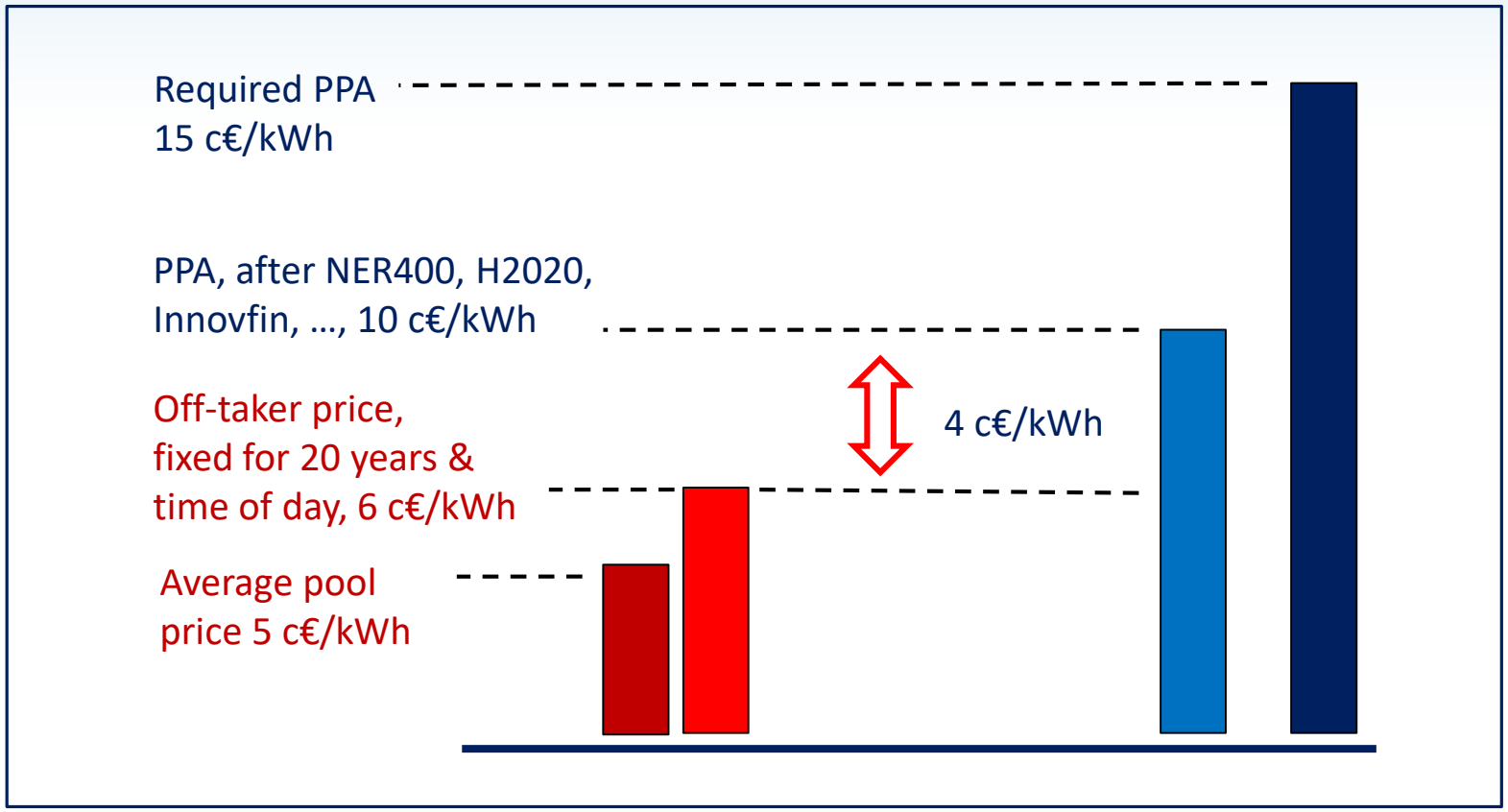
Initiative for Global Leadership in STE/CSP

As presented to the steering committee members of the SET Plan in December 2015 in Brussels, STE Industry, the Turbine sector and the Research Centers in Europe have jointly elaborated a sound initiative for keeping the technological leadership of Europe in this field, which is based in the three following elements:

- A First Of Its Kind, FOIK, advanced demonstration project, which will validate the provisions of the RES Directive on Cooperation Mechanisms exporting physically electricity from a Southern to a central European Member Estate.
- The downsizing of the commercial supercritical steam turbines to a size that fits with the optimum size of Central Receiver Tower plants, which is in the range of 100 MW. This development will have direct impact in the reduction of the current generation costs of STE plants
- A comprehensive and coordinated research activities as presented by EERA covering the development of new fluids able to work at the required temperature by the supercritical steam turbines along with research on advanced materials with increased durability, developments for cheap and efficient thermal storage with sensible and latent heat and environmental footprint reduction at STE plants, especially with regard to water consumption.

The rationale behind a First Of A Kind “FOAK” CSP Project

New advanced large size (> 100 MW) CSP comercial plant in the South of Europe delivering dispatchable electricity to Northern – Central European countries



The resulting gap of approx. 4 c€/kWh would be very competitive - compared with other alternatives - for countries which are missing the 2020 targets

The contribution of EU Turbines members

Some members of EU Turbines have already confirmed their interest in exploring the downsizing of their supercritical turbines

What can R&D further provide? (I)

Research Centers - through EERA - presented in the SET Plan Steering Committee meeting in Brussels in December 2015 a comprehensive list of R&D initiatives, which could effectively contribute to reduce the cost of the electricity generated in STE plants

- ✓ New cycles and/or power plant schemes: Innovative hybrid cycles using alternative working fluids such as supercritical CO2. This might include highly recuperated Brayton cycles in order to achieve significantly higher cycle efficiencies and require advanced supercritical CO2 turbomachinery (compressors and expanders) to execute the power system.

- ✓ Increasing the flexibility of the CSP power plant through the use of fast reacting fossil fuel fired boilers/gas turbines for frequency response (primary, secondary + tertiary reserve). Start-up/shut-down ability and load following capability to better respond to changes in availability of solar power and demand as well as minimum load to improve the overall efficiency of the turbine.

- ✓ Improvement of short-term meteorological prediction in STE plants.

What can R&D further provide? (II)

- ✓ Optimizing the integration of CSP systems with thermal power plants with Integrated Solar Combined Cycle Systems (ISCC) by reducing the efficiency loss in fossil fuel only mode (measures to mitigate overdesign) and increasing efficiency in ISCC mode (use of excess heat in the boiler).

- ✓ In many situations smaller scale STE plants (used for electricity and/or process heat and/or desalination) may be competitive against other technologies (islands, off-grid, difficult topology). Therefore these SME-related activities should be considered as well.

- ✓ All these new concepts must show from the beginning feasible and cost effective storage systems since dispatchability remains the distinct feature in utility-scale power plants as compared to PV.

Conclusions

The join EERA/EUTurbines/ESTELA Initiative for Global Leadership in STE/CSP deserves a high consideration by the SET Plan (Research, Science and Innovation) as well as by Climate Action and Energy.

Business as usual form the SET Plan would mean for the STE sector:

- A lot of paper work and misunderstandings on the sector
- Many former initiatives frustrated
- No real contribution to the competitiveness of the technology
- Nothing different as compared with an eventual “FP 8”

The European STE sector - Industry and Research – requires a determined action by the Commission. Something similar to a PPP with specific and enough buget assignments and effective governance.

There is a lot to gain by doing this and there is a lot to loose if we don’t move fast


THANK YOU FOR YOUR ATTENTION!