

Solar Decathlon Africa 2019

Team Oculus

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CGPS March 27, 2019



WPI

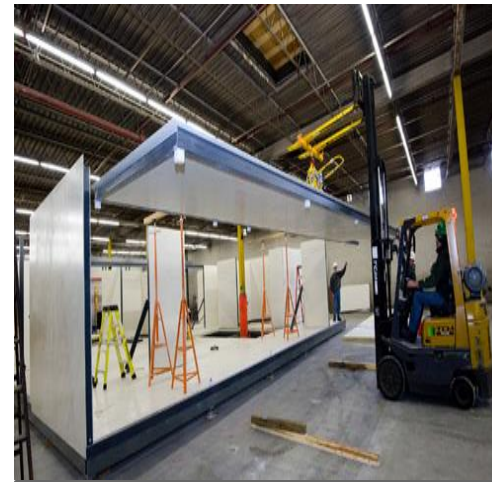
SOLAR DECATHLON COMPETITION



**Collegiate
competition
sponsored by
U.S.
Department of
Energy since
2002**



**Design and
build innovative,
efficient, net-
zero energy
structures**



**2-3 weeks to
construct house**



**Judged from ten
categories
(e.g. sustainability,
comfort)**

**SOLAR DECATHLON
AFRICA MOROCCO 2019**



TEAM OCULUS

Our diversity,
Our force



Team Statistics

- We speak more than 7 languages all together
- From 4 continents
- Over 100 students
- From 4 Universities (WPI, ENSIAS, ENSAM, AUST)

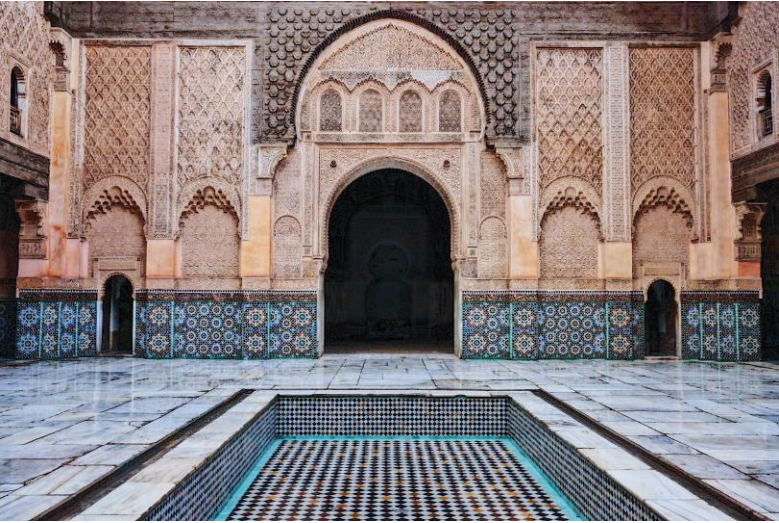
Morocco



- North West Africa
- 274,460 sq mi
- Population of 35,740,000
- Mediterranean climate
- City of competition: Ben Guerir



Morocco Culture and Heritage



MAPS

Competition site



Team OCULUS



جامعة مولاي إسماعيل
UNIVERSITÉ MOULAY ISMAÏL



المدرسة الوطنية العليا للفنون والمهن
ÉCOLE NATIONALE SUPÉRIEURE D'ARTS ET MÉTIERS



WPI



ENSIAS



Knowledge is Freedom



CONCEPT

Design, Innovate, Impact

Architecture

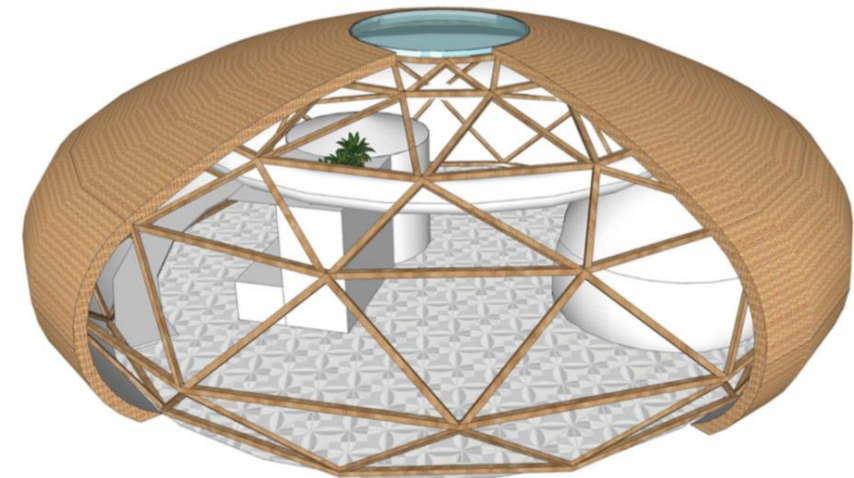
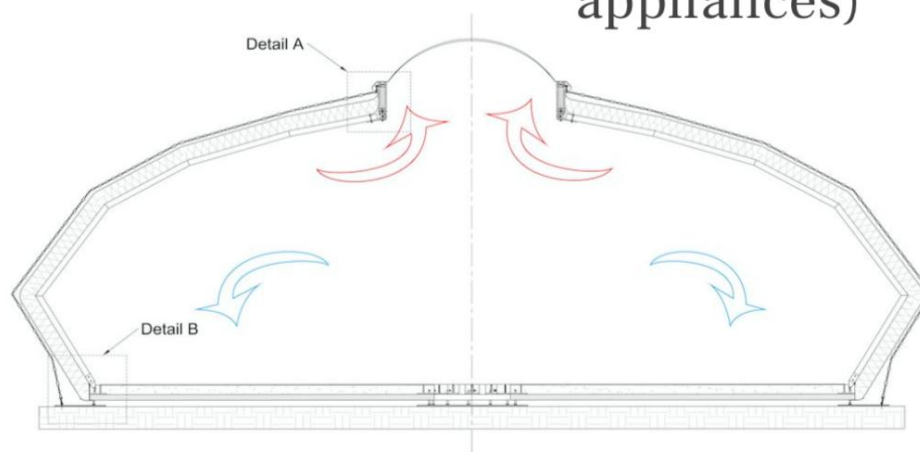
Open and flexible floor plan and the movable furniture, we give the user the freedom to shape the space. ADA compliant design.

Constructability

Modular wood structure, easy to manufacture and assemble. Use of local materials and crafts, reducing construction cost and promoting local cultural. A compact frame for all equipment (HVAC, electrical appliances)

Sustainability

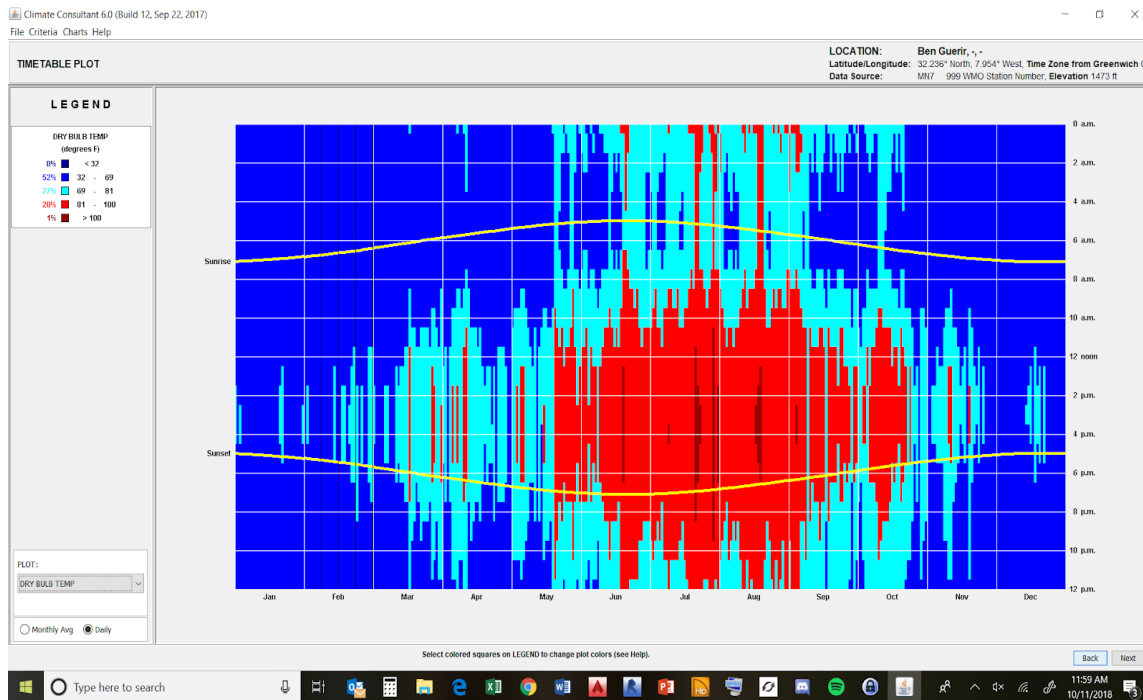
PV panels, wastewater and greywater reuse system, a passive cooling system, wood structure and 0 wood waste



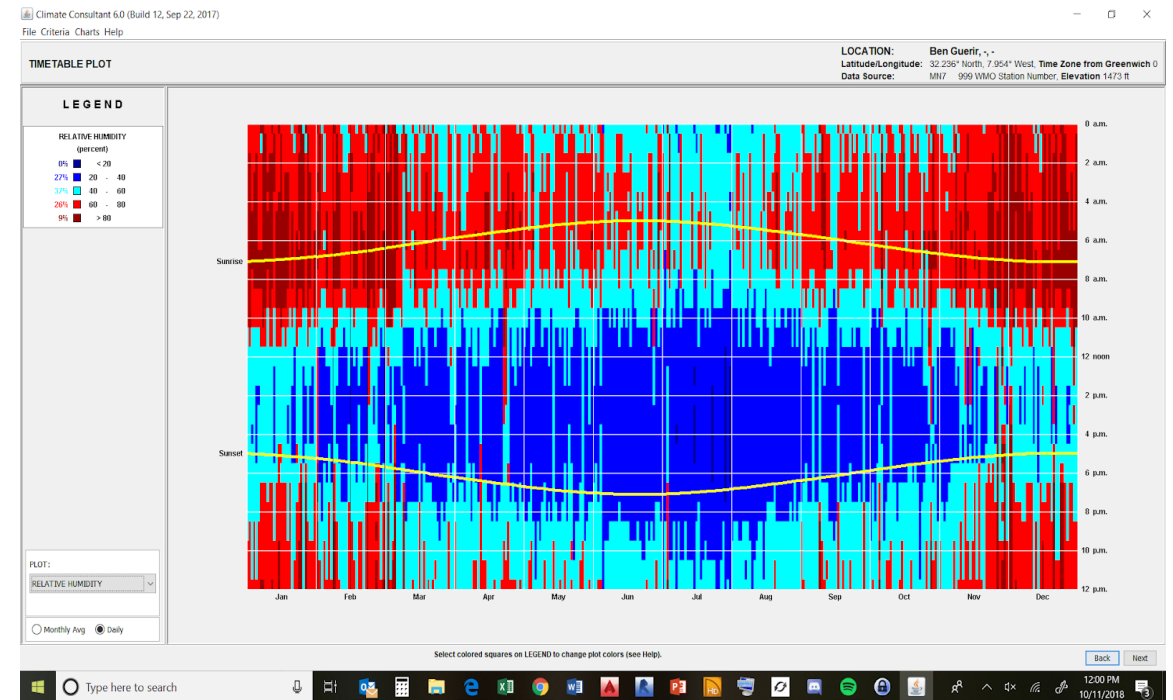


Local climate

- Mediterranean climate
- September: high temperature is 90F and low temperature 65F. Average humidity is 50%.
- Very low precipitation, average 11 hours of sunshine per day.



Timetable plot of temperature from ClimateConsultant software



Timetable plot of relative humidity from ClimateConsultant software

- Ben Geurir EnergyPlus weather file.

- Ben Geurir EnergyPlus weather file.

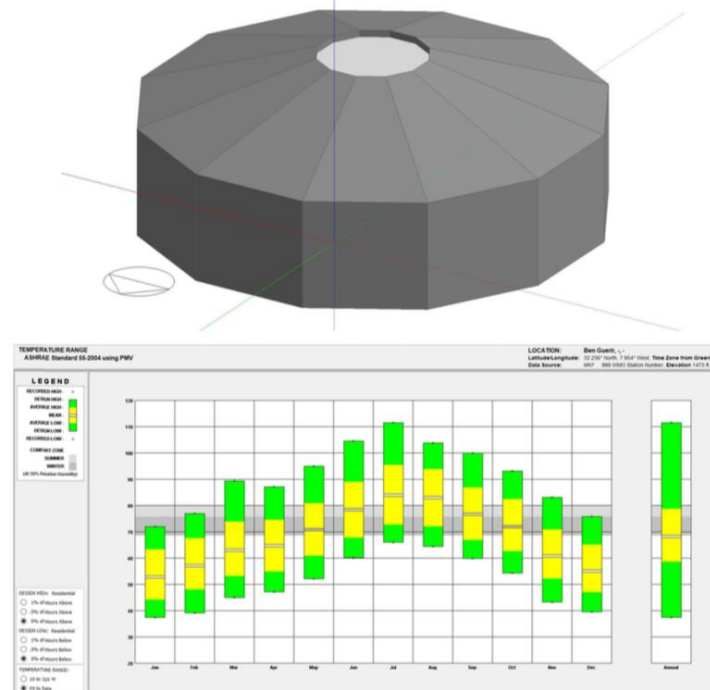
Mechanical Aspect

Photovoltaics

Polycrystalline solar panel technology



Heating, ventilation, and air conditioning (HVAC)



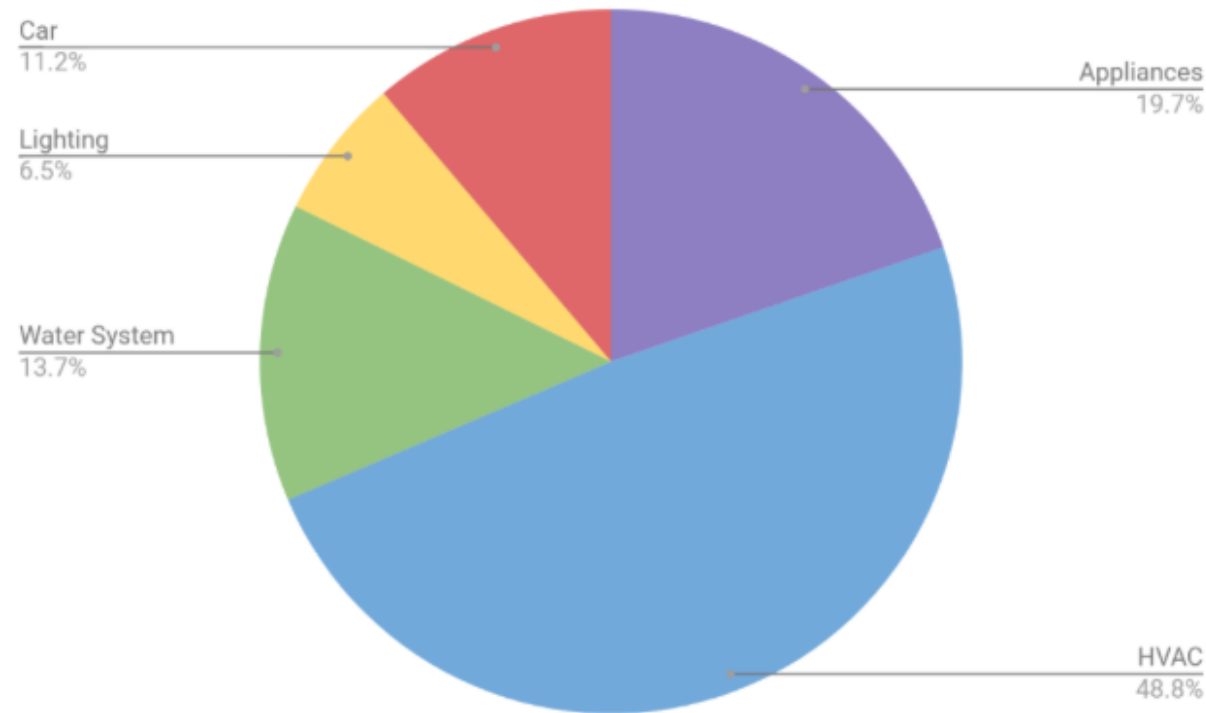
Electric vehicle

Most energy efficient option was the Renault Zoe



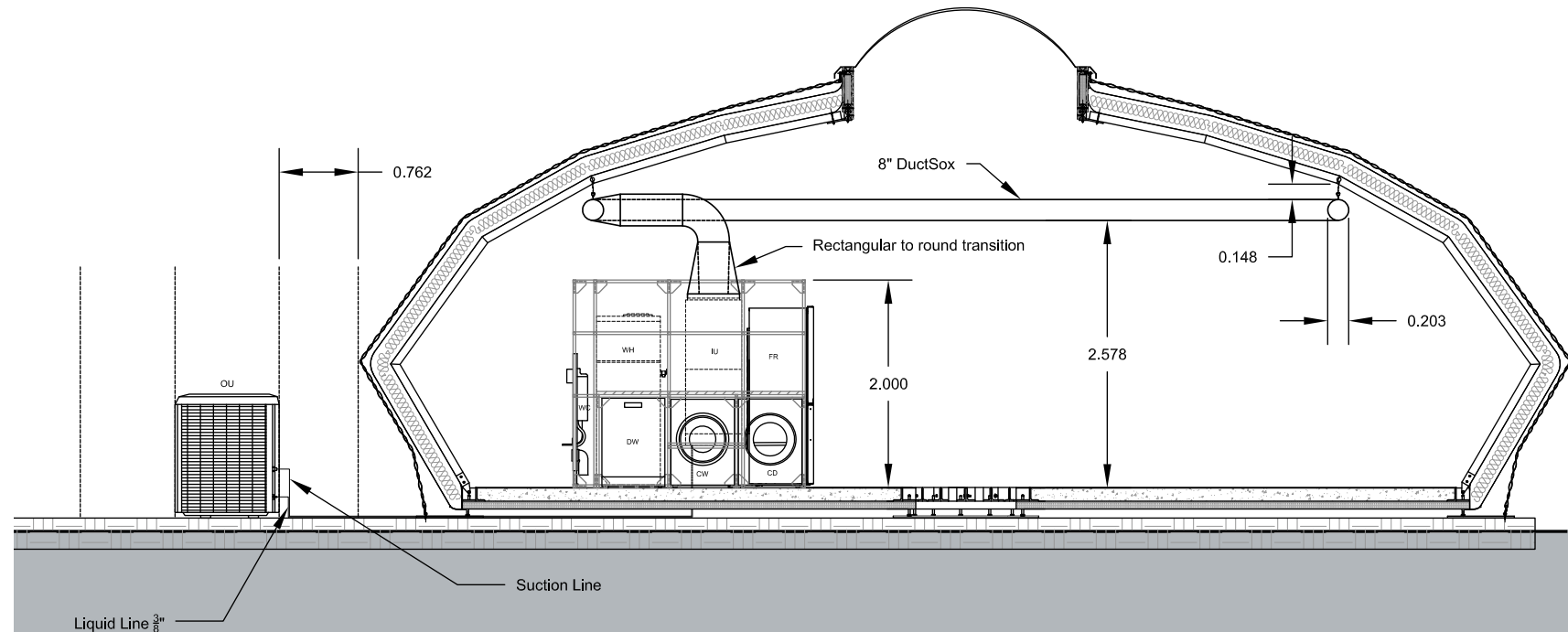
ENERGY CONSUMPTION

- Estimated daily consumption = 375kWh/day
 - 30 PV panel, 5 arrays in modules of 6
- Tilt angle for September of : 32 ° from horizontal



Mechanical System

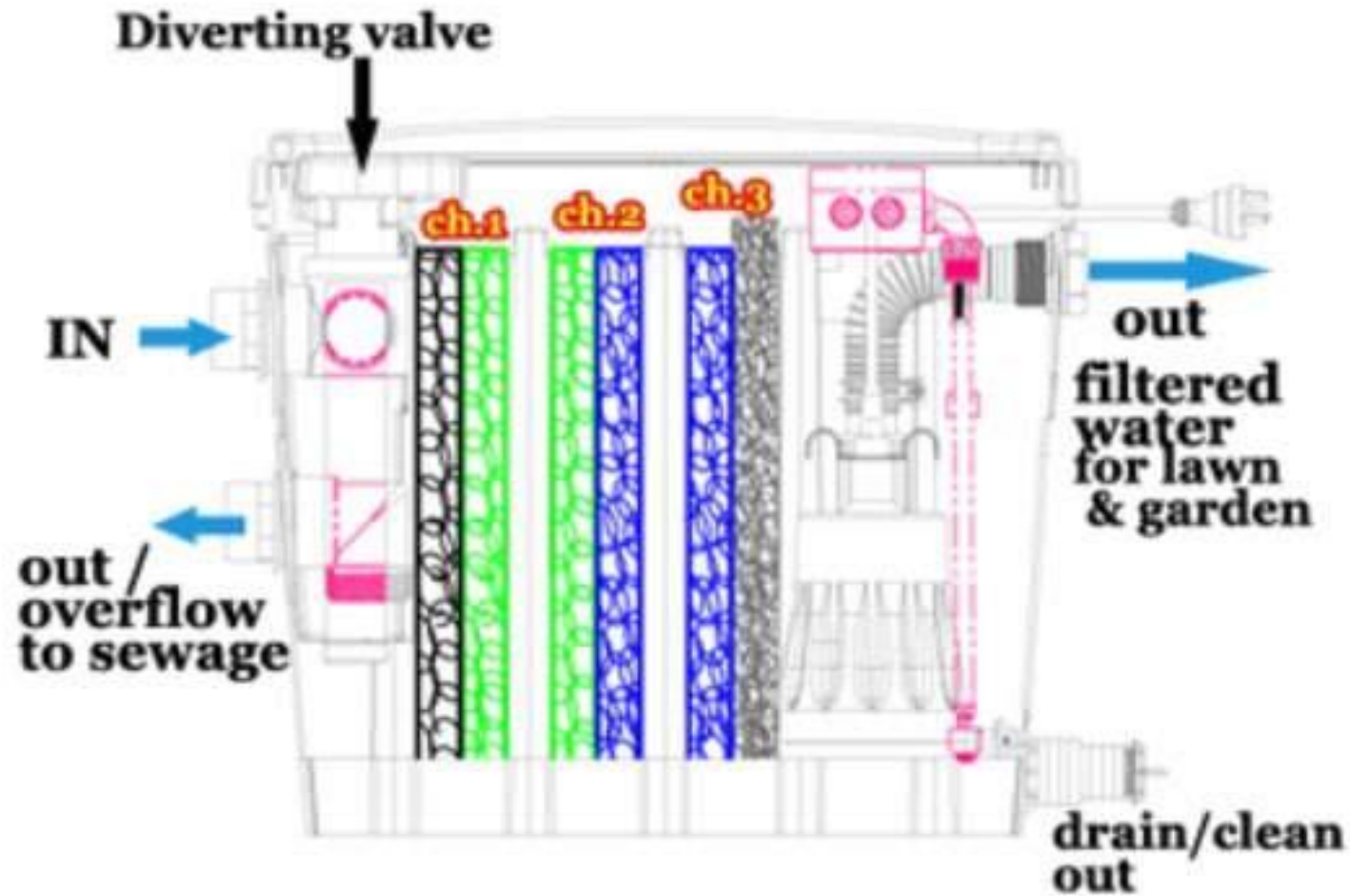
- A compact and framed mechanical box will house the HVAC equipment, kitchen equipment and toilet, for minimal installation effort.
- Ducted split system for even air distribution (use of DuctSox)
- Polycrystalline solar panel technology







Grey Water Recycling System

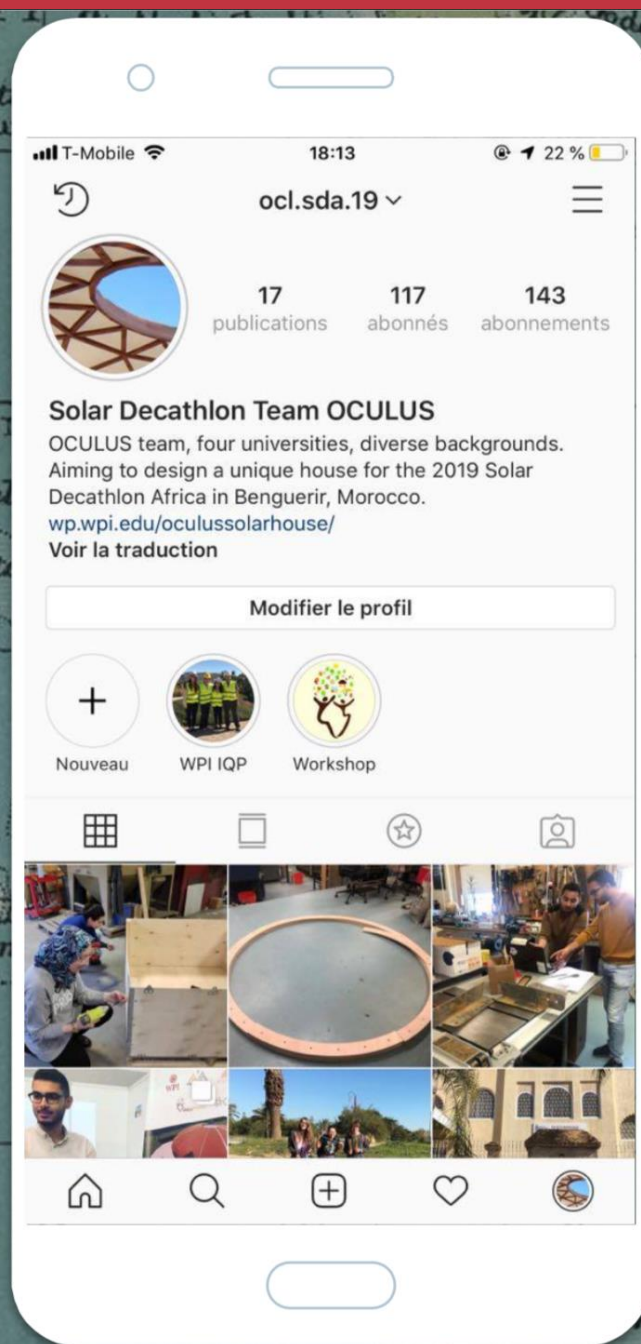




WPI



Instagram @ocl.sda.19




Follow us on
Instagram to help us
win the social media
and communication
contest!

<https://wp.wpi.edu/oculussolarhouse/>

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Welcome to Team OCULUS



About

Team OCULUS is a consortium led by students and faculty members of Worcester Polytechnic Institute (WPI – USA), L'École Nationale Supérieure d'arts et Métiers (ENSAM – Meknes, Morocco), L'École Nationale Supérieure d'Informatique et d'Analyse de Systèmes (ENSIAS – Rabat, Morocco) and the African University of Science and Technology (AUST – Abuja, Nigeria). The goal of Team OCULUS Solar Decathlon project is to demonstrate and realize

Preparing for the Solar Decathlon



March 2019

| M | T | W | T | F | S | S |
|----|----|----|----|----|----|----|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |



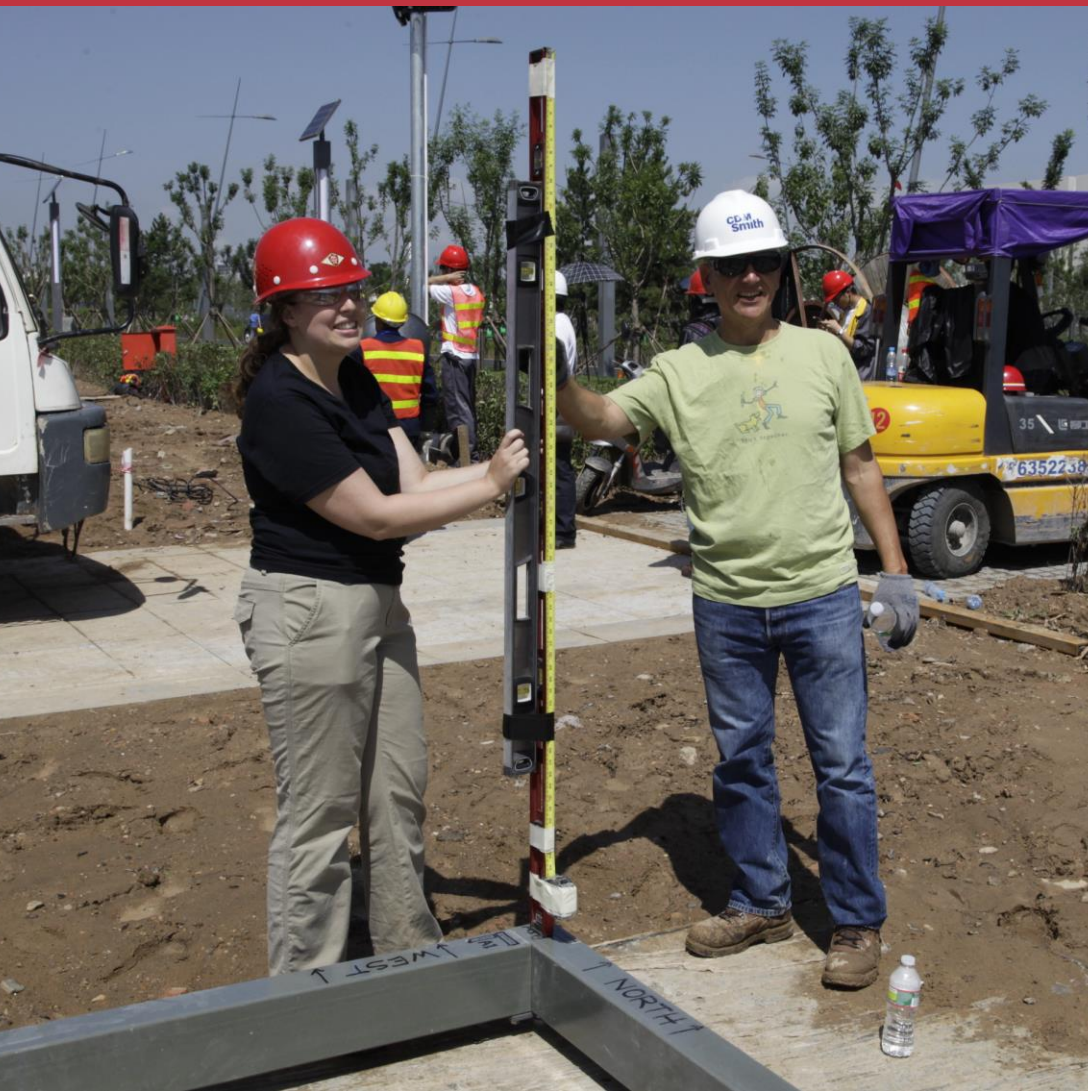
House Construction in Worcester



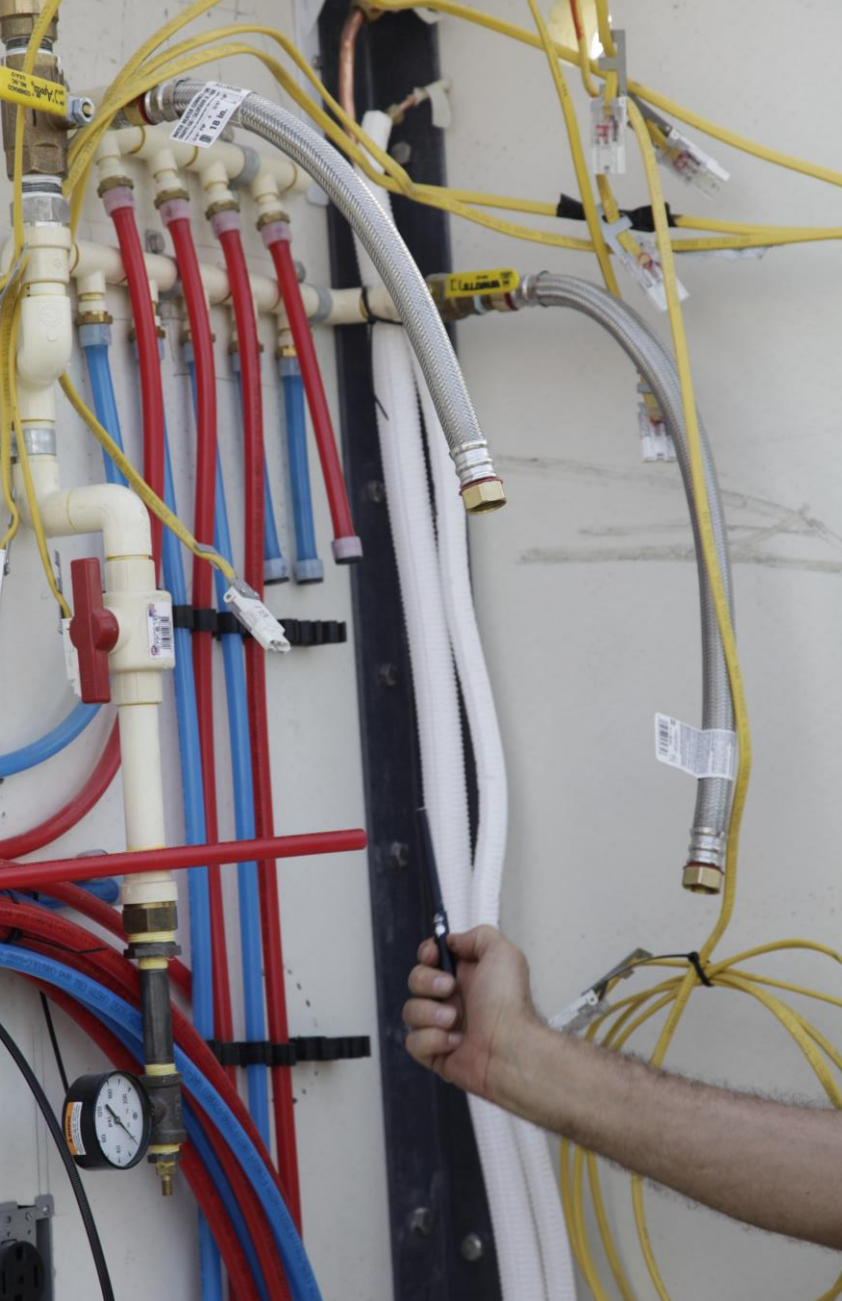


代表队: TEAM BE-WA-NY
组成大学:
纽约大学理工学院
比利时根特大学
和伍斯特里工学院















WPI



WPI





WPI

Day 1-Start of Construction





WPI





















Thank You!



W



WPI



Thank you!
Any Questions?







WPI





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Preparing for the Solar Decathlon

Morocco Weeks 3 & 4

3 & 4

00:00

March 2019

| M | T | W | T | F | S | S |
|---|---|---|---|---|---|----|
| | | | | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |

ocl.sda.19

17 publications

117 abonnés

143 abonnements

Solar Decathlon Team OCULUS

OCULUS team, four universities, diverse backgrounds. Aiming to design a unique house for the 2019 Solar Decathlon Africa in Benguerir, Morocco. wp.wpi.edu/oculussolarhouse/

Voir la traduction

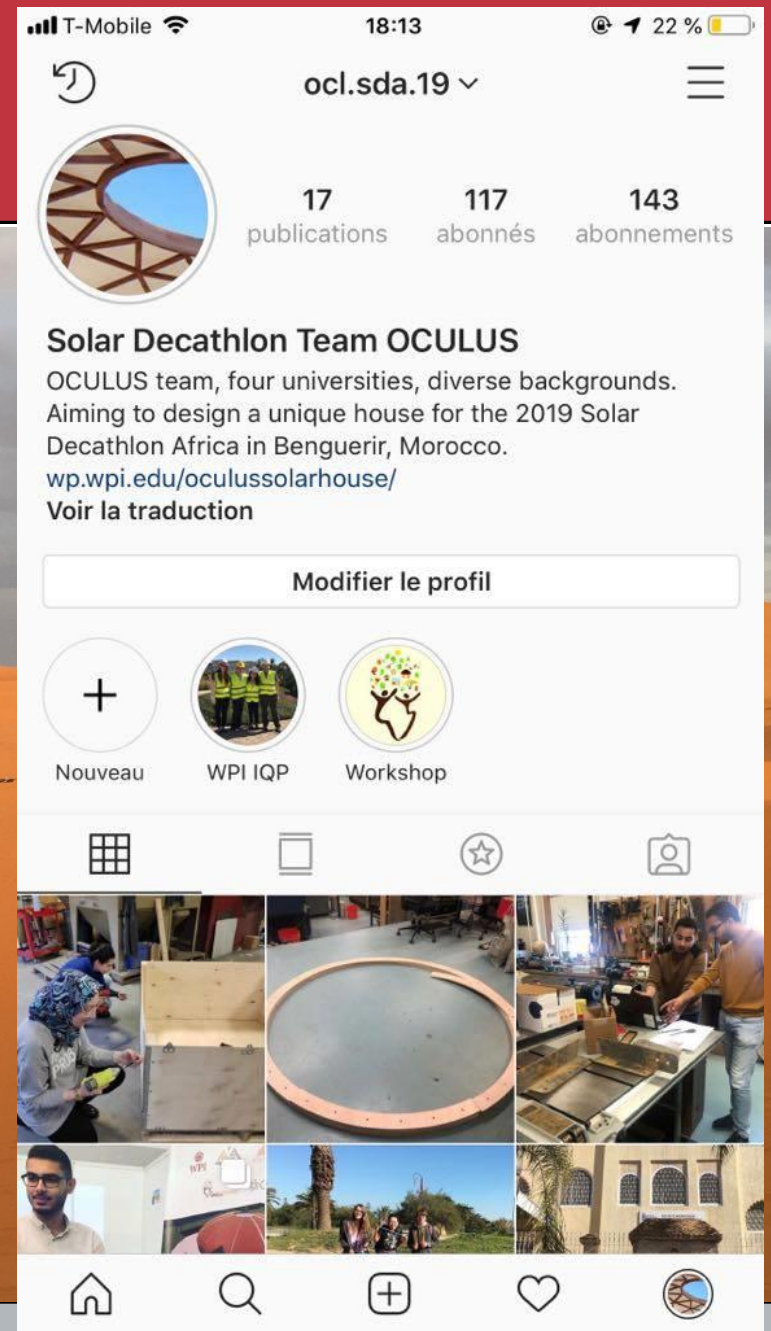
Modifier le profil

Nouveau

WPI IQP

Workshop

Instagram:
@ocl.sda.19



WPI

DESIGN AND SIZING OF THE STRUCTURE

International codes

Codes

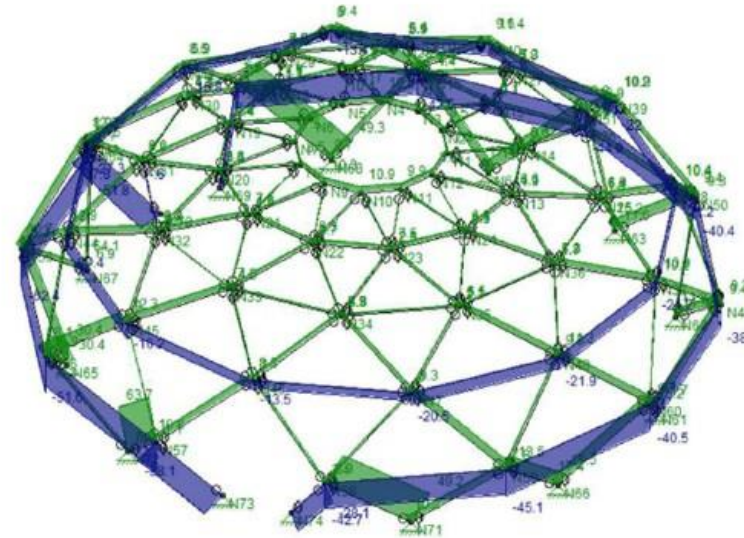
- ASCE 7-10
- IBC 2018

Materials

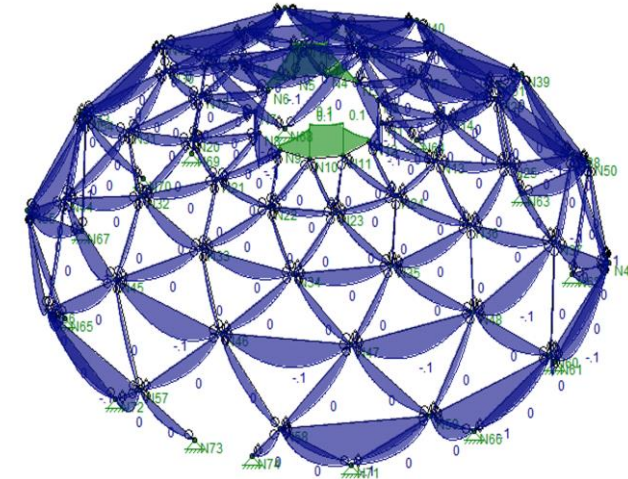
- Wood: Douglas fir
- Steel: A36

Sections

- Wood : Wood 4x4
- Steel : 63.53x6.364



RISA 3D – Moment forces



RISA 3D – Axial forces

Finally, The framework will be with wood members with 4x4 inches (~10x10 cm).