

European Innovation Partnership on Smart Cities and Communities

Positive Energy Blocks



THE EXPERIENCE OF THE SUSTAINABLE HOUSE PATIO 2.12

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What is Solar Decathlon?

Solar Decathlon Europe is an **international competition** in which 20 universities from around the world are selected to build a prototype of self-sufficient solar house, subject to **10 tests** to be evaluated by a prestigious jury.

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Patio 2.12

The **Patio 2.12** house is a **modular, low cost prefabricated** housing solution, energetically self-sufficient.

The project consists in a **kit of prefabricated modules**, which contain habitable rooms standing around a courtyard, which acts as the linking space between the modules.

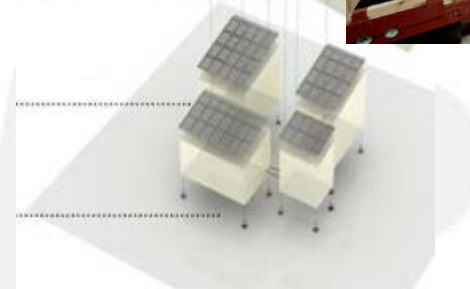
Each of these modules are **energetically self-sufficient**, in addition, they are spatially and constructively independent.



Industrialization

We propose the concept of "**open industrialized system**" that comes from a spatial and lightweight constructive precast modular system, **allowing change and adapt** to different configurations, places or different uses.

This offers the users a **flexible and adaptable housing**



Industrialization

- Ease of transport
- Dry Construction
- Adaptability
- No footprint

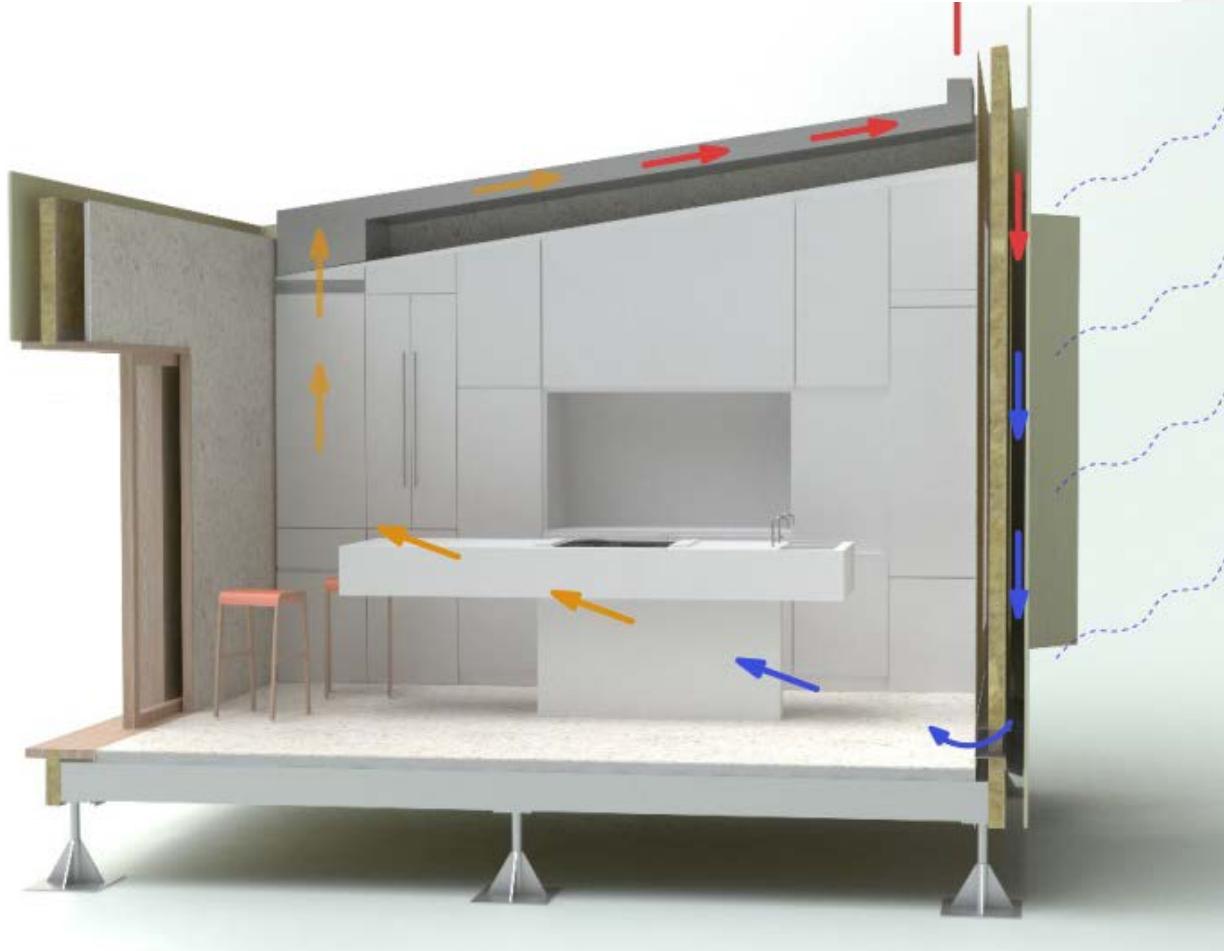


Evaporative Cooling

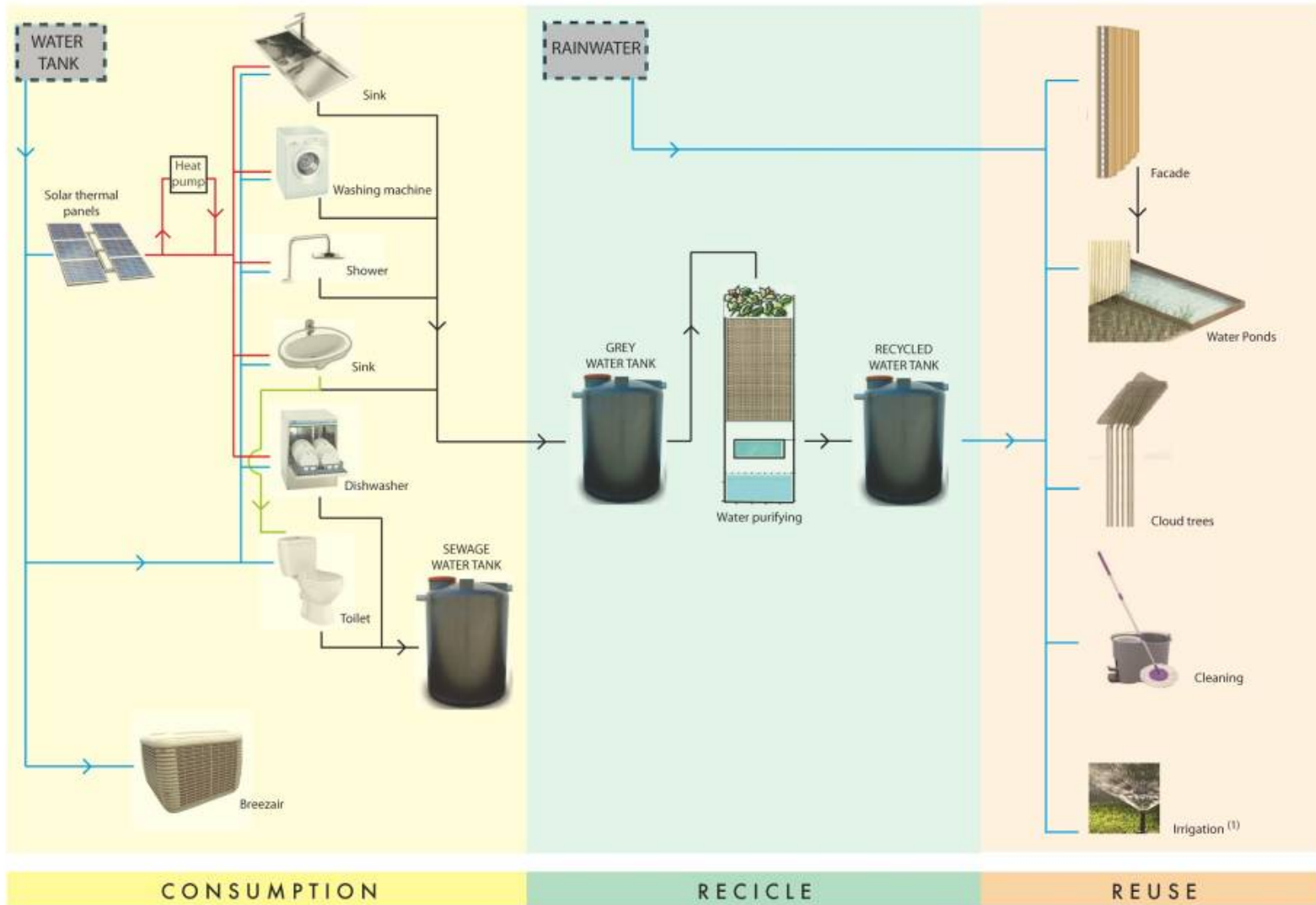
The **breathable ceramic** features an inner **watering system**, the ceramic plates are humidified and the external heat evaporates the water.

As the water evaporates absorbs energy from the air chamber which cools down, the cold air is brought the rooms through adjustable automated air gates, thus producing a convection current which circulates air to the solar chimney grid.

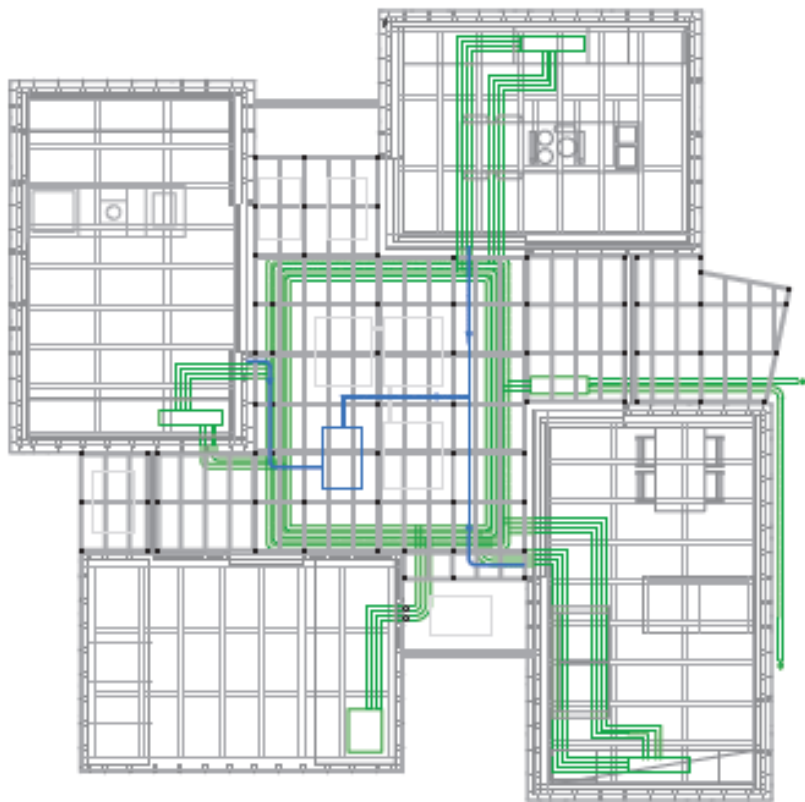
The lightweight ceramic coating becomes an “active material” by means of an evaporative cooling system: the "Botijo Effect".



Patio 2.12



Technological Islands



Photovoltaic System

Type 2:

Photovoltaic Power → 3 kWp

PV Inverter → 2.5 kW

Type 1:

Photovoltaic Power → 2.7 kWp

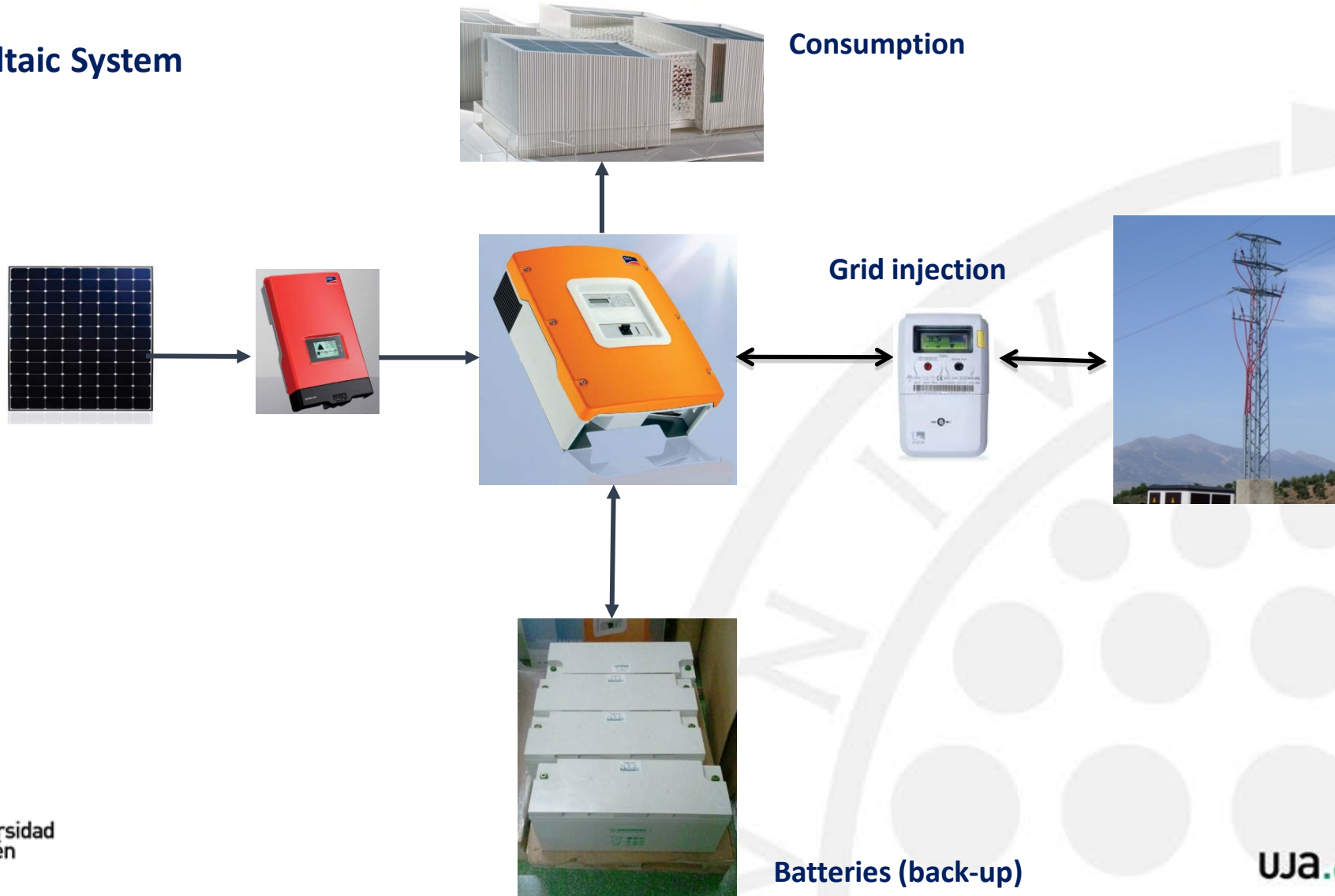
PV Inverter → 2 kW

+ thermal

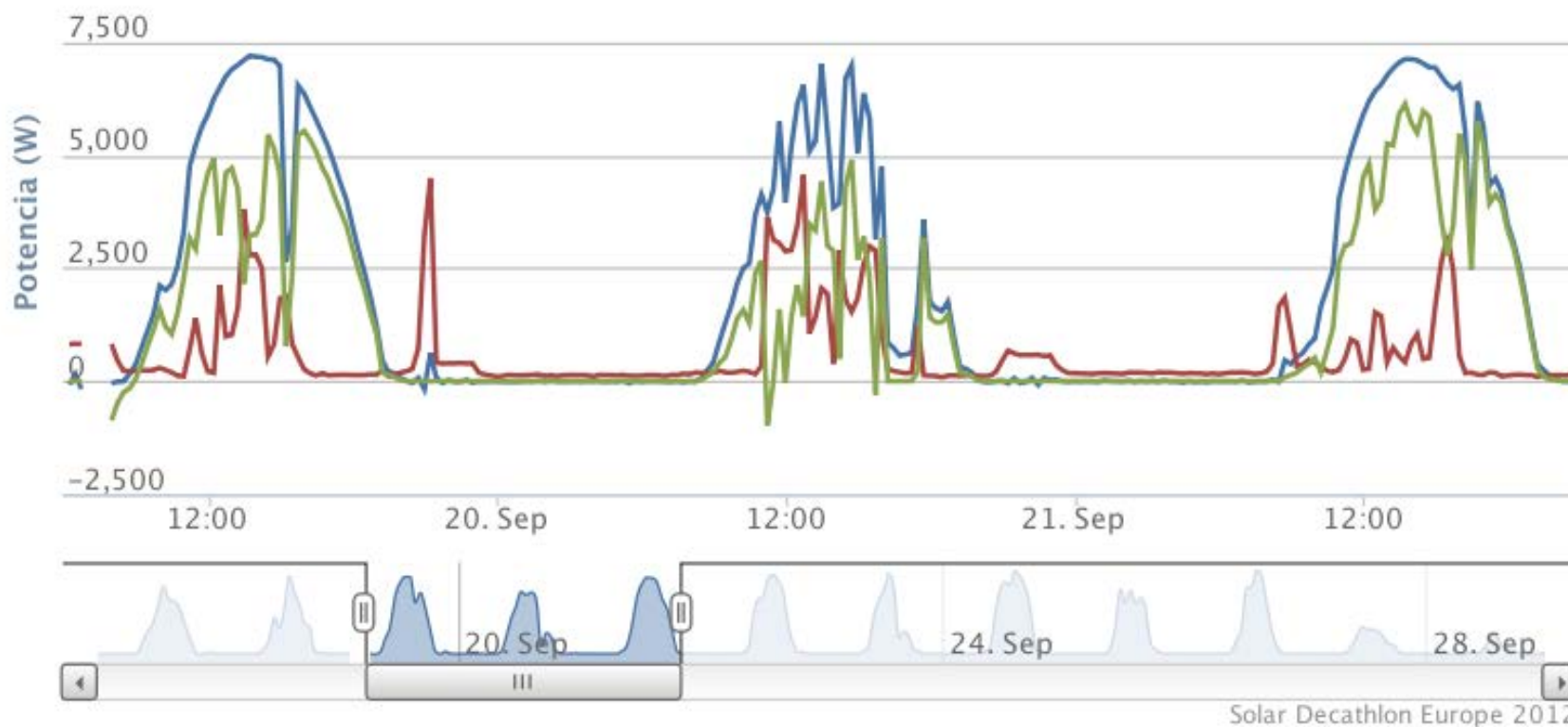
TOTAL: PV ≈ 11,3 kWp
Inverter = 9 kW



Photovoltaic System



Photovoltaic System → Energy Balance



Solar Decathlon Europe 2012



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Projects resulting from Patio 2.12

S.I.V.E.R

INDUSTRIALIZED HOUSING SYSTEMS.
Self-Sufficient Prefabricated modular housing

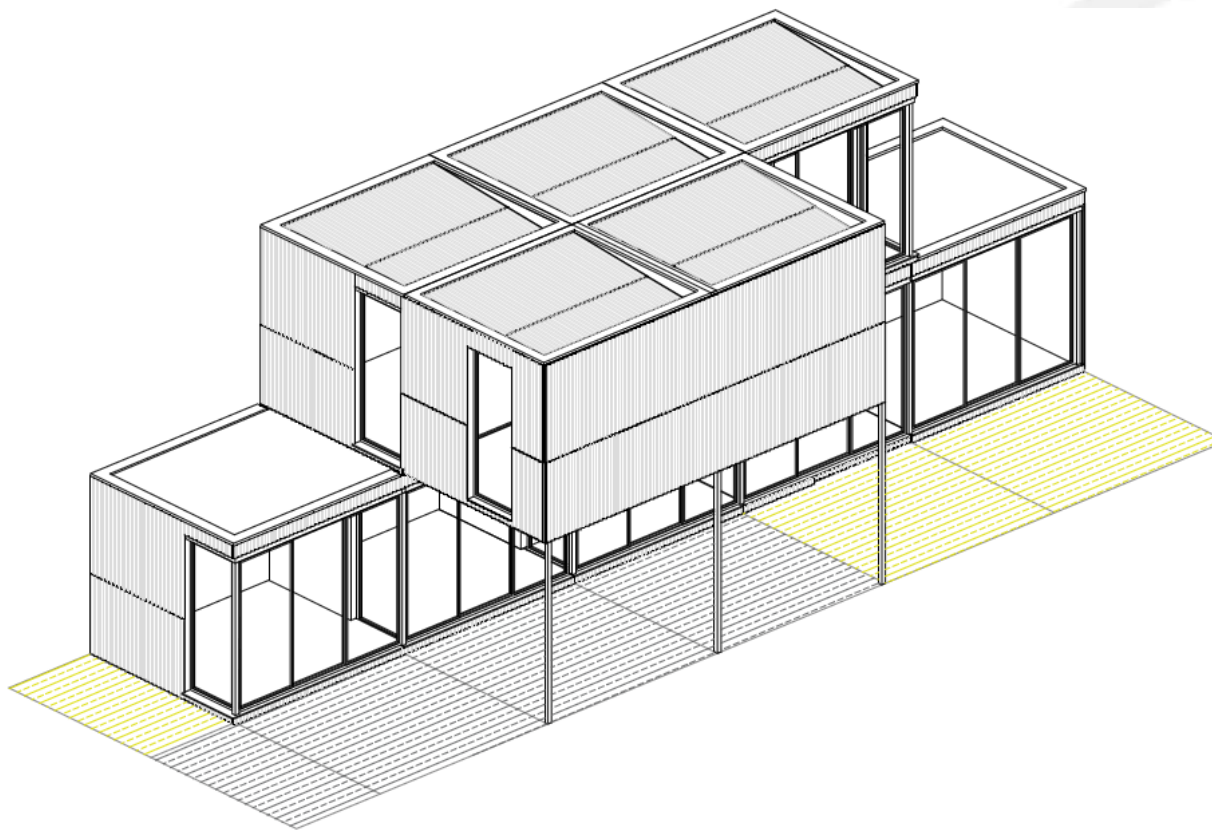


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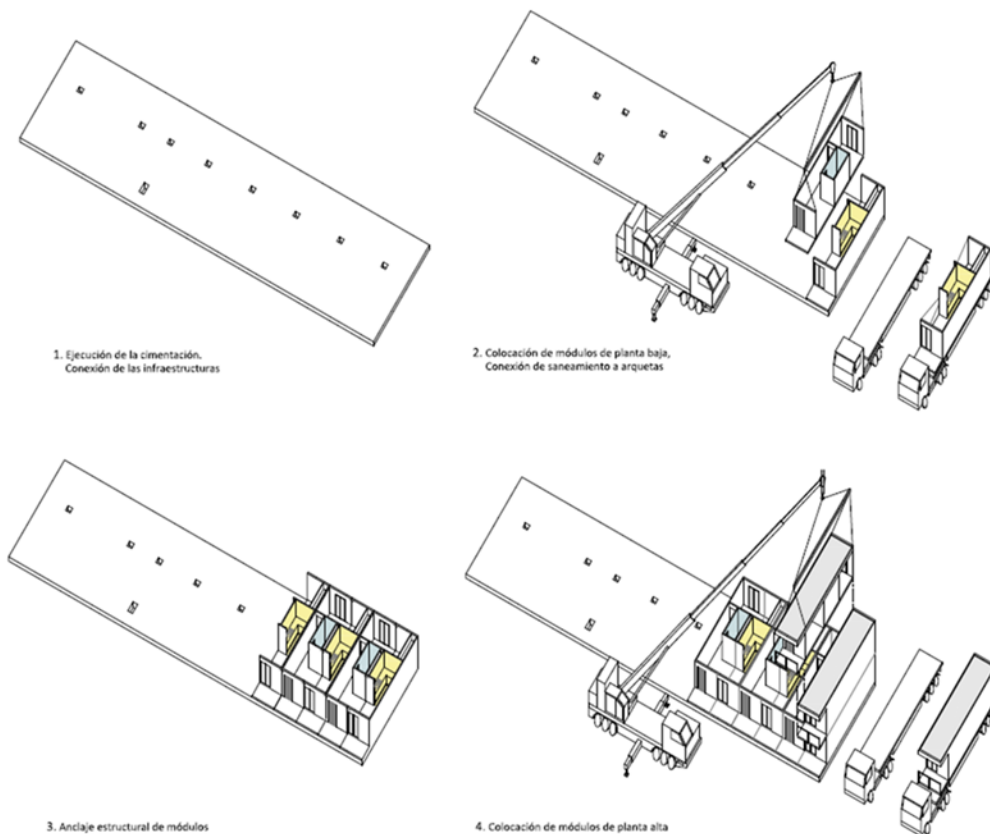
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Social Housing





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Touristic Lodging



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INDUSTRIALIZED HOUSING SYSTEMS.
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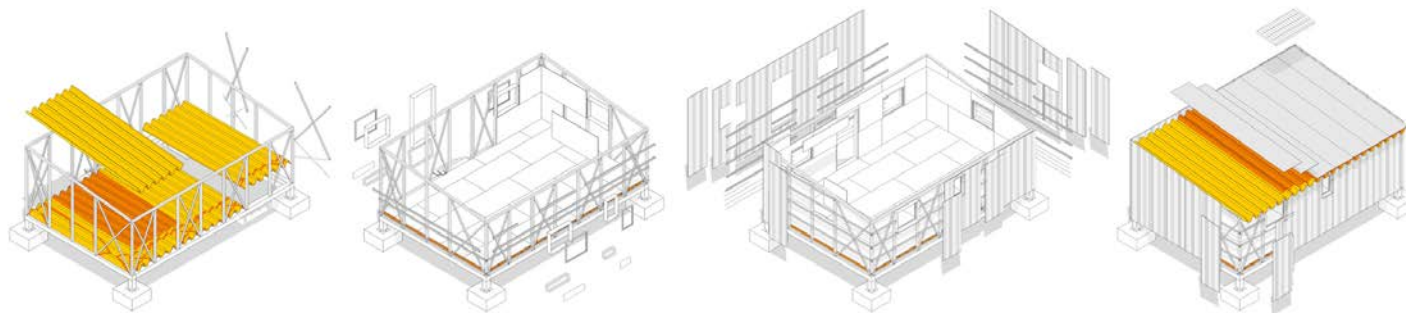


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Emergency housing





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LIVING
KITS



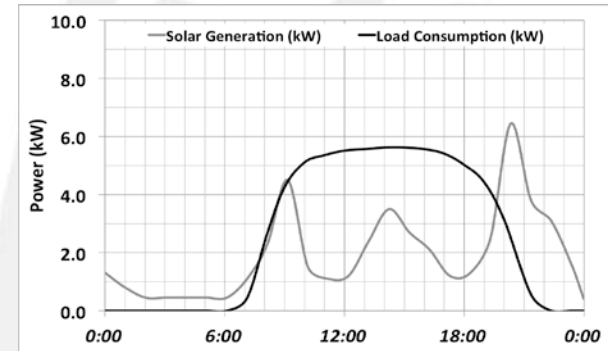
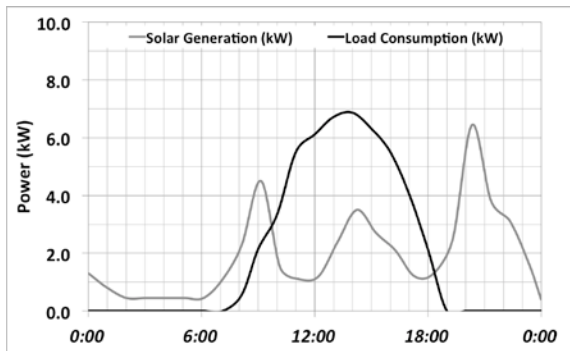


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Barriers to overcome

- More experimental pilot projects → *R&D + social effects*
- Legal supporting mechanism → *Governmental Administrations*
- National Entities of Auditors and Energy Certifiers → **enace**[®]
- Technical challenges I → Industrialization, materials
- Technical challenges II → BIPV optimization, generation-consumption balance
- Technical challenges III → Forecasting tools, Batteries, Smart-Grids...



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