



U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

2023 Build Challenge Rules

July 2021

The U.S. Department of Energy (DOE) Solar Decathlon® is a collegiate competition, comprising 10 Contests, that challenges student teams to design and build highly efficient and innovative buildings powered by renewable energy.

The Solar Decathlon Competition Guide defines the framework of the competition. This document contains the 2023 Build Challenge Rules, which describe all aspects of how the Build Challenge will be conducted, scored, and awarded. The information in the Rules is supplemented by the Competition Guide.

List of Acronyms

ADA	Americans with Disabilities Act
ANSI	American National Standards Institute
AHJ	Authority Having Jurisdiction
cfm	cubic feet per minute
CO ₂	carbon dioxide
dB	decibel
dBa	A-weighted decibels
DOE	U.S. Department of Energy
EDT	Eastern Daylight Time
EST	Eastern Standard Time
HERS	Home Energy Rating System
HVAC	heating, ventilating, and air conditioning
kWh	kilowatt-hours
Leq	sound level equivalents
Lx	lux
NREL	National Renewable Energy Laboratory
OSHA	Occupational Safety and Health Administration
PPM	parts per million
PV	photovoltaic
SUI	Solar Utilization Index
Wh	watt-hours

Foreword—Why Solar Decathlon Build Challenge?

High-performance building design includes comprehensive building science, energy efficiency, optimized mechanical systems, indoor air quality, resilience, and water conservation. Numerous attributes will ultimately determine whether buildings succeed or fail in terms of the human experience, including affordability, comfort, health, durability, safety, and adequate resources. Yet, professional curricula across the United States and around the world do not consistently provide students with the skills needed to effectively integrate high-performance measures into their design, engineering, and construction management careers moving forward. Moreover, emerging crises related to affordability, health, disaster risks, and water shortages are making these skills an imperative at the same time that degree programs are working to effectively integrate them into their curricula.

To help address this gap, the U.S. Department of Energy (DOE) Solar Decathlon® Build Challenge focuses on two critical goals: to integrate high-performance design and construction education into degree programs, and to inspire the public and industry through innovations implemented by student teams. As a collegiate competition with 10 Contests that challenges student teams to design and build highly efficient and innovative buildings powered by renewable energy, the Solar Decathlon has grown since it began in 2002 to have an international footprint, with global events and tens of thousands of alumni around the world. The Solar Decathlon Build Challenge is helping create the next generation of the building workforce, with the skills and passion to build or retrofit high-performance, energy-efficient, net-zero buildings.

More information about the Solar Decathlon is available in the [Solar Decathlon Competition Guide](#) and on the [Solar Decathlon website](#).

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1 Summary of Important Dates

The following are key milestones for the 2023 Build Challenge:

- **July 2021:** 2023 Build Challenge Rules are released.
 - The Team Application is available on the [Solar Decathlon website](#). Teams can begin work as early as the release of the Rules.
 - After a team completes its application, the team is provided access to Build Challenge communications and resources, including Building Science Education, topical webinars, and energy modeling software.
- **October 26, 2021, 5 p.m. EDT:** Team Application deadline
 - The application can be accessed from the [Solar Decathlon website](#).
 - Each team pays a nonrefundable \$100 fee; identifies a Faculty Lead and a Student Team Lead and provides the name, email, and phone number for each of those individuals; submits a preliminary roster of student team members; and submits a Build Challenge Proposal.
- **November 30, 2021, 5 p.m. EST:** D1—Project Introduction Deadline
 - Deadline by which all teams must complete the Project Introduction, which includes a Conceptual Design of the team’s entry.
- **February 15, 2022, 5 p.m. EST:** D2—Project Management Plan Deliverable Deadline
 - The Project Management Plan deliverable includes information about the team’s project construction partner and site.
- **March 29, 2022, 5 p.m. EDT:** D3—Construction Documentation Deliverable Deadline
- **April 12, 2022, 5 p.m. EDT:** D4—Design Presentation Deliverable Deadline
- **April 22–24, 2022:** Solar Decathlon Competition Event
 - 2023 Build Challenge teams present to industry leaders who determine which teams will receive prize funding from DOE and which teams advance to the Construction phase of the Challenge.
- **July 12, 2022:** Updated 2023 Build Challenge Rules Released
 - Minimal revisions expected, primarily focused on clarifying intent or adding definition to dates or schedules.

- **August 2, 2022, 5 p.m. EDT: D5—Permit Documentation Deliverable Deadline**
- **October 18, 2022, 5 p.m. EDT: D6—Construction Progress Deliverable Deadline**
- **January 30, 2023: Final Build Challenge Rules Released**
 - Minimal revisions expected, primarily focused on clarifying intent or adding definition to dates or schedules.
- **February 14, 2023, 5 p.m. EST: D7—Construction Completion Deliverable Deadline**
 - Teams must have: (1) received a Certificate of Occupancy from their local Authority Having Jurisdiction (AHJ), (2) installed all Organizer Instrumentation Equipment, and (3) demonstrated an accessible tour route through their house to organizers.
- **February 17–March 17, 2023: Measured Contest Evaluation Period**
 - All homes are to be evaluated independently of each other.
 - Point penalties of 1 point per day of delay will be assessed to teams not ready to begin measured contest evaluations on February 17, 2023.
- **March 28, 2023, 5 p.m. EST: D8—Project Story Deliverable Deadline**
 - Including Jury Documentation, As-Built Documentation, House Photography and Videography, and summary of public exhibit success and ongoing social media engagement by this deadline.
- **March 29–April 18, 2023: Local Exhibition Period**
 - While teams may exhibit their as-built houses earlier, such as alongside the Measured Contest activities, all homes should be open to the public during this period.
- **April 19, 2023, 5 p.m. EDT: Final Presentation Deliverable Deadline**
- **April 21–24, 2023: Solar Decathlon Competition Event**
 - All teams will present to juries on the National Renewable Energy Laboratory (NREL) campus in Golden, Colorado, USA.
 - All team scores calculated as part of the Measured Contest Activities will be announced.
 - All competing teams will earn points according to the Build Challenge Rules, and the team with the most points overall will win.
 - All competing teams will be provided an opportunity to present their projects to other competitors, industry professionals, and related guests.
- **May 10, 2023, 5 p.m. EDT: D10—Final Report Deliverable Deadline**

2 Build Challenge Structure

Teams entering the Build Challenge design and build a residential unit in their local community. For more information on the Solar Decathlon, including the relationship between the Design Challenge and the Build Challenge, see the [Solar Decathlon Competition Guide](#).

The Build Challenge comprises 10 Contests, each worth 100 points. Each team selects and defines a specific location, building lot or site, and neighborhood characteristics as context for the building design and its relationship to surrounding structures and the community. All teams must have a specific target site and location for consideration by the juries, though the team will retain the option to locate the house elsewhere after the Challenge.

The team must build a single dwelling unit for evaluation. A dwelling unit, as defined by the [2018 International Energy Conservation Code](#), is a single unit that provides complete independent living facilities for one or more people, including permanent provisions for living, sleeping, eating, cooking, and sanitation. Total area compliance should be verified using the American National Standards Institute (ANSI) [Square Footage—Method for Calculating: ANSI Z765-2003 \(R2013\)](#), which states that the finished area is the sum of the finished and conditioned areas measured at the floor level to the exterior finished surface of the outside walls.

Teams shall design and build an energy-positive house in their region that can be effectively exhibited and operated. As such, renewable energy must be evaluated and integrated into the project and built house. The design should respond to a unique, team-specified target market that would benefit from collegiate institution innovation and engagement.

Teams may build multifamily housing where the design is part of a duplex, townhome, or multifamily development. However, the house presented must represent a complete dwelling unit, and only one dwelling unit will be evaluated as part of the contests.

The house must be between 400 ft² and 3,000 ft². The house must have separate entry and exit doors with an accessible route through the house for tour groups. Not all levels must be accessible, but the visitor should have a comprehensive and compelling tour experience, with ramps in accordance with the Americans with Disabilities Act (ADA). The organizers will have a third-party inspector verify the ADA tour route through each house prior to providing approval to compete.

Teams are required to present their solutions at the Competition Events occurring on the NREL campus in Golden, Colorado. The organizers do not plan to provide financial assistance for lodging or travel expenses.

Teams that compete in the Solar Decathlon Build Challenge design fully functional houses compliant with Challenge guidelines and then build/remodel, exhibit, and operate houses in their own communities. Each house is extensively measured to evaluate its performance, and teams present to multiple juries in competition with all other teams. For the Build Challenge, each of the 10 Contests are scored independently, and the team with the most points at the end of the competition wins.

2.1 Challenge Phases

Design Activities

Following notification of acceptance into the design phase of the Build Challenge, each team begins work on its design solution. During this phase, teams refine their concept, recruit industry partners, confirm the location for the construction of the house, and prepare deliverables.

Each team sends at least one student, or up to five students total, to attend the Solar Decathlon Competition Event in person, April 21–24, 2022, at NREL in Golden, Colorado, to present their design progress for determination of the Approval to Proceed. One Faculty Lead is recommended to attend; up to two are allowed to attend for each team. In total, a team may have a maximum of seven team members present if they bring five students and two Faculty Leads. As part of the 2022 Competition Event, team progress will be evaluated by experts for an Approval to Proceed to the next phase and for receipt of prize funds, as outlined in the Approval to Proceed Procedures, which will be made available on the [Solar Decathlon website](#). Up to 20 teams are expected to receive prize funding from the Department of Energy following receipt of an Approval to Proceed. All teams who receive an Approval to Proceed will be eligible to remain in the competition, though it is possible not all teams who receive an Approval to Proceed will receive Prize funding.

Design activities run from acceptance through April 2022.

Construction Activities

Following receipt of an Approval to Proceed in April 2022, teams shall complete their designs including all elements of the Construction Documentation deliverable, and include all appropriate construction drawings, details, energy models, specifications, site plans, and project plans per the schedule of deliverables. Teams will complete recruitment of industry partners/sponsors and fundraising, and identify a final location for their as-built house. The Construction Documentation should be completed to such a level that a general contractor could build the house as the team intends with minimal additional questions or follow up. The Construction Documentation will not be released publicly.

Following the successful completion of their Construction Documentation, teams build their house. Throughout the process, teams are expected to follow safe construction practices and document activities that may be relevant to the juries. Teams are responsible for all costs associated with materials and construction of the house design.

Construction activities run from April 2022 through house completion, expected in early 2023.

Public Exhibition

Each team shall prepare and offer a comprehensive tour of the house to all visitors. Any team members or associated individuals can offer tours of the house to the public.

The tour shall educate the visitors about the Solar Decathlon, the team's target market and goals, the design solution itself, and how visitors could adopt technologies or practices in their own homes or in their professional careers. All tours and aspects of each team's public outreach shall be informative, interesting, and accessible by people of all abilities. Digital technologies (such as

virtual reality, television screens, or apps), printed signage, and components (such as scale models, wall sections, or material samples) may be used to entice and educate the visiting public.

Public exhibition activities run for at least two weekends between March 29 and April 18, 2023.

Competition

Following the successful construction of the house, each team will compete in the Solar Decathlon 2023 Build Challenge. Organizers will work with each team to verify functionality and collect measurements necessary for scoring at a location to be coordinated with each team, and teams will present their solutions to juries. The teams will present to juries using photographs, videos, models, and/or other mediums to demonstrate their design and as-built house. All teams may optionally use photographs, videos, models, and/or other mediums to demonstrate aspects or elements of their design. The organizers will arrange to have each house photographed and documented using interactive 3D photography with walkthroughs; this information will be provided to the juries for review in advance of deliberation. During the competition phase, teams will also exhibit their as-built houses to members of the general public, educating them about opportunities for energy efficiency and energy production in their own homes.

Competition activities will run from April 18–24, 2023.

2.2 Required Tasks

- Attend monthly all-team conference calls for project updates and important information from the organizers about Build Challenge requirements, as outlined in Section 2.
- Ensure all student team members complete the online Building Science Education course or receive a confirmation from the team's Faculty Lead indicating that equivalent training is provided as part of the student's curriculum.
- Design and document a project compliant with the requirements listed in the latest version of the Build Challenge Rules.
- Build a house compliant with the requirements listed in the latest version of the Build Challenge Rules.
- Exhibit the project locally, compliant with the requirements listed in the latest version of the Build Challenge Rules.
- Submit all materials by the stated deadlines. Note that all deadlines are 5 p.m. Eastern Time (EDT from March to November each year, and EST from November to March)
- Participate in the 2023 Solar Decathlon Competition Event, and present to Build Challenge jurors.

2.3 Team Structure

- Each team must be associated with a collegiate institution and include a Faculty Lead.
- Each team must have at least five students, with one student designated as the Student Team Lead and others filling in the other team officer roles, as outlined in Table 1.
- Multiple collegiate institutions may combine to form a team.
- If a team member who is not a U.S. citizen wants to participate in person at the Competition Event held at NREL, each non-U.S. citizen must submit a Foreign National Data Card.

Table 1. Team Officers

Role	Responsibilities
Student Team Lead	The Student Team Lead is responsible for the overall success of the team's entry to the Challenge. This person ensures that official communications from the organizers are routed to the appropriate team member(s).
Construction Officer	The Construction Officer is responsible for planning and executing the construction of the house, including providing the necessary oversight on construction activities.
Measured Contest Officer	The Measured Contest Officer serves as the primary strategist and coordinator of measured contests. This person collaborates with the organizers' instrumentation team and the team's construction manager to accommodate the organizers' equipment.
Health and Safety Officer	The Health and Safety Officer is responsible for developing the team's Health and Safety Plan, providing health and safety oversight to the project, and advising the project manager and construction manager, as necessary, on project health and safety issues. This person is also responsible for the team's safety, including fire watch, public safety, and evacuation procedures.
Community Outreach Officer	The Community Outreach Officer is responsible for sharing the team's design and innovations with the community, as well as development of communications products such as branding, team website, social media posts, and/or marketing materials; the Community Outreach Officer also leads implementation of public exhibition activities.
Faculty Advisor	The Faculty Advisor is a faculty member who advises the team and represents a competing collegiate institution.
Faculty Lead	The Faculty Lead is a Faculty Advisor who serves as a primary contact for a team; the Faculty Lead is responsible for communicating competition details from organizers to team members, as well as overseeing and closely engaging with the team.

2.4 Student Decathlete Qualifications

Each student must be pursuing a degree and enrolled in at least one class at a participating collegiate institution or have graduated within the 12 months prior to April 1, 2023. Student team members can be from any discipline and any level of collegiate schooling.

2.5 Faculty Lead Role

The Faculty Lead, or leads, agrees to:

- Negotiate and maintain a productive relationship between the Solar Decathlon team and the related collegiate institution(s);
- Verify that participating students complete the Building Science Education course or equivalent curriculum; ensure safety for all people participating in construction;
- Guarantee the necessary information is provided to team members who will be on-site at the competition events;
- Attend the competition in person; and
- Ensure the team builds the house as designed and exhibits to the public.

2.6 Application and Proposal

Teams interested in participating in the Build Challenge are required to complete a Team Application, including a Build Challenge Proposal. All teams who submit a complete Build Challenge Proposal will be accepted into the Design phase of the competition.

2.7 Building Code

The Solar Decathlon Build Challenge Building Code applies to all houses built as part of the Solar Decathlon Build Challenge. Homes are subject to local, state, and national codes or standards governing topics such as minimum bedroom size, fire protection requirements, resilience, or other requirements. If there are conflicts between the Solar Decathlon Build Challenge Building Code and local regulations where both conditions cannot be met, teams must discuss the discrepancy with the Solar Decathlon Build Challenge Building Official. The Building Code will be posted on the [Project Site](#) no later than November 1, 2021.

2.8 Units of Measurement

English units of measurement are preferred; however, a submission with metric units is acceptable. If metric units are used, metric units should be stated first, with English equivalents in parentheses.

3 Build Challenge Requirements

3.1 Authority

U.S. Department of Energy

DOE is the sponsoring organization, and the Solar Decathlon Build Challenge Director has the final decision-making authority in all aspects of the Challenge. NREL is responsible for the execution of the Challenge.

Build Challenge Manager

The Build Challenge Manager is the only rules official authorized to write and modify these rules.

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 operation or safety of the competition.

- a) The official version of the rules shall be the rules on the [Project Site](#). 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 [Project Site](#). In the case of a conflict, the official version shall govern. If there is a dispute, DOE and 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.

3.2 Administration

3.2.1 Precedence

If there is a conflict between two or more versions of the rules, the version having the later date takes precedence. If a conflict exists between two or more rules in this document, the Build Challenge Manager will determine which rule has precedence and will inform all teams of the decision on the rules. If a conflict exists between the Competition Guide and the Build Challenge Rules document, the Build Challenge Rules document takes precedence.

3.2.2 Violations of Intent

A violation of a rule's intent is considered to be a violation of a rule itself. The organizers, in consultation with DOE, have the ultimate authority in interpretation of rules. All decisions made by DOE are final, and there is no process for appeal. Attempting to exploit a perceived loophole in the rules that incentivizes behavior that does not align with the goal of the competition will not be viewed favorably. DOE reserves the right to change the rules of the competition at any time.

3.2.3 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 Site](#): Official communications suitable for viewing by all teams and organizers are posted on the [Project Site](#). The site will host messages and files for the teams.
- b) Organizer Email: For confidential communications, teams may email the organizers. The content of communications sent to this email address remains confidential unless the team grants permission to the Build Challenge Manager 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 Site](#). The Build Challenge email address is SDbuild@nrel.gov. The overall Solar Decathlon Competition email is solardecathlon@nrel.gov. Should a team need to contact DOE's Solar Decathlon Director directly, the email is solar.decathlon@ee.doe.gov.
- c) Building Science Education: All student team members are required to complete the free, organizer-provided building science education course or receive an equivalency waiver from their faculty adviser indicating that equivalent training is part of their curriculum.
- d) Webinars: At least one member from each team is expected to participate in regularly scheduled conference calls with the organizers. Additionally, teams are expected to participate in webinars intended to educate and prepare the teams for successful participation in the Challenge.
- e) Meetings: The teams and organizers may have one or more private meetings on an as-needed basis. Attendance is expected unless prior notice is given to the Build Challenge Manager.
- f) Individual Email: For expediency and to protect design confidentiality amongst teams, teams and organizers may communicate directly via email. Organizers will not share team information discussed via email publicly unless appropriate for all teams or the public.

3.2.4 Prize Structure

Up to 20 competing teams will be selected for prize funds via the process outlined in the Approval to Proceed Procedures, which will be available on the [Solar Decathlon website](#). Evaluators determining whether or not a team receives Approval to Proceed and a prize disbursement are separate from NREL staff, DOE staff, contest jurors, and the adjudication of these rules.

Prize disbursements are expected to be distributed at the conclusion of the Design phase, following the process outlined in the Approval to Proceed Procedures. Up to 20 teams that successfully complete their house design and complete construction will earn a financial award, likely \$50,000 per team.

- a) Prizes are distributed by the organizers to a single entity and account, as directed by the team Faculty Advisor on official collegiate institution letterhead and signed by collegiate institution leadership. The official team Faculty Advisor must be identified prior to any award. Multiple recipients will not be accommodated.
- b) For U.S. teams, it is the sole responsibility of the team to determine any taxes or associated payments required as a result of this award. Foreign teams are subject to nonresident alien withholding of 30% under Chapter 3 of the Internal Revenue Code (26 U.S.C. Chapter 3). Tax withholding requirements are determined by the W8BEN-E submitted by the foreign entity that was certified by their authorized signer. Any distribution beyond the initial recipient is the sole responsibility of the team.

- c) Through participation in the competition, each team agrees to accept the decisions of the organizers. The results are final. No right to counsel is authorized.

3.2.5 Effective Date

The latest released version of the rules posted to the [Project Site](#) represents the rules in effect.

3.2.6 Decisions on the Rules

The [Project Site](#) will contain a “Decisions on the Rules” database that provides interpretations of the rules contained in this document. Should a rules official make a decision that may affect the strategies of all teams, the rules officials will add the decision to the “Decisions on the Rules” database and notify all teams of the addition.

3.2.7 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, the team is putting itself at risk of incurring a penalty.

3.2.8 Penalties

Teams committing rules infractions are subject to one or more of the following penalties, depending on the severity of the infraction: (1) point penalty applied to one or more of the 10 Contests; (2) disqualification from part, or all, of one or more of the 10 Contests; or (3) disqualification from the competition.

- a) The rules officials are authorized to apply point penalties and disqualify a team from part, or all, of one or more contests as a consequence of rules infractions.
- b) The rules officials shall report to the director any significant rules infractions. The Build Challenge Manager determines whether a rules infraction is significant. The Build Challenge Director is solely authorized to 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.
- c) The Build Challenge Manager shall notify all teams via the [Project Site](#) 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 rule violated, a brief description of the infraction, and the penalty to be applied.

3.2.9 Protests

- a) Official written protests may be filed by a team for any reason following the release of scores or decisions on the Rules. A filing fee of up to 10 points is assessed to the team 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 if the team or the rules officials are too busy to engage in discussions that may result in resolution of the dispute without a protest.

- c) Protests shall be submitted within 24 hours of the action being protested. The final opportunity to file a protest is 5 p.m. MDT on Saturday, April 22, 2023.
 - o Exception: The results of one or more juried contests are announced on the final day of the Competition Event and cannot be protested.
- d) The protest shall be submitted by emailing the Build Challenge Manager at SDbuild@nrel.gov. The protest shall be attached as a PDF to the email, and the email subject should include “Solar Decathlon 2023 Build Challenge Protest” and the name of the team submitting the protest. The protest shall include the name of a decathlete representing the team filing the protest, 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 Build Challenge rules.
- g) Following the receipt of a protest, the protest resolution procedure will occur as follows:
 - o The Build Challenge Manager convenes the Protest Resolution Committee.
 - o The Build Challenge Manager submits the team’s protest to the committee. Unless the Build Challenge Manager is called by the committee to testify, the Build Challenge Manager is not permitted to read the protest until after the Protest Resolution Committee has submitted its written decision.
 - o The committee reads the protest in private. No appearance by the Build Challenge 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.
 - o The committee members shall individually call the decathlete who submitted the protest and the Build Challenge Manager for testimony to fully understand the protest. The committee may choose to call additional individuals for testimony.
 - o The committee considers the protest and notifies the director and Build Challenge 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.
 - o Following acceptance by DOE, if the recommendation involves changes to a team’s measurement or score, the Build Challenge Manager will ensure that the appropriate changes are applied to the scoring server.
 - o The Build Challenge Manager posts a copy of the protest and decision on the [Project Site](#).

3.3 Participation

Collegiate institutions may be multidisciplinary and may choose to have multiple internal groups of students complete designs, but only one design project may be submitted.

3.3.1 Team Structure

Each team shall provide contact information via the [Project Site](#). for the team officers listed in Table 1 and shall keep the contact information current for the duration of the project.

- a) Teams shall provide the contact information for only one person in each officer position.
- b) Faculty members are only eligible to fill the Faculty Advisor team officer position. Decathletes must fill all other team officer positions.

3.3.2 Safety

Each team is responsible for the safety of its operations.

- a) Each team member and team crew member shall work in a safe manner at all times during the project in accordance with the requirements identified in the Rules.
- b) Each team shall supply all necessary personal protective equipment and safety equipment for all of the team's workers and visitors during the project.
- c) Throughout activities, including any setup of exhibits or houses, a minimum level of personal protective equipment shall be worn by each team member and team crew member:
 - 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 3 inches (7.6 centimeters) 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
 - Safety boots (meeting Class 75 impact/crushing standards of ASTM F2413 or equivalent) with ankle support.
- d) Additional personal protective equipment or safety equipment shall be used if required for the task being performed (e.g., shock/arc protection, hearing protection, face shields, dust mask).
- e) Team members who expect to participate in any electrical work during the project shall meet Occupational Safety and Health Administration (OSHA) 29 CFR Part 1910, Subpart S Electrical 1910.399 requirements, and in doing so will be considered a Qualified Electrical Worker.

3.3.3 Conduct

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

3.3.4 Use of Likeness, Content, and Images

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.

- a) 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 DOE's and the Solar Decathlon sponsors' websites with unrestricted use.
- b) 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.

3.3.5 Competition Withdrawals

Any team wishing to withdraw from the Build Challenge must notify the Solar Decathlon Director and Build Challenge Manager in writing. Teams considering withdrawal are encouraged to communicate early and frequently with the Build Challenge Manager. All written withdrawals signed by the listed Faculty Advisor are final.

3.3.6 Deliverables

Teams are required to submit all deliverables associated with the project. All deliverables are due by 5 p.m. EST/EDT on the dates indicated in this document. Late or incomplete submission of deliverables may be subject to penalty points. 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. Eligibility for earning points in the competition is determined separately from evaluation for an Approval to Proceed, as outlined in the Approval to Proceed Procedures, which are available on the [Solar Decathlon website](#).

Penalty points for late submissions still received on the due date are scaled linearly, based on the time received after 5 p.m. EST/EDT up until 11:59 p.m. EST/EDT on the day following the due date. The maximum penalty associated with next-day late submission of each deliverable is two points; additional penalty points may be assigned for failure to meet submission requirements beyond the scenarios indicated in this document, including incomplete but on-time deliverables and deliverables received after the due date.

3.4 Build Challenge House Requirements

The finished square footage, as defined by [Square Footage—Method for Calculating: ANSI Z765-2003 \(R2013\)](#), shall be at least 400 ft² (37.16 square meters [m²]) and less than 3,000 ft² (278.71 m²).

- a) For the purposes of the Solar Decathlon, all finished square footage is included in the finished square footage calculation, regardless of whether or not the finished square footage is contiguous (i.e., attached to the main dwelling unit). Both maximum and minimum square footages must be within the limits set above.
- b) Teams may compete using one unit of a multifamily property, where additional dwelling units are placed adjacent to or otherwise surrounding the competition prototype.

The teams must meet the requirements for residential construction set by their local AHJ. The house must be built to meet the stricter of either the Solar Decathlon Build Challenge Building Code or the locally adopted building and energy codes.

3.4.1 Entrance and Exit Routes

Each house must have a distinct entrance and exit doorway, each of which shall be at least 36 inches (in.) wide.

The main house entrance may be placed on any side of the house. However, an accessible route leading from a public access point to the main entrance of the house shall be provided.

The house exit route shall be accessible to the public and lead from the main house exit to a publicly accessible street or path.

3.4.2 Competition Prototype Alternates

The juries may consider alternate installations of the competition prototype; however, each team must build a single complete dwelling unit for consideration by the juries. Additional dwelling units may be proposed to be adjacent to, or otherwise surrounding, the competition prototype. Only the competition prototype house with its included components and functionality, as built, is evaluated by juries. It is permissible to show the competition prototype house in context in renderings, photographs, or other media.

Juries shall consider how the design addresses local building code provisions and site restrictions at the target client's site.

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.

3.5 Energy

3.5.1 Photovoltaic Technology Limitations

Bare photovoltaic (PV) cells and encapsulated PV modules must be commercially available by or approved by the organizers prior to the beginning of the Competition Event.

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 the Competition Event.

3.5.2 Energy Monitoring

Teams shall install full branch-circuit level monitoring equipment within their competition prototype. This circuit-level energy monitoring shall provide data in a way that can be consumed by a homeowner, such as through an app or website showing which appliances, functions, or devices used energy, not just how much and when energy was used.

3.5.3 Energy Sources

After the conclusion of construction and until the conclusion of the Community Exhibition, global solar radiation incident on the lot is the only source of energy that may be consumed in the operation of the house. Homes may be grid-connected or grid-independent, but any electrical energy consumed by the house that is not collected/generated onsite must be offset with site-collected/generated renewable energy.

- a) Fireplaces, firepits, candles, and other devices using nonsolar fuels are not permitted in the designs.
- b) Gas-fired appliances are not permitted in designs, whether new construction or retrofit.
- c) The use of batteries is permitted as detailed below in the “Energy Storage” and “Inspections” sections of these rules.

3.5.4 Net Zero Plus Energy

All houses must be built with sufficient on-site PV energy generation to be net zero on an annual basis.

3.5.5 Energy Storage

Batteries include most commercially available energy storage devices, such as electrochemical batteries and capacitors. Additional energy storage may also be permissible, following discussion and approval by the Build Challenge Manager.

- a) The storage, such as batteries, and associated enclosure(s) must be compliant with the Solar Decathlon Build Challenge Building Code.
- b) The use of primary (nonrechargeable) batteries (no larger than 9-volt) 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.
- c) The use of the factory-installed battery within a team’s electric vehicle is permitted. Vehicle-to-grid power flow capabilities within the competition prototype is only permitted if vehicle-to-grid power flow and associated equipment are approved by the vehicle’s manufacturer.
- d) Plug-in (nonhardwired) 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 present at the competition house.

- e) Stand-alone, PV-powered devices with small secondary batteries are permitted, but the aggregate battery capacity of these devices may not exceed 100 watt-hours (Wh).

3.6 Build Challenge Events

Build Challenge Events include Competition Event on April 21–24, 2022, at NREL in Golden, Colorado; the Community Exhibition activities, which occur primarily in early 2023, and the Competition Event in April 2023, which will also take place at NREL.

3.6.1 Registration

All Solar Decathlon Build Challenge Event participants must register using the online registration site to submit required forms.

3.6.2 Program Branding Recognition

All communications materials produced by the teams concerning or referring to the project (including team websites) shall refer prominently to the competition as the “U.S. Department of Energy Solar Decathlon®” and the Challenge as the “2023 Build Challenge.”

- a) Teams are required to use the Solar Decathlon logo, the DOE word mark, and the NREL logo on all communication materials used. The Solar Decathlon logo must be at least three times the size of all other logos.
- b) The Solar Decathlon logo, the DOE word mark, and the NREL logo are the only required graphic elements teams must use.
- c) Team uniforms are exempt.

3.6.3 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 text and logo.

- a) Communications materials or other products that exist largely for the recognition of sponsors are limited to 20 ft² (1.858 m²) at the Community Exhibition. Other products include, but are not limited to, signs, exhibits, posters, plaques, photos, wall art, and furnishings.
- b) For multimedia or audio presentations a team chooses to play during their Community Exhibitions, no more than 20% of the total time, 1 minute, or whichever is less may be dedicated to the recognition of team sponsors.
- c) Off-the-shelf components that feature a built-in manufacturer’s logo are acceptable and do not need to be accompanied by the Solar Decathlon text and logo.
- d) Team uniforms are exempt.

3.6.4 Logistics at Build Challenge Events

- a) Each team is responsible for the transport of any necessary team equipment or exhibits to the Competition Event. Each team is responsible for any damage to or loss of such items.
- b) Each team is responsible for procuring all necessary equipment, tools, and supplies to build its house.
- c) Each team is responsible for transportation, accommodations, lodging, food, and beverages.

- d) Each team is responsible for making its own reservations and arrangements, and for covering all necessary costs.

3.6.5 Inspections

Each team entry is required to comply with the Solar Decathlon Build Challenge Rules and Building Code.

- a) All teams must provide an inspection record from their local AHJ or an approved third-party inspector that demonstrates compliance with the Solar Decathlon Building Code and, as applicable, locally adopted codes. Inspections are expected to occur throughout the construction process and must be completed for a team to be eligible to compete in Build Challenge Events.
- b) Each team shall be required to provide an ADA-compliant accessible tour-route through its house, inspected by a qualified professional prior to public exhibit. The entire home does not need to be accessible.
- c) The Build Challenge Manager shall check each team's inspection status to determine which houses are eligible to participate in the contests. All final inspections shall be passed by the deadline indicated in these Rules. Failure to pass inspections by the required deadline may disqualify a team for participation in Competition Event and is considered a rules violation. A team must have passed inspections to be eligible to participate in the contests.
- d) Because open, partially functioning houses and exhibits are preferable to closed, fully functioning houses, the organizers may direct the inspectors to require that an unsafe condition be corrected so public visits can occur—even if, as a consequence, the house is ineligible for participation in one or more contests.

3.7 Build Challenge Activities

3.7.1 House Occupancy

Under normal circumstances, no more than 50 people may be located in the finished square footage of the team's house at any one time for safety reasons.

3.7.2 House Operators

Only student decathletes, as defined in Section 1.3, are permitted to operate the house and participate in the contests.

- a) All competition-related communications during the Build Challenge Events shall be between the organizers and decathletes. Non-decathlete team members and crew, including faculty, are not permitted to participate in or listen to competition-related communications.
- b) Non-decathlete team members are permitted to give tours to the public and be present on the exhibition site.

3.7.3 Late Design Changes

The final project assembled shall be consistent with the design and specifications presented in the As-Built Documentation.

- a) If there are known inconsistencies between the final project and the as-built drawings and the Project Manual, the team shall document these inconsistencies and submit the documentation to the Build Challenge Manager as soon as possible after the inconsistency is known. The Build Challenge Manager will compile a summary of all known inconsistencies discovered during the inspections process and submit the summary to the respective juries.

3.7.4 Public Exhibit

- a) Teams are required to provide an accessible route to all areas of the house or exhibit that are available to the public during exhibit hours.
- b) Teams are permitted to produce and distribute up to one informational brochure or handout at the Community Exhibition.
- c) Teams may develop signage that complements public exhibit tours by informing visitors about the team project and engaging visitors waiting in line.
- d) Signage on display at the Community Exhibition shall be compliant with branding guidelines.

3.7.5 Team Uniforms

- a) During all Build Challenge Events and special events specified by the organizers, all team members present shall wear uniforms representing their team.
- b) Team sponsor logos are approved to be visible only on the back of the team uniform (e.g., jacket, shirt, hat, or another wearable item).

4 Build Challenge Contests

The Solar Decathlon Build Challenge consists of 10 separately scored Contests, and some Contests contain one or more Subcontests. Each Contest is worth 100 points. The team with the highest total points at the end of the competition wins. Points are earned through jury evaluation and measured performance. Measured Contests are evaluated based on the criteria indicated in the Contest details.

Table 2. Contests and Subcontests

Contest No.	Contest Name	Contest Type	Points	Subcontest Name	Subcontest Points
1	Architecture	Juried	100	None	n/a
2	Engineering	Juried	100	None	n/a
3	Market Analysis	Juried	100	None	n/a
4	Durability and Resilience	Juried	100	None	n/a
5	Embodied Environmental Impact	Juried	100	None	n/a
6	Integrated Performance	Measured	100	Hot Water	30
				Interior Light Levels	20
				Internally Generated Noise	10
				Airtightness	20
				Passive Performance	20
7	Occupant Experience	Measured	100	Kitchen Appliances	30
				Clothes Washing	10
				Clothes Drying	10
				Home Electronics	5
				House Occupancy	15
				Electric Vehicle Charging	15
				Grid Responsive Electronics	15
8	Comfort and Environmental Quality	Measured	100	Temperature Control	30
				Humidity Control	20
				Indoor Air Quality	20
				Comfort Gradient	20
				Exterior Noise Infiltration	10
9	Energy Performance	Measured	100	Energy Efficiency	30
				Energy Production	20
				Energy Balance	30
				Energy Value	20
10	Presentation	Juried	100		n/a

4.1 Architecture

This Contest evaluates the building's architecture for creativity in matching form with function, overall integration of systems, and ability to deliver both outstanding aesthetics and functionality.

A jury of architects shall assign an overall score for each team's project after completing the procedure outlined in the Rules.

The jury shall consider the following in its evaluation:

- **Architectural Concept and Design**, including approach, coherence, uniqueness, responsiveness, and challenges.
- **Architectural Implementation**, including build quality, appearance, effectiveness, functionality, materiality, passive strategies, and efficiency.
- **Documentation**, including accuracy, level of completion, clarity, and techniques used to convey the design to the jury.
- **Innovation**, with regard to scale and proportion, indoor/outdoor connections, composition, and holistic and integrated design.

4.2 Engineering

This Contest evaluates the effective design of high-performance engineering systems, technologies, and techniques that enable energy efficiency adoption and renewable energy production.

A jury of engineers shall assign an overall score for each team's project after completing the procedure outlined in the Rules.

The jury shall consider the following in its evaluation:

- **Approach**, including research, multidisciplinary collaboration, use of market-leading technologies, and engineering integration.
- **System and Component Design**, including component selection, passive strategies, integrated functionality, envelope design, occupant comfort, lighting, energy production, plumbing, structure, and landscaping.
- **Efficiency and Performance**, including likely savings, expected performance, use of renewable energy resources, maintenance, and operability.
- **Documentation**, including construction drawings and energy model accuracy, level of completion, clarity, and techniques used to convey the design to the jury.
- **Innovation**, with regard to research processes and the use of new, unique, or atypical technologies or engineering solutions that improve on the status quo.

4.3 Market Analysis

This Contest evaluates the building’s appeal, affordability, and attainability to the stated target market. This includes addressing specific market needs, such as affordability and financial feasibility, and socioeconomic barriers to increase likelihood of adoption by intended occupants and the construction industry for impactful, cost-effective design.

A jury of professionals shall assign an overall score for each team’s project after completing the procedure outlined in the rules.

The team must define a target client, with a minimum level of detail including household income, location, and requirements as indicated in Table 3. The target market defined for the competition prototype must be for year-round occupancy.

Table 3. Examples of Target Client Definition

Characteristic or Requirement	Example 1	Example 2	Example 3
Location of permanent site	Minot, North Dakota	Folsom, California	Boston, Massachusetts
Client demographic	Working professionals	Recent graduate	Retired individual
Household income	\$85,000	\$180,000	\$30,000

The jury shall consider the following in its evaluation:

- **Affordability and Cost-Effectiveness**, including the estimated up-front cost of construction and costs of operations and maintenance, the affordability to the team’s target market, and the level to which the design appropriately balances cost with performance and quality.
- **Market Analysis**, including responsiveness to the characteristics and requirements of the team-defined target market, demonstration of market need, and the effectiveness of the house’s energy features to improve the marketability of the house.
- **Livability**, including current market expectations for livability and convenience, the house’s support for a safe, functional, and enjoyable place to live, and the expected likelihood of the design to encourage a homeowner to use fewer resources than a typical homeowner.
- **Buildability**, including effectiveness of drawings, documentation, and construction details that enable the design to be adopted and built by a typical construction company.
- **Scalability**, including U.S. market impact potential, integration of off-site construction techniques, the ability for trades to reproduce the design at scale, and the extent to which the design could have immediate and/or long-term commercial impact in the marketplace.
- **Innovation**, with regard to approach to livability and buildability, inspiring the public to consider opportunities for housing of the future.

4.4 Durability and Resilience

This Contest evaluates the building's long-term ability to endure local environmental conditions and anticipate, withstand, respond to, and recover from disruptions.

A jury of professionals shall assign an overall score for each team's project after completing the procedure outlined in the rules.

The jury shall consider the following in its evaluation:

- **Durability**, including the ability of the building envelope to maintain long-term performance despite routine environmental conditions.
- **Performance**, including the extent to which the house provides occupants critical load capabilities and the ability to withstand and recover from potential disasters because of risks posed by weather and other natural or human-caused events.
- **Resource Management**, including the extent to which the building relies on external supply of energy and water; and how much the design integrates passive strategies, reduces lifecycle impacts, enables the reclamation and reuse of water, and requires less energy than a comparable code-compliant building.
- **Resilience**, including the ability of the building to maintain critical operations during disruptions and quickly restore normal operations.
- **Innovation**, with regard to unique or innovative approaches to building resilience, occupant safety, house performance, and occupant health.

4.5 Embodied Environmental Impact

This Contest evaluates cumulative environmental impact of all processes over the course of the building life cycle, including extraction of raw materials, production and manufacturing processes, shipping, construction, operation, and end-of-life.

A jury of professionals shall assign an overall score for each team's project after completing the procedure outlined in the rules.

The jury shall consider the following in its evaluation:

- **Design Decisions and Conclusions**, including the changes to initial approaches following analysis and the consideration of reclamation, refurbishment, repair, reuse, and recycling of materials throughout the building's life cycle.
- **Life Cycle Assessment**, including the calculated whole-life energy use, greenhouse gas emissions, and other environmental impacts; and the quality of analysis and determination of the environmental impact of material production, manufacturing, house operation, and end-of-life.
- **Embodied Environmental Impact**, including the expected or likely total impact of material extraction, manufacturing, transportation, construction, use, and end-of-life decommissioning of the building.
- **Innovation**, with regard to "circular economy," "re-x," operations, and the building's total environmental impact.

4.6 Integrated Performance (measured)

This Contest evaluates the interdependencies of building design elements to achieve optimized whole building performance. In a truly integrated design, when any element is altered or removed from the building, overall building performance is diminished.

Hot Water Subcontest

Significant water and energy are often wasted as occupants wait for hot water to emerge from their showerhead. All available points are earned for providing water of at least 105°F (40.556°C) before an average of 2 cups (0.473 L) of water has passed through each of the showerhead, lavatory, and kitchen sink faucets under normal operation. If more than one of each fixture exists in the house, the fixture most likely to be commonly used shall be the one evaluated.

- a) Reduced points are earned for an average draw between 2 (0.473 L) and 20 (4.73 L) cups. Reduced point values are scaled linearly. If more than 20 (4.73 L) cups of water, on average, are required to be drawn to reach a temperature of 105°F (40.556°C), no points are earned.
- b) Teams are offered three attempts to meet this requirement, with each attempt separated by at least 8 hours of time. The team may not cycle water through their system in advance of this evaluation in a way intended to manipulate the evaluation results.

Interior Light Levels Subcontest

All available points are earned by maintaining a time-averaged interior illumination level between 300 lux (lx) and 1,500 lx for each measured 15-minute period over 3 days according to the Build Challenge Event schedule. There will be four 2-hour periods on each of the 3 days timed to evaluate illumination levels at night, dawn, midday, and dusk.

- a) Reduced points are earned if the time-averaged interior illumination level is between 300 lx and 100 lx, or between 1,500 lx and 2,000 lx. Reduced point values are scaled linearly. No points are earned for a time-averaged interior illumination level below 100 lx or above 2,000 lx.
- b) The organizers will identify at least two zones in each house and measure the illumination level at the approximate center of each zone at a height of 3 ft (0.914 m). Care will be taken to ensure that the measurement reflects the functional illumination of the room. The time-averaged interior illumination level deviating farthest from the target lighting level for a particular scored period is the illumination level of record.

Internally Generated Noise Subcontest

HVAC systems, electronics, mechanical equipment and other noise-emitting office devices, as well as occupants themselves, can be sources of indoor noise. All available points are earned for a maximum background noise in the home, measured in-home based on interior noise sources (HVAC systems, lighting, appliances, and other building services operating simultaneously) less than or equal to 40 A-weighted decibels (dBA).

- a) Reduced points are earned for measurements between 40 dBA and 55 dBA. Reduced point values are scaled linearly. No points are earned for a measured maximum background noise in the home greater than 55 dBA.

- b) The organizers will identify at least two zones of each house and measure the exterior noise infiltration at a previously agreed upon location in each zone. The zone exterior noise infiltration deviating farthest from the target range is the zone of record.

Air Tightness Subcontest

All available points are earned for a measured air tightness of less than or equal to 0.05 cfm 50/ft². Evaluation will be completed in advance of the competition by an independent, third-party energy rater selected and hired by the organizers, who will follow a process that is consistent for all teams.

- a) Reduced points are earned for measurements between 0.05 cfm 50/ft² and 0.25 cfm 50/ft². Reduced point values are scaled linearly. No points are earned for measurements above 0.25 cfm 50/ft².
- b) To calculate CFM50, the interior volume of each house is required to be known. Each team shall provide this value to the organizers.

Passive Performance

Teams are evaluated on their home's ability to sufficiently retain its interior comfort for occupants without the use of energy-intensive electrically controlled thermodynamic cycles over a 3-day period. All available points are earned for maintaining a time-averaged interior dry-bulb temperature that is at least 20% closer to the upper or lower bound of the target temperature range defined in the Temperature Control Subcontest than the time-averaged exterior dry-bulb temperature during the 3-day measurement period.

- a) Reduced points are earned if time-averaged interior dry-bulb temperature is 10% to 20% closer to the target temperature range compared to the exterior dry-bulb temperature. Reduced point values are scaled linearly. No points are given for 0 to 10%.
- b) The organizers will identify at least two zones in each house and measure the temperature of each zone. The zone deviating farthest from the target is the zone temperature of record.

For example, if the time-averaged exterior temperature is 100°F (38°C) and the house maintains a time-averaged interior temperature of 80°F (27°C), the difference between the exterior and interior temperatures is 20°F (11°C), which is 77% of the difference between 100°F (38°C) and the upper end of the target range of 74°F (23°C). This would earn full points. If, however, the time-averaged interior temperature was 98°F (37°C), it would only be 8% closer to the target range ($2/26 = 8\%$) and would earn 0 points.

4.7 Occupant Experience (measured)

This Contest evaluates how the building design prioritizes occupant experience, productivity, and quality of life.

Kitchen Appliances Subcontest

All available points are earned for successfully operating each kitchen appliance according to the following constraints.

- a) **Refrigerator:** All available points are earned for maintaining time-averaged interior temperature of a refrigerator between 34°F (1.111°C) and 40°F (4.444°C) during the scored periods.
 - Reduced points are earned if the time-averaged interior refrigerator temperature is between 32°F (0°C) and 34°F (1.111°C) or between 40°F (4.444°C) and 42°F (5.556°C). Reduced point values are scaled linearly. No points are earned for a time-averaged interior refrigerator temperature below 32°F (0°C) or above 42°F (5.556°C).
 - The refrigerator volume published in the manufacturer's specifications shall be a minimum of 4.5 cubic feet (ft³) (0.127 m³).
 - The refrigerator may only be used to store food and beverages.
- b) **Freezer:** All available points are earned for maintaining a time-averaged interior temperature of a freezer between -20°F (-28.889°C) and 5°F (-15°C) during the scored periods.
 - Reduced points are earned if the time-averaged interior freezer temperature is between -30°F (-34.444°C) and -20°F (-28.889°C) or between 5°F (-15°C) and 15°F (-9.444°C). Reduced point values are scaled linearly.
 - The freezer volume published in the manufacturer's specifications shall be a minimum of 2 ft³ (0.0566 m³).
 - The freezer may be used to store food and only enough ice to fill the freezer's ice bin (or equivalent).
- c) **Oven:** All available points are earned for maintaining a time-averaged interior temperature of an oven between 400°F (204.444°C) and 450°F (232.222°C) during scored periods.
 - Reduced points are earned if the time-averaged interior oven temperature is between 250°F (121.111°C) and 400°F (204.444°C) or between 450°F (232.222°C) and 550°F (287.778°C). Reduced point values are scaled linearly.
 - The oven volume published in the manufacturer's specifications shall be a minimum of 2 ft³ (0.0566 m³).
 - The oven may not contain any food or beverages during the measurement period.
 - Teams are provided two attempts to meet this requirement, with each attempt separated by at least 8 hours of time.
- d) **Cooktop:** All available points are earned for bringing at least 8 cups (1.892 L) of water in a pot to a rolling boil during a scored period.

- Reduced points are earned if the temperature of the water is between 50% and 100% of the boiling temperature of water for the location where measurements are collected. Reduced point values are scaled linearly.
- Teams are provided two attempts to meet this requirement, with each attempt separated by at least 8 hours of time.

Clothes Washing Subcontest

All available points are earned for washing laundry by running an automatic clothes washer containing six organizer-supplied bath towels through three complete, uninterrupted, “normal” (or equivalent) cycles on one of the specified days in the Build Challenge calendar, which is available on the [Project Site](#).

- a) The clothes washer shall operate automatically and have at least one wash and rinse cycle.
- b) Cycle “interruption” includes the adjustment of supply temperature or flow in a manner not anticipated by the manufacturer or addressed in its operation manual.
- c) 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.
- d) The evaluation begins when a team indicates it is ready for the organizers to evaluate. Multiple attempts per load are not allowed.

Clothes Drying Subcontest

All available points are earned for drying laundry by returning a load of laundry to a total weight less than or equal to the towels’ total weight before washing. For a particular day, both the Clothes Washing and Clothes Drying tasks must start and finish within a single contiguous time period allowed in the Build Challenge calendar to be eligible for points.

- a) Reduced points are earned if the “dry” towel weight is between 100% and 110% of the original towel weight.
- b) Reduced point values are scaled linearly. No points are earned for a measured weight above 110% of the original towel weight.
- c) A load of laundry is eligible for clothes drying points only if the team previously achieved a complete, uninterrupted clothes washing cycle during the same time period.
- d) 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.

Home Electronics Subcontest

All available points are earned for successfully operating smart home electronics, including a television, a computer, a smart outlet, and energy monitoring circuits. Teams may choose when to target earning points within the available times indicated in the Build Challenge calendar. The available points are divided equally across the three elements listed below:

- a) The television display shall be a minimum of 27 in. (68.58 cm), and the computer display shall be a minimum of 15 in. (38.1 cm), each as according to the manufacturer's stated display size. The television and computer displays shall be able to be operated simultaneously and controlled independently of each other. Points are earned for demonstrating that each can be powered and operated successfully.
- b) Each home shall have at least one smart outlet or light that can be controlled remotely and set to a schedule. Points are earned for demonstrating successful operation of the outlet or light.
- c) Each home shall have the ability for the homeowner to monitor circuit-level energy use. Points are earned for demonstrating complete and successful circuit-level energy monitoring to the organizers.

House Occupancy Subcontest

Each team shall host at least six members of its community for at least 2 hours as specified in the Build Challenge calendar. The House Occupancy Subcontest will feature at least six individuals in addition to two decathletes operating the house. The goal of this Subcontest is to validate a fully functional house with visitors and to enable a successful evaluation of the house for the Comfort & Environmental Quality Contest. To earn full points for the House Occupancy Subcontest, teams shall:

- a) Host at least six guests, including at least one organizer-invited observer.
- b) Serve a complete meal with an adequate amount of food for all guests at appropriate serving temperatures and in a timely manner.
- c) Prepare and cook all food and beverages in the house during a scheduled period of time in accordance with the Build Challenge calendar.
- d) Serve and have guests eat the meal in the finished square footage.
- e) Comply with the following safety requirements:
 - Do not use any flames, including candle flames.
 - Do not serve or use any alcoholic beverages.
 - Use only drinking water purchased in sealed containers.
 - Wash and rinse all dishes and cookware before use.
 - Store all food and beverages properly.
 - Do not use coolers to store food, beverages, or ice.

Electric Vehicle Charging Subcontest

All available points are earned for charging an electric vehicle from a battery state below 40% to at least 75% within a time period available in the Build Challenge calendar. Teams may choose when to begin the charging, but each task must begin and end within the times indicated in the Build Challenge calendar; once a team has initiated the task, additional attempts are not permitted. Teams may drive the car before start of the Subcontest to reduce the battery charge state to an appropriate starting level.

- a) The vehicle must be entirely electric. Hybrid vehicles and nonelectric vehicles are not permitted.
- b) The competition prototype house must include the infrastructure required to charge the vehicle.
- c) Any vehicle used must be a model commercially available at the beginning of the Competition Event.
- d) The vehicle must have four wheels and, at a minimum, seat two individuals side by side.
- e) The charging of the vehicle must be witnessed by an organizer-approved observer.

Grid-Responsive Electronics Subcontest

Each house shall have the capability to respond to a conceptual utility-initiated load-shedding call. To earn full points in this Subcontest, the organizers will verify the house's capability to shed at least 30% of its load in response to a received request from the local utility.

- a) Reduced points are earned for a load-shedding capability between 0% and 30% of its load. Reduced points are scaled linearly. If automated load-shedding is not possible, no points are earned.

4.8 Comfort and Environmental Quality (measured)

This Contest evaluates the building's capability to deliver intended comfort and indoor environmental quality.

Temperature Control Subcontest

All available points are earned for maintaining a time-averaged interior dry-bulb temperature between 68°F (20°C) and 74°F (23.333°C) during the scored periods.

- a) Reduced points are earned if the time-averaged interior dry-bulb temperature is between 64°F (17.778°C) and 68°F (20°C) or between 74°F (23.333°C) and 78°F (25.556°C). Reduced point values are scaled linearly. No points are earned for a time-averaged interior dry-bulb temperature below 64°F (17.778°C) or above 78°F (25.556°C).
- b) The organizers will identify at least two zones in each house and measure the temperature of each zone. The zone temperature deviating farthest from the target temperature range is the zone temperature of record.
- c) To be eligible to earn points, a team must demonstrate an ability to raise or lower temperature by at least 5°F from the ambient temperature using mechanical means.

Humidity Control Subcontest

All available points are earned at the conclusion of each scored period by achieving a time-averaged interior relative humidity between 35% and 50% during at least one of the scored periods.

- a) Reduced points are earned if the time-averaged interior relative humidity is between 25% and 35% or between 50% and 70%. Reduced point values are scaled linearly. No points are earned for a time-averaged interior relative humidity below 25% or above 70%.

- b) The organizers will identify at least three zones of each house and measure the humidity of each zone. The zone humidity deviating farthest from the target humidity range is the zone humidity of record.
- c) To be eligible to earn points, a team must demonstrate an ability to raise or lower humidity by at least 5% from ambient using mechanical means or demonstrate that the climate zone of the target market does not require humidity control.

Indoor Air Quality Subcontest

All available points are earned at the conclusion of each scored period by keeping the time-averaged interior carbon dioxide (CO₂) level below 1,000 parts per million (PPM) following occupancy of six individuals for 1 h. The CO₂ levels are measured when the house is occupied as part of the House Occupancy Subcontest.

- a) Reduced points are earned for time-averaged interior CO₂ levels between 1,000 PPM and 2,000 PPM. Reduced point values are scaled linearly. No points are earned for time-averaged interior CO₂ levels above 2,000 PPM.
- b) The organizers will identify at least two zone in each house and measure the CO₂ level of each zone. If more than one measurement is collected, the CO₂ level deviating farthest from the target CO₂ level is the CO₂ level of record.

Comfort Gradient

All available points are earned at the conclusion of each scored period for achieving a maximum delta of time-averaged interior dry-bulb temperatures of 3°F (1.66°C) across all measurement locations.

- a) Reduced points are earned if the time-averaged interior dry-bulb temperature gradient is between 3°F (1.66°C) and 10°F (5.55°C) No points are earned for a time-averaged interior dry-bulb temperature gradient greater than 10°F (5.55°C).
- b) The organizers will identify at least three zones in each house and measure the temperature of each zone.

Exterior Noise Infiltration Subcontest

The sound insulation decibel (dB) values for three of the 1/3 octave bands will be calculated between 100 hertz and 5 kilohertz—specifically, 200, 1,000 and 4,000 kilohertz. All available points are earned for a measured sound pressure level from outside noise intrusion less than or equal to 35 dBa based on an assumed peak hour sound level equivalents (Leq) of 90 dBa.¹

- a) Reduced points are earned for measurements between 35 dBa and 50 dBa. Reduced point values are scaled linearly. No points are earned for a measured exterior noise infiltration greater than 50 dBa.
- b) The organizers will identify at least two zones of each house and measure the exterior noise infiltration at a previously agreed upon location in each zone. The zone exterior noise infiltration deviating farthest from the target range is the zone of record.

¹ <http://www.usgbc.org/node/4631859?return=/credits>

4.9 Energy Performance (measured)

This Contest evaluates whole-building energy consumption and how it is offset by renewable energy systems.

Energy Efficiency Subcontest

All available points are earned for a Home Energy Rating System (HERS) score of 40 or below, without any renewable energy being considered. The organizers will hire qualified HERS rater(s) to evaluate all team houses based on as-built features and construction documents.

Reduced points are earned for a HERS score between 40 and 60. Reduced points are scaled linearly. No points are earned for a HERS score above 60.

Energy Production Subcontest

All available points in this Subcontest are earned at the conclusion of the energy period by successfully generating at least 20 kilowatt-hours (kWh) in a 24-hour period, starting at a time agreed upon in advance between the team and the organizers. A positive energy production indicates successful solar installation and operability.

Reduced points are earned for an energy production value between 0 kWh and 20 kWh. Reduced points are scaled linearly. No points are earned for an energy production value of 0 kWh.

Net-Zero Energy Subcontest

Each team's modeled energy production and estimated energy consumption will be evaluated by the organizers for the target site, as well as evaluated for whether or not the house will produce at least as much energy as it will consume over the course of 1 year, including the charging and operation of an electric vehicle estimated to be driven 20 miles per day.

Full points are earned for achieving a modeled annual net production of energy (i.e., annual net consumption less than 0 kWh). Reduced points are earned for an annual net consumption between 0 kWh and 2,000 kWh. Reduced points are scaled linearly. No points are earned for an estimated annual net energy greater than 2,000 kWh.

Solar Energy Utilization Subcontest

This Subcontest evaluates each team's approach to maximizing on-site solar energy use and the team's ability to control not only how much energy is used in the building, but when it is used. The Solar Utilization Index (SUI) will be measured over the course of a 3-day measurement period. The SUI is defined as the percentage of on-site solar energy that is used at the time of generation for direct use in the building, and it is calculated as follows:

$$SUI = \frac{\sum_{i=1}^{T/\Delta t} P_{i,osr} \cdot \Delta t}{\sum_{i=1}^{T/\Delta t} L(i)}$$

where:

L = the Energy Load for time step i , or $L(i) = P_{i,import} \cdot \Delta t + P_{i,osr} \cdot \Delta t - P_{i,export} \cdot \Delta t$

$P_{i,osr}$ = the power from the on-site renewables at time step i

$P_{i,import}$ = the power imported from outside the energy boundary at time step i

$P_{i,export}$ = the power exported from inside the energy boundary to outside at time step i

Δt = the length of time of the time step i

T = the total time of the evaluation.

All available points are earned by achieving a SUI value greater than 0.70 (70%). Reduced points are earned if this average value is between 70% and 0%. Reduced points are scaled linearly.

4.10 Presentation

This Contest evaluates effective communication of design strategies to relevant audiences, including written, verbal, multi-media, and visual presentation materials.

A jury of communications professionals shall assign an overall score for each team's project after completing the procedure outlined in the Rules.

The jury shall consider the following in its evaluation:

- **Strategy**, including approach to inspire future professionals, incumbent industry leaders, and the public at-large to pursue energy efficiency and renewable energy opportunities through a comprehensive, consistent, and integrated communications strategy to present effective verbal and visual communications to a clearly defined audience.
- **Implementation**, including presentation quality, elements, and structure that conveys the goals of the team and its design, tells a story that resonates, and engages the public effectively.
- **Outreach Activities**, including the quantity, quality, and effectiveness of actions to educate individuals through means such as in-person tours, digital activities, and site visits.

5 Build Challenge Juried Contest Evaluation Process

Each contest shall have a jury panel made up of three to five jurors who will assess the team projects. All 6 juries will review each team. The juries will review the assigned deliverables associated with all competing teams and will evaluate the presentations from each Division. The juries will then assign a percentage integer value according to this process for every team, awarding a 1st through nth place for all teams in each Division. Ties are not permitted.

5.1 Juror Process

Each jury shall follow the following steps:

Step 1: Deliverables Review

Each juror will spend approximately 1–2 hours reviewing the relevant submitted deliverables to form an initial understanding of the relevant details of each team’s project.

Step 2: As-Built House Evaluation

Each jury will complete an extensive evaluation of the house as built by the competing teams. Each house will be documented by a professional, organizer-provided 3D walk-through and real estate–style photography.

Step 3: Witness Presentation by Team to Jury

Each jury will witness a presentation by each team to the jury. The jury presentation period will offer the jurors an opportunity to ask the decathletes for clarification of questions that may arise during the deliverables review and evaluation of the as-built house.

Step 4: Deliberation

During the deliberation phase, the jury shall assign each team a percentage integer from 0% to 100% and shall submit its percentage integers to the Build Challenge Manager, who will convert them to a score based on the total number of available points for the contest being judged.

The jury must submit written or recorded scoring justifications for each team to the Build Challenge manager.

5.2 Team Process

It is ultimately the team’s responsibility to be ready for the jury presentations at the times indicated in the jury presentation schedule provided on the [Project Site](#).

- a) Up to six decathletes may be present during the presentations to the juries. No other team members may be present.
- b) If a team is not ready for a jury to begin its evaluation at the scheduled time, then the total time the jury spends with that team will be reduced.
- c) Initially, each team will have 10 minutes to present their project to all juries and competition event attendees.
- d) Following the initial presentations, each jury will be provided 15 minutes to meet with each team privately, followed by a 5-minute deliberation period. During the 15 minutes with each

team, the entire time is allocated for team members to lead the jury through the contest-specific aspects of the design and answer any questions the jury may have.

- e) Presentation boards and other electronic or visual media are permitted to be on display during jury presentations.
- f) Teams may not record the jury visit or the private jury discussion period.
- g) Areas of the house or exhibit excluded from the accessible exhibit route may be considered by the juries and considered in their evaluations.
- h) The organizers will provide all juries with summaries of relevant rule and code violations for each team so they are aware of violations before giving credit for aspects of the project that are not in compliance.

6 Build Challenge Deliverables

Throughout the project, the organizers will require teams to submit deliverables necessary for ensuring safety and for generating sufficient interest in the Solar Decathlon Build Challenge Events. These design deliverables (outlined in Table 4) serve the following important functions:

- In the **Project Introduction**, the team shall disclose to the organizers their initial design decisions, all nonstandard design features, communications strategies, site operations plans, and health and safety considerations that require further review prior to the continuation of the project into the design development phase. The team shall provide a project management plan for the next phases of the Challenge.
- At all stages, the **drawings and project manual** shall demonstrate compliance with the Solar Decathlon Build Challenge Building Code and Rules so the inspectors are able to grant final on-site approval by verifying that the constructed project was accurately represented by the approved drawings and project manual.
- At all stages, the **drawings and project manual** are expected to provide sufficient detail to enable a residential contractor to generate an accurate, detailed cost estimate and to efficiently construct the building as the design team intended it to be built.

Table 4. Design Deliverables

Deliverable Name	Required Content	Due Date
D1: Project Introduction	<ul style="list-style-type: none"> • Team Short Description • Conceptual Design • Initial Conceptual Design Renderings 	November 30, 2021
D2: Project Management Plan	<ul style="list-style-type: none"> • Initial Project Report, including Project Management Plan • Schematic Design Drawings • Construction Partner Details • Construction Site Details 	February 15, 2022
D3: Construction Documentation	<ul style="list-style-type: none"> • 75%+ Complete Construction Documentation • Public Project Renderings • Construction Schedule 	March 29, 2022
D4: Design Presentation	<ul style="list-style-type: none"> • 20-Minute Design Presentation • Public Project Renderings • Optional Poster 	April 12, 2022
D5: Permit Set Documentation	<ul style="list-style-type: none"> • Updated Project Report, including Project Management Plan • Permit Set – Construction Documentation • Updated Public Project Renderings 	July 29, 2022
D6: Construction Progress	<ul style="list-style-type: none"> • Copy of Construction Permit from AHJ • Construction Progress Photos • Updated Construction Documentation 	October 18, 2022
D7: Construction Completion	<ul style="list-style-type: none"> • Copy of Certificate of Occupancy from AHJ • Organizer Instrumentation Equipment Installation Report • Demonstration of ADA-Compliant Accessible Tour Route 	February 14, 2023
D8: Project Story	<ul style="list-style-type: none"> • Final Project Report, including Project Management Plan, Public Project Summary, Summary of Online and Public Exhibit Success, Completed Form of Key Features, and Team Roster • Jury Documentation • As-Built Construction Documentation • House Photography • 3-Minute Audiovisual Presentation • Video of Public Tour & Team Story B-Roll 	March 28, 2023
D9: Final Presentation Deliverable	<ul style="list-style-type: none"> • Final Jury Presentation Files 	April 19, 2023
D10: Final Report	<ul style="list-style-type: none"> • Post-Event Project Report 	May 10, 2023

6.1 D1: Project Introduction

The Project Introduction deliverable is reviewed by organizers, and feedback is provided. The project introduction is not made publicly available, with the exception of the team description, goals, and renderings, which may be shared on the Solar Decathlon website. Additional details on formatting, length limitations for individual content areas, and expectations will be provided on the [Project Site](#). The Project Introduction is limited to 30 pages.

Team Short Description

- A 100-word description
- A short project summary
- A team structure graphic.

Conceptual Design

- Floorplans
- Wall section
- Elevations.

Initial Conceptual Design Renderings

- Interior rendering(s)
- Exterior rendering(s)
- Birds-eye renderings showing solar panels.

6.2 D2: Project Management Plan

The Project Management Plan is reviewed by organizers, and feedback is provided. The project introduction is not made publicly available, with the exception of the team description, goals, and renderings, which may be shared on the Solar Decathlon website. Additional details on formatting, length limitations for individual content areas, and expectations will be provided on the [Project Site](#). The Project Management Plan is limited to 30 pages.

Initial Project Report, including Project Management Plan

- A 100-word description
- A short project summary
- A team structure graphic
- Project Management Plan.

Schematic Design Drawings

- Floorplans
- Wall section
- Elevations.

Construction Partner Details

- Explanation of who will help build the house, and if applicable, how will they be paid.

Construction Site Details

- Where will the house be built, including a designated AHJ.

6.3 D3: Construction Documentation

The Construction Documentation Deliverable shall represent 75%+ complete construction documentation. The documentation shall clearly indicate all design details, house systems, and methodologies expected to be present in the competition prototype. While details may not be fully complete or finalized, the Construction Documentation Submission shall provide sufficient information for the organizers to conduct a thorough Solar Decathlon Build Challenge Rules and Building Code compliance review. The submission must address the team's approach to safety, including identifying team-specific concerns and constraints. All major decisions with regard to the project design are expected to be complete. The Construction Documentation Submission will not be reviewed by any contest juries. However, it may be made publicly available following submission.

75% Complete Construction Documentation

- Site plan
- Landscape, structural, architectural, interiors, fire protection, plumbing, mechanical, electrical, and telecommunications details
- Statement of grid islanding capabilities, health and safety approach, energy analysis, structural calculations, and construction specifications.

Public Project Renderings

- A minimum of five images with at least one exterior, one interior, and one bird's-eye view.

Construction Schedule

- A detailed Gantt-style chart showing the expected and targeted construction schedule for the project.

6.4 D4: Design Presentation

Each team shall develop Design Presentation files, which are representative of the material presented at the Competition Event. The Design Presentation, together with the Design Development Documentation deliverable are used as the basis of the Approval to Proceed and prize disbursement.

20-Minute Design Presentation

- A 20-minute presentation on the project to be delivered in person during the Competition Event, with an additional 5 minutes for questions, for a total 25-minute team presentation, including information on team structure and industry partnerships, target market description, design summary, and approach to winning each contest.

Updated Public Project Renderings

- A minimum of five images, with at least one exterior, one interior, and one bird's-eye view.

6.5 D5: Permit Set Documentation

The final Permit Set Documentation submission shall represent complete Construction Documentation, with sufficient detail for a contractor to build the competition prototype house as it is expected to exist for the Build Challenge. The documentation shall include complete and final design details, house system specifications, and construction information. 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 Solar Decathlon 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. However, it may be made publicly available following submission.

Updated Project Report, Including Project Management Plan

- A 100-word description
- A short project summary
- A team structure graphic
- Project Management Plan.

Permit Set – Construction Documentation

- Site plan
- Landscape, structural, architectural, interiors, fire protection, plumbing, mechanical, electrical, and telecommunications details
- Statement of grid islanding capabilities, health and safety approach, energy analysis, structural calculations, and construction specifications.

Updated Public Project Renderings

- A minimum of five images with at least one exterior, one interior, and one bird's-eye view.

6.6 D6: Construction Progress

The Construct Progress deliverable is reviewed by organizers, and feedback is provided. The construction progress deliverable is not made publicly available, with the exception of the construction progress photos, which may be shared on the Solar Decathlon website. Additional details on formatting, length limitations for individual content areas, and expectations will be provided on the [Project Site](#).

Copy of Construction Permit from Authority Having Jurisdiction

- A scan or photo of the document provided by the local AHJ demonstrating approval for the team to begin construction.

Construction Progress Photos

- A minimum of ten images with at least one exterior, one interior, and view with students showing the progress of construction.

Updated Construction Documentation

- Any relevant updates to the previously submitted Permit Set – Construction Documentation.

6.7 D7: Construction Completion

The Construction Completion deliverable is reviewed by organizers, and feedback is provided. The construction completion deliverable is not made publicly available, with the exception of the construction photos, which may be shared on the Solar Decathlon website. Additional details on formatting, length limitations for individual content areas, and expectations will be provided on the [Project Site](#).

Copy of Certificate of Occupancy from Local AHJ

- A scan or photo of the document provided by the local AHJ demonstrating approval for the team to begin construction.

Organizer Instrumentation Equipment Installation Report

- A report showing the complete installation and verified operation of all required Organizer Instrumentation Equipment necessary for the evaluation of the house as part of the Competition.

Demonstration of ADA-Compliant Accessible Tour Route

- A video showing the complete and final accessible tour route through the home to be used for public exhibition activities, including detailed close-up shots of thresholds, doorways, clearances, and ways to explain what is contained in inaccessible areas such as second floor spaces.

6.8 D8: Project Story

The Project Story is reviewed by organizers, and feedback is provided. This will eventually be made publicly available, though elements such as the Jury Documentation will be withheld until after scoring is complete. Additional details on formatting, length limitations for individual content areas, and expectations will be provided on the [Project Site](#).

Final Project Report

- Project Management Plan
- Public Project Summary
- Summary of Online & Public Exhibition Success
- Completed Form of Key Features
- Team Roster.

Jury Documentation

The jury deliverables shall provide a summary of each team's approach to meeting the contest requirements for each of the juried contests. The jury deliverables are 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 are reviewed by jurors as time permits. The narratives will not be made public prior to the release of the respective contest results.

- Jury Narratives, up to 10 pages for each juried contest.

As-Built Construction Documentation

- Final Documentation, including but not limited to the site plan, landscape, structural, architectural, interiors, fire protection, plumbing, mechanical, electrical, and telecommunications details, energy model, structural calculations, and construction specifications.

House Photography

- Final exterior and interior professional house photography, including at least 5 exterior photos, 2 interior photos of each room within the house, the solar system installed, and key technology within the home such as inverters, batteries, heating systems, cooling systems, appliances, and smart home technology.

3-Minute Audiovisual Presentation

- Wide-screen, high-definition video file (e.g., .mov, .mp4)
- Accompanied by a document including a verbatim transcript of the audio narrative to meet Section 508 compliance standards 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.
- Must include video footage of the complete constructed house as built prior to the competition
- May contain still photos and graphics
- Gives the jurors a realistic preview of what they will experience during the on-site walkthroughs
- 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.

Video of Public Tour & Team Story B-Roll

- High-definition video content of students giving their typical 5- to 10-minute tour of their house to the general public and key "b-roll" video content where students answer select questions provided by organizers. The video will be used to assemble program marketing materials, conduct outreach, and engage with onsite attendees of the Solar Decathlon.

6.9 D9: Final Jury Presentation Files

Each team shall develop presentation files for its design, which are presented at the Competition Event. The presentations, together with the Project Story & Jury Documentation deliverable, and evaluation of the as-built house are used as the basis for evaluation by juries in accordance with these Rules. The Final Jury Presentation files will be made public following the completion of the competition.

Public Jury Presentation Files

- A 20-minute presentation on the project to be delivered in person during the Competition Event, to all other competing students and to all juries simultaneously.
- Presentation slides with an aspect ratio of 16:9
- Teams are encouraged to embed all videos in the team submission and to notify the organizers before arriving at the competition to allow organizers to ensure that the appropriate software is available to play the video.

6.10 D10: Post-Event Project Report

The Final Report shall reflect the results of the team's Solar Decathlon project. It is used by the organizers to improve future events and provide lessons learned opportunities.

- Summary of fundraising activities, final project budget, and lessons learned
- Results of media outreach activities, including statistics
- Results of on-site exhibition activities, including total number of visitors
- Evaluation of the team's online presence
- Team perspective on the effectiveness of the organizers' communications efforts and the fairness of the Rules
- Description of the final plans for the house
- Short description of each team member's future plans for employment, continued study, or other endeavors
- Suggested competition improvements
- Any other information that would be helpful to the organizers or future teams.