



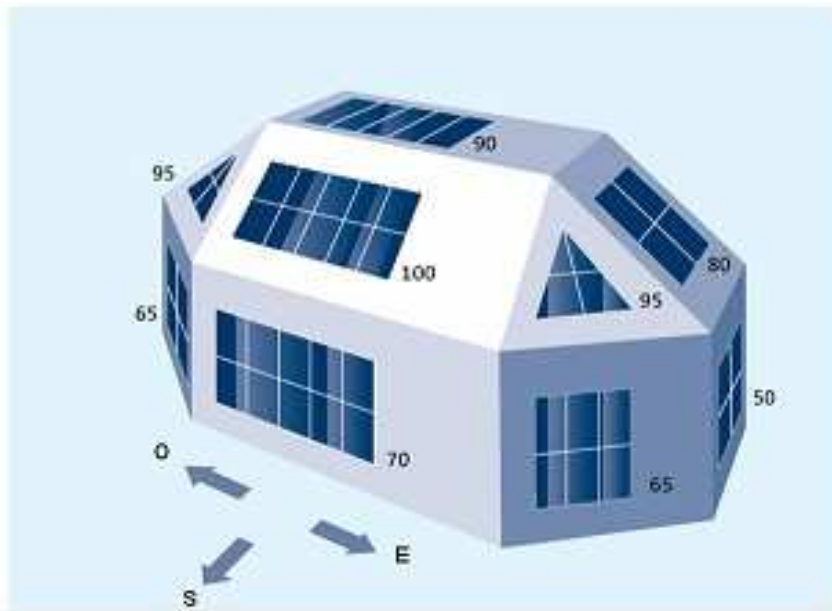
CALL FOR PROJECTS – GRID-CONNECTED SELF-CONSUMPTION PHOTOVOLTAIC SYSTEMS





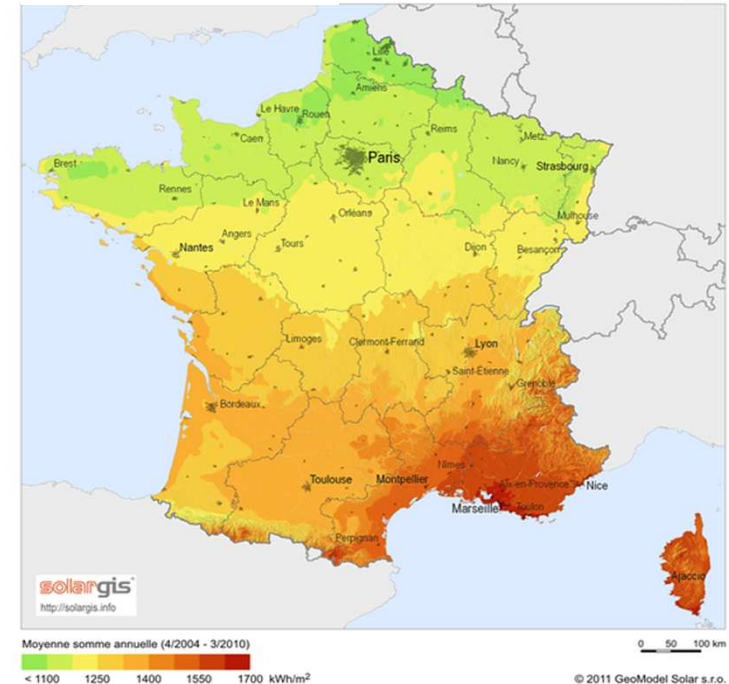
PHOTOVOLTAIC: *solar energy*

The **amount of potential energy** varies depending on the solar azimuth angle and the number of hours of sunshine.
 In France, this figure ranges from **3 kWh/m²/day in the north** to **5.2 kWh/m²/day in the south**. In Nouvelle-Aquitaine the average figure is **4.2 kWh/m²/day**.



Total horizontal irradiation

France



Annual total:

Depending on the technology used, yield ranges from 10% to 20%. It may be reduced by the **orientation** and the **angle** of the solar panel.
 In the end, **the amount of energy that can be recovered** varies between **0.21 and 0.84 kWh/m²/day**.



PHOTOVOLTAIC: *the advantages*

- Materials (silicon) **available** in large quantities
- **Mature** technology
- **Tried and tested** implementation
- **Affordable** investment costs (< EUR 2,000/kWp)
- **Competitive** production costs (on average **EUR 0.1027/kWh***)
- **Free** resource (the sun's rays)
- **8,000 times more** resource than we need

*Average cost calculated over approx. 80 systems supported

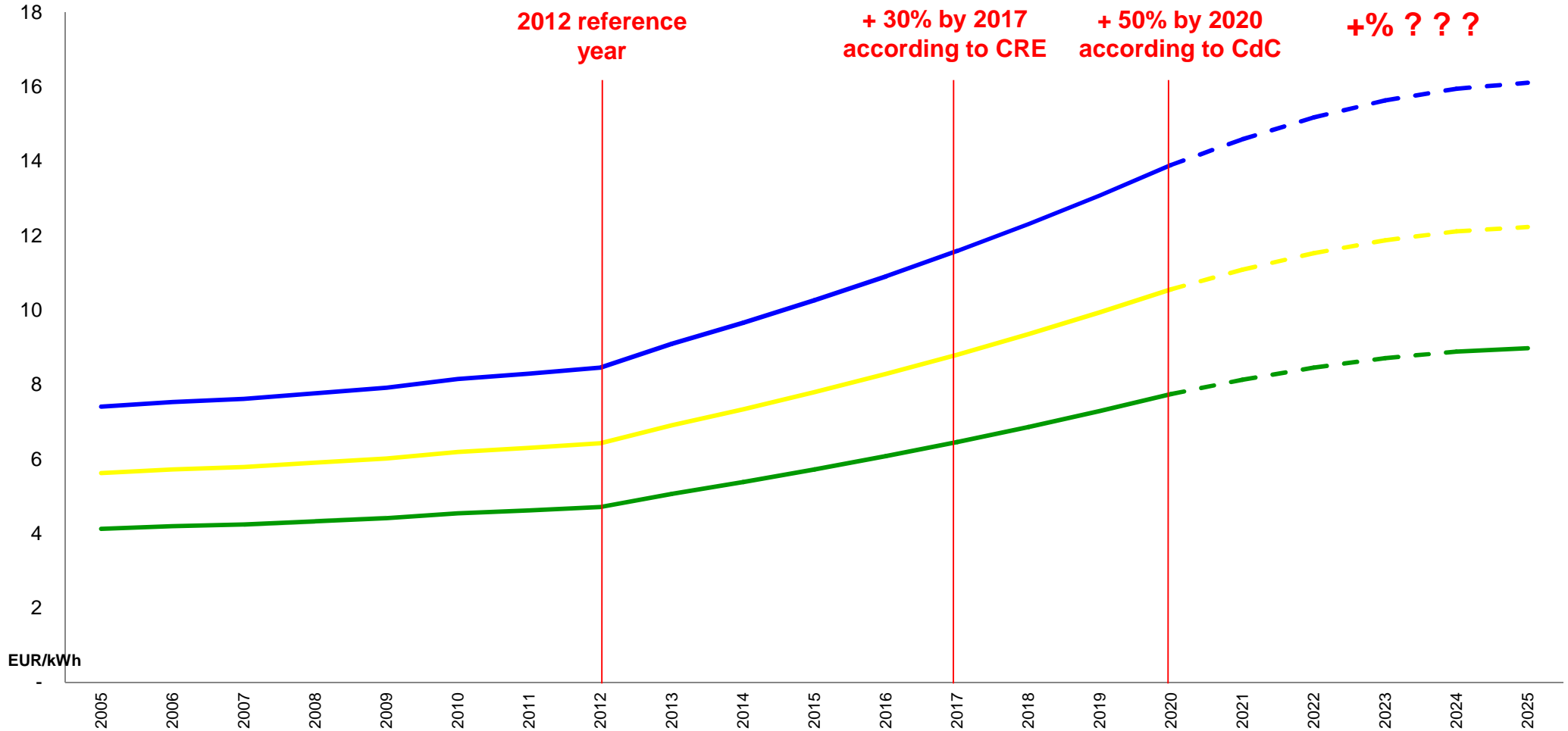


BACKGROUND

- > Introduction of the buyback rate in **July 2006**
- > **Speculative PV bubble between 2007 and 2010**
 - ↳ **Moratorium on PV in 2010**
 - ↳ **Tapering buyback rate unclear and unsustainable**
 - ↳ **Technical complexity (integration)**
- > **Connection cost (PTF=technical and financial offer)**
- > **Fukushima nuclear power plant accident (Japan) in 2011**
 - ↳ **Increase in the price of electricity:**
 - +30% in 2017 (CRE) and +50% in 2020 (CdC)**
- > **Fall in the price of system installation:**
 - ↳ **EUR 8,800/kWp in 2007 – EUR 1,600/kWp in 2016**



Impact of Fukushima in France: improved safety measures at nuclear power plants



➤ Development of rates from 2012 to 2020 (excluding standing charges and VAT)

Sources: DGEC-CRE-CdC



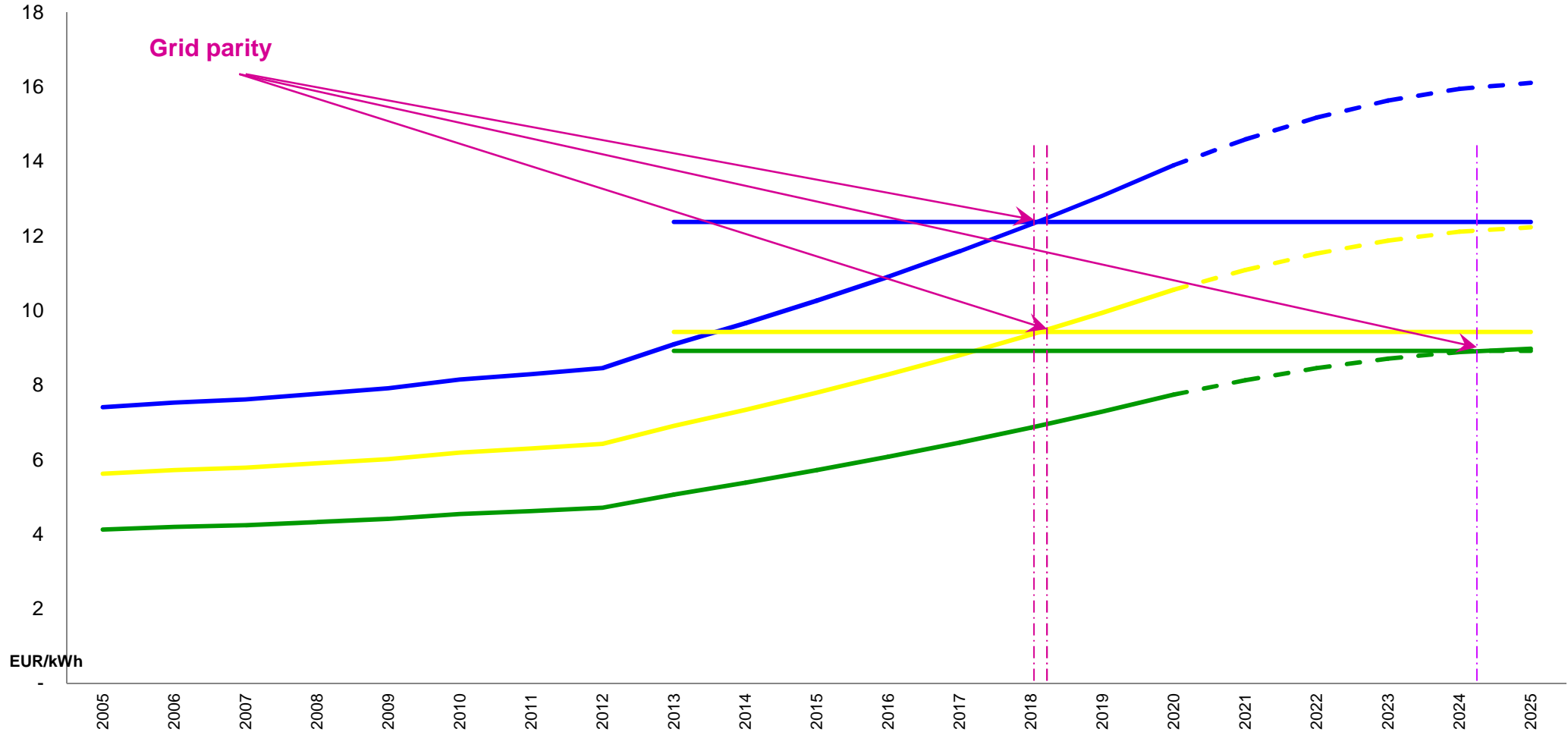
TARGETS:

- Move away from the restrictive, negative belief:
 - ↳ buyback rate, integration, connection, etc.

- > Get back to the **basics of energy management**
- > Move from **design** to **implementation** of PV self-consumption
- > Find another way to implement PV
- > Increase skills in/knowledge of self-consumption
- > First building block for intelligent grids:
 - ↳ smart homes, smart building, smart grids
- > Adopt an **energy transition approach**



Grid parity: convergence in the prices of electricity purchased and electricity produced



- 2012 price development (excluding standing charges and VAT)
- PV projects investment + operation / production over 25 years
- Average cost of electricity produced: EUR 0.1027/kWh

Sources: DGEC-CRE-CdC
 CRA 2013/2016



APPROACH IN AQUITAINE (example):

- > **2013:** Organisation of a call for PV self-consumption projects:
 - **Framework:** grid-connected (provide an energy service)
 - **Targets:** public and private service sector, industrial, social landlords
 - **Excluding:** individuals, national government
 - **Approach:** sustainable development (water, waste, pollutant, process)
 - **Energies:** consumption management
 - **Economy:** global approach (investment, operation)
 - **Technical:** no building integration but innovation
 - **Subsidy:** switch from a handout-based to a project-based approach

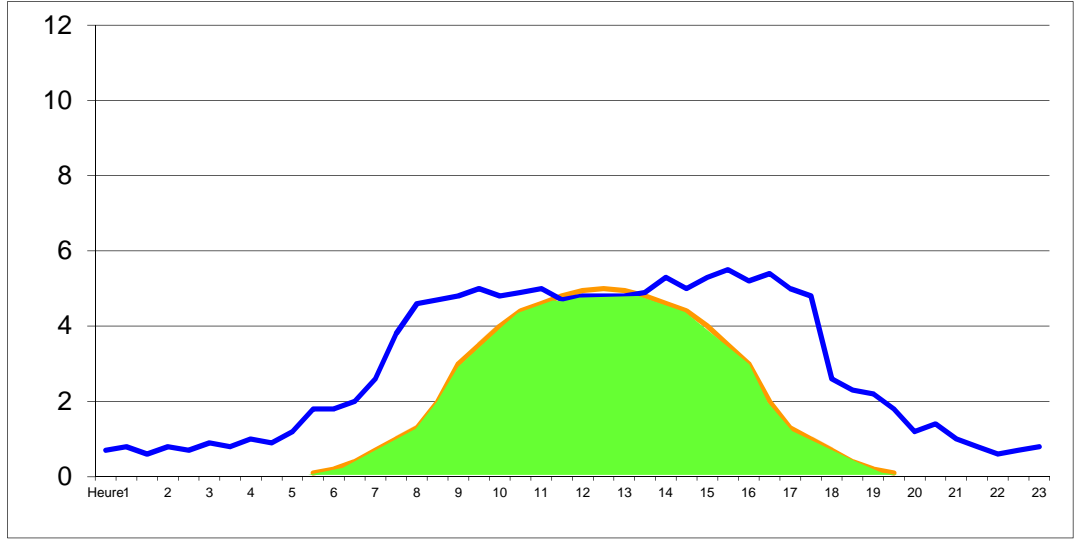
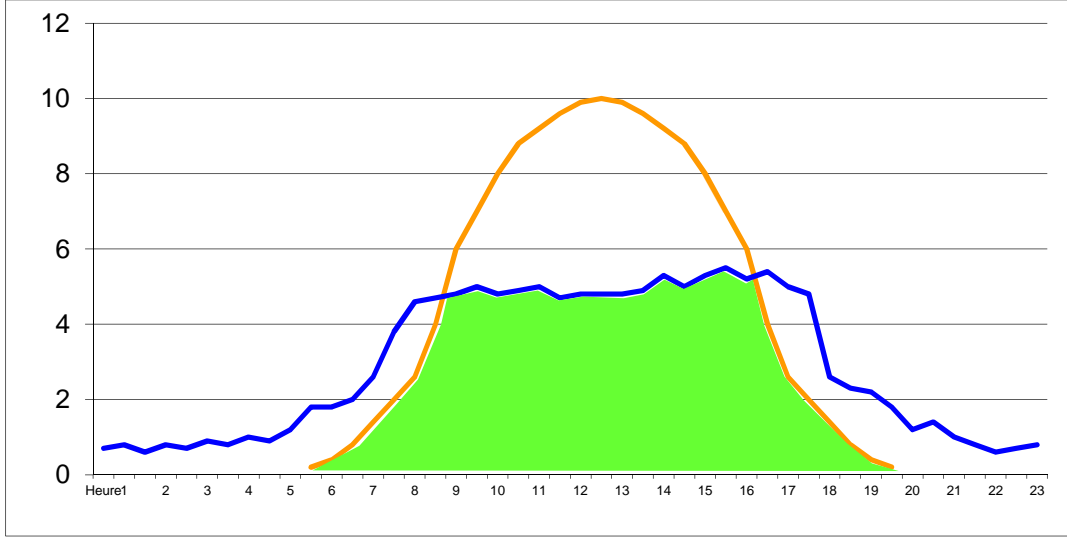
- > **2014, 2015, 2016 developments**

- > **Expert** project analysis and labelling by the Sysolia business cluster

- > **Monitoring** systems supported between 2013 and 2015 (5 types)



REGIONAL CHOICE:



↗	Power (kW)	↘
↗	Cost (EUR)	↘
↗	% Self-consumption	↘
↗	% Cover	↗
Necessary	Resale	Pointless
↗	Connection	0
Random	MDE	↘
↗	Smart grid	Random
Uncertain and expensive	Conclusion	Effective and cost-effective



CONDITIONS:

Year	Power	Self-cons	Resale	Storage
2013	10 to 100 kWp	66%	Yes	No
2014	10 to 250 kWp	75%	No	Yes
2015	10 to 500 kWp	80%	No	Yes
2016	10 to kWp	85%	Yes < 70% <100 kWp	Yes

ELIGIBLE:

- > Photovoltaic and electricity demand management survey
- > Supply: panels, rails, inverters, distribution boards, storage
- > Cabling and monitoring
- > Project management and installation

PV kWh PRICE: $\frac{\text{CAPEX}^1 + \text{OPEX}^2}{\text{kWh} \times 25 \text{ years}^3}$

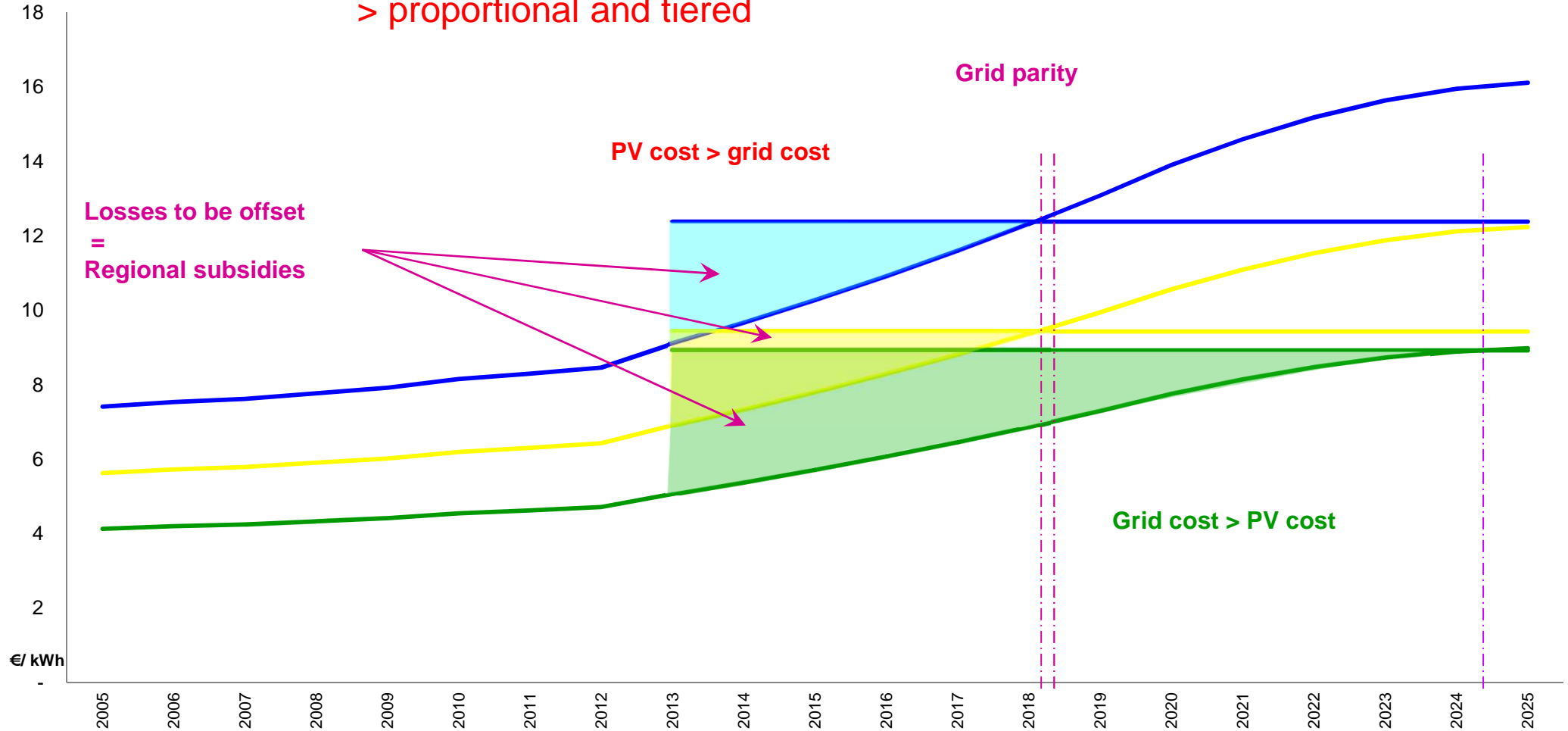
1) Survey + investments

2) Upgraded maintenance + 2 inverter sets + 1 battery set

3) Production reduced by 0.05%/year



Regional subsidy: > differential between purchased electricity and self-consumed electricity
 > proportional and tiered



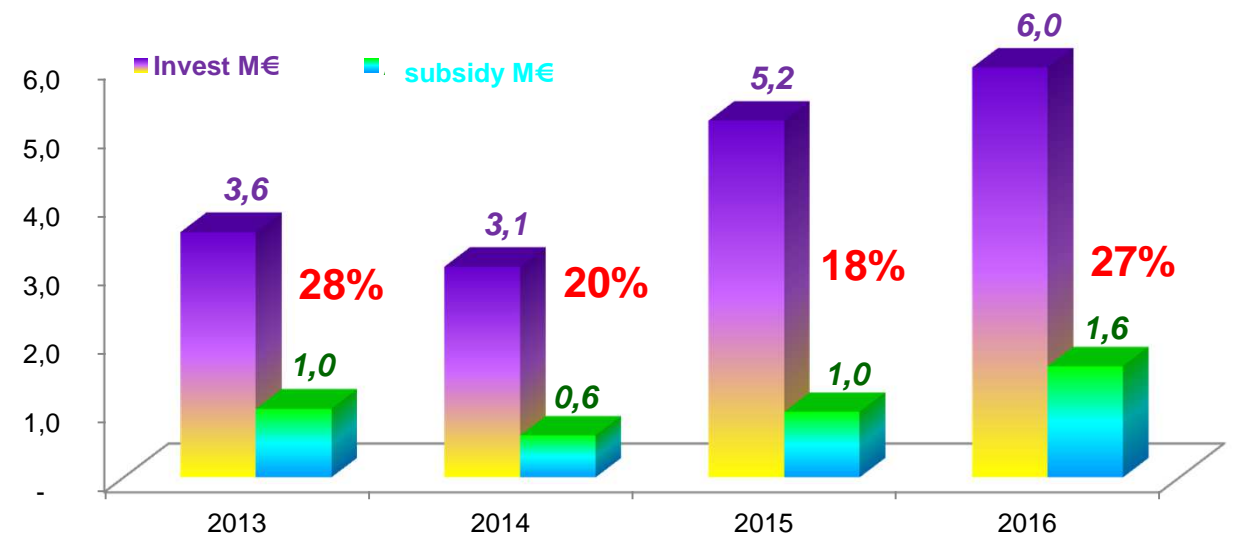
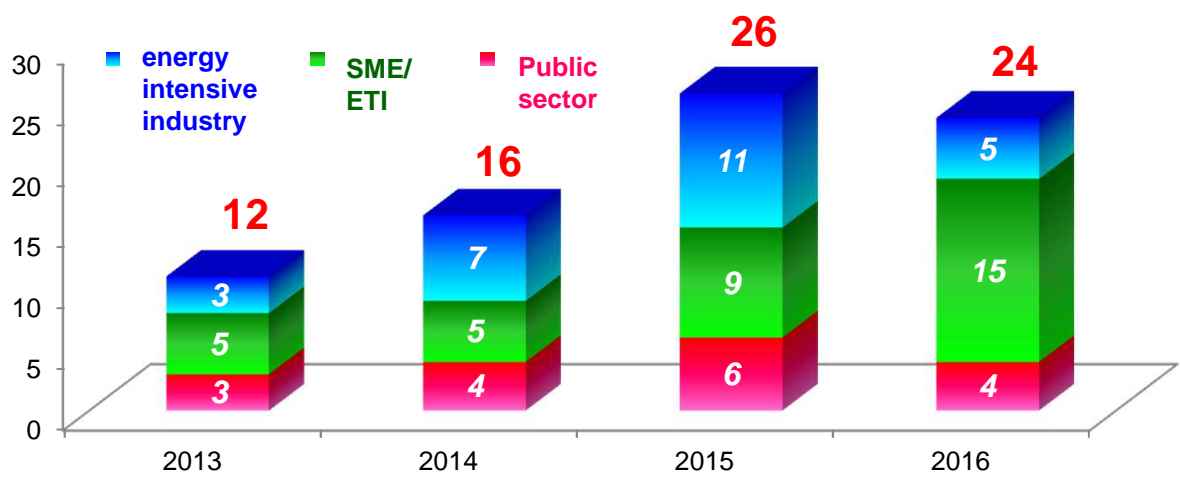
- Grid parity => price of electricity produced = price of electricity purchased
- Average subsidy rate per rate type : ~ 24% (10 to 50%)

Sources: DGEC-CRE-CdC
 CRA 2013/2016



FEEDBACK:

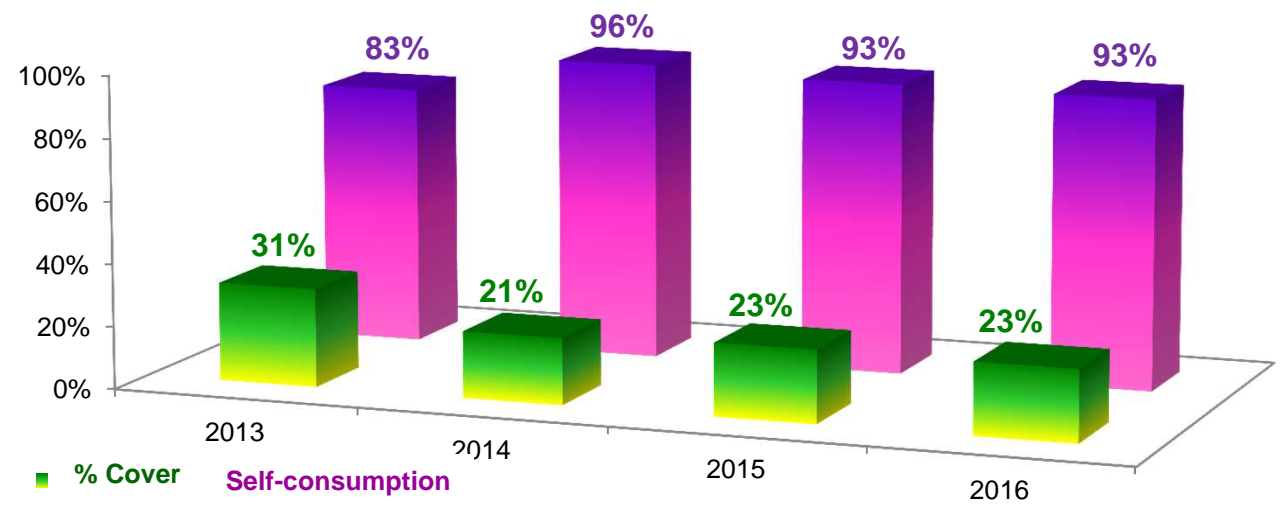
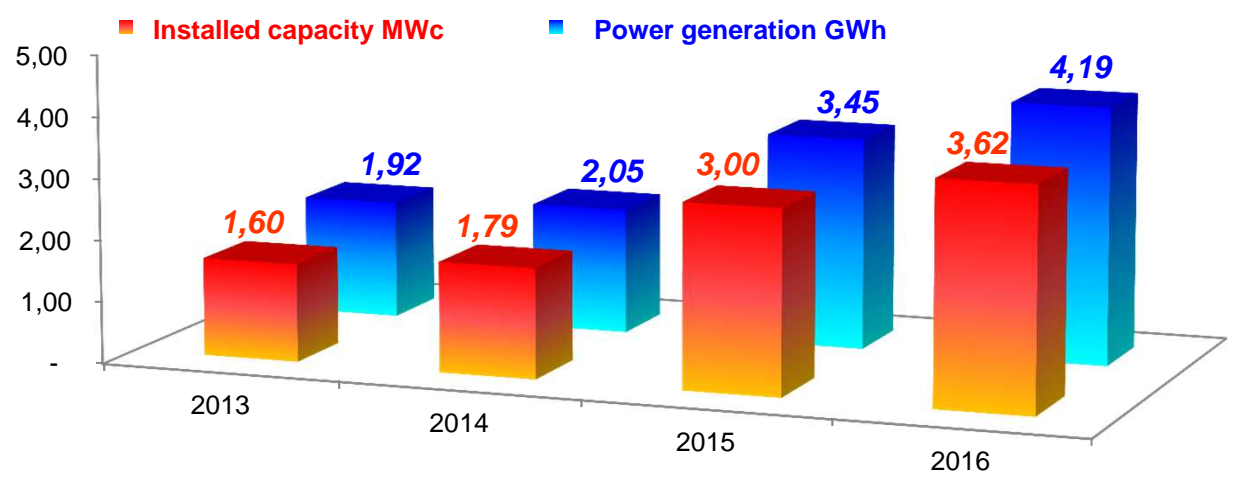
> Administrative and financial data over 4 years:





FEEDBACK:

> Technical and energy data over 4 years:

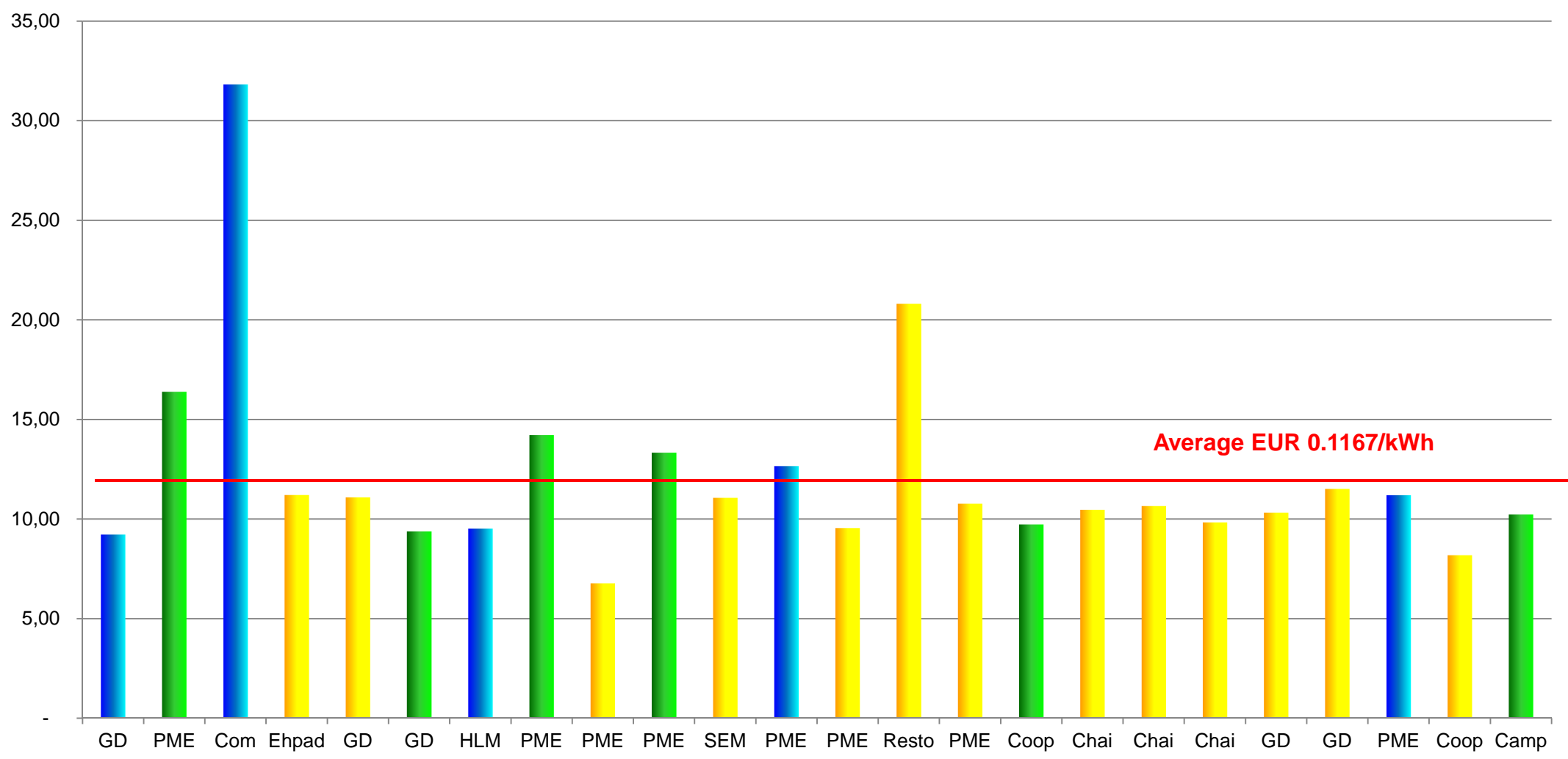




FEEDBACK:

> 2016 PV electricity cost:

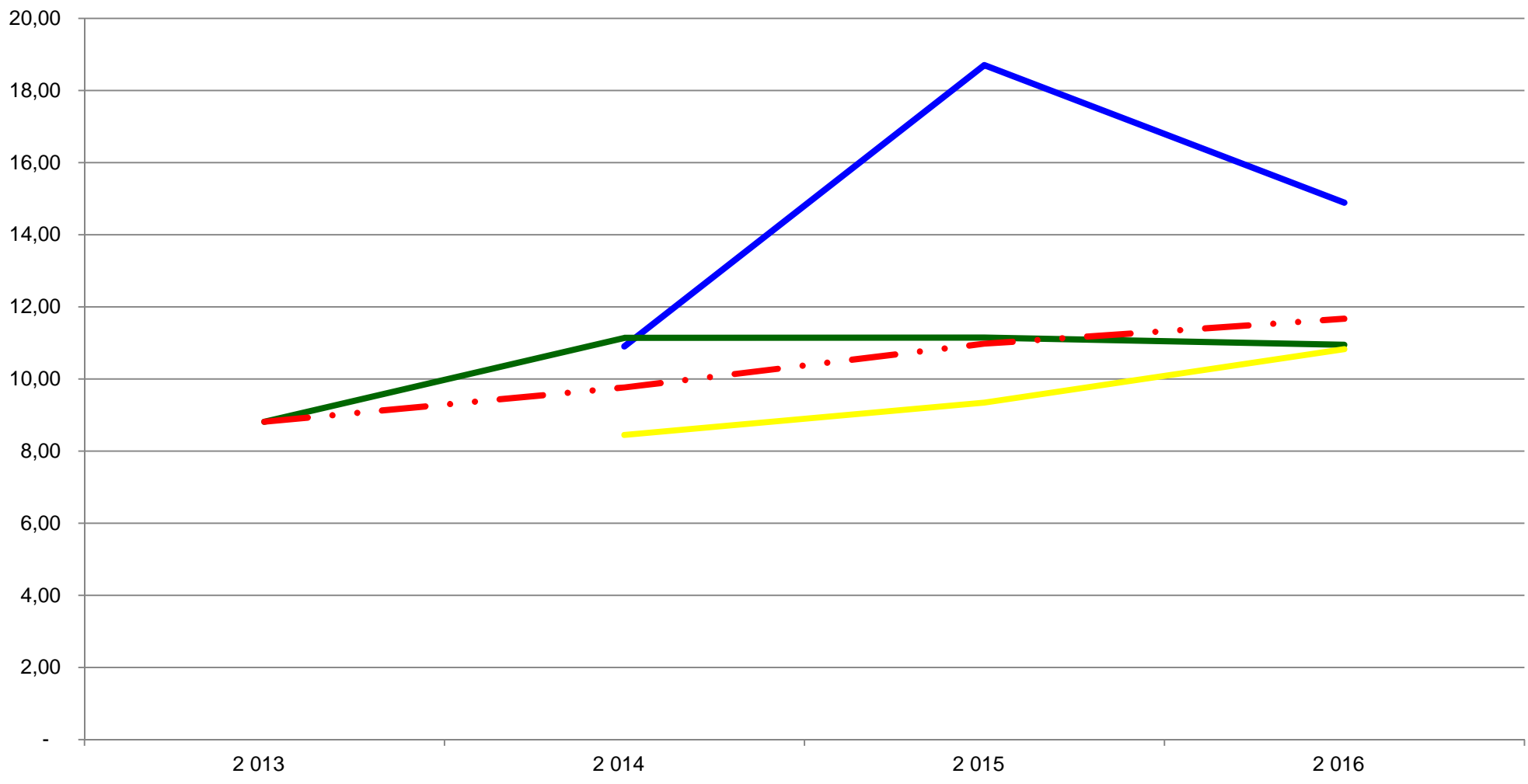
Average blue rate cost EUR 0.1489/kWh
 Average yellow rate cost EUR 0.1094/kWh
 Average green rate cost EUR 0.1083/kWh
 Grid parity between 2019 and 2036 (3-20 years)





FEEDBACK:

> Development in production costs over 4 years:





PROSPECTS:

- > Installation **monitoring** 2013 to 2015 (before and after meter)
 - ↳ Good Practice Guide (White Paper ? > French Directorate-General for Energy and Climate - DGEC)
- > **2017**: Organisation of a call for self-consumption projects (PV, wind, etc.)
 - **Framework**: grid-connected (provide an energy service)
 - **Targets**: public and private sectors (excl. individuals and national government)
 - **Energies**: consumption management (electrical and thermal kWh)
 - **Economy**: global approach (investment, operation)
 - **Technical**: **storage** and **grid intelligence** (supply/demand digitisation)
 - **Subsidy**: keep a tiered and proportional project-based approach

Year	Power	Self-cons.	Resale	Storage	Grid intelligence
2017	10 to kWp <i>Can be split</i>	90%	On a loop	Yes	Yes



THANK YOU

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