PV for Heating & Cooling: A PV perspective

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PVPS

What is IEA PVPS?

- Implementing Agreement from International Energy Agency – Energy Technology Network.

- Established in 1993
- 29 members: 24 countries, European Commission, 4 associations

- Strategy 2013-2017: "*To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems*"

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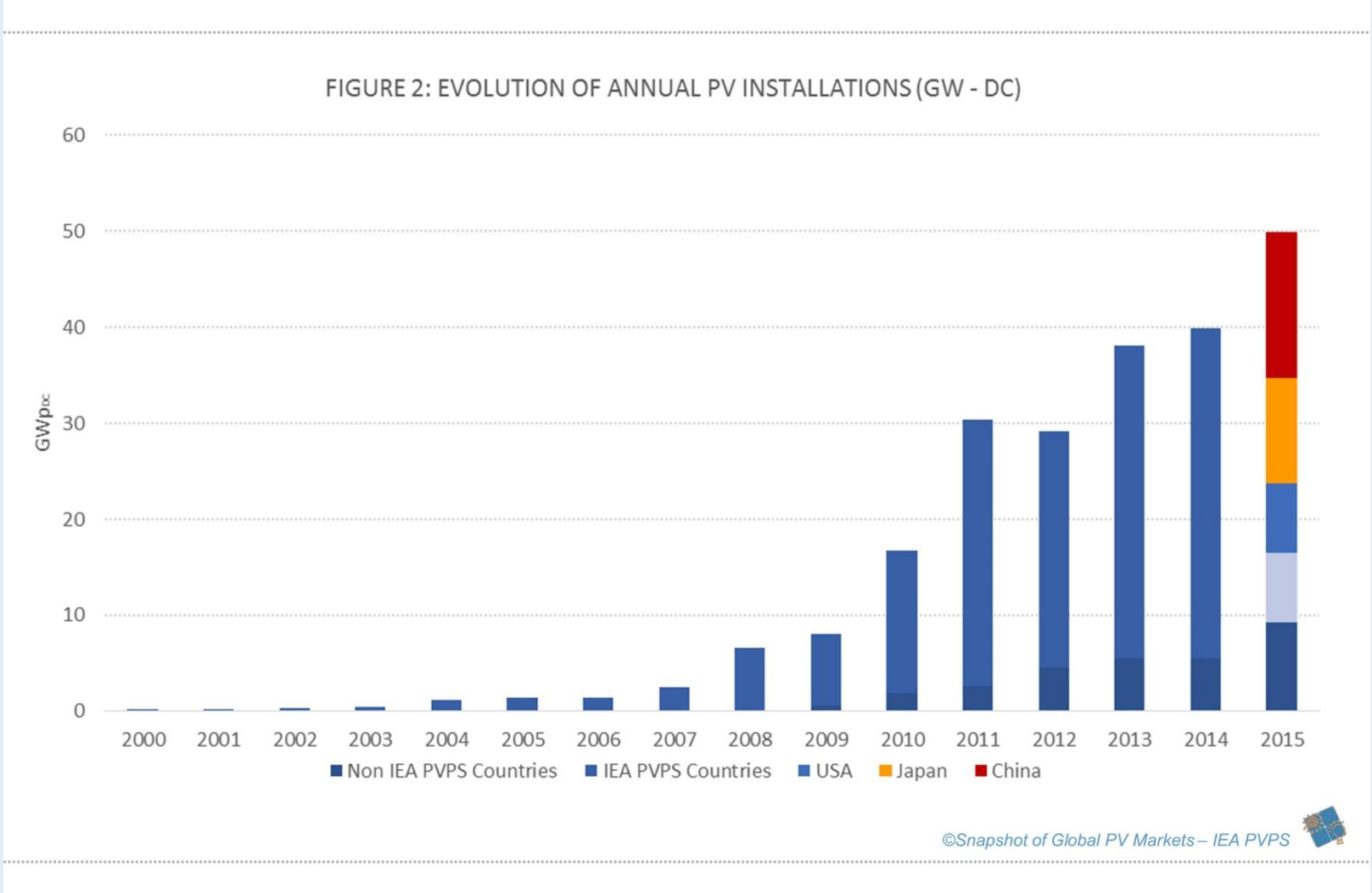
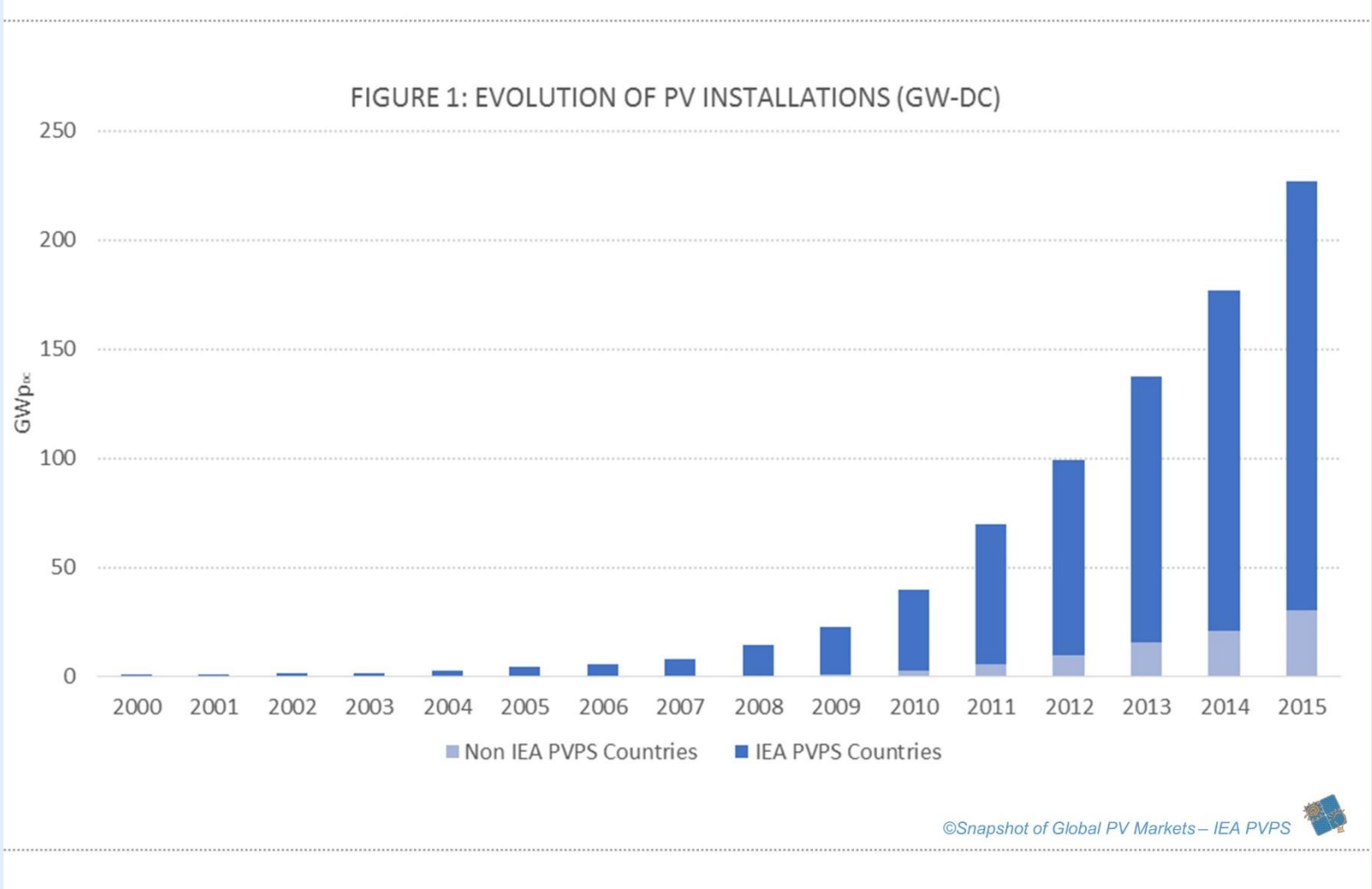
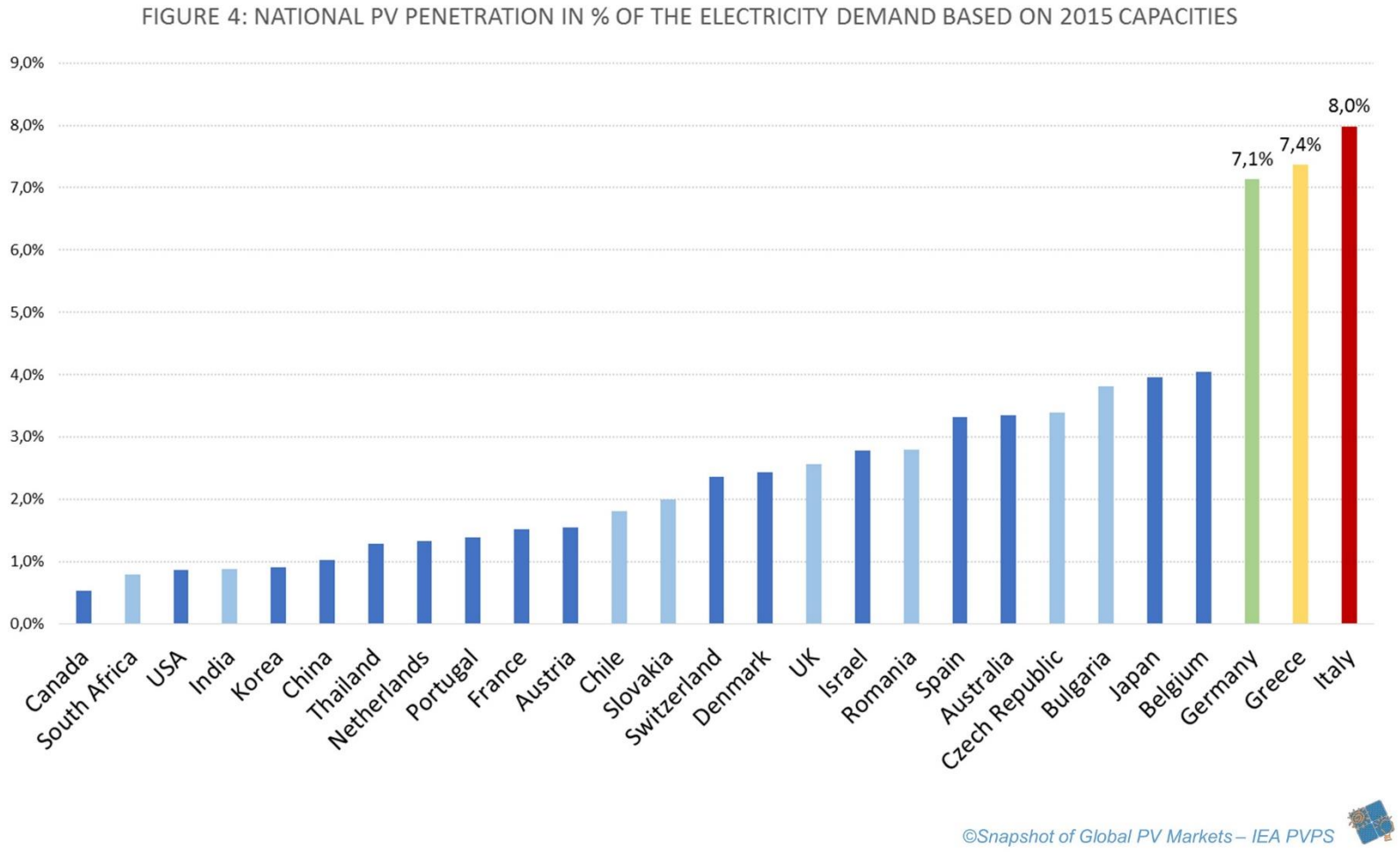
50.000 MW installed in 2015



227.000 MW end of 2015



% electricity demand



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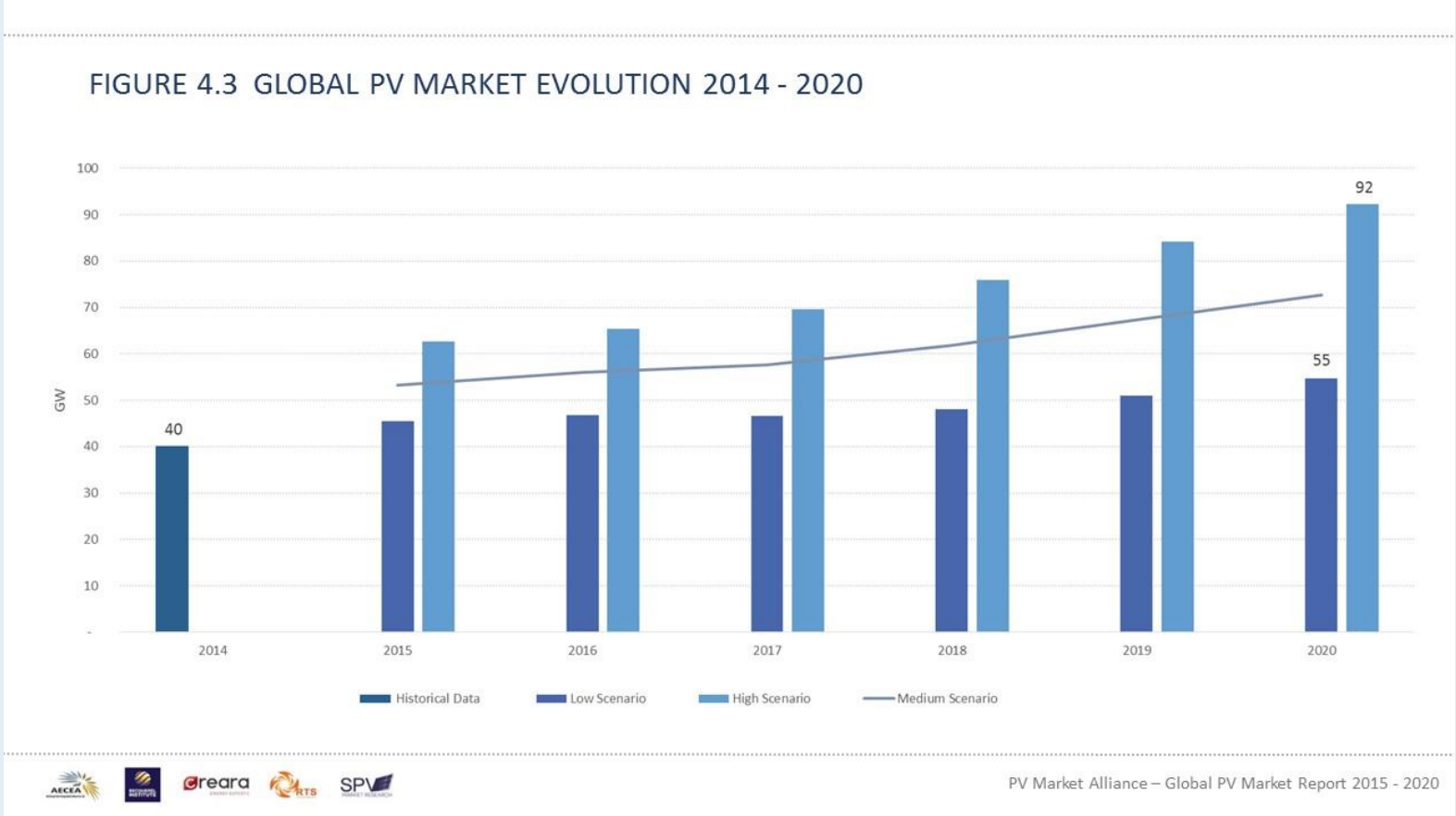
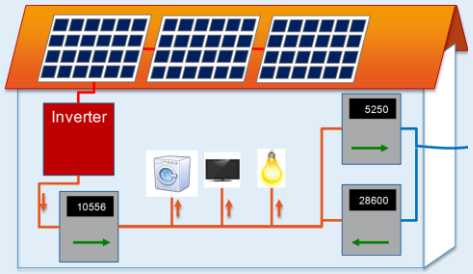
Where is the market going to?



Global PV Market Report – *PV Market Alliance* 2015

2 Distinct PV Worlds



Distributed PV

Self-consumption, energy effiency, grid parity, competition with utilities distribution business

Prosumers

One technology

Producers

Grid injection, PPA, competition with utilities generation business

Centralized PV

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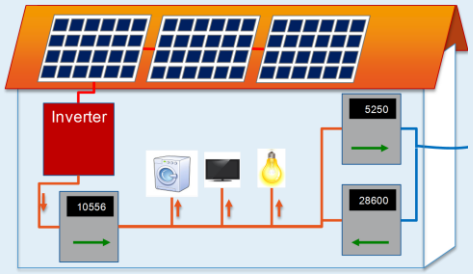
Competitiveness of PV Solutions



Distributed PV

Savings on the electricity bill = Retail prices – « must Pay » (grid costs, taxes…)

Prosumers

One technology

Producers

Electricity sales = Wholesale market prices – forecasting premium

Centralized PV

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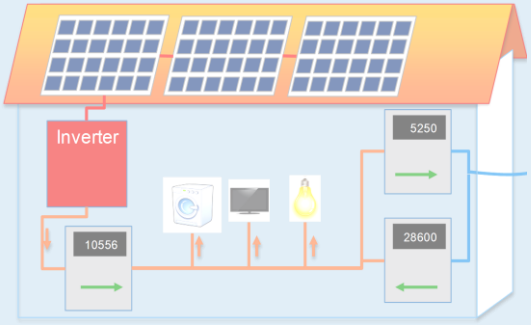
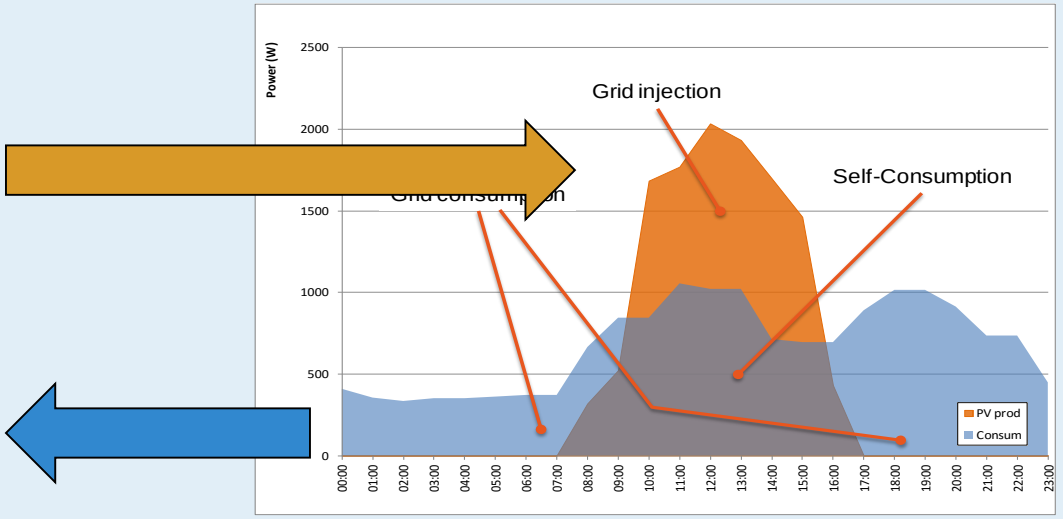
The self-consumption challenge

- Self-consumption of PV installations
- 20 to 100%





- Challenge: minimizing grid injection
- Solutions: decrease PV system size, DSM, Storage

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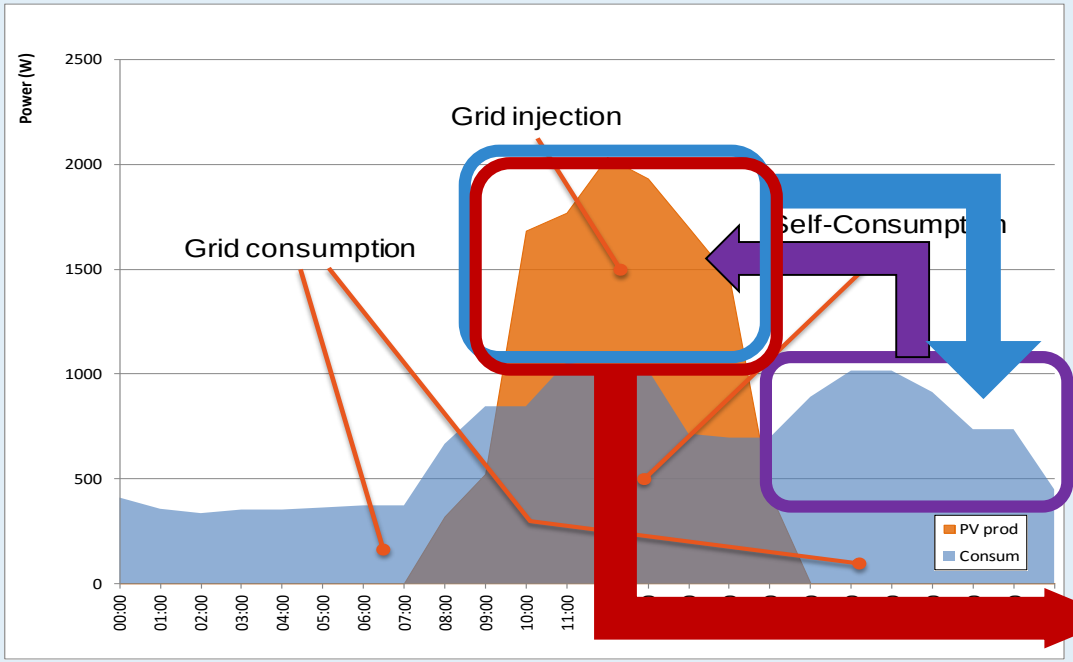
DSM & Storage Solutions

DSM

Electricity Storage

Other uses(out of the load)



H&C, Transport

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Task 53

Research questions

- What self-consumption ratio of PV electricity can be reached ? With:
  - Direct use of PV electricity
    - Direct water heating
    - Air conditioners
  - Indirect use (Heat-Pump)
    - For hot water production
    - Heating
    - Cooling

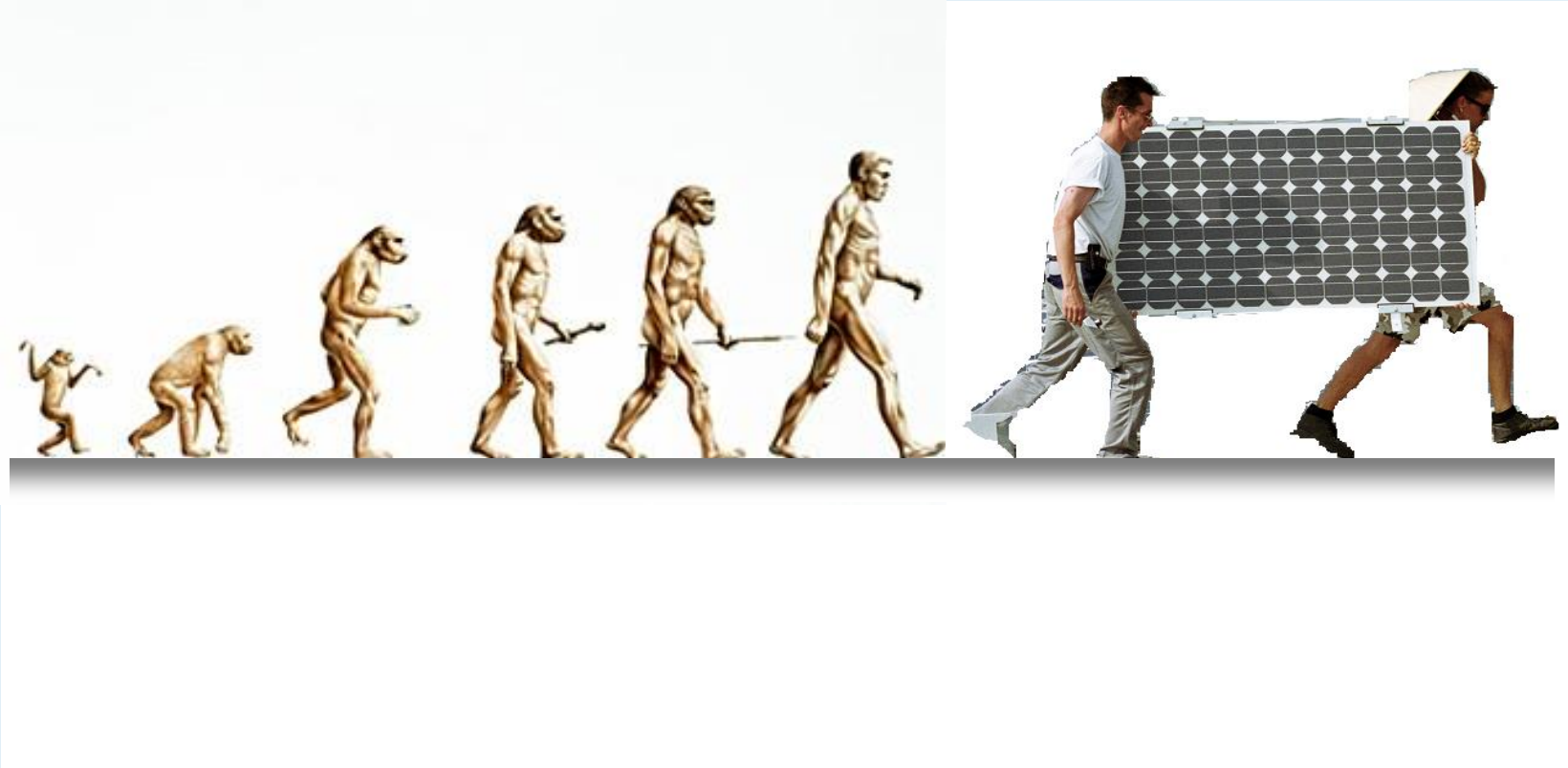
Competitiveness ?

- A simple business model (Ex: Spain)
  - PV electricity production cost: 0,1 EUR/kWh (1500 kWh/kWp + 1,5 EUR/WP + WACC @ 7%)
  - Residential electricity prices 0,2 EUR/kWh (assuming 100% savings on electricity bill)
  - Value of injected electricity = 0 !
  - With 30% SC: -0,04 EUR/kWh
  - With 70% SC: +0,04 EUR/kWh
    - Margin for investment in H&C
    - NPV_20years (i=2%) for a 3kWp PV system = 3200 EUR
- What about Italy?
  - NPV = 5700 EUR (using Scambio Sul posto)

Conclusion(?)

- PV declining costs are opening a range of new solutions
- PV and H&C offer grid integration and system integration solutions
- Solving the reluctance of regulators to allow grid injection of PV electricity at a fair value > local use
- Solutions already available?
- Need for a regulatory framework ? PEB ?
- Need for education: the electricity storage option is NOT the only one and NOT the cheapest one.
- Collaboration ?

The Next Step in Evolution

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Thank you for your attention