

The release of water or other liquids onto the competition site or into nearby storm drains is prohibited without the organizers approval.

4-7. Lot Conditions

- a. A vertical elevation change of up to 10 cm may exist across a lot. Organizers will provide topographical maps of the site including an indication of team lot location. Exact placement of team lots may vary by up to 1 m.
- b. Teams must design adjustable foundations and plan accordingly to meet the specific conditions of the site.

4-8. Electric Vehicles

Teams are expected to provide an electric vehicle within their solar envelopes during contest week.

- a. The vehicle must be electric. Hybrid vehicles and non-electric vehicles are not permitted.
- b. Unauthorized movement of the vehicle on the competition site is prohibited throughout all public exhibit periods.
- c. The competition prototype house must include the infrastructure required to charge the vehicle.
- d. Any vehicle used must be commercially available to all teams at the beginning of contest week.
- e. The vehicle must have four wheels and, at a minimum, seat two individuals side by side.
- f. The vehicle must be licensed, registered, and insured as required for operation on Morocco roadways.



Rule 5. The Solar Envelope

5-1. Solar Envelope Dimensions

To protect the neighbor's right to the sun, the house and all site components on a team's lot must stay within the solar envelope shown in figure 1.

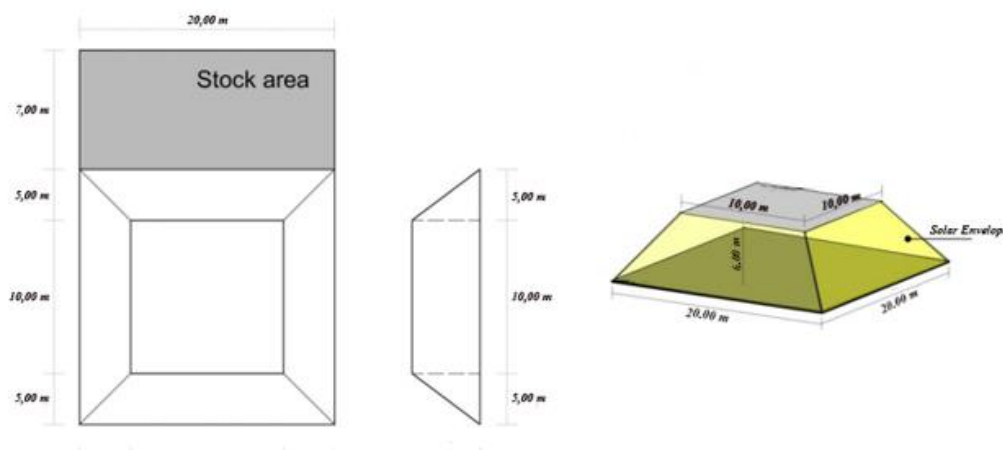


Figure 1: Solar Envelope Dimensions

- a. The official height of a site component or set of contiguous site components is the vertical distance from the top of the house foundation (lowest point of any floor joists) along the outside perimeter of the architectural footprint to the highest point of the site component(s).
- b. 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:
 - i. The team makes a request to the competition project manager for an exemption prior to the start of assembly.
 - ii. The team can prove to the competition project manager's satisfaction that the component is not significantly restricting a neighbor's right to the sun.
 - iii. The competition project manager determines that the component is sufficiently unique in function and small in size to warrant an exemption.
- c. Moveable or convertible house or site components shall not extend beyond the solar envelope during live demonstrations or in printed or electronic media presented by the team during jury visits, public exhibit hours, or contests.
- d. Any vehicle on the competition site shall not extend beyond the solar envelope.

Rule 6. The Project

6-1. Structural Design Approval

Each team shall submit structural drawings and calculations that have been stamped by a qualified, licensed design professional.



- a. By stamping the structural drawings and calculations, the licensed professional certifies that the structural provisions of the **Solar Decathlon AFRICA Building Code** have been met by the design, and that the structure is safe for the public to enter if it has been built as designed.
- b. The licensed professional shall stamp the structural drawings and calculations of the house and all site components that might pose a threat to public safety if they fail.

6-2. Electrical and Photovoltaic Design Approval

- a. Each team shall submit Electrical drawings and calculations that have been stamped by a qualified, licensed electrical design professional.
- b. By stamping the electrical drawings and calculations, the licensed professional certifies that the electrical provisions of the Solar Decathlon AFRICA Building Code have been met by the design, and that the electric system is safe for the public to enter if it has been built as designed.
- c. The licensed professional shall stamp the electrical drawings and calculations of the house and all site components that might pose a threat to public safety if they fail.

6-3. Minimum & Maximum Measurable Area

The measurable area shall be at least 55 m² (600 ft²) but shall not exceed 90m² (970 ft²) for single floor housing unit and 110.00 m² (1200 ft²) for multi-story housing units.

- a. If the building has convertible or moveable components, the maximum and minimum measurable area observed during live demonstrations or shown in printed or electronic media presented by the team during jury visits, public exhibit hours, or contests count as the maximum and minimum measurable areas of record, respectively.
- b. All primary living areas shall be located within the measurable area.
- c. The measurable area is the covered and constructed area remaining when walls, columns, stair shaft and closets or any other storage or technical built from floor to ceiling, are excluded.

6-4. Architectural Footprint

- a. The projected ground coverage area of all site components, including but not limited to: the competition prototype house, decking, pergolas, overhangs, railings, ramps, seating, solar thermal, and solar photovoltaic panels shall not exceed 250 m² (2700 ft²).
- b. Free standing potted vegetation, the team's electric vehicle, and signage shall not be included in this measurement.

6-5. Entrance and Exit Routes

- a. The main house entrance may be placed on any side of the house. However, an accessible route leading from the main street of the solar village to the main entrance of the competition prototype shall be provided.
- b. The house exit route shall be accessible to the public and lead from the main house exit to one of the publicly accessible streets of the solar village adjacent to the solar envelope.



6-6. Competition Prototype Alternates

- a. The juries shall not consider alternates to the competition prototype. Only the competition prototype house with its included components and functionality, as presented on the competition site, may be evaluated. Competition prototype alternates cannot be shown in any materials considered by the Architecture, Engineering & Construction, Innovation, Market Appeal, or Sustainability juries. Team websites and public exhibit communications materials, including signage, handouts, and public display information, are not subject to this rule.
 - i- Juries shall not consider alternates to address local building code provisions and site restrictions at the target client's site. The juries will be instructed to assume that the Solar Decathlon AFRICA Rules and Building Code also apply at the target client's site.
 - ii- Public exhibit communications materials are not considered part of the competition prototype and do not need to be shown in renderings, drawings, or other materials.

Rule 7. Vegetation

The use of potted vegetation is permitted. All potted vegetation shall comply with Rules 4-4 and 4-6.

7-1. Placement

Vegetation may be moved around the solar envelope until the beginning of contest week, after which, it shall remain stationary until the conclusion of contest week, unless the drawings clearly show how some or all vegetation is designed to be moved as part of an integrated system.

Rule 8. Energy

8-1. PV Technology Limitations

- a. Bare photovoltaic cells and encapsulated photovoltaic modules must be commercially available by the beginning of the event or approved by the organizers prior to arrival at the competition site.
- b. Substantial modification of the crystal structure, junction, or metallization constitutes the manufacture of a new cell and is not allowed unless approved by the organizers prior to arrival at the competition site.

8-2. PV System Size Limitation

Photovoltaic installation size is limited to a maximum 10 KW rated DC capacity.

8-3. Energy Monitoring

Teams shall install a Home Energy Monitoring System within their competition prototype. While the data will not be utilized for competition purposes, teams shall consider and utilize this technology. Teams will be asked to provide the collected data at the conclusion of the competition and the data may be shared amongst teams.



8-4. Energy Sources

After the conclusion of stand-alone assembly and until the conclusion of the Contests week, global solar radiation incident upon the lot is the only source of electrical energy that may be consumed in the operation of the house without the requirement of subsequent energy offsets.

Exception: Teams may use organizers-supplied village grid power that is exempt from the Electrical Energy Balance Contest during grid-tie assembly for construction equipment, site lighting, and task lighting located outside the measurable area only.

- a. 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.
- b. Fireplaces, fire pits, candles, and other devices using non-solar fuels are not permitted in the designs. Exception: The use of batteries is permitted by Rule 8-5.

8-5. Batteries

Batteries include most commercially available energy storage devices, such as electrochemical batteries and capacitors.

- a. The use of batteries as part of the competition prototype design is permitted. The batteries must begin the competition fully-charged and end up fully-charged.
- b. The maximum battery storage capacity is 5 KWH.
- c. The batteries, and associated enclosure(s), must be compliant with the Solar Decathlon AFRICA-related Building Code.
- d. The use of primary (non-rechargeable) batteries (no larger than “9V” size) is limited to smoke detectors, remote controls, thermostats, alarm clock backups, and other small devices that typically use small primary batteries. These batteries do not need to end the competition with a full charge.
- e. The use of the factory-installed battery within the team’s electric vehicle is permitted. Vehicle-to-grid power flow is only permitted, if vehicle-to-grid power flow and associated equipment are approved by the vehicle’s manufacturer.
- f. “Plug-in” (non-hardwired) 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, or “plugged into” the house’s electrical system whenever the devices are located in the house or within the solar envelope. Exception: If not used in the operation of the house at any time during contest week, portable electronic devices used for mobile communications, such as cell phones and tablets, are permitted within the solar envelope without having to be plugged into the house’s electrical system.
- g. Stand-alone, PV-powered devices with small secondary batteries are permitted, but the aggregate battery capacity of these devices may not exceed 100 Wh.

8-6. Desiccant Systems

If a desiccant system is used, it must be regenerative.



- a. 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.
- b. 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, a measurement at the conclusion of the electrical Energy Balance Contest may not be necessary.
- c. 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.
- d. 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 by the competition project manager.

8-7. Village Grid

The organizers shall provide the village with an electric power grid that provides AC power to and accepts AC power from the houses.

- a. The organizers shall provide the necessary service conductors and connect the conductors at the utility interconnection point.
- b. All houses shall operate with an AC service of 60 Hz, 220/380V split-phase with neutral. Any alternatives to this approach must be discussed and approved by organizers prior to arrival on the competition site. Acceptance of any alternatives will depend on acceptance and support provided by the local utility. Alternatives are not guaranteed.
- c. At the date and time specified in Appendix B, teams have the option to switch from stand-alone assembly to grid-tie assembly, if all relevant inspections have been passed and the village grid is available. Teams shall not switchback to stand-alone assembly after switching to grid-tie assembly. At a later date and time specified in Appendix B, all teams shall have switched to grid-tie assembly.

8-8. Net Metering Rules

When the competition starts, each team's bidirectional meter resets to zero.

Rule 9. Liquids

9-1. Container Locations

- a. Primary supply water and greywater containers shall be located outside of the measurable area.
- b. Solar storage, hot water, or other thermal storage containers may be located within the measurable area.
- c. The primary supply water tank(s) shall be fully shaded from direct solar radiation.

9-2. Greywater Reuse

A team may reuse greywater as permitted in the Solar Decathlon AFRICA-related Building Code or approved by the Solar Decathlon AFRICA Building Official on a case-by-case basis. Any greywater reuse



must be approved by the Solar Decathlon AFRICA Building Official before the start of assembly on the competition site.

9-3. 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 or heat source.
- Other purposes as approved by the Solar Decathlon AFRICA Building Official on a case-by-case basis. Alternative uses must be approved by the Solar Decathlon AFRICA Building Official before the start of assembly on the competition site.

9-4. Evaporation

Water may be used for evaporation purposes.

9-5. Thermal Mass

- a. Teams may use liquids as thermal mass.
- b. The thermal storage containers shall be isolated, i.e., the contained liquid shall not circulate to other containers or systems.

9-6. 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.

9-7. Water Delivery

- a. The Solar Decathlon AFRICA organization will provide water connections and portable water to each team for use during the contest period.
- b. The Solar Decathlon AFRICA Organization will supply portable water pipelines to each team lot.
- c. Water supply will be monitored.
- d. The Team must connect to the water system provided on the time allowed during the competition.
- e. All water containers must be completely "discharged" at the beginning of the competition phase.
- f. Details will be provided on the project group.

9-8. Water Removal

The procedure and associated requirements for water removal follow:

- a. 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. All openings shall be easily accessible.
- b. The Solar Decathlon AFRICA organization will not provide sewer line system on the village site. Teams should provide water storage tanks for wastewater.



- c. The water removal will occur at the time indicated in the competition Calendar during the assembly, competition and disassembly phases.
- d. Details will be provided on the project group.

9-9. Team-Provided Liquids

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

- Personal hydration
- Irrigation
- Thermal mass (quantity limited by bearing pressure limit and Rule 9-6 for restrictions)
- Food preparation except for the contest needs.
- Hydronic system pressure testing
- Assembly (e.g., hydraulic fluid), finishing (e.g., paint), and cleaning (e.g., mineral spirits).
- Teams may provide glycol, deionized water, or other working fluids for thermodynamic systems using working fluids other than non-potable water if approved by the organizers prior to arrival at the competition site.

Rule 10. The Event

10-1. Registration

All Solar Decathlon AFRICA event participants must register.

- a. The following rules apply to all participants:
 - i. Each event participant must register individually. Group registrations are not allowed.
 - ii. When registering, event participants must complete all required information and forms before access to the competition site is allowed.
- b. Organizers, team members, and staff are required to provide a photo. Participants should use the online registration site to submit completed forms, information, and photos prior to the event. Once all information, forms, and photos are received, the organizers will issue an event security ID that must be visible at all times while on the competition site. Exception: team crewmembers are not required to provide a photo.
- c. Visiting media are not considered participants and will not be required to register but must check in at registration headquarters. Due to safety concerns, site access for visiting media may be restricted.

10-2. Event Sponsor Recognition

All communications materials produced by the teams concerning or referring to the project (including team websites) shall refer prominently to the project as the “SOLAR DECATHLON AFRICA”.

- a. Teams are required to use the Solar Decathlon AFRICA logo, the Ministry of Energy, Mines and Sustainable Development wordmark, the logo of IRESEN & the logo of UM6P on all communications materials used on the competition site. The Solar Decathlon



AFRICA logo must be at least three times the size of all other logos (The Solar Decathlon AFRICA identity guidelines are expected to be made available by Fall 2018).

- b. The Solar Decathlon AFRICA logo, the Ministry of Energy, Mines and Sustainable Development wordmark and IRESEN & UM6P logos are the only required graphic elements teams must use.
- c. Team uniforms are exempt from Rule 10-2. See Rule 11-5 for specifics.

10-3. Team Sponsor Recognition

Team sponsors may be recognized with text, logos, or both, but the text and logos must appear in conjunction with the Solar Decathlon AFRICA text and logo.

- a. Rule 10-3 applies but is not limited to all communications materials that will be on display or distributed on the competition site.
- b. Communications materials or other products that exist largely for the recognition of sponsors are limited to 1.85 m² (20 ft²), in aggregate within the solar envelope. "Other products" include, but are not limited to, signs, exhibits, posters, plaques, photos, wall art, and furnishings.
- c. For multimedia or audio presentations shown on the competition site, no more than 20% of the total time, 1 minute, or whichever is less may be dedicated to recognition of team sponsors.
- d. Labels that feature a built-in manufacturer's logo are acceptable and do not need to be accompanied by the Solar Decathlon AFRICA text and logo.
- e. Team uniforms are exempt from Rule 10-3. See Rule 11-5 for specifics.

10-4. Logistics

- a. 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.
- b. Each team is responsible for procuring all necessary equipment, tools, and supplies.
- c. Each team is responsible for transportation, accommodations, lodging, food, and beverages. The organizers will make drinking water available on the competition site to all team members for the duration of the event.
- d. Each team is responsible for making its own reservations and arrangements and for covering all necessary costs.
- e. The organizers will help with the logistics and no effort will be spared to assist all team members, within the limits of their capacities.

10-5. Inspections

Each project will be inspected for compliance with the Solar Decathlon AFRICA-related Rules and the Solar Decathlon AFRICA-related Building Code.

- a. Inspections are expected to occur only between the hours of 8 a.m. and 5 p.m. during the assembly period but may be restricted further due to environmental or personnel constraints.
- b. A team shall notify the appropriate inspector when it is ready for an inspection.



- c. Additional random inspections for compliance shall take place throughout contest week.
- d. The competition project 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 contests. All final inspections shall be passed by the deadline indicated in Appendix B. Failure to pass inspections by the required deadline may disqualify a team for participation in the event and will be considered a Rules violation subject to Rule 2-8. A team must have passed inspections by the conclusion of the inspector's work day for a team to be eligible to participate in the following day's contests, which officially start at midnight. Exception: Jury visits will proceed as scheduled regardless of a team's inspection status. However, jurors will be made aware of the team's inspection status and may consider it in their evaluations.
- e. Because open, partially functioning houses are preferable to closed, fully functioning houses, the organizers may direct the inspectors to require that an unsafe condition be corrected so that public visits can occur—even if, as a consequence, the house is ineligible for participation in one or more contests.

Rule 11. Contest Week

11-1. House Occupancy

Under normal circumstances, no more than six people may be located in the measurable area of the house.

- a. Rule 11-1 is automatically suspended whenever the Temperature, Humidity and Lighting intensity measurements are suspended. See Appendix B for the Temperature and Humidity and Lighting intensity measurements schedules.
- b. Jurors, observers, official organizers-provided competition photographers, media, writers, visiting decathletes during the dinner party, and others with authority to enter a house as an organizer are not counted toward the number of house occupants.

11-2. House Operators

- a. Only decathletes are permitted to operate the house and participate in the contests during contest week.
- b. All competition-related communications on the competition site shall be between the organizers and decathletes.
- c. Non-decathlete team members and team crew, including faculty, are not permitted to participate in or listen to competition-related communications.
- d. Non-decathlete team members are permitted to give tours to the public and be present on the competition site.

11-3. Late Design Changes

The final project assembled on the competition site shall be consistent with the design and specifications presented in the as-built deliverable.

- a. If there are known inconsistencies between the final project and the as-built drawings and project manual, the team shall document these inconsistencies and submit the



documentation to the competition project manager and Solar Decathlon AFRICA Safety Officer as soon as possible after the inconsistency is known. The Safety Officer will review the changes against the team's final EHS Plan to assess whether the changes warrant additional or different safety controls. The competition project manager will compile a summary of all known inconsistencies discovered during the inspections process and submit the summary to the respective juries.

11-4. Public Exhibit

- a. Teams are required to provide an accessible route to all areas of the house and site that is available to the public during exhibit hours.
- b. Teams are permitted to produce and distribute up to one informational brochure or handout on the competition site.
- c. Teams shall develop signage that complements public exhibit tours by informing visitors about the team project and engaging visitors waiting in line.
- d. Teams are prohibited from selling items to the general public on the competition site.
- e. Only organizers-approved vendors may provide food and beverage to the general public on the competition site.

11-5. Team Uniforms

- a. During contest week and special events specified by the organizers, all team members present on the competition site or the site of a special event shall wear uniforms representing their team.
- b. Team uniforms are exempt from Rules 10-2 and 10-3.
- c. Team sponsor logos are approved to be visible only on the back of the team uniform (jacket, shirt, hat, or other wearable items).
- d. The only information or graphics that are approved to be visible from the front of the team uniform (jacket, shirt, hat, or other wearable items) shall be the institution(s) and its logo(s), the team name and logo, and the Solar Decathlon AFRICA logo.
- e. A built-in clothing manufacturer logo may be visible on the front or back of the team uniform, or both.

11-6. Impound

Each house shall be impounded on specified nights as indicated in Appendix B under the direct supervision of the organizers or staff. Team members shall not occupy the competition site during impound hours. There is a 20-minute impound grace period for teams to leave the competition site.



II. CONTESTS

The Solar Decathlon AFRICA competition consists of 10 separately scored contests, and some contests contain one or more Subcontests. The team with the highest total points at the end of the competition wins. Points are earned through jury evaluation, task completion, and monitored performance. Measured contests are evaluated based on the criteria indicated in the contest details. The scoring of the juried contests is more flexible than the scoring of the measured Subcontests; However, for the sake of fairness, the jurors will use the evaluation methods described in (Appendixes C and D).

Juried		
Contest Number	Contest Name	Points
1	Architecture	100
2	Engineering & Construction	100
3	Market Appeal	100
4	Communications & Social Awareness	100
7	Sustainability	100
10	Innovation	100
Juried Total		600

Table 3: Juried Contest



Measured				
Contest Number	Contest Name	Points	Subcontest Name	Points
5	Appliances	100	Refrigerator	14
			Freezer	14
			Clotheswasher	14
			Clothes drying	16
			Oven	18
			Cooking	12
			Dishwasher	12
6	Home life & Entertainment	100	Hot water draw	26
			Home electronics	10
			Dinner party	13
			Movie night	11
			Commuting	40
7	Comfort Conditions	100	Temperature	55
			Humidity	15
			Light intensity	30
9	Electrical Energy Balance	100	Energy performance	60
			Performance ratio	20
			Generation-consumption correlation	20
			Measured Total	

Table 4: Measured Contests and Subcontests

Contest 1: Architecture

A jury of 3-5 professional architects shall assign an overall score for the architecture design's conceptual coherence, merit, integration, and implementation. The jury will consider the submitted deliverables (see III. COMPETITION DELIVERABLES; 6.8) and perform an onsite evaluation of the competition prototype house (see Appendix B).

The jury shall consider the following specific criteria in its evaluation:

Evaluation Criteria

1. The implementation of a concept or ideas that lead to the development of the competition prototype home. It is relevant that the house respects both the architecture of the host region of the competition and its target site.
2. The overall coherence among architectural, structural, mechanical, electrical, plumbing, lighting, landscaping and other related disciplines and systems of the house.
3. The use of local materials and sustaining technologies should demonstrate a quality integration into the design.



4. The effectiveness in the use of architectural elements including, but not limited to: ratio aspect, indoor/outdoor connections, composition, transformable or multi-use spaces and the linkage between various house elements...
5. The integration of both the natural and electrical lighting in the house, and the effectiveness of the lighting system design.
6. The architectural design should respond to the needs of a five-member household.
7. The construction specifications, lighting design, and audiovisuals should accurately reflect the constructed project as assembled on the competition site.

Contest 2: Engineering & Construction

A jury of 3-5 professional engineers shall assign an overall score for the structure and engineering design's merit and implementation. The jury will consider the submitted deliverables (see III. COMPETITION DELIVERABLES; 6.8) and perform an on-site evaluation of the competition prototype house (see Appendix B).

The jury shall consider the following specific criteria in its evaluation:

Evaluation Criteria

1. Competition prototype structure: structure design, innovation, code-compliance, and calculations will be evaluated.
2. Building design of the house: to evaluate the construction of the house in everything related to its construction solutions: envelope, interior divisions, and finishes, as well as the performance and effectiveness of the adopted solutions.
3. The competition prototype house should demonstrate the higher level of functionality, viability, reliability, and efficiency of the building envelope; electricity, plumbing, lighting, HVAC and solar systems; and their adequate integration in the overall project:
 - a. Plumbing Design and installation: design and dimensioning the related system as well as the evaluation of its suitability considering the house's needs. It is required to adopt the approach of water conservation as low flow and water saving fixtures, grey-water system, treatment and/or water reuse, since Morocco suffers a water stress.
 - b. Electrical System Design and installation: design and dimensioning of the related system, as well as the evaluation of its suitability considering the house's needs. The energy efficiency approach is positively evaluated.
 - c. Photovoltaic (PV) System Design and installation: The jury will evaluate the functionality, technical design, implementation, and reliability of the PV system considering the following items:
 - i. Analysis of the Electrical Production Simulation: A detailed report about the electrical energy production of the household will be prepared based on the climate conditions of both Benguerir and site target of competition prototype house.
 - ii. Technical documentation of the photovoltaic installation: Quality of the solar photovoltaic system and renewables-related technologies will be assessed.
 - d. Solar Thermal System Design and Construction: The jury will evaluate the suitability of the solar thermal system regarding each project's particular needs and uses.



- e. Building Integrated Solar Active Systems (BIPV “Photovoltaic”, BIPVT “Photovoltaic and Thermal”): The Solar Active Systems’ installation will be evaluated relative to its integration in the house. It will be considered that the “building integration” exists when the modules are elements of the house’s composition, fulfilling dual functions at a time: produce electricity and be a component of the finished house.
- f. Efficiency of the House envelope: The jury will evaluate the house envelope. Passive strategies of the house will be evaluated as well as their effectiveness to reduce the house’s thermal needs.
- g. Efficiency of the House’s HVAC systems: The jury will evaluate the functionality of HVAC system and its potential to maintain uniform thermal comfort conditions via temperature control, humidity control, air movement, and a successful distribution design.
4. Monitoring of the house’s equipment: The Jury will be looking for effective communications and analysis process, focusing on the application of engineering principles, modeling, simulations and creative solutions. The use of BACS “building automation control system” is positively evaluated.
5. Construction and systems’ specifications, energy analysis results and discussion, and audiovisuals should accurately reflect the constructed project as assembled on the competition site.

Contest 3: Market Appeal

A jury of 3-5 professionals from the homebuilding industry shall assign an overall score for the design’s attractiveness to the team-defined target market and market impact potential. The jury will consider the submitted deliverables (see III. COMPETITION DELIVERABLES; 6.8) and perform an on-site evaluation of the competition prototype (see appendix B).

The jury shall consider the following specific criteria in its evaluation.

Evaluation criteria:

The assessment of the house’s viability regarding its Livability, Marketability, Buildability and Affordability. In this contest, the objective is to identify and justify the target market of the house, focusing on the attraction capacity for potential users and companies of the building industry.

1. Livability
 - a. The design should offer the potential occupant(s) a safe, functional, convenient, comfortable and enjoyable place to live in.
 - b. The design should meet the needs and desires of the target client (five-member middle-class household).
2. Marketability
 - a. The house should demonstrate exterior and interior appeal for the target client.
 - b. The materials, equipment, and specific choices should respond to the desires of the target client.
 - c. The value added by the house.
3. Buildability and Affordability



- a. The drawings and construction specifications should enable, through sufficient quality and detail, a contractor to generate an accurate construction cost estimate.
- b. The drawings and construction specifications should enable, through sufficient quality and detail, a contractor to construct the building as the design team intended it to be built.
- c. Teams should deliver a detailing prototype development costs: invoices of materials and every direct cost involved in the construction of prototype (see Appendix F: Cost Estimate Requirements)
- d. Teams must submit a valid justification that explains the affordability of the project and its benefits compared to a conventional home.

Contest 4: Communications & Social Awareness

A jury of 3-5 communications professionals shall assign an overall score for the success of each team's communications strategies, materials, and efforts to educate, inform, and interest the public. The jury will consider the submitted deliverables (see III. COMPETITION DELIVERABLES; 6.8) and perform an on-site evaluation of the competition prototype house (see Appendix B).

The jury will consider the following specific criteria in its evaluation.

Evaluation criteria:

1. The assessment of the team's communications efforts by reviewing the quality, delivery, and innovation of each team's final communications materials, communications narrative and audiovisuals, and by evaluating the public exhibit materials, house tours and communications summary presentation on site.
2. Effectiveness: The message chosen and its effective presence in the communications actions, adequacy of the solutions designed for each target group and its pedagogies adaptation.
3. 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.
4. Creativity: A pertinent development of the team's Visual Identity.
5. Team's presentation performance: Each team must prepare a presentation of maximum 5 minutes, the methodology for this presentation is depending on each team's strategy.
6. Materials to be assessed :
 - a. Uniform design.
 - b. The handout material.
 - c. Website development and administration.
 - d. Social media network development and administration.
 - e. Shading areas for people waiting in line.

Contest 5: Appliances

The objective is to evaluate the functionality and the efficiency of the selected appliances, in order to test the performance of the house while complying with the demanding standards of present day



society in term of Appliances' use. This contest tries to reproduce the average energy use in a modern home.

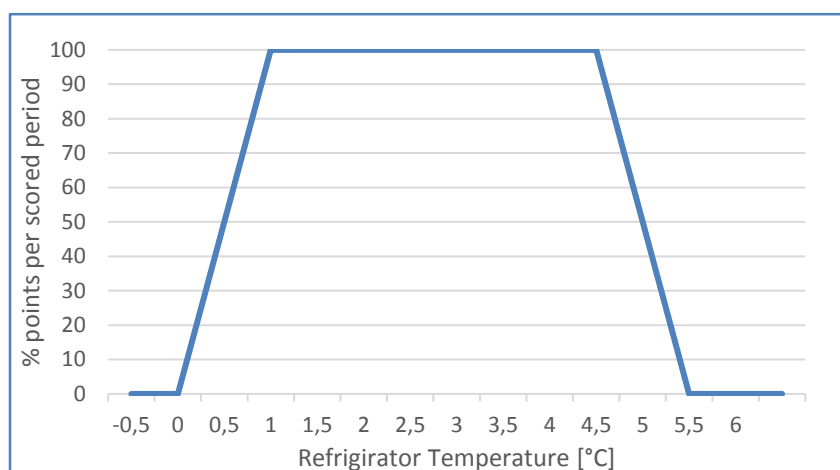
Scoring will value results rather than means and it will be assessed on data collected by the organization's monitoring system during the contest week.

Evaluation criteria:

Subcontest: **Refrigerator**

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°C during the scored period. A temperature sensor will be located inside the refrigerator and will be continuously measuring.

1. Reduced points are earned if the time-averaged interior refrigerator temperature is between 0.0°C and 1.0°C or between 4°C and 5°C. Reduced point values are scaled linearly, as shown in Figure 2.
2. The refrigerator volume published in the manufacturer's specifications shall be a minimum of 170 liters.
3. The refrigerator is used to store food and beverages for the purpose of the dinner and the activities of the event.



Full Points:	$1^{\circ}\text{C} \leq \text{Temperature} \leq 4.5^{\circ}\text{C}$
Reduced Points:	$0^{\circ}\text{C} \leq \text{Temperature} < 1^{\circ}\text{C}$ $4.5^{\circ}\text{C} < \text{Temperature} < 5.5^{\circ}\text{C}$
No Points:	$\text{Temperature} < 0^{\circ}\text{C}$ $\text{Temperature} > 5.5^{\circ}\text{C}$

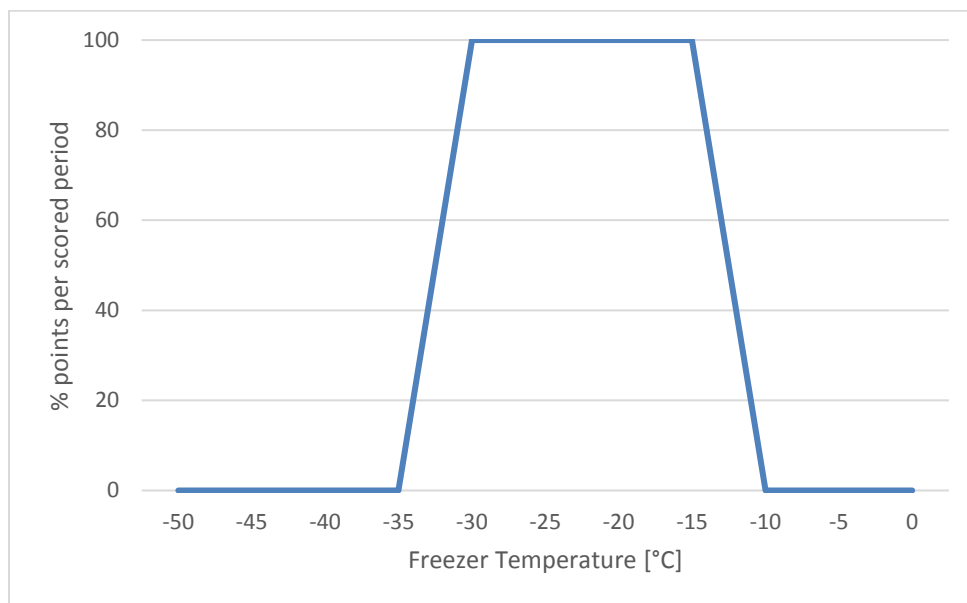
Figure 2: Scoring function for Refrigerator Subcontest

Subcontest: **Freezer**

All available points are earned at the conclusion of each scored period by keeping the time-averaged interior temperature of the freezer between -30.0°C and -15.0°C during the scored period. A temperature sensor will be located inside the refrigerator and will be continuously measuring and recording.



1. Reduced points are earned if the time-averaged interior freezer temperature is between -35°C and -30°C or between -15.0°C and -10°C . Reduced points are scaled linearly, as shown in Figure 3.
2. The freezer volume published in the manufacturer's specifications shall be a minimum of 56 liters.
3. The automatic defrost function may be disabled.
4. The freezer is used to store food, water and beverages for the purpose of the event's activities.



Full Points:	$-30^{\circ}\text{C} \leq \text{Temperature} < -15^{\circ}\text{C}$
Reduced Points:	$-35^{\circ}\text{C} \leq \text{Temperature} < -30^{\circ}\text{C}$
	$-15^{\circ}\text{C} < \text{Temperature} < -10^{\circ}\text{C}$
No Points:	$\text{Temperature} < -35^{\circ}\text{C}$
	$\text{Temperature} > -15^{\circ}\text{C}$

Figure 3: Scoring function for the Freezer Subcontest

Subcontest: **Clothes washer**

All available points are earned for washing laundry by running an automatic clothes washer through one or more complete, uninterrupted, "Normal" (or equivalent) cycle(s) within a specified time periods allotted in Appendix B.

1. A load of laundry is defined as organizer-supplied bath towels.
2. The clothes washer shall operate automatically and have at least one wash and rinse cycle.
3. One or more complete, uninterrupted, "Normal" (or equivalent) cycle(s) in an automatic clothes washer shall be used to wash the laundry.
4. On several days during contest week, two loads of laundry are required to be washed. Teams have the option to combine double loads and wash them in one clothes-washer cycle.
5. The drying function in a combination washer/dryer shall be disabled until the completion of the wash cycle.

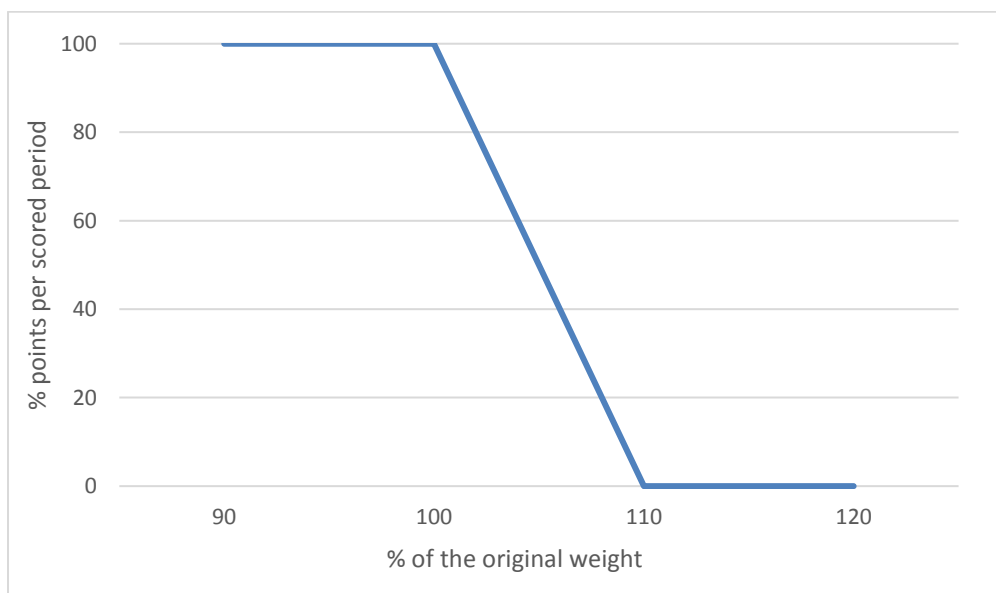


6. Cycle “interruption” includes the adjustment of supply temperature or flow in a manner not anticipated by the manufacturer or addressed in its operation manual. Including the disruption of an ordinary cycle due to user interaction.
7. Cycle completion shall be confirmed by the observance of an audible or visible signal.
8. The organizers 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.
9. Only water may be used for clothes washing. No other kind of soap or similar products may be used during contest.

Subcontest: **Clothes Drying**

All available points are earned by returning a load of laundry to a total weight less than or equal to the towels’ total weight before washing. The task must both start and finish within the time periods allotted in Appendix B to be eligible for points.

1. Reduced points are earned if the “dry” towel weight is between 100% and 110% of the original towel weight. Reduced point values are scaled linearly. No points are earned for a measured weight above 110% of the original towel weight, as shown in Figure 4.
2. A load of laundry is eligible for clothes-drying points only if the team previously achieved a complete, uninterrupted clothes washer cycle as described in Subcontest: Clothes washer during the same available time period outlined in Appendix B.
3. The drying method may include active drying (e.g., machine drying), passive drying, (e.g., on a clothesline), or any combination of active and passive drying. All drying methods that require the towels to be visible (such as on a clothesline) must be demonstrated to the Architecture and Market Potential juries as they visit the houses.



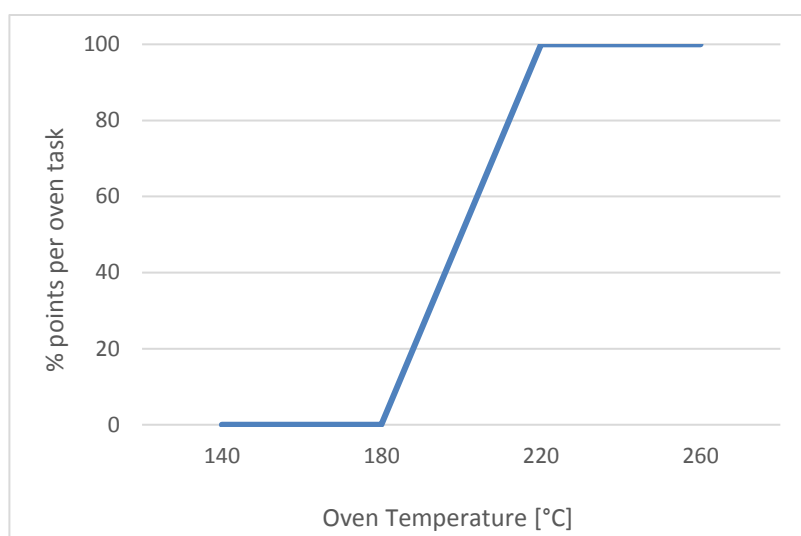
Full Points:	% of the original weight < 100
Reduced Points:	$100 \leq \text{\% of the original weight} \leq 110$
No Points:	% of the original weight > 110

Figure 4: Scoring function for the Clothes Drying Subcontest

**Subcontest: Oven**

All available points are earned at the conclusion of each scored period by keeping the oven time-averaged 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.

1. 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 5.
2. The oven volume published in the manufacturer's specifications shall be a minimum of 55 liters.



Full Points:	Oven Temperature $\geq 220^{\circ}\text{C}$
Reduced Points:	$180^{\circ}\text{C} \leq \text{Oven Temperature} \leq 220^{\circ}\text{C}$
No Points:	Oven Temperature $< 180^{\circ}\text{C}$

Figure 5: Scoring function for the Oven Subcontest

Subcontest: Cooking

All available points are earned by using a kitchen appliance to vaporize 2 kg of water within a specified period of time.

1. Reduced points are earned if between 0.5 kg and 2 kg of water are vaporized. Reduced point values are scaled linearly, as shown in Figure 6.
2. Any kitchen appliance may be used, but it must operate in its normal configuration as it is vaporizing the water.
3. The water shall be vaporized in a single pot and the starting water weight shall be at least 3 kg.

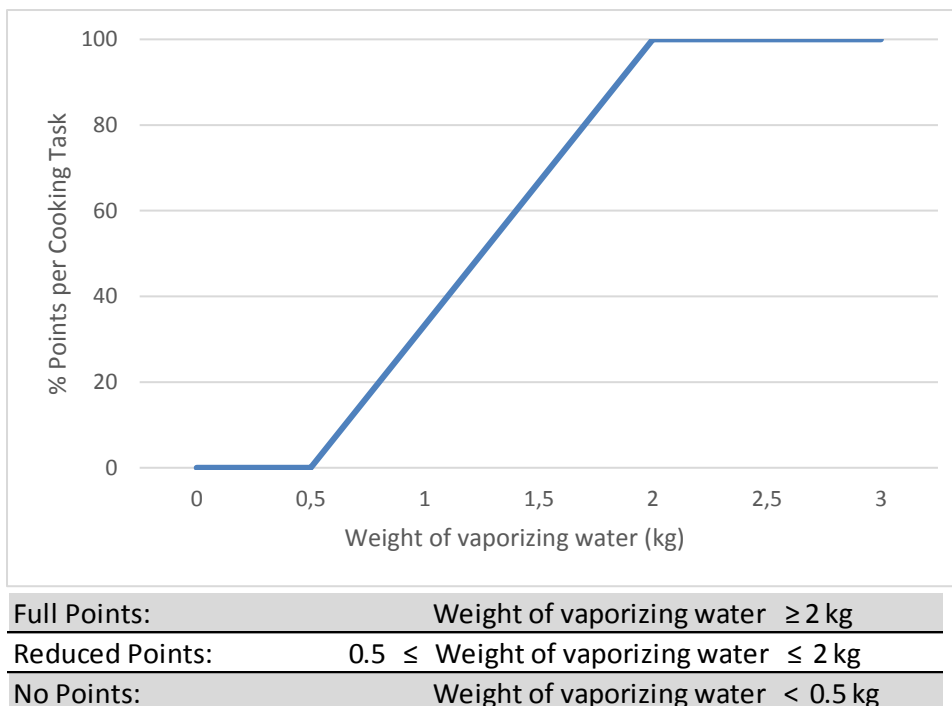


Figure 6: Scoring function for the Cooking Subcontest

Subcontest: **Dishwasher**

All available points are earned by running a dishwasher through a complete, uninterrupted, “normal” (or equivalent) cleaning cycle within a specified period of time. See Appendix B for the time periods designated for dishwashing tasks.

1. The dishwasher shall operate automatically, have at least one wash and rinse cycle, and have a minimum capacity of eight place settings according to the manufacturer’s specifications.
2. If the dishwasher has a heated drying option, this option shall be disabled.
3. Cycle “interruption” includes the adjustment of supply temperature or flow in a manner not anticipated by the manufacturer or addressed in its operation manual, including the disruption of an ordinary cycle due to user interaction.
4. Cycle completion shall be confirmed by the observance of an audible or visible signal.
5. The teams shall consult the operation manual to identify appropriate cycle settings. The setting chosen shall be a complete wash cycle. “Normal” or “regular” settings shall be selected, if available. Otherwise, settings most closely resembling typical “normal” or “regular” settings shall be selected.
6. The dishwasher may be run empty, partially loaded, or fully loaded; the load may be soiled or clean.

Contest 6: Home Life & Entertainment

This contest should simulate the demanding standards of present day society. While showing a productive place and a positive experience, the participating teams should adopt strategies to save energy without jeopardizing the completion of the monitored tasks.



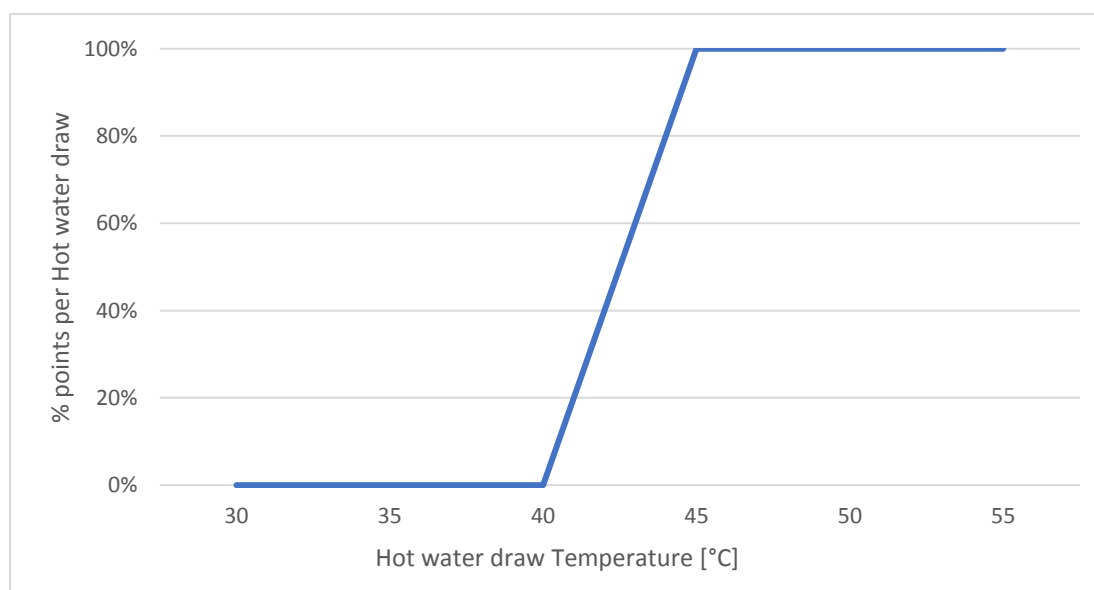
Scoring will value results rather than means.

Scoring will be assessed on data collected by the organization's monitoring system during the competition week.

Subcontest: **Hot water draws**

Hot water draws will occur during the times specified in the Competition Calendar. For each draw, at least 50 liters of hot water shall be delivered in 10 minutes to qualify for points. All available points are earned for delivering an average temperature of at least 45°C. An average temperature below 40°C earns no points. For temperatures between 40°C and 45°C, points are scaled linearly, as shown in Figure 7.

1. These hot water draws are designed to simulate most of the washing and bathing tasks that would take place in a typical day.
2. The schedule for hot water draws will vary from one day to the next, just as it does in a typical home.
3. The maximum number of hot water draws for one day will not exceed three, but they may occur consecutively.
4. Teams will notify the Organization when they would like to realize the hot water draws, during the time specified in the Competition Calendar.
5. For fairness, all teams will be drawing hot water on nearly identical schedules.
6. Hot water will be drawn from the bathroom shower fixture.
7. If a house has multiple showers, the shower expected to be used most frequently by the occupants will be used for the hot water draws.





Full Points:	Hot water draw Temperature $\geq 45^{\circ}\text{C}$
Reduced Points:	$40^{\circ}\text{C} \leq \text{Hot water draw Temperature} \leq 45^{\circ}\text{C}$
No Points:	Hot water draw Temperature $< 40^{\circ}\text{C}$

Figure 7: Scoring function for the Hot Water draw

Subcontest: **Home Electronics**

All available points are earned for operating a television (TV) and computer during specified periods of time. See Appendix B for specific details regarding the number of points per home electronics task and the time periods designated for home electronics tasks.

1. The TV display shall be a minimum of 68.6 cm (27 in.) according to the manufacturer's stated display size. The computer display shall be a minimum of 38.1 cm (15 in.) according to the manufacturer's stated display size. The computer may be a laptop or desktop computer. The TV and computer displays shall be able to be operated simultaneously and controlled independently of each other.
2. The organizers will supply content that must be shown on the TV display during the home electronics Subcontest. There is no required volume setting, but the brightness of the display shall be set to at least 75% of maximum. Observers will conduct spot checks to verify that the TV is showing the supplied content and that the brightness is at the required level.
3. The organizers will supply content that must be shown on the computer display during the scored periods. A decathlete may temporarily suspend the supplied content to use the computer for other practical purposes, but the display of supplied content shall be resumed whenever the computer is not being used for other practical purposes. The brightness of the display shall be set to at least 75% of maximum. Observers will conduct spot checks to verify that the computer is either showing the supplied content or is being used by a decathlete, and that the brightness is at the required level.

Subcontest: **Dinner Party**

Each team shall host two dinner parties for its neighbors during contest week. See Appendix B for the dinner party schedule and the number of available points per dinner party. Dinner parties will feature a pair of guest decathletes from each of three competing teams. To earn full points for the dinner party, teams shall:

1. Host at least eight individuals for the dinner party – two decathletes from each of three other teams and up to two VIP guests. VIP guests may include organizers, media, government employees, family members, or other individuals approved by the organizers to attend the dinner parties. If VIP guests do not participate, at least two host team decathletes shall participate in the dinner party.
2. Meet all house occupancy rules described in Rule 11-1 for the dinner party.
3. Have the guests attend for the duration of the dinner party period as indicated in Appendix B. While in attendance, the guests shall participate in the meal and act respectfully.
4. Serve a complete meal with an adequate amount of food for all guests, at appropriate serving temperatures, and in a timely manner within the dinner party period as indicated in Appendix B



5. Serve a unique meal at each dinner party.
6. Serve and have guests eat the meal in the measurable area, at the eating area designated in the drawings.
7. Submit to the organizers detailed dinner party menus, recipes, and ingredient lists that accurately reflect the meal served for each dinner party.
8. the Dinner Party shall comply with the following safety requirements:
 - a. The use of flames, including candle flames, is prohibited during contest week (see Rule 8.4-b).
 - b. No alcoholic beverages may be stored in the house, used in meal preparation, served, or part of a meal in any way.
 - c. All water used for cooking and drinking shall be drinking water purchased in sealed containers.
 - d. Prior to use for the Dinner Party, all dishes and cookware shall be washed with hot water and soap and rinsed prior to use.
 - e. Normal domestic wastewater may go into the wastewater tank.
 - f. 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, and pecans), fish, shellfish, soy, wheat, and gluten.
 - g. Outdoor cooking and grilling equipment may be incorporated into the competition prototype house, but the use of such equipment is prohibited on the competition site. The use of coolers to store food, beverages, or ice associated with the Dinner Party on site is not permitted. Coolers may be used for transporting food to the competition site only. The observers use a specific scoring chart delivered by the organizers and will be filled out at the end of the Dinner Party.

Subcontest: **Movie Night**

Each team shall host a Movie Night for its neighbors during contest week. See Appendix B for the Movie Night schedule

To earn full points for the Movie Night, teams shall:

1. Host at least eight individuals for the Movie Night – two decathletes from each of three other teams and up to two VIP guests. VIP guests may include organizers, media, government employees, family members, or other individuals approved by the organizers to attend the Movie Night. If VIP guests do not participate, at least two host team decathletes shall participate in the Movie Night.
2. Have two the guests attend for the duration of the Movie Night period as indicated in Appendix B. While in attendance, the guests shall participate and act respectfully.
3. Vote for one of three movies selected by the organizers via the poll to be sent out via email prior to the event. The movie receiving the most votes shall be provided by the organizers on the day



of movie night and shall be the movie shown in all houses on movie night. The selected movie shall be available in several of the most popular video formats, so that each team may request the format most suitable for its home theater system.

4. Maintain normal audiovisual equipment settings throughout the duration of the Subcontest. Observers or a small team of organizers, or both, will verify that these settings are maintained on movie night.
5. The observers use a specific scoring chart delivered by the organizers and will be filled out at the end of the Movie Night.

Subcontest: **Commuting**

Electric vehicle driving tasks will occur at the approximate times specified in Appendix B. Teams shall complete 40 kilometers driving in no more than 65 minutes, four times during the contest week, to qualify for points. Electrical energy consumed for the task will be measured at the electric charging points. All available points are earned by the teams that complete the task.

1. These driving tasks are designed to simulate most of the transportation requirements that would take place for a household.
2. The electric vehicle is required to be fully charged before starting the driving task. After the task, the vehicle will be charged to full again, and the amount of electricity charged is regarded as the energy consumed for commuting.
3. Teams that fail to complete the task get zero point on the task.
4. The schedule for the commuting tasks varies from one day to the next.
5. The vehicle must meet the requirements of Rule 4-8.
6. The vehicle must be driven by a decathlete who is licensed to operate a motor vehicle and accompanied by at least one passenger, who shall also be a decathlete.
7. Both the driver and the passenger must wear a seat belt and follow all applicable Moroccan driving laws.
8. The electric vehicle may only be charged from the house electrical system. Any charging from alternate locations is considered a rules violation.

Contest 7: Sustainability

A jury of 3-5 industry professionals shall assign an overall score for the team's sustainability in concept, approach, design, implementation, and operation. The jury will consider the submitted deliverables (see 3. COMPETITION DELIVERABLES; 6.8) and perform an on-site evaluation of the competition prototype house (see Appendix B).

The jury shall consider the following specific criteria in its evaluation.

Evaluation criteria

1. *Sustainability in Architecture:*



- a. To evaluate the passive design strategies: reduce energy consumption “bioclimatic strategy” and integrate thermal-insulating materials in the components of the competition prototype house.
 - b. The optimization of natural lighting (making optimal use of daylight).
 - c. The use of resource-efficient and low embodied-energy materials.
 - d. The adaptability of the spaces provided.
2. *Sustainability in Engineering and Construction:*
- a. Assess an environmental impact assessment that Includes, but not limited to: the Life-Cycle, the water consumption, from the materials manufacturing (including energy) to the final set up (selective demolition plan, reusability), the structure flexibility and possibilities for being reused, the structure adaptation to future technological changes will also be evaluated, as well as the adequacy of the systems selected according to the house’s needs.
3. *Communication and Social Awareness related to sustainability:*
- a. To evaluate the capacity to transmit the key concept of sustainable construction (saving resources, renewable energy, energy efficiency, etc.), as well as the influence on general public custom behavior towards a more sustainable approach of life. The effort to highlight the sustainability of the competition prototype house to the general public through different means and /or devices will be positively evaluated.
4. *Sustainability in Market Appeal:*
- a. To evaluate the factors that directly influence the sustainability of the industrialization of houses.
 - b. The degree of flexibility of use, maintenance requirements, optimization of assembly and disassembly.
 - c. The economic viability of industrialization will be evaluated, taking into consideration the potential economic growth.

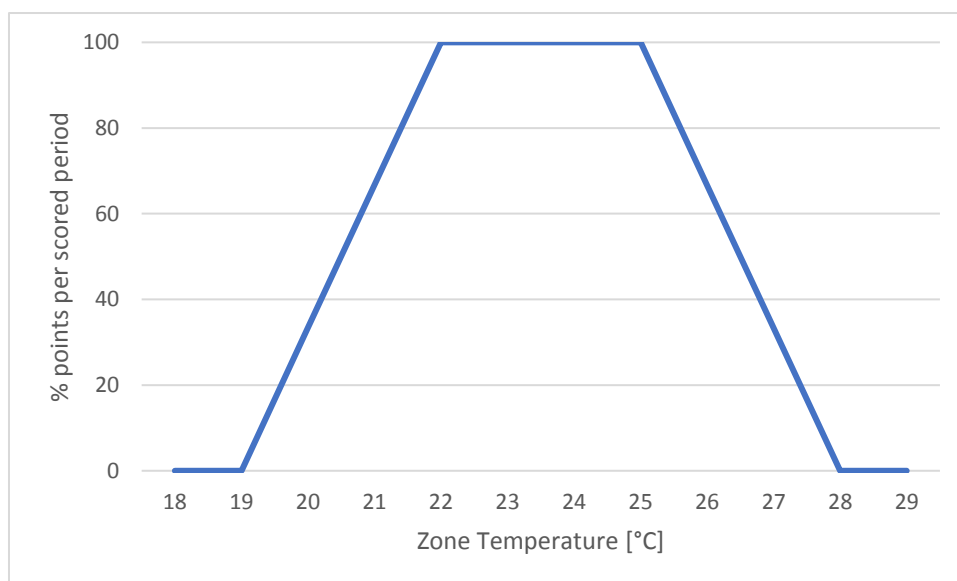
Contest 8: Health & Comfort

The objective is to assess the capacity for providing interior comfort of the house through the control of temperature, humidity and lighting intensity.

Subcontest: **Temperature**

All available points are earned at the conclusion of each scored period by keeping the time-averaged interior dry-bulb temperature between 22°C and 25°C during the scored period. See Appendix B for the schedule of scored periods and for the number of available points per scored period.

- Reduced points are earned if the time-averaged interior dry-bulb temperature is between 19°C and 22°C or between 25°C and 28°C. Reduced point values are scaled linearly, as shown in Figure 8.
- The zone temperature deviating farthest from the target temperature range is the zone temperature of record. The organizers will identify at least two zones in each house and measure the temperature of each zone.



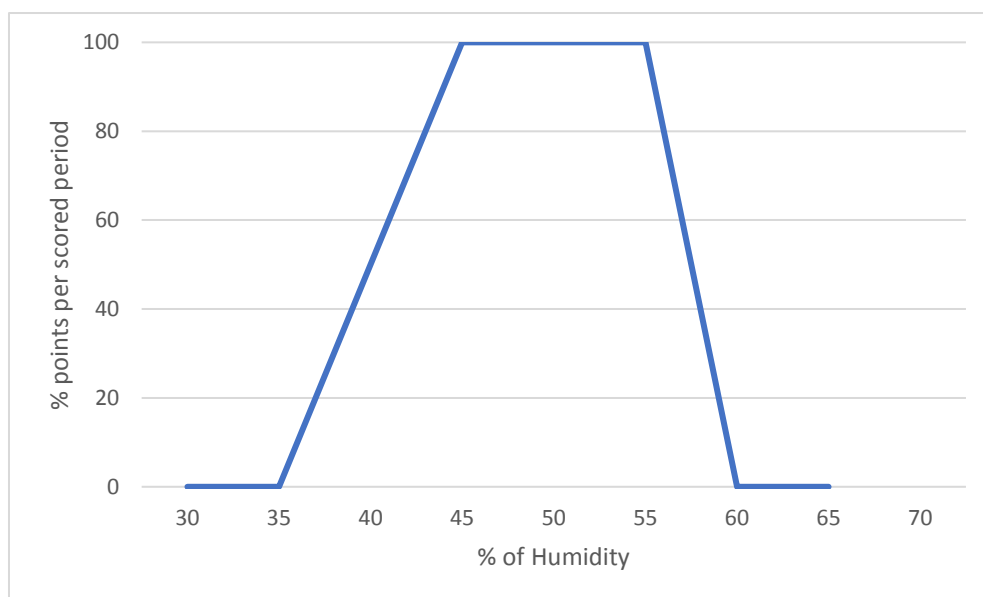
Full Points:	$22^{\circ}\text{C} \leq \text{Zone Temperature} \leq 25^{\circ}\text{C}$
Reduced Points:	$19^{\circ}\text{C} \leq \text{Zone Temperature} \leq 22^{\circ}\text{C}$
	$25^{\circ}\text{C} \leq \text{Zone Temperature} \leq 28^{\circ}\text{C}$
No Points:	$\text{Zone Temperature} < 19^{\circ}\text{C}$
	$\text{Zone Temperature} > 28^{\circ}\text{C}$

Figure 8: Scoring function for Zone Temperature Subcontest

Subcontest: Humidity

All available points are earned at the conclusion of each scored period by keeping the time-averaged interior relative humidity between 45% and 55% during the scored period. See Appendix B for the schedule of scored periods and for the number of available points per scored period.

- Reduced points are earned if the time-averaged interior relative humidity is between 55.0% and 60.0%, and also 35.0% and 45.0%. Reduced point values are scaled linearly, as shown in Figure 9.
- In multi-zone houses, the zone humidity deviating farthest from the target humidity range is the zone humidity of record.



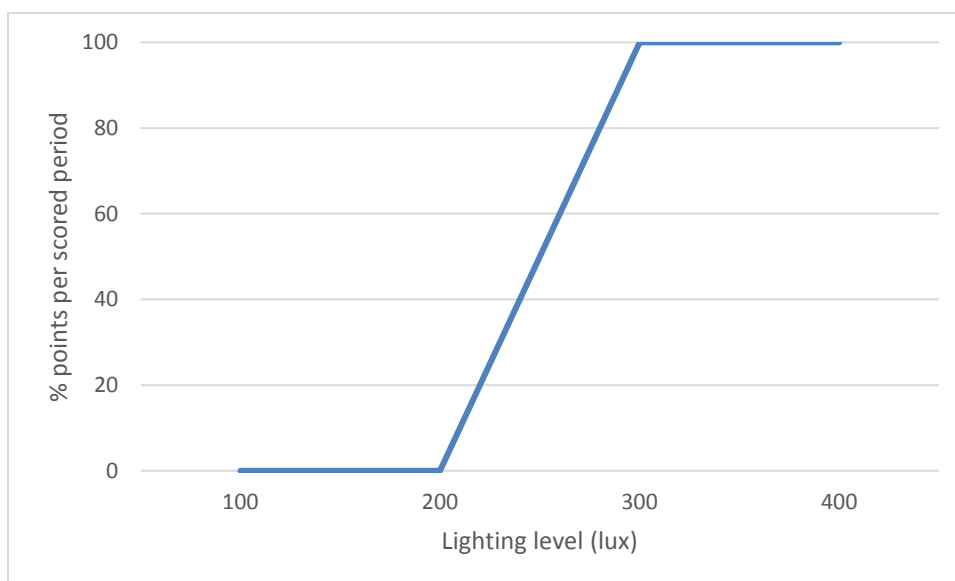
Full Points:	$45\% \leq \text{Humidity} \leq 55\%$
Reduced Points:	$35\% \leq \text{Humidity} \leq 45\%$
	$55\% \leq \text{Humidity} \leq 60\%$
No Points:	$\text{Humidity} < 35\%$
	$\text{Humidity} > 60\%$

Figure 9: Scoring function for Humidity Subcontest

Subcontest: **Light intensity**

The lighting level measurements in the two different zones of the house will take place at the scored periods in the Competition Calendar (See Appendix B). A photometer will be located in the chosen zones.

- All available points are earned at the conclusion of each scored period by keeping the lighting level above 300 lux during the scored period.
- Reduced points are earned if the lighting level is between 200 lux and 300 lux. Reduced points are scaled linearly, as shown in Figure 10.
- Light-emitting devices within 50 cm of the sensors are not permitted.
- The organizers will measure the illumination level at the approximate center of the chosen area, height of 1m (3.2 ft.). Care will be taken to ensure that the measurement reflects the functional illumination of the room.



Full Points:	Lighting level	≥ 300 lux
Reduced Points:	$200 \text{ lux} \leq$ Lighting level	≤ 300 lux
No Points:	Lighting level	< 200 lux

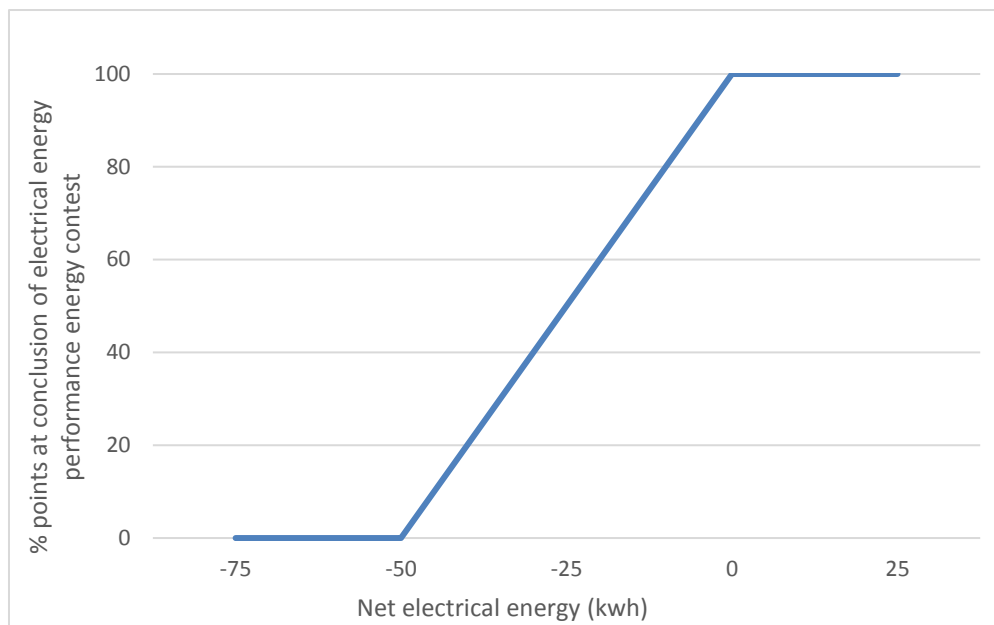
Figure 10: Scoring function for Lighting level Subcontest

Contest 9: Electrical Energy Balance

The objective is to evaluate the houses' self-sufficient electricity provided by active solar technology.

Subcontest: **Energy Performance**

All available points are earned at the conclusion of the specified Energy performance period (see Appendix B) for a net Electrical Energy Balance of at least 0 kWh. A positive net Electrical Energy Balance indicates net production; a negative net Electrical Energy Balance indicates net consumption. Reduced points are earned for a net Electrical Energy Balance between -50 kWh and 0 kWh. Reduced points are scaled linearly, as shown in Figure 11.



Full Points:	Net electrical energy	≥ 0 kwh
Reduced Points:	-50 kwh $\leq$ Net electrical energy	≤ 0 kwh
No Points:	Net electrical energy	≤ -50 kwh

Figure 11: Scoring function of the Energy performance Subcontest

Subcontest: **Performance Ratio**

Performance Ratio will be determined at the conclusion of the specified energy performance period (see Appendix B). All available points are earned by the team that has the highest Performance Ratio, to evaluate the efficiency of the photovoltaic system. Other teams will be scored proportionally, as shown in the following equation:

$$\text{Points obtained} = \frac{\text{Teams' performance ratio}}{\text{Highest performance ratio}} * \text{Total points}$$

Subcontest: **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 the electricity transport losses. This effect is maximized if electricity is consumed at the same time as it is generated. This Subcontest will evaluate the temporary correlation between electricity generation and electricity demand during the Contest week periods where electricity generation is computed.

This correlation is the following: $\xi = \frac{E_{GI}}{E_L}$

Where E_{GI} 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:

$$\xi = \frac{E_{GI} + E_{bat,l}}{E_L}$$



Where E_{bat_1} is the electricity supplied by the batteries to the loads. Points will be awarded according to the following expression: Points obtained = Total Subcontest points * ξ

Note: This Subcontest will only be evaluated during the daily intervals in which all houses are free of shadows.

Contest 10: Innovation

A jury of 3-5 industry professionals shall assign an overall score for the team's innovation in concept, approach, research, design, implementation, and execution. The jury will consider the submitted deliverables (see 3. COMPETITION DELIVERABLES; 6.8) and perform an on-site evaluation of the competition house (see Appendix B).

The jury shall consider the following specific criteria in its evaluation:

Evaluation criteria

1. Research

- a. The use of research processes to develop or decide on design solutions.
- b. Adopt a research process that lead to the market breakthrough of new, unique, or atypical technologies that improve the status quo.
- c. Researches that brought solutions to the challenges faced by the emerging AFRICA will be positively evaluated.
- d. Research on the specificities of local materials and their potential integration in the Green buildings of tomorrow.

2. *Innovation in Architecture:*

Evaluating to what degree, the proposed solutions provide:

- a. New spatial and functional concepts.
- b. Bioclimatic passive strategies.
- c. Quality design through local material insertion.
- d. The appropriate use of light, and use of texture.

3. *Innovation in Engineering and Construction:*

- a. Evaluating the innovative design of the house's structure and systems (plumbing, electrical and photovoltaic).
- b. The acoustic performance of the adopted solutions.
- c. Evaluating the innovative approach to addressing residential architecture.
- d. The integration of local materials in the construction solutions.

4. *Innovation in Water management:*

- a. Assess an innovative system so to use less water than a comparable code-built house.
- b. Implement innovative strategies of water reclamation and reuse.



5. Innovation in Energy Efficiency:

- a. Evaluating the innovative active and passive technological contributions that enhance the energy efficiency of the house.

6. Innovation in Comfort conditions:

- a. Adopting the innovative ways to improve the hydrothermal, environmental, illumination and acoustic efficiency of the house, hence, promoting the livability, as well as facilitating the perfect functioning of the house.

7. Innovation in Communication and Social Awareness:

- a. Assessing all of the creative 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, the sustainable construction and the use of renewables.

8. Innovation in the Market Appeal:

- a. Assessing the novelty of the proposals for industrialized houses, especially those that can be adapted to multifamily buildings.
- b. New attractive formulas that improve the households and industry's perception towards these typologies of housings, thus favoring their future marketability.
- c. New ways of business, promotion and commercialization of the product.



III. COMPETITION DELIVERABLES

1. 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 Solar Decathlon AFRICA organization. For specific dissemination reasons, all the deliverables should be in English.

Deliverables are considered to be on-time if they are received by the Solar Decathlon AFRICA organization by 5 p.m. Morocco time on the respective due date. In the Solar Decathlon AFRICA competition, there are two different ways for submitting the deliverables: shipped or electronic; depending on the materials or documentation required.

Teams who are not sending the deliverables on time, or not fulfilling with all the content requirements, will be subject to penalties. All deliverables submitted are property of Solar Decathlon AFRICA Organization.

2. Shipped Submission

The hard copies documents, along with the model and the audiovisuals are the only deliverable materials required to be sent to Solar Decathlon AFRICA address (stated on the project group).

3. Electronic submission

All electronic files shall be uploaded to the Solar Decathlon AFRICA [shared folder](#).

Teams wishing to reduce file size may submit electronic files as ZIP files. Other formats may be acceptable after consultation with the Organization.

Details for accessing the [shared folder](#) is provided in the project group.

3.1 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:

1. Embed all fonts.
2. Maintain a minimum resolution of 300dpi.
3. The different sections shall be indicated with bookmarks.
4. Submit as vector-based documents, not raster images for every page.
5. Generate natively, if at all possible. Scans shall be avoided if at all possible.

Whenever possible, utilize the “save as” or “EXPORT” to PDF functions within CAD, 3D rendering, or illustration application to produce a PDF.

If an application does not support a direct-to-PDF function, create a postscript file by printing to a postscript printer with “print to file” option selected. Use this postscript (.ps or .prn) file to create a high-resolution PDF.



1. Outputting the drawings into a raster image format (.jpg, .tiff, .png, .gif, etc.) and then creating a PDF from the images, is NOT ACCEPTABLE.
2. All raster PDFs are large files at 300dpi, unacceptable quality at lower resolutions, and not scalable without degradation.

3.2 Multimedia File requirements: photos and videos

1. Teams may submit photographs, graphics or videos in each deliverable, to complete the information submitted or give further details.
2. Photographs shall be submitted in the native format of the camera, such as JPEG or RAW, if available.
3. Every file conversion or image resampling from the original results in image degradation, so keep conversions to a minimum.
4. 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:
 - i. Name, phone number, and e-mail of person submitting the file.
 - ii. Multimedia file editor's name and affiliation.
 - iii. For photographs, please indicate date and location and identification of any individual visible.

4. File Naming Instructions

The required file-naming convention for all electronic files follows:

[TEAM ABBREVIATION]_[DELIVERABLE NUMBER]_[file name]_[SUBMISSION DATE (YYYY-MM-DD)].[EXTENSION]

Example #1: Team X (AAA) construction Drawings number 3 submitted as part of Deliverable 7 on February, 12, 2017

- AAA_D7_CD_3_2017-02-12.jpg

Example #2: A set of three multimedia files as part of Deliverable 5 submitted by University X (AAA) to the Organizers on May 16, 2017, would have the following file names:

- AAA_D5_MF_1_2017-05-16.pdf

a. List of Team abbreviations:

It will be shared once the participating teams have been selected.



b. List of Deliverable Abbreviation:

File Name	DELIVERABLE ABBREVIATION
100 Word Description	100W
Project Management Plan	PMP
Schematic Design Summary	SDS
Team Overview	TO
Design Development Drawings	DDD
Design Development Project Manual	DDPM
Construction Drawings	CD
Construction Project Manual	CPM
Signed & Stamped Structural Documentation	SSSD
Health and Safety Plan	HSP
Project Summary	PS
Team Photograph	TP
Construction Photography	CPHOTO
Logo	LOGO
Multimedia file	MF
Digital Project Representation	DPR
Competition Prototype Graphic Floorplan	CPGF
Dinner Party Menus and Recipes	DINNER
Public Exhibit Materials	PEM
Jury Narratives	JN
As-Built Drawings	AB
As-Built Specifications	SPEC
Audiovisual Presentation	AVP
Renderings	REND

5. Documents Formatting Requirements

a. Building Information Model (BIM):

- All the drawings shall be generated in Autodesk AUTOCAD (.dwg). Other formats may be acceptable after consultation with the Organization.

b. Project Drawings and Hard Copies Drawings:

- ISO "A3" (297 mm X 420 mm) or ANSI "D" (55.88 x 86.36 cm) sheet size.
- Packaged into a single PDF file.
- Consistent with the Project Drawings Template (see Rule 3.17).



c. Project Manual and Hard Copies Manual:

- ISO "A4" (210 mm X 297 mm) or ANSI A (216 mm x 279 mm) sheet size.
- Packaged into a single PDF file.
- Consistent with the Project Manual Template.

d. Press Release:

- ISO "A4"(210 mm X 297 mm) or ANSI A (216 mm x 279 mm) sheet size.
- Packaged into a single PDF file.

6. DELIVERABLE PHASES

6-1. Team Short Description & Project Management Plan

100-word description

The team shall provide a 100-word description of the team and its goals. This is expected to be used by the organizers for outreach and for placement on the Solar Decathlon website.

Project Management Plan

The team shall provide a project management plan that outlines the team's structure, approach to the competition, general work schedule, course integration, and fundraising schedules. The project plan is limited to five (5) pages.

6-2. Schematic Design Summary

The schematic design proposal will be reviewed by the organizers, and feedback will be provided. It will not be reviewed by any juries and will not be made publicly available until after the completion of the competition, with the exception of the renderings, which may be shared on the Solar Decathlon website.

Format Requirements

- Packaged into a single PDF file. Renderings may be submitted separately, if desired.
- Up to 30 pages.

Content Requirements

• <i>Team mission statement (1 paragraph)</i>
• Detailed strategy for winning the competition including a contest-by-contest approach (3–5 pages)
• Design drawings and/or written description of the following systems and components, with identification of any unique systems and components that are being considered (12–17 pages): ○ Temporary foundations and anchors ○ Site Plan, including the competition prototype, tour route, decks, and additional site elements



○ Landscaping Plan ○ Interior, dimensioned floor plans, including the tour route ○ Building sections ○ Typical wall, floor, and roof sections ○ Structural system details ○ Interior finishes ○ Plumbing plan ○ DC electrical plan and one-line diagram ○ AC electrical plan and one-line diagram ○ Mechanical systems (including HVAC and solar-related mechanical systems, if any) ○ Transportation and on-site assembly approach (modules, cranes, trailers, etc.)
• Summary of potential innovations and non-standard elements being pursued (1–2 pages)
• Description of public exhibit, communications, and outreach strategy (1–2 pages)
• Computer-generated renderings of competition prototype design (5–6 images)
• Health and Safety Plan outline including approach to meeting OSHA training requirement (1–2 pages)
• Identification of the licensed design professional expected to stamp structural documentation (1 page)

6-3. Team Overview

Teams shall provide updated information on their team strategy, makeup, project design, etc., for use on the Solar Decathlon website and for outreach programs. Teams are encouraged to have developed an online presence (website, social media, blog, guest postings, etc.) by this time.

Format Requirements

- Packaged into a single PDF file. Renderings and/or audiovisuals may be submitted separately, if desired.
- Up to 20 pages

Content Requirements

• Updated 100-word description of team and its goals
• Digital representation (renderings, graphic floor plan, photography of scale model, animation, etc.) of competition prototype design (8–10 images, minimum 1080 pixels in shortest dimension).
• Team photograph including as many members of the team as possible and associated file identifying the name of each individual shown and the photographer (1 image, minimum 1080 pixels in shortest dimension).
• Summary of unique project elements, considerations, innovations, research, or technology being considered (1–4 pages).
• Summary of team's current online presence, including social media accounts and website address, as utilized (1–2 pages).
• Summary of public outreach conducted and press coverage achieved to-date (1–2 pages).

6-4. Design Development Documentation Submission

The design development submission shall represent 90% complete construction documentation. The documentation shall clearly indicate all design details, house systems, and methodologies expected to be present in the competition prototype on the competition site. While some details may not be fully completed or finalized, the design development submission shall provide sufficient information



for the organizers to conduct a thorough rules and building code compliance review. The submission must address the team's approach to safety, including identification of team-specific concerns and constraints. All major decisions with regard to the project design is expected to be complete. The design development submission will not be reviewed by any juries.

6-4.1 Design Development Drawings

Format Requirements

- Packaged into a single, bookmarked PDF document
- Up to 150 pages

Content requirements

Design drawings, including at a minimum:

- General, including solar envelope compliance, accessible tour route, Architectural footprint, water delivery and removal compliance information, and constructed footprint calculations.
- Site, including temporary footing locations, ground penetrations, and adjustable footings.
- Landscape, including plantings, containers, and watering methodology.
- Structural, including building, decking, and associated structures.
- Architectural, including dimensioned floorplans, building sections, detailed sections, reflected ceiling plans, roof plans, elevations, window and door schedules, and exterior structures.
- Interiors, including finishes, furniture layout, and cabinetry.
- Fire Protection, including sprinklers and required detection systems.
- Plumbing, including layout, schedules, diagrams, and solar thermal (if applicable).
- Mechanical, including layout, schedules, diagrams, and installation requirements.
- Electrical, including AC and DC layout, one-line diagrams, three-line diagrams, and sizing calculations.
- Telecommunications, including instrumentation, wiring, and associated elements.
- Operations, including house transportation, assembly methodology, and staging.

6-4.2 Design Development Project Manual

Format Requirements

- Packaged into a single, bookmarked PDF document.

Content Requirements

• <i>Project overview.</i>
• Detailed Water Budget.
• Interconnection Information Form, including summary of any unlisted electrical components.
• Summary of reconfigurable features.
• Health and Safety as outlined in Appendix E.
• Energy Analysis and Simulation.
• Structural Professional Acknowledgement Letter, signed and stamped by licensed professional indicating acceptance of the Construction Documentation deliverable deadline and support of team.
• Structural Calculations.
• Construction Specifications.



6-5. Digital Project Representation

The teams shall submit renderings, photographs, graphics, and/or animations representing the competition prototype design and competition entry for use on the Solar Decathlon website and in outreach materials generated by the organizers. High quality and varied submissions are expected to lead to greater visibility for the team. This submission can include renderings, photography of scale models or mock-ups, refined graphics, computer-generated walkthroughs, 360-degree virtual tours, or other representations as determined by the team. The organizers will select a subset of submitted documentation for public distribution.

Format Requirements:

- Packaged into a single, zipped file. If elements are hosted online, a link shall be included in the submission.
- Photographs shall be at least 1080 pixels in their shortest dimension and shall be accompanied by a file containing the name and affiliation of the photographer or graphic creator and identification of any individuals visible.
- Videos, if submitted, shall be widescreen format and accompanied by a verbatim transcript of the audio narrative and identification of the creator and any individuals visible in the video. Closed captioning does not need to be included within the video file. Permission must be provided for any copyrighted content or audio used as part of the video.

Content Requirements:

• Minimum of five images, with at least one exterior, one interior, and one birds-eye view.
• Photographs
• Videos, if available.

6-6. Final Construction Documentation Submission

The final construction documentation submission shall represent 100% complete construction documentation, with sufficient detail for a contractor to build the competition prototype house as it is expected to appear on the competition site. The documentation shall include complete and final design details, house system specifications, and construction. While it is recognized that a few minor details may change during construction, the construction documentation submission shall provide sufficient information for the organizers to conduct a final rules and building code compliance verification. The submission must address the team's approach to safety, including identification of team-specific concerns and constraints. The construction documentation submission will not be reviewed by any juries.

6-6.1 Construction Drawings

Format Requirements

- Packaged into a single, bookmarked PDF document
- Up to 150 pages



Content Requirements

Complete construction drawings, including at a minimum:

- General, including solar envelope compliance, accessible tour route, finished architectural footprint, water delivery and removal compliance information, and constructed footprint calculations.
- Site, including temporary footing locations, ground penetrations, and adjustable footings.
- Landscape, including plantings, containers, and watering methodology.
- Structural, including building, decking, and associated structures.
- Architectural, including dimensioned floorplans, building sections, detailed sections, reflected ceiling plans, roof plans, elevations, window and door schedules, and exterior structures.
- Interiors, including finishes, furniture layout, and cabinetry.
- Fire Protection, including sprinklers and required detection systems.
- Plumbing, including layout, schedules, diagrams, and solar thermal (if applicable).
- Mechanical, including layout, schedules, diagrams, and installation requirements.
- Electrical, including AC and DC layout, one-line diagrams, three-line diagrams, and sizing calculations.
- Telecommunications, including instrumentation, wiring, and associated elements.
- Operations, including house transportation, assembly methodology, and staging.

6-6.2 Construction Project Manual

Format Requirements

- Packaged into a single, bookmarked PDF document.

Content Requirements

• Project Overview.
• Detailed Water Budget.
• Interconnection Application Form, including summary of any unlisted electrical components.
• Summary of reconfigurable features.
• Complete Energy Analysis and Model.
• Construction Specifications.
• Draft Cost Estimate.

6-6.3 Stamped Structural Submission

The structural submission shall represent a complete structural design, including structural calculations and specifications. The entire submission shall be stamped by a licensed design professional, such as a structural engineer or architect, licensed to stamp residential structural drawings and calculations.

Format Requirements

- Packaged into a single, bookmarked PDF document.



Content Requirements

- Stamped structural calculations and specifications demonstrating compliance with the Solar Decathlon AFRICA Building Code.

6-6.4 Health and Safety Plan

Format Requirements

- Packaged into a single, bookmarked PDF document.

Content Requirements

- Health and Safety Plan meeting the requirements outlined in Appendix E.

6-7. Project Summary & Public Exhibit Materials

The team shall submit an updated description of the project team and design approach, renderings, graphic floor plans, logos, and other relevant information for use on the Solar Decathlon Africa 2019 website and for organizer outreach about the event. The team shall submit all public exhibit materials the team plans to employ on the competition site, for organizer review of proper use of Solar Decathlon Africa branding, sponsor recognition, content, etc.

6-7.1 Project Summary

Format Requirements

- Packaged into a single, bookmarked PDF file.
- 10 pages maximum.

Content Requirements

• A 100-word or less description of your team house. (1 paragraph).
• Design philosophy and house design, indicating goals, architectural style, target market, etc. (1 page).
• Unique house features. What makes the house unlike any other? (1 page).
• Technological innovations incorporated into your house. (1–2 pages).
• Define the target client for the team house and how the design responds to this market's needs. (1 paragraph).
• Team organization, number of members, and permanent (non-university) email addresses for all team members. (1 page, or attachment).
• Future plans for the house. Where will it go after the competition? (1 paragraph).

6-7.2 Team Photograph

Format Requirements



Photographs shall be at least 1080 pixels in their shortest dimension and shall be accompanied by a file containing the name and affiliation of the photographer or graphic creator and identification of any individuals visible.

Content Requirements

- | |
|---|
| <ul style="list-style-type: none">• Include all team members (if possible), and strive for excellence and creativity. |
|---|

6-7.3 Construction Photography

Format Requirements

Photographs shall be at least 1080 pixels in their shortest dimension and shall be accompanied by a file containing the name and affiliation of the photographer(s) and identification of any individuals visible.

Content Requirements

- | |
|--|
| <ul style="list-style-type: none">• At least 10 photographs showing construction to-date of the competition prototype. |
|--|

6-7.4 Team Logo

Format Requirements

Vector or high-resolution format appropriate for print; EPS preferred.

Content Requirements

- | |
|--|
| <ul style="list-style-type: none">• Graphic logo. |
| <ul style="list-style-type: none">• Associated text file containing name, phone number, and email of person submitting logo. |

6-7.5 Digital Project Representation

The teams shall submit updated renderings, photographs, graphics, and/or animations representing the competition prototype design and competition entry for use on the Solar Decathlon AFRICA website and in outreach materials generated by the organizers. High quality and varied submissions are expected to lead to greater visibility for the team. This submission can include renderings, photography of scale models or mock-ups, refined graphics, computer-generated walkthroughs, 360-degree virtual tours, or other representations as determined by the team.

The organizers will select a subset of submitted documentation for public distribution.

Format Requirements

- Packaged into a single, zipped file. If elements are hosted online, a link shall be included in the submission.



- Photographs shall be at least 1080 pixels in their shortest dimension and shall be accompanied by a file containing the name and affiliation of the photographer or graphic creator and identification of any individuals visible.
- Videos, if submitted, shall be widescreen format and accompanied by a document including a verbatim, identification of the creator and any individuals visible in the video. Closed captioning does not need to be included within the video file. Permission must be provided for any copyrighted content or audio used as part of the video.

Content format

• Minimum of five images, with at least one exterior, one interior, and one birds-eye view
• Photographs
• Videos, if submitted.

6-7.6 Competition Prototype Graphic Floor Plan

The graphic floor plan is expected to be posted to the Solar Decathlon Africa 2019 website and used in various communications materials to introduce the public to each competition prototype. The floor plan should be presented in a way to demonstrate the layout of the house, interior furnishings, and all site elements.

Format Requirements

- Natively-generated vector PDF file

Content Requirements

• Complete floor plan showing all exterior elements, including landscaping, ramps, decks, and solar envelope and interior elements, including furniture and fixtures.

6-7.7 Dinner Party Menus and Recipes

Format Requirements

- Packaged into a single, bookmarked PDF file

Content Requirements

• Restaurant-style dinner party menu for each dinner party
• Comprehensive ingredient list for each dinner party.

6-7.8 Public Exhibit Materials

Format Requirements

- Packaged into a single, bookmarked PDF file
- Each public exhibit material shall be represented at its full scale within the PDF; therefore, it is expected that the PDF may contain sheets at several different scales.



Content Requirements

Design of onsite signage, team handout, digital displays, or other products intended to convey information to the public.
Plan depicting location of all public exhibit materials.
Team uniform design.
Links to team website and/or social media properties.

6-8. Jury Deliverables

The jury deliverables provide an opportunity for teams to present their projects to each jury prior to arrival on the competition site. The jury deliverables are expected to provide a summary of each team's approach to meeting the contest requirements for each of the juried contests. The jury deliverables will be reviewed by the respective jury prior to the competition. The narratives may include any combination of text and graphics. The narratives may link to multimedia hosted online, which will be reviewed by jurors as time permits. The narratives will not be made public prior to the release of the respective contest results.

6-8.1 Jury Narratives

Format Requirements

Packaged into a single, bookmarked PDF file for each jury

Content Requirements

Architecture Narrative, including architectural photography (10 pages, maximum + up to 10 photographs).
Engineering & Construction Narrative, including energy analysis (10 pages, maximum + energy model analysis and results).
Market Appeal Narrative, including complete cost estimate¹³ (10 pages, maximum + cost estimate).
Communications & Social awareness Narrative, including links to team website and/or social media accounts (10 pages, maximum + onsite public exhibit materials).
Innovation Narrative (10 pages, maximum + appendices).

6-8.2 As-Built Drawings

Format Requirements

- Packaged into a single, bookmarked PDF document
- Up to 150 pages
- Size ISO "A3" (297 mm X 420 mm) sheet size

Content Requirements

Complete construction drawings representing the as-built competition prototype house and with sufficient detail for a residential general contractor to build the house without additional input from the team.



6-8.3 As-Built Specifications

Format Requirements

Packaged into a single, bookmarked PDF document, of sufficient detail for a residential general contractor to build the house without additional input from the team.

Content Requirements

- | |
|--|
| <ul style="list-style-type: none">• Construction Specifications. |
|--|

6-8.4 Audiovisual Presentation

Format Requirements

- Widescreen, high-definition video file (such as .mov, .mp4, etc.).
- 3-minute maximum length.
- Accompanied by a document including a verbatim transcript of the audio narrative and identification of the creator and any individuals visible in the video. Closed captioning does not need to be included within the video file. Permission must be provided for any copyrighted content or audio used as part of the video.

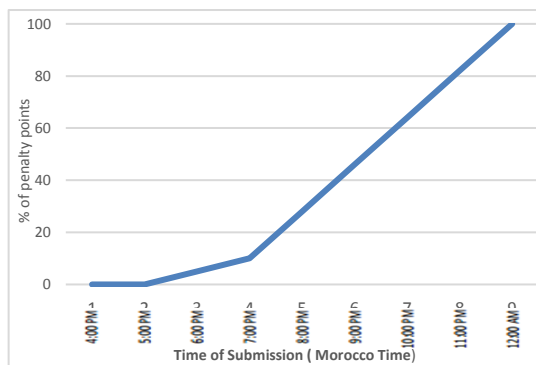
Content Requirements

- | |
|--|
| <ul style="list-style-type: none">• Must include video footage of the complete constructed house as-built prior to the competition |
| <ul style="list-style-type: none">• May contain still photos and graphics |
| <ul style="list-style-type: none">• Gives the jurors a realistic preview of what they will experience during the on-site walkthroughs |
| <ul style="list-style-type: none">• Includes an audio narrative that explains to viewers what they're seeing and describes the underlying philosophy behind the design and team approach to the competition. |

7. Deliverables submission schedule

Teams are required to submit all deliverables associated with the project as described in III.6. All deliverables are due by 5 p.m. Moroccan Time on the dates indicated in the Figure 12. Late or incomplete submission of deliverables may be subject to penalty points or reduction in prize values. Following receipt, organizers will review the deliverables and provide comments to teams. Teams shall correct all issues noted to be eligible for participation in the competition.

Penalty points for late submissions still received in the tolerated time “within the 24 hours after the due time” are scaled linearly, as shown in figure 12. The penalty associated with late submission of each deliverable is indicated in figure 1; However, additional penalty points may be assigned for failure to meet submission requirements beyond the scenarios indicated in Figure 1, including incomplete but on-time deliverables and deliverables received after tolerated time.



Additional penalty points:	Time of Receipt $\geq$ 11:59: 59 PM
Reduced (steep):	11:59:59 PM > Time of Receipt $\geq$ 7:00 PM
Reduced (shallow):	7:00 PM > Time of Receipt $\geq$ 5:00 PM
No penalty points:	Time of Receipt $\leq$ 5:00 PM

Time of receipt relates only to date of required submission .

Submission after 11:59:59 PM on the date will result in additional penalty points of a severity to be determined by the competition project manager.

Deliverables Name	Maximum Penalty Points if Received on the tolerated Time	Due date
D-1. Team Short Description & Project Management Plan	0,25	April 11, 2018
D-2. Schematic Design Summary	0,25	May 23, 2018
D-3. Team Overview	1	September 12, 2018
D-4. Design Development Documentation Submission	2	November 14, 2018
D-5. Digital Project Representation	1	December 19, 2018
D-6. Final Construction Documentation Submission	3	February 6, 2019
D-7. Project Summary & Public Exhibit Materials	1	April 6, 2019
D-8. Jury Deliverables	2	August 21, 2019

Figure 12: Scoring function for deliverables submission schedule



IV. APPENDIXES

APPENDIX A: GENERAL DEFINITIONS

Assembly

The period of time between the allowed arrival of trucks on site and the beginning of the contests on the competition site.

Communications manager

The organizer responsible for the project's public outreach and communications activities.

Communications materials

All printed or electronic publications designed to convey information to the public.

Competition

All aspects of the Solar Decathlon AFRICA related to the contests and the scoring of those contests.

Competition Project manager

The head rules official responsible for writing and enforcing the rules and conducting the competition.

Competition prototype

The complete assembly of physical components installed within the solar envelope.

Competition site

The area provided by the organizers containing all solar envelopes, pedestrian walkways, and associated organizer equipment, structures, and infrastructure.

Contest

The Solar Decathlon AFRICA competition consists of 10 separately scored contests.

Contest week

The period on the competition site when some or all contests are in progress.

Decathlete

A team member who meets the decathlete eligibility rules provided on the project group.

Decision on the Solar Decathlon AFRICA Rules

The competition project manager's interpretation or clarification of the Solar Decathlon AFRICA Rules.

Director

The organizer representing the Moroccan Research Institute of Solar Energy and New Energies (IRESEN) who has final decision-making authority regarding all aspects of the project.

Disassembly

The period of time between the closing of the public exhibit and the completion of competition site cleanup.

**Event**

The activities that take place on the competition site including, but not limited to, registration, assembly, inspections, contests, special events, public exhibits, and disassembly.

Event production manager

The organizer responsible for the project's special events and volunteer activities.

Event sponsor

An entity selected by Solar Decathlon AFRICA Organizers to help ensure the success of the project.

Faculty advisor

A team member who is a faculty member and representative of a participating collegiate university/school in the project.

Grid-tie assembly

The period of time during assembly after the house has been connected to the village grid.

Juror

An organizer selected by the competition project manager to participate as a member of a specific jury.

Jury

A group of jurors evaluating a specific juried contest.

Measured subcontest

A subcontest based on task completion or monitored performance.

Observer

An organizer, assigned by the competition project manager, to observe team performance and records the results of specific contest activities but does not provide interpretations of the rules.

Organizer

An IRESEN, UM6P and/or their partners' employee, subcontractor, juror, or observer working on the project.

Project

All activities related to the Solar Decathlon AFRICA.

Project Group

A community forum that includes official communications suitable for viewing by all teams and organizers.

Protest resolution committee

A group of three organizers selected by the competition manager to resolve team protests.

Public exhibit

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

Qualified Electrical Worker

A team member who has the requirements for qualified electrical work on the competition site



Rules

All principles or regulations governing conduct, action, procedure, arrangement, etc., for the duration of the project, represented in aggregate by this Solar Decathlon AFRICA rules document.

Rules official

An organizer authorized to interpret the rules and officiate one or more of the contests.

Scored period

Any 15-minute period beginning at 0, 15, 30, or 45 minutes after the hour fixed in the Event Schedule during contest week.

Scoring server

A server that collects data and calculates composite scores.

Site operations manager

The organizer responsible for all event site operations.

Solar Decathlon AFRICA Building Code

A set of design and construction standards set forth for the protection of public health and safety during the event.

Solar Decathlon AFRICA building official

The rules official responsible for writing, interpreting, and enforcing the Solar Decathlon AFRICA Building Code.

Solar envelope

The area, as defined by Rule 5, containing the competition prototype.

Stand-alone assembly

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

Staff

An individual working for the organizers whose role is not described elsewhere in these definitions Solar Decathlon AFRICA.

Subcontest

An individually scored element within a contest.

Team

The combination of team members representing a single entry to the competition

Team crew

A team member who is involved with a team's project and may be unaffiliated with a participating school

Team member

An 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 team crew members are all considered team members

**Village grid**

The bi-directional, 240 V “phase-Neutral” 60-hz AC electrical network on the competition site to which each house has an individually metered connection.

Volunteer

An individual selected by the volunteer coordinator to support activities on the competition site and whose role is not described elsewhere in these definitions

Volunteer coordinator

An organizer selected by the event production manager to manage volunteer activities on the competition site



APPENDIX B: EVENT SCHEDULES

(To be completed by Spring 2019)



APPENDIX C: JURIED CONTESTS GUIDELINES

(To be completed by spring 2019)



APPENDIX D: MEASURED SUBCONTESTS GUIDELINES

(To be completed by spring 2019)



APPENDIX E: Health and Safety Plan Requirements

The overall success of the Solar Decathlon AFRICA competition is dependent on the health and safety of all team members, volunteers, organizers, and the public. To achieve this objective, each team is required to submit a Health and Safety Plan that identifies the following elements:

- a. How you will be minimizing risk.
- b. How you will address major hazards that may be encountered during assembly and disassembly activities on the competition site.
- c. How you will control these hazards to prevent injury to team and crew members, volunteers, subcontractors, organizers, and the public.
- d. Areas of high risk—such as electrical safety, working at elevated heights/fall protection, hoisting and rigging activities, and safe equipment operations—shall include the necessary level of detail to ensure the health and safety of all site personnel.
- e. How you will ensure that you are in compliance with applicable regulations.
- f. The roles and responsibilities for the Team's core supervisory personnel (Project Manager, Construction Manager and Health and Safety Officer(s)) throughout the event.

1. Plan Development

A Health and Safety Plan template will be provided on the project group. The template will identify major topics to address the level of detail required, performance expectations, and requirements such as minimum levels of training needed for various team positions. The format of each team's submitted plan can deviate slightly from the recommended template as long as the information and level of detail are equivalent, and the Decathlon-specific requirements are met. Each plan shall be developed in consideration of the unique needs and requirements of each team's competition prototype alternate and construction methodologies on the competition site.

Teams are to work or consult with their school's environment, safety, and health department during the development process. They can be an excellent resource when developing their Health and Safety Plans, while also ensuring that school-specific requirements are addressed.

2. Required Training

To ensure a minimum knowledge base regarding health and safety issues during construction activities, the team's project manager, construction manager, and health and safety officer are required to complete the OSHA 30-hour Construction Safety Training course. Teams are strongly encouraged to have their Faculty Advisor also complete the OSHA 30-hour course. Proof of course completion for the OSHA 30-hour Construction Safety Training shall be included with the Health and Safety plan. Teams are also encouraged to have each team member who will be participating in construction activities to complete an OSHA 10-hour Construction Safety Training class (not mandatory) prior to participating in construction.



3. Submission and Approval

Teams are required to submit their Health and Safety Plan to the organizers for acceptance. Teams are responsible for updating the Health and Safety Plan, both before and after acceptance, to reflect changes in construction parameters. For example, if a team did not plan to use a crane to place its house when the plan was submitted but later decided that a crane would be necessary, then the team is required to update the plan accordingly.

During the event, a current copy of each team's Health and Safety Plan shall always be made available on their site in a prominent location. Individuals working on your site shall be briefed on the final, approved plan and should know the expectations regarding safety, hazards, and controls.



APPENDIX F: Cost Estimate Requirements

The teams shall provide a complete construction cost estimate as part of their Market Appeal jury narrative with a report provided to the juries. While the exact estimated construction cost of each competition prototype house is not scored, juries will consider the cost-effectiveness with regard to meeting team and design goals.

1. Basis for Estimates

- a. Each estimate shall be based on the as-built construction documentation. The as-built documentation is expected to closely represent the house as it appears on the competition site.
- b. Cost estimates must include all necessary labor, material, and equipment costs necessary to construct the competition prototype. Teams must add professional labor in addition to material costs.
- c. Labor costs shall include the typical installation time for each factor, based on a labor norm (production factor) applied to the contractor installing each item. These costs shall be included as labor costs for a specific item or as a separate line item in the estimate.
- d. All labor rates and estimates shall be for typical residential construction sites and schedules. The unique circumstances of the competition site shall not influence the estimate.
- e. Material prices shall not include the transportation costs.
- f. Shop fabricated items shall be estimated as to the cost to the general contractor, plus any labor required for installation.
- g. Heavy equipment and scaffolding necessary for construction on the competition site shall be included. Costs for crane rental and operation time necessary for assembly shall also be included. Small tools do not need to be separately added, as they would be included within the General Conditions allowance.

2. Estimate Exclusions

- a. The construction cost estimate shall exclude the general contractor's "General Conditions," including but not limited to site supervision, permitting, inspections...
- b. The estimate is to represent construction costs and shall exclude other project costs including but not limited to land acquisition costs, realty fees, professional design and consulting fees, furniture, fixtures, and financing costs.
- c. Any element included in a competition prototype house that is not used during the competition, does not impact the performance of the house, and is not presented or visible to the juries in any way shall not be included.
- d. Site work and improvements that are not on the competition site are not to be included.
- e. Signage relating to the communications contest shall not be included.



3. Estimate Formats

- a. Example estimates will be provided by the organizers.

4. Pricing Notes

- a. The foundation system that will be built on the competition site shall be included.
- b. Built-in fixtures such as counter tops, murphy beds, window coverings, casework, and built-in cabinetry shall be included in the cost estimate. Furniture that is freestanding is excluded.
- c. Mechanical, electrical, security, and communications systems present on the competition site shall be included.
- d. Built-in kitchen appliances, ovens, refrigerators, washers, dryers, and other similar elements shall be included.
- e. Landscaping (plants, arbors, soil, etc.) is included. Built-in hardscaping (mounted planters, paving, outdoor lighting, decking, railings, and trellises) shall be included in the construction cost estimate.

5. Estimate Verification

- a. Teams will be provided an opportunity to submit their completed estimate for review by a professional cost estimator in advance of the jury deliverables deadline. The professional estimator will provide written feedback on the estimate.
- b. Teams will be permitted to provide a dispute and clarification narrative to the estimator following this review up to five pages in length. The estimator shall review this response in advance of the competition. As appropriate, the team and estimator may schedule a phone call to discuss.
- c. The estimator will conduct an on-site walkthrough of each competition prototype house prior to providing a report on the construction cost estimate to the juries, as indicated above. The on-site walkthroughs will offer the estimator an opportunity to make visual verifications of information presented in the construction cost estimate and associated deliverables. The walkthrough will provide an opportunity for the estimator to ask the decathletes for clarifications or questions that may have arisen during the deliverables review.



Engage with Solar Decathlon AFRICA online.
For more information, please contact us on
sda@iresen.org

www.solardecathlonafrica.com



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