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RES competences

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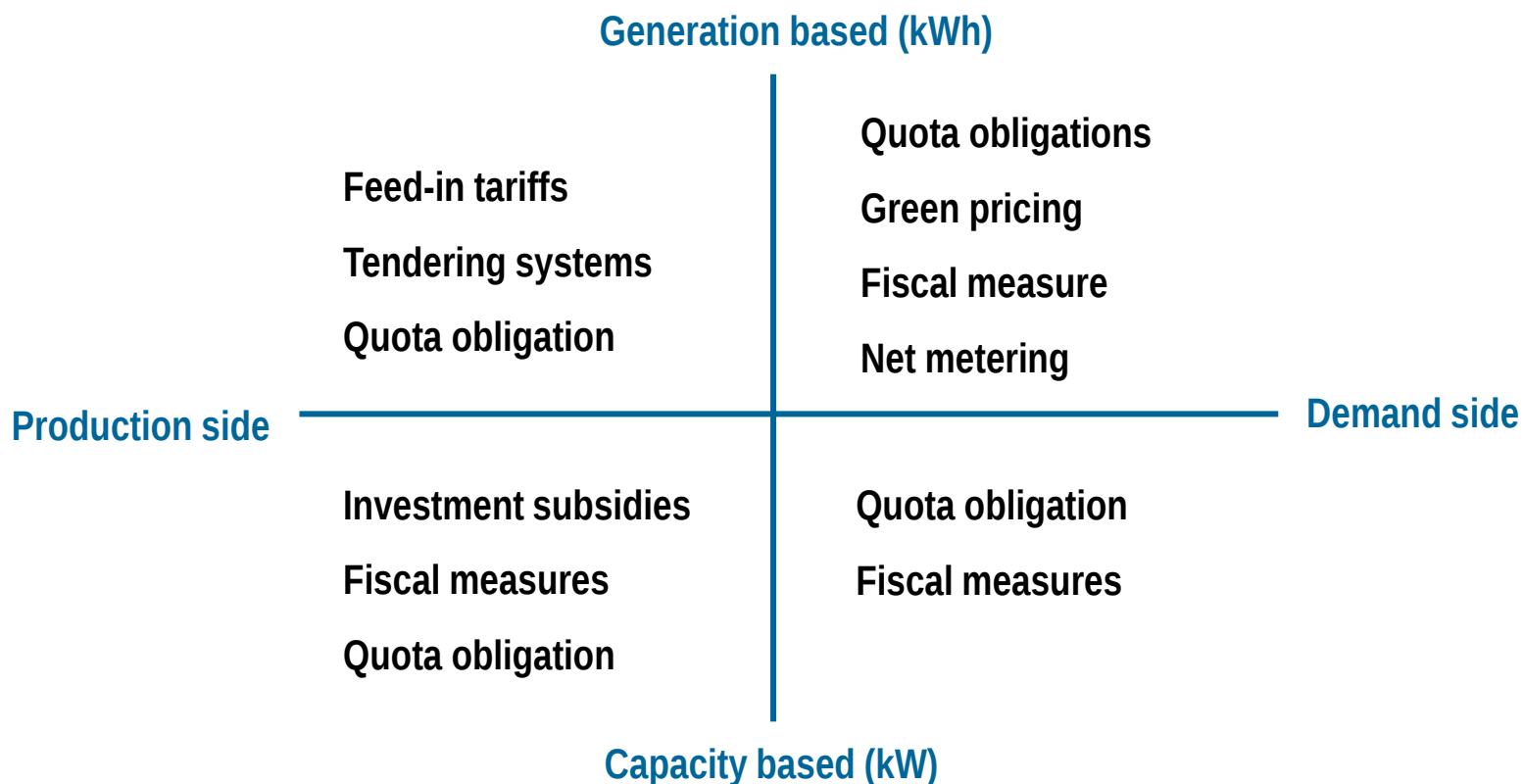


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Classifying renewable incentive schemes





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Feed-in tariff main methodologies

Considering the existing and the evolving legislation in ECOWAS countries, the focus of the document is given to feed-in tariffs.

Feed in tariff may be mainly classified in

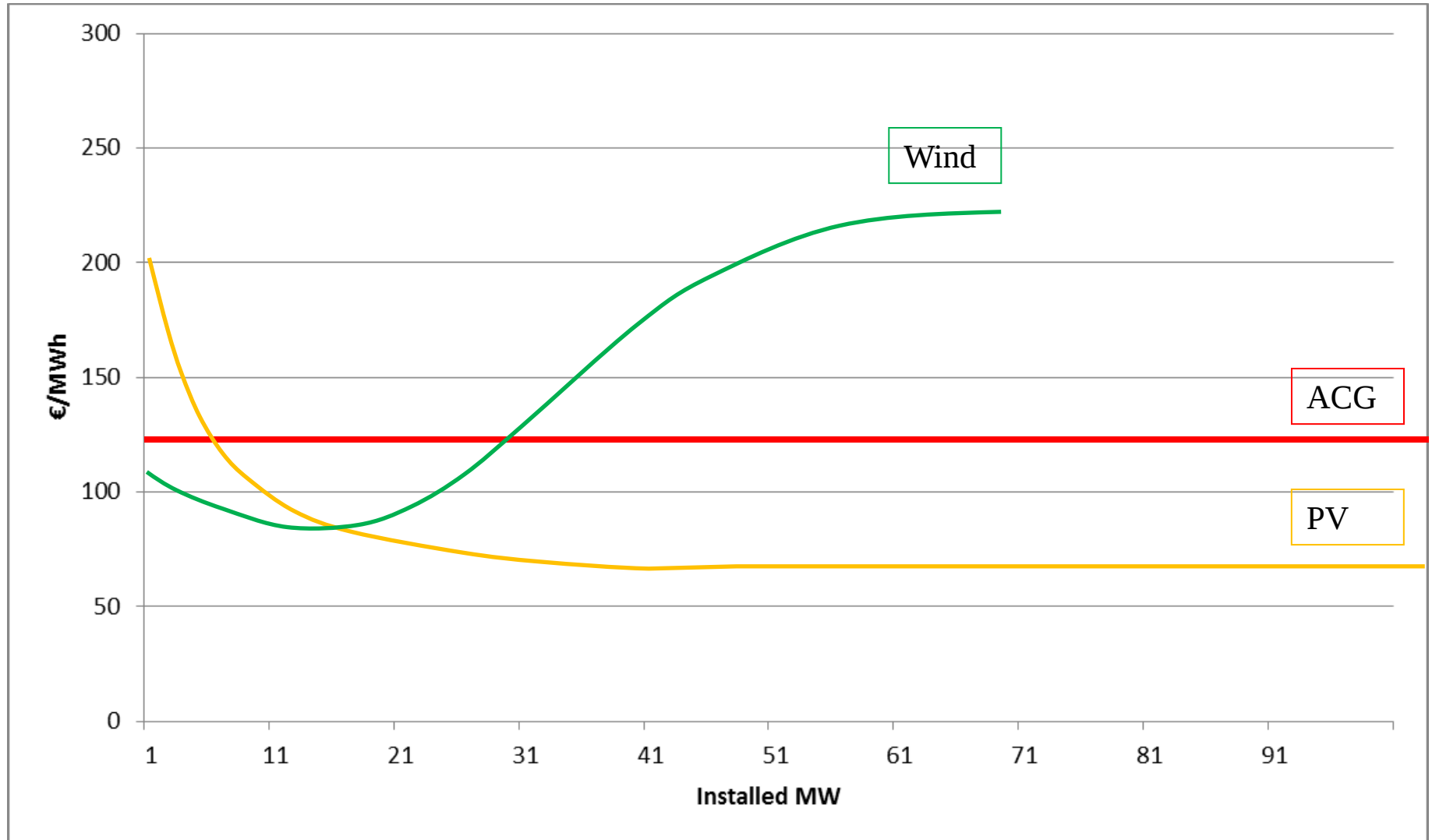
- Mechanisms based on the Avoided Cost of Generation (ACG) principle
- Mechanism based on specific technology cost (STC): rate of return principle
- Examples and case studies



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Avoided Cost of Generation

- The principle behind ACG is to pay RES as much as the generation cost of the system. ACG should not necessarily be considered as an incentive but rather as an option for IPPs to enter the market
- The policy argument in favor of ACG is very strong: it does not conflict with other market priorities as it does not introduce additional costs for the consumers
- There are two main approaches to calculate ACG:
 - Long run marginal cost of generation
 - Average cost of generation, or wholesale price



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LRMC

- Long run marginal cost (LRMC) of generation is usually the most used methodology to set ACG. LRMC corresponds to the cost that the public utility would pay to introduce additional capacity into the system and run it.
- LRMC estimation is based on three main components:
 - Investment cost of a reference technology, including capital remuneration
 - O&M costs, fixed and variable
 - Fuel cost of generation (variable cost)



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Avoided cost of alternative technology

Steam turbine/CCGT	120MW
Fuel	NG, HFO, LFO, Coal/Mix
Efficiency	55%-38%
Life span	20 years
CAPEX €/kW	1400€
Fuel cost €/kWh	65€/kWh
O&M €/kWh	5€/kWh
WACC/IRR	15%

1. Avoided cost of alternative technology
 1. Average market cost
 2. Marginal market cost
 3. Retail cost
2. Identification of benchmark technology (capacity, efficiency)
3. Identification of fuel used (NG, coal, HFO, LFO, mix)
4. Estimation of CAPEX for benchmark technology
5. Estimation of OPEX (including fuel cost) of benchmark technology
6. Estimation of cost of capital/rate of return



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LRMC

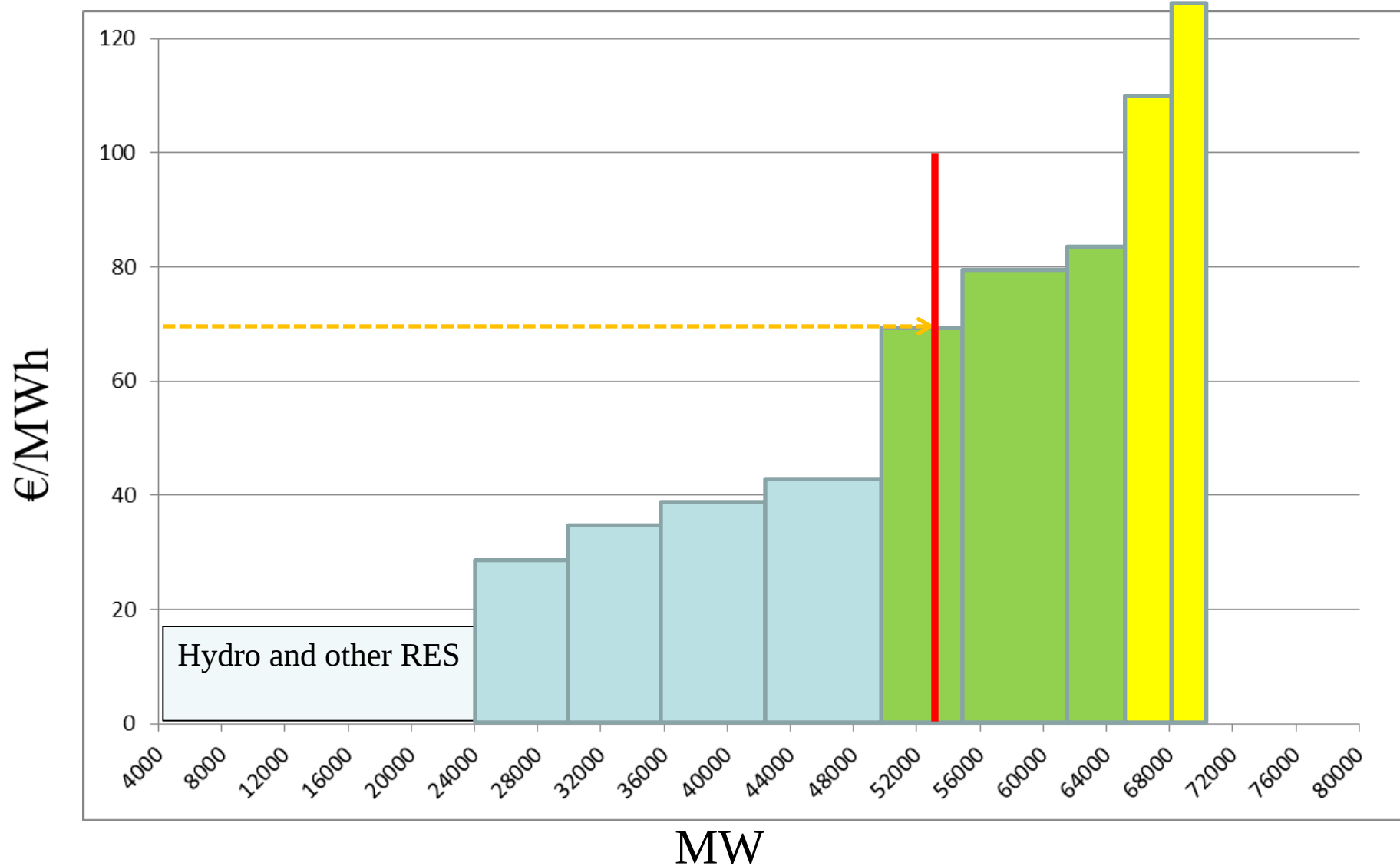
- RES technologies are not producing uniquely during peak hours, they also generate electricity during base and mid load.
- It is possible therefore to correct LRMC by choosing a set of different technologies and fuels (reflecting national generation share and representing technologies at base load, mid merit and peak load)
- LRMC recognizes an implicit incentive for RES.



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Updating ACG mechanism

Nevertheless using ACG methodology means to pay back a technology (RES) whose cost are mostly fixed (capital) with the ACG of a technology whose costs are mainly variable (fuel).

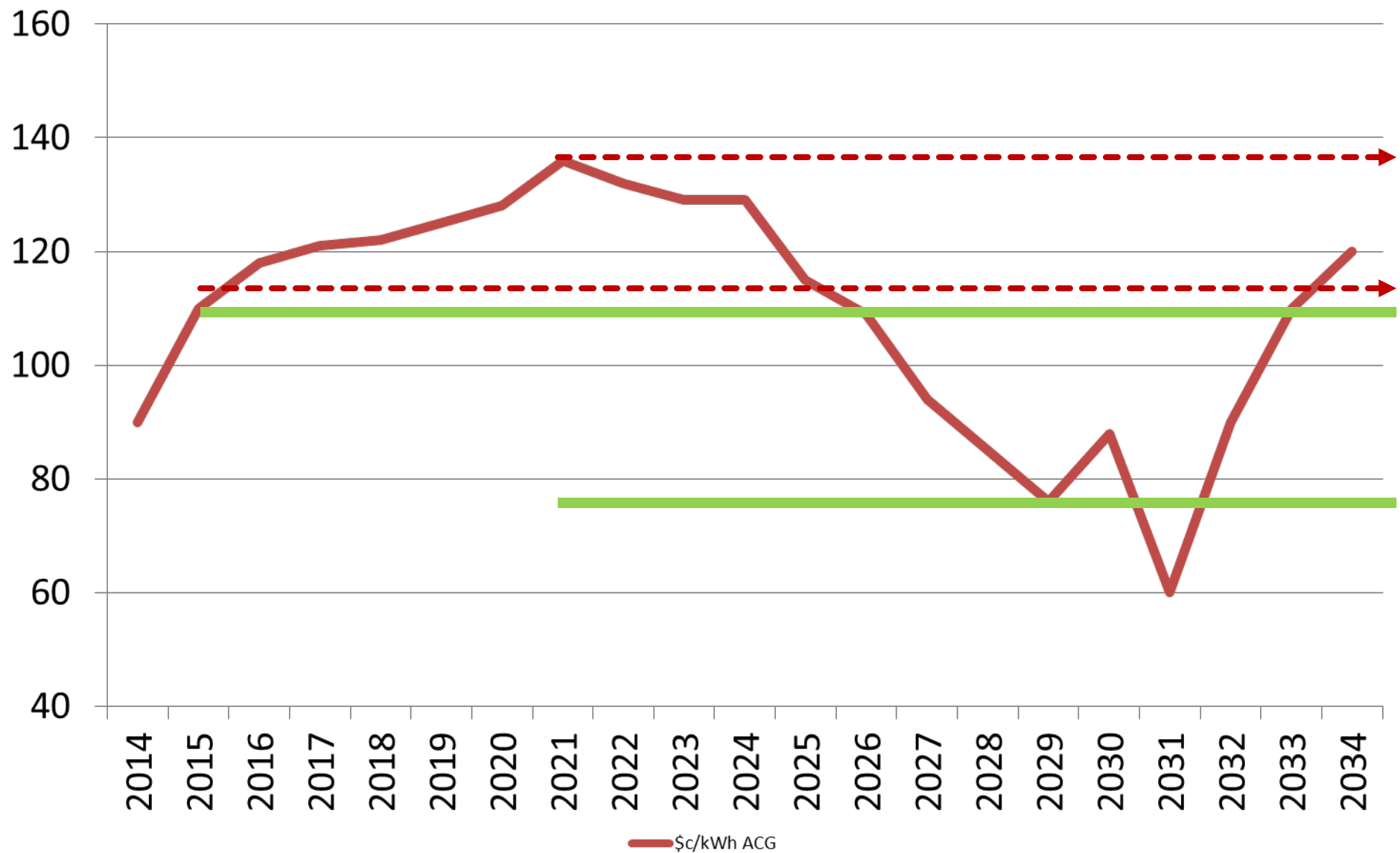
- Each RES plant is associated to the AGC of the year of commissioning; If ACG is not updated with time a RES plant in the future may be remunerated significantly lower or higher
- The ACG is estimated each year and all RES plants get the same price irrespective of their year of commissioning.



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Specific technology cost

- ✓ The principle behind the *specific technology cost (STC)* mechanism is to introduce a different feed-in price according to the estimated cost of different renewable technologies.
- ✓ When setting STC, the regulator aims at recognizing a *fair* capital remuneration to the IPP
- ✓ Technology cost may change for a number of variables that it is not possible to predict
- ✓ Most STC mechanisms need to be periodically updated to follow the real technology cost and keep RES remuneration in line with the expected rate of return.



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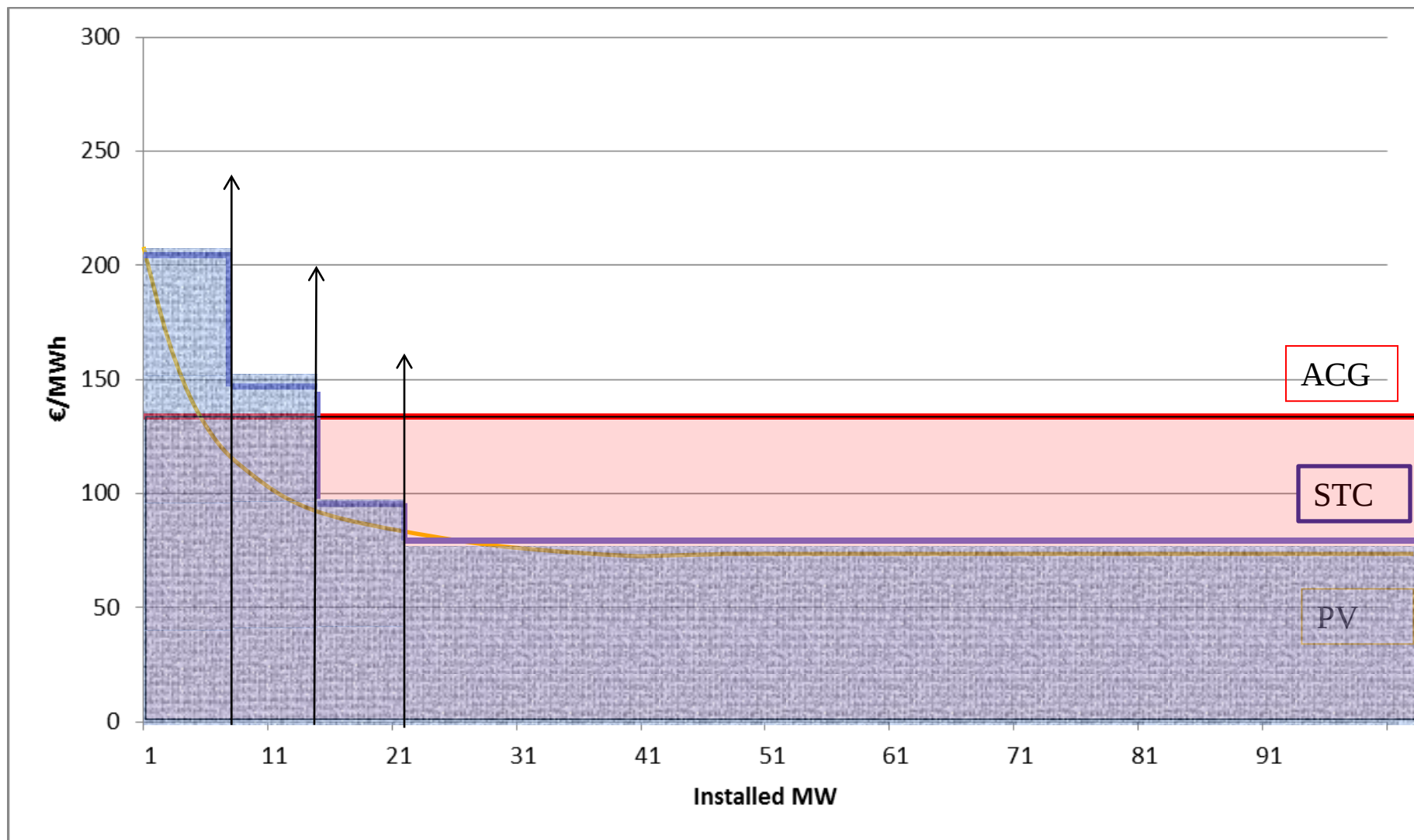
- In some cases, the STC feed-in tariff already includes a regression factor and tariffs are reduced by a given percentage each year
- The regression factor may be successfully adopted in emerging markets where the entry level cost of a technology may be significantly more expensive than the *real* technology cost.
- The initial incentive cost may be compensated by the development of a RES national industry and the availability of technologies that may prove to be less expensive than conventional generation in the long run.



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Other option of Feed-in

- Feed in tariff may also be modulated into time of generation tariff. Time-tariff have the effect to incentive renewable production when the system is producing electricity at higher cost. This will incentive the construction of programmable RES rather than non-programmable ones
- Auction systems may be put in place in order to assign access to feed-in tariff rights when the overall capacity is constrained

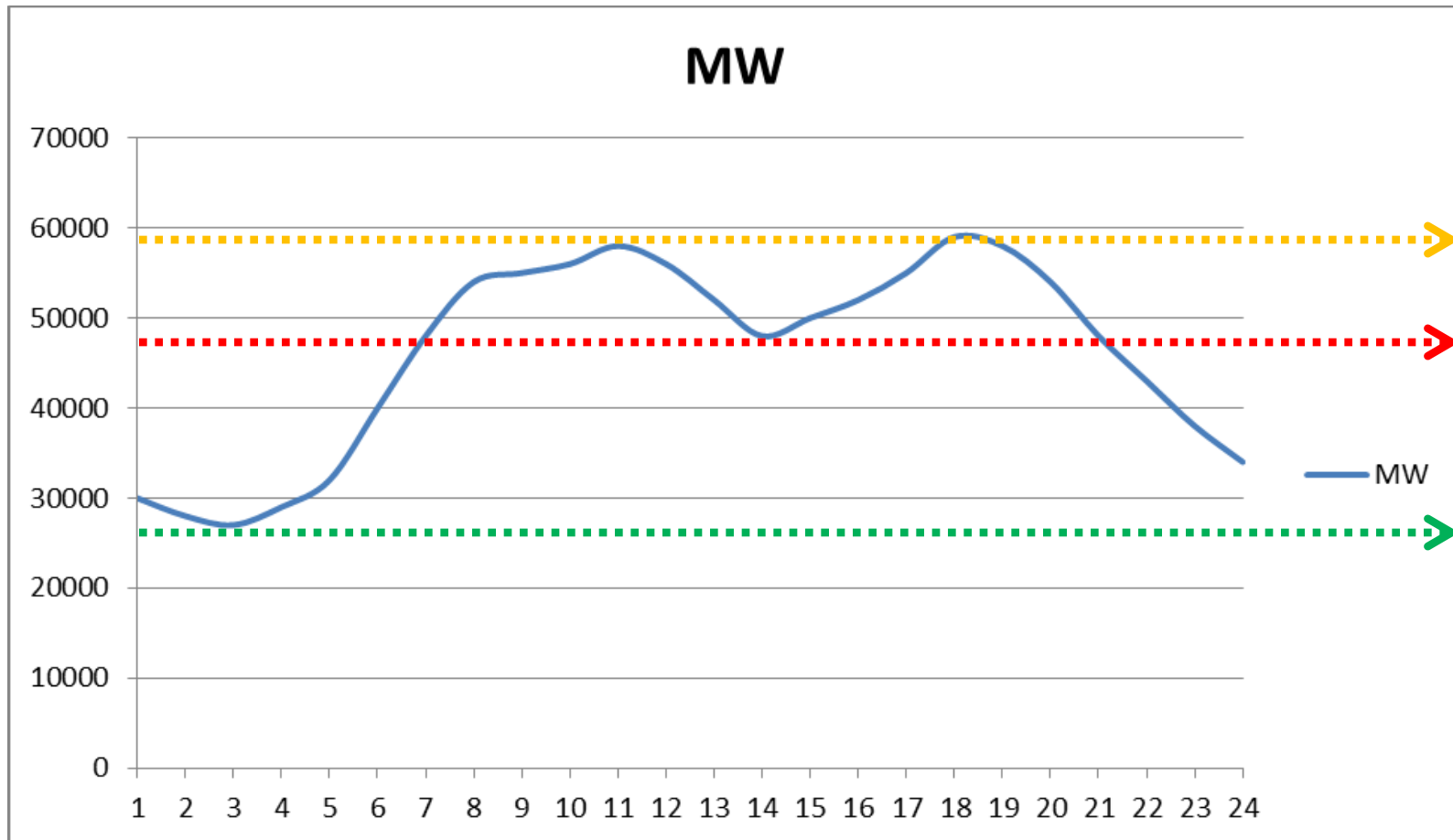


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Daily load





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Feed-in updates

- *Inflation*: inclusion of inflation into the feed-in tariff formula will keep RES remuneration constant to real terms over the period
 - In principle it is advisable to adjust to inflation feed-in tariff for existing plants only. For new plants, the feed-in level calculated in the past should not inflation adjusted as RES technology costs are often decoupled from inflation
- In some cases foreign exchange variation against €/ \$ is considered in tariff update as most technologies are purchased on international markets
- it might be useful to specify some minimum technical standard to avoid the installation of outdated RES system.