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Challenges and Opportunities for the future electricity grid:

New business models for Collective Self-Consumption (CSC): Analysis of the Spanish case.



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Collective Self Consumption (CSC): Context

Electricity act

1. Unbundling of CEB
2. Implement **cost-reflective tariffs**, but secure access to electricity **for everyone**
3. Deployment of **RES** based on **private investments**.

Rooftop solar in Sri Lanka

Rooftop solar based on **individual self-consumption**...
...but mainly **invested by middle-high income** consumers.

→ How can CSC help on these goals?

→ How can we expand Rooftop solar participation to the rest of consumers?

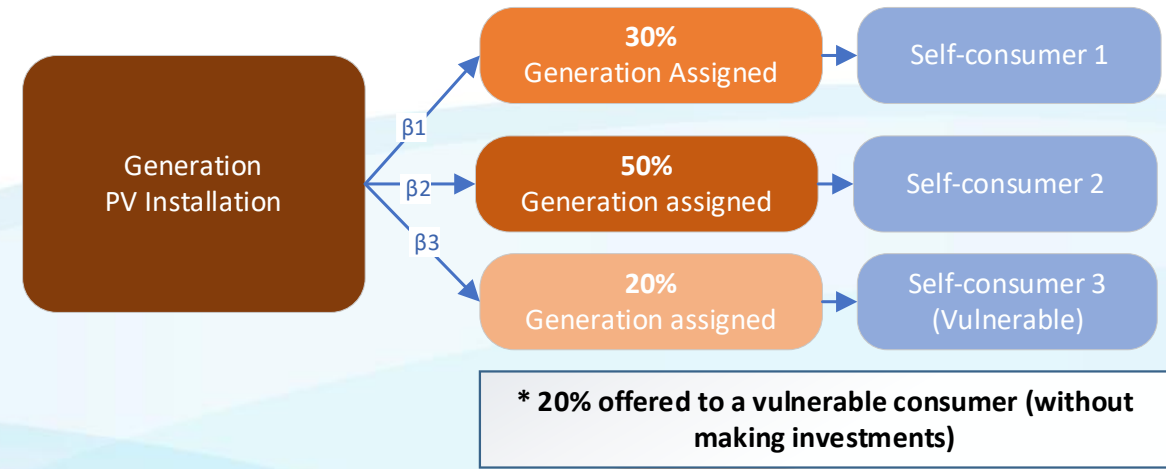
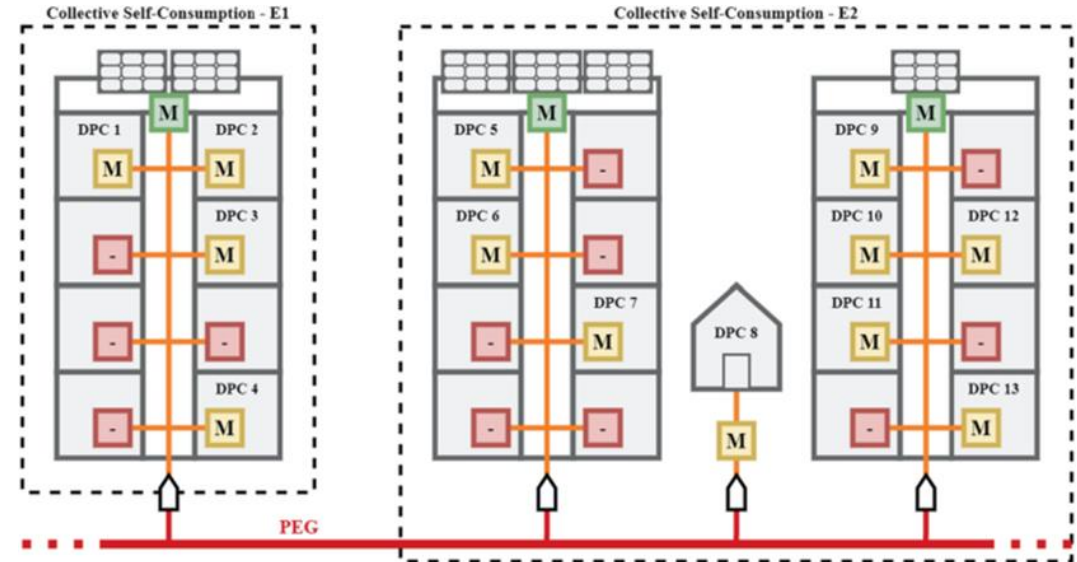


Why Collective Self-Consumption

1. **Increases of RES** and reduction of CO2 emissions.
2. **Lowers electricity prices** and locally produced.
 - Cheaper per kWh **produced**.
 - Reduction of **network costs**.
3. **Enables democratic participation in RES** for **low-income** consumers and consumers without rooftops available).
4. **Facilitates private investments**.

How does it work?

- Various **consumers share the electricity** produced by a RES (PV) installation.
- Directly internal network or through **distribution network**.
- **Sharing:** Each consumer gets X% of the electricity generation
- Produced energy reduces the electricity consumed in the bill, for each consume: Virtual net metering.



The example of Spanish regulatory context for Collective Self-Consumption (CSC):

- **Favorable conditions** for CSC projects.
 - **Permits virtual net-metering** (before not allowed)
 - **Offer *simplified CSC model options*:**
 - General: CSC selling surpluses to the grid when >100 kW. Requires to register the installation as electricity producer*
 - a. Installations ≤ 100kW: Simplified compensation for surpluses and no registration:*
 - b. Without surpluses (easier permits and no registration).*
 - **No taxes or extra grid charges** for self-consumed electricity.
- CSC: consumers must be located **“close to the generation point”** :
 - **Less than 2 Km***.
 - Connected to the **same distribution network** / transformer.
 - Same cadastral number.
- **From Feed-in Tariffs → → EU Subsidy for (30-40%) investment → → Now, market based (limited public support)**

Business model examples:

1. Neighbor model

Consumers invest and promote the PV system (same or different %).

Example of 32 neighbors promoting 42KW PV in the rooftop of their residential building.



Business model examples:

2. Energy Communities

Consumers create and participate in a legal entity called Energy Community (EC): Cooperative, association, or limited liability company.

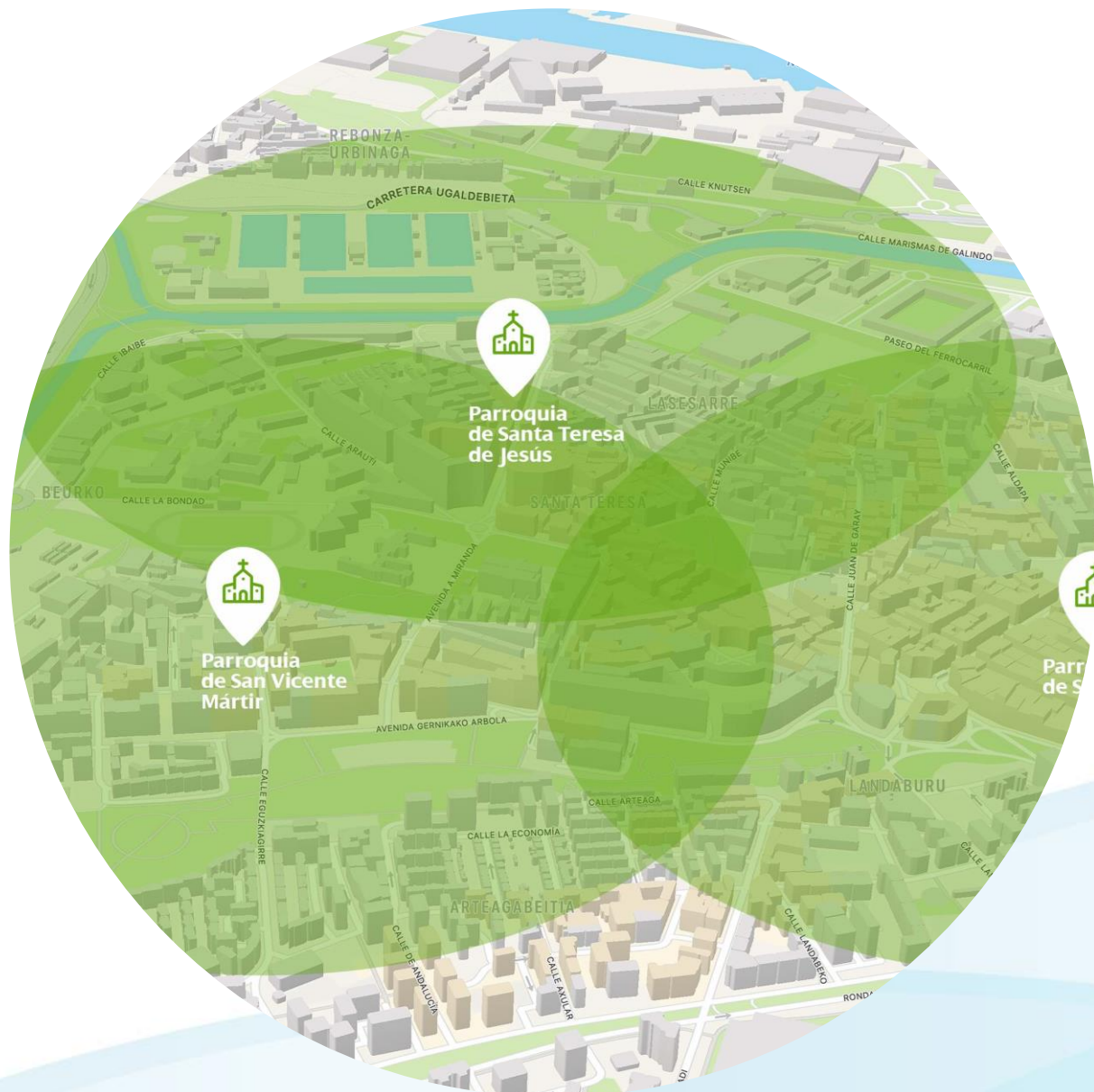
Example of Asteasu EC:

- The **municipality** leads an energy community and offers rooftops: School and swimming pool with total 60kW)
- The citizens participate with **yearly subscriptions** in the energy community.
- Part of the generation for **low-income consumers**.



*** New definition in the EU legislation (as an agent in the energy sector).**

- **Local Participants:** Municipalities, SMEs and individuals.
- Primarily **objective:** Promote local social, economic and environmental benefits.
- It can develop **different energy activities:** CSC, but also: Wind projects, EV charging, District Heating and Cooling, building retrofitting.



Business model examples:

3. IPP / Energy utility model

- The **IPP or Utility** identifies rooftop owners willing to rent their rooftops and develops PV installations: **AGREGATION**
- The **consumers** can very simply identify PV installations (closer than 2km) and register as self-consumers (website /online).
- The consumer buys or rents (for example: 1 share = 0,5kW).
- The consumer reduces the bill through virtual net metering.
- **Note:** The utility can decide to assign X% of the shares to vulnerable consumers.
- Offered by all the main Utilities! Ibedrola, Repsol, Endesa

Summary of Business models

Summary	1. Neighbor model	2. Energy Communities	3. External investment
Investment of the PV installation	Consumer	Energy Community	IPP / Utility
Consumer payments	Initial investment in PV system.	Subscription or initial investment (through the EC).	Monthly subscription fee (rent) / buying shares

Indicators	1. Neighbor model	2. Energy Communities	3. External investment
Simplicity for consumers	Middle	Low	High
Replicability	Low	Middle	High
Flexibility (to change beneficiaries)	Low	Middle	High
Accessibility for low-income consumers	Low	Middle / High*	Middle / High*
Social cohesion	Middle	High	Low
Local benefits	High	High	Middle

Lessons learnt for Sri Lanka: The Business Model (BM)

- Different **business models adapt to different interests and contexts...and many others to come.**

Energy community model	External investor model (IPP / Utilities)
<ul style="list-style-type: none">↓ More complex and higher level of compromise and social cohesion necessary. Less flexible.↑ Opportunities beyond CSC: Wind, EV charging, E. efficiency projects, etc.↑ Higher local socio-economic benefits.	<ul style="list-style-type: none">↑ Easy implementation. Access without investment.↑ Higher replicability and flexibility to change beneficiaries.↓ Lower concern.

- Collective self-consumption **increases opportunities for democratization and social participation.**
 - **Sharing with low-income consumers: Direct support** (instead of through tariffs).
 - By opening different **financing and payment opportunities** for the private sector.
 - **Participation without** having an **own rooftop.**

Lessons learnt for CSC in Sri Lanka: Requirements

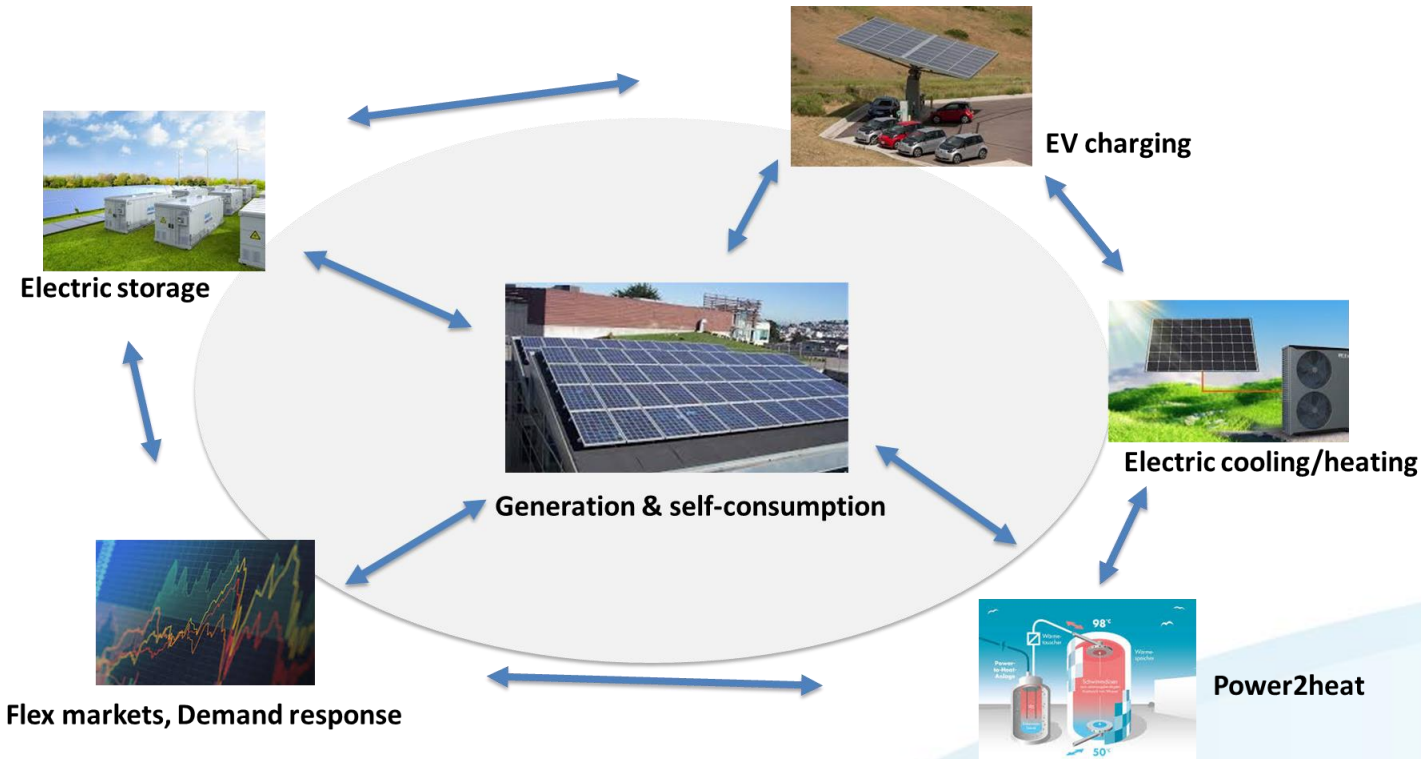
- Technical Requirements:
 - **Digitalized network** and bi-directional **smart metering** required (AMI).
 - Improved network control centers: **Renewable Energy Centers** for NSO controls.
- Regulatory considerations: **Enabling regulation** is necessary.
 - **Virtual net-metering without extra taxes and grid charges.**
 - **Simplified procedures** for project developments (specially network permissions).
- Further considerations for **reducing congestion and unbalances**:
 - **“Proximity” between generation – consumption** (by limiting the distance).
 - **Hourly** (or sub hourly) **based metering** supports matching the supply and demand at local level every hour.

Upcoming business models & cross sectorial integration

Opportunity to decarbonize other sectors: For example, Electric Vehicle charging

Business model need to **combine cross-sectorial and cross technological interactions.**

Consumer centric business models



Thanks!

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