

Latest joint efforts between Research and Industry for strengthening European CSP leadership



THE VIEWS OF THE INDUSTRY
J.-A. NEBRERA
ACS COBRA CEO
ESTELA VICE-PRESIDENT

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As a reminder:

An assessment by both ESTELA industry members and academia of project proposals under H2020 was performed in late 2016 and completed in 2017 with additional information related to the 2nd pillar of the Implementation Plan of the “Global Leadership in Concentrated Solar Power”.

Via the SET-Plan governing (Steering Group) and dedicated bodies (Temporary Working Group) the European Commission tries now to get some commitments by member states around the Implementation Plan.

THE ESSENTIAL FEATURES OF THE STE INDUSTRY POSITION RELATED TO THE 2ND PILLAR OF THE IMPLEMENTATION PLAN (FOAK)

The recent information provided by EC **especially about the EIB/EDP funding possibilities** have been definitely **appreciated by industry** in the sense of a real support to be integrated in any financial engineering around a new CSP project in Europe.

Nevertheless: the **main driver** to invest in such project should be a kind of PPA or “FiT” suitable to fill the gap between the off-taking price and the generation cost.

We are continuing to deepen our contacts with governments to get to this point.

Knowing that the cost reduction target of the IP (< 10 €cts/kWh before 2020 compared to 2013) was *de facto* already achieved by several offers outside Europe (Dubai),

the most important point of the IP remains to demonstrate that we approach / reach this cost reduction target in Europe via the implementation of a commercial plant in Europe, the home market of the CSP industry.

Doing so, industry could indeed reap competitiveness advantages from the results of research lines (especially those that had been ranked as promising related to their cost reduction effects by industry) that may come to a factual implementation via the support of some member states and possibly some industry partners could then be most effectively used in such commercial projects.

For commercial project proposals, developers need first of all a political framework on which industry can build up the best projects ideas focused on specific needs and specific situations.

- Such a framework would ideally consist in having **at least a Member State opening a system-value-based (not technology based,) auction for imported RES, that would today easily reveal the competitiveness of CSP – possibly hybridized with other sources** – compared to any other solution for manageable renewable energy generation.

- This can be also well **supported at regional level by various initiatives aiming at easing the implementation of a commercial plant.**
- **Unfortunately, energy policy decisions remain today still a national competence.** The current political mainstream policy across many member states remains to **increase up non-manageable RES capacities beyond needs** hoping that:
 - a) the current overcapacities in fossil generation are sufficient to balance the system
 - b) the “forecasted” deployment of batteries in the e-mobility will solve all storage issues (which is an unrealistic dream) that will no doubt be faced in Europe at the latest with the necessary dismantling of old/dangerous generation units...

Finally, all this could be even increased by a use of the existing **cooperation mechanisms**, that no member state has properly used so far!

Since these mechanisms are expected to be maintained in the recast RES Directive along with obligations for renewable electricity interchanges, we do hope for some improvements in this context.

WHAT DO WE WANT TO DEMONSTRATE?

- Demonstrate the behavior, in a full industrial environment, of new concepts, systems, components, materials, procedures, tools, software... for
 - ✓ Reducing generated electricity costs
 - ✓ Increasing generated electricity value

STE FOAKs: multiple challenges/compromises

- Size
- Technological innovation
- EPC contractor risks
- Cost of finance
- Cost of power generated
- Location / solar resource

STE FOAKs: Size

- Very large relative to other technologies: demonstration projects (PT, CT) are very big, and risks associated are of the same size: € hundreds of millions
- The larger the project, the smaller the CAPEX and OPEX per MWh generated: to get lower electricity cost, you must put more money at stake

STE FOAKs: Technological innovation

- Higher technology associated risks: The failure of a single component can affect the whole plant performance during long time:
 - ✓ Turbine Generator
 - ✓ CT receiver and associated equipment
 - ✓ Storage tanks
- Higher CAPEX: Very innovative components are unique by definition, and their manufacturing costs are high
- Higher OPEX: innovative components are usually less proven and therefore more prone to failures

STE FOAKs: EPC Contractor risks (1)

- At the time of the project's financial closing, the EPC Contractor must usually guarantee:
 - ✓ Material Investment costs: which are very difficult to estimate accurately, as:
 - many components are new (real cost?),
 - design will likely take more time and be more subject to redesign and mistakes, what will mean more engineering costs, lower performance of construction manpower and losses in the materials and components utilized
 - there is no previous experience with bulk units: cabling, piping, small components
 - System testing and overall commissioning will be more costly and will take longer than in a “well proven technology” plant
 - ✓ Completion time: delays are difficult to anticipate and prevent

STE FOAKs: EPC Contractor risks (2)

- At the time of the project's financial closing, the EPC Contractor must usually guarantee:
 - ✓ Plant performance:
 - Difficult to anticipate using several innovative concepts, components, etc.
 - Subject to unexpected shutdowns due to equipment failures, frequently with a long time to repair
 - ✓ Guarantees of equipment during a certain period of time (the guarantee period)
 - Difficult to assess for the same reasons
 - Higher insurance costs and excesses

STE FOAKs: EPC Contractor risks (3)

- For the size of projects we are discussing, the typical EPC Contractor risks are a very large amount, which will be unacceptable for any prudent company

STE FPOAKs: Cost of Finance: equity and loans

- The typical Renewables equity partner is little interested in high risk projects, even if those risks are taken by others
- Banks are the same, unless they have a very attractive return and a good risk coverage (EPC Contractor?)
- The result is that expected IRRs and interests are higher than for a typical project

STE FOAKs: Cost of power generated

- Size: smaller than the ideal, to reduce the overall risk, leads to higher CAPEX and OPEX per MWh generated
- More aggressive innovation means higher costs of CAPEX (unique components, EPC Contractor), OPEX and finance, leading to higher cost of generated power
- **Regardless the savings and advantages to be enjoyed in future STE plants, a FOAK generation cost in Europe will likely be higher than a large standard plant built in a good resource place elsewhere**

STE FOAKs: Location

- Necessarily within Europe?
- Where in Europe?
- Solar resource
- Logistics costs: construction, operation
- Political and regulatory risks
- Commercial considerations from technology export perspective
- Manpower skills and costs: construction and operation & maintenance
- Electricity sale
- Value of dispatchability and firmness
- Permitting and power evacuation

STE FOAKs: in summary, a multiple compromise

- Technical risks, degree of innovation, CAPEX, OPEX, financial costs
- More size: larger risk and less generation costs
- Location: lower resource, but many other advantages

STE FOAKs: who are interested and why?

- The European Union: technical leadership, increased exports/jobs, a lower cost of future clean electricity
- Some European Regional authorities: industrial, construction and/or O&M jobs
- The European STE industry: export
- Other EU multilateral or bilateral institutions: export promoting agencies, development aid agencies...
- Innovation entities in Europe, as a way to reach the market with new ideas, covering the “last mile” from Lab to Market

STE FOAKs: how to finance?

- Power sales
- Price linked to the appreciation of the value: value related auctions?
- Low cost finance: EIB?
- Technical risk assumption: **real** technical risk sharing, **first** technical risk assumption will facilitate commercial loans
- Grants:
 - ✓ For innovative equipment and components: MS? Manufacturer Region?
 - ✓ For the whole project: EU, MS, Region
- Equity: low IRR expectation; interested parties, such as host Region, EPC Contractor

STE FOAKs: a way ahead (1)

- Host Region support (Extremadura is leading the Regions with interest in solar power): land acquisition, permitting, connecting point, water concessions, relationship with hosting Municipality...
- PPA or similar to sell the power whenever a high appreciation for STE values is found: Germany, Netherlands, Luxembourg, Belgium...?
- PPA should not include heavy penalties for delay; regulation to relief affected country damages for delay, if any
- Risk sharing mechanism at EU level (EIB?): loan, first loss insurance...
- Concepts not too innovative
- Components, equipment and materials well tested in “lab” conditions (PSA, real size prototypes...)
- Grants: from EU, MSs and Regions of origin of equipment and components...; for MSs, the grant could be by way of specific purpose renewable auction

STE FOAKs: a way ahead (2)

- If so agreed, a non-binding, open to new parties, MoU can be signed among initially interested parties
- Extremadura (or other suitable interested region) can launch a “Association for Innovation” tender to select one or several partners for FOAKs:
- With an initial time to complete the project’s development (i.e. 1-2 year)
- If successful, the Region may provide an affordable (small) grant, or can provide the land rights
- The Region may purchase a small portion of the electricity generated, in order to justify the tender



THANK YOU FOR YOUR ATTENTION