Project Advisory Board Closed Workshop #1 Minutes

June 11th 2015, Munich (DE)

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Introduction

The Solar Bankability (SB) project Consortium had its first Project Advisory Board (PAB) meeting on June 11th 2015 in Munich (DE) at the venue of Intersolar Europe 2015. The meeting took place during the morning and the objectives were:

- Bring the pre-defined PAB members up to speed with the project current status, objectives (short term and long term) and next steps.
- Receive a first-hand feedback and guidance by the PAB members for better approaching the challenges and addressing the necessary points in the project.
- Bring together important high level stakeholders and share their experience and knowledge by answering key questions and participating to valuable discussion points contributing to the success of the project by crafting strong recommendations.

All the 10 PAB members managed to participate in the meeting. The full attendees list as well as the meeting agenda can be found below. The main highlights are summarized in the next sections of this report.

List of attendees

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<td>Torsten Heidemann</td>
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<td>Michael Pearson</td>
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<td>David Moser</td>
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<td>Achim Woyte</td>
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<td>Caroline Tjengdrawira</td>
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<td>Matthias v. Armansperg</td>
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<td>Daniel Oechslin</td>
<td>DOE ACCELIOS Solar</td>
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<td>Magnus Herz</td>
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<td>Willi Vaassen</td>
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<td>Ioannis Thomas Theologitis</td>
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Meeting agenda

09:00  Welcome coffee - Signing the ethics statement

09:15  Welcome notes  
Caroline Tjengdrawira, 3E, Technical Coordinator

09:30  Roundtable presentation  
All

09:50  Brief presentation on preliminary findings  
David Moser, EURAC, Project Coordinator

10:00  First round of break out Discussions  
Moderator: David Moser, EURAC, Project Coordinator

10:45  Coffee break

11:00  Second round of break out Discussions  
Moderator: Matthias v. Armansperg, ACCELIOS Solar, Project Partner

12:00  Wrap up  
All

12:15  Next steps and closing remarks  
Caroline Tjengdrawira, 3E, Technical Coordinator

12:20  Networking lunch
Workshop Minutes

- The workshop started slightly late at 09:25 due to difficulties for some participants to find the venue.
- The workshop started with some welcoming notes from CTJ and the agenda was presented (part of the proceedings).
- The workshop continued with a roundtable presentation. All partners presented themselves, their organization, experience and relevance with the project.
- CTJ made a presentation about the project. Work packages, objectives and deliverables expected were presented. The presentation concluded with some general questions to trigger the discussion on important aspects.
- DMO conducted the first Breakout Session and three points were discussed (Point #1, #2 and #3 as reported in details in the next section). Following some good exchanges, the meeting continued with DMO’s presentation on the current status of the technical work packages: the risk matrix development. The floor was given to the rest of the experts around the table for comments.
- MAR started the second Breakout Session with presenting the work of the project around “the business models”, the different types in relevance with the market segment. Two points were discussed (Point #4 and #5) and inputs were gathered from the PAB members.
- The workshop was wrapped up by gathering any additional comments, inputs and wishes from the PAB.
- The workshop minutes and materials will be distributed afterwards to the PAB.
- The PAB will be contacted individually to discuss individual participations and interviews.
- CTJ thanked all participants for coming to the workshop, for being active in discussions and in giving very insightful information on PV financing.
- The workshop was adjourned at ~13:00 with networking lunch for participants.
Discussion Points

Point 1: Is your company/organization still active in financing/managing/etc new PV installations or is it only active in the secondary market?

- A first point that was discussed was the difference in terms of risk assessment between the primary and secondary markets.
- PAB members were involved in both types of markets (and financing).
- In newer or emerging countries the financing is more geared on new projects.
- The secondary market however, is on increased focuses but this is country dependent. In DE and FR, some investors/financers tend to keep investment because they are performing and thus the secondary market is rather limited. In countries such as IT or ES on the other hand, there are larger secondary markets driven by the stressed aspects (elimination of subsidies, for e.g.). For the latter, there appears to be consensus among the PAB members that the issue is not so much on the lack of equity or the lack of number of available projects (in Spain, for e.g., there are indeed a lot of projects available), but more on that there are not many technically sound projects to invest or take over. It was highlighted that in Spain as also in other countries the banks were happy because they designed the debt not based on the FiT (but obviously the investors were not happy about it).
- Re-financing cost is cheap, meaning Weighted Average Cost of Capital (WACC) is lower for such projects.
- There was a remark to distinguish the type of secondary market since we can identify two subcategories:
  - The category where you push projects to the market – simple case. Those projects are distressed projects, which you restructure to optimize their return.
  - The category where you aggregate existing assets. This is very interesting because the pension funds or more conservative investors are entering into this field. This implies of course that the risk perception has come down but also that the sizes have changed.
- What new business models do we mean when we refer to suggestions for new business models? We should be more explicit. (for consortium’s consideration).
- One of the emerging trends nowadays is to build larger portfolios of smaller projects (100-150kW). The challenge is how to account for technical risks in a bundled portfolio such as this (how to structure the portfolio (based on location, structure, etc.), how to decide on the extent of commissioning and monitoring (cost vs risk management)).
  - Banks will be able to lend 80% for such residential and commercial systems with a fairly good interest. However, you will still need some considerable equity first to have
the bank on board. In general there is enough amount of money available for project financing. The difference today is that the requirements have become stricter. But for good and bankable projects there is a lot of financing available.

- There was a suggestion to have some guidelines for bankable portfolio which is different from bankable project. For example, how to do technical and financial due diligence in all of them (portfolio), collateralization and yield monitoring.

- It was mentioned that project assessment by the banks could change – e.g. assess an example of project and then use statistical risks based on this.

**Point 2: Which failures have the highest economic impact based on your experience?**

- The cost based failure analysis has been done for wind but not for PV.

- There was a question on how the project will tackle the mitigation measures (for consortium's consideration).

- Module are still of primary concern as they are the main component in PV plant.
  
  - Module defects and lack of standardization in definition and rejection criteria: there is a fast growing number of manufacturers. The challenge is on deciding which manufacturers have good quality system that will ensure good quality modules. In addition, more and new defects are discovered continuously. However, there are lots of focuses on module defect understanding in recent years (e.g. snail trails, PID) but unfortunately there is lack of standardized defect definition and acceptance level. In addition, the module supply contracts are not “good” or stringent enough. For example, “snail trails” mean poor quality and that means that should be considered as a rejection criteria.

  - Risk ownerships: there should be a clear documentation on which risk is born by which stakeholder. For instance, risks in transportation are risks for the EPC contractor and not the investor. Banks finance projects, not modules or equipment. Banks will ask for insurance companies to step in. Therefore different risks are important to be mapped (including also warranty expiry, bankruptcies of the EPC, O&M risks etc.).

- From the above, we come up to the point where we need to have definitions of what a good quality project is (for consortium’s consideration). There is no standard for e.g., on how many cell cracks will be necessary to reject a module. We tend to wait only for the final acceptance (reject or no after 2 years). This is an important point and is attached to the selection of a good EPC.

- There are lesser numbers of inverter manufacturers in the market (many are from the EU) and thus the technical risks are considered more manageable. Also there are warranties and additional insurance to address inverter failure (MAR noted that in insurance claim, inverter
failure is treated as high priority). One primary technical risk associated with inverter is inverter selection: what type of inverters to use. Things to consider:

- System topology: trade-off between a system designed with central vs string inverters. When not optimized, this could impact the plant performance.

- The availability of qualified technicians in proximity to service central inverters as they require more skills to maintain and troubleshoot. It is noted that central inverter does not breakdown as often if maintained properly.

- The spare parts logistics which is important for the risk mitigation and the bankability of the project. Aspects to consider are the type of components to stock, are they expensive, for how long you should plan (e.g. until the project pays back the debt?). Replacement cost could be high if the failing part of inverters is no longer produced; for e.g., the spare part used may be of newer generation and has higher output and thus the module array or string may need to be reconfigured. It was mentioned that around 4% of the total cost is reserved for inverters only.

- The compatibility to local/country grid code (which in turns is driven by the development of the grid code itself).

  - Transformer failure is also seen as giving high economic impact. This is because when a transformer goes down, the lead time to replace could be long (6-8 weeks). The issue is primary in determining the cause of failure and to be prepared for it. Comments were made that PV plant designers should only choose to use transformers intended for PV systems.

  - Finally, there seems to be a major consensus that in PV financing, people are financed and not projects, meaning that the trust that stakeholder “inspires” plays a significant role.

Point 3: Were issues related to end of life/decommissioning taken into account in PV projects relevant to your organization?

- It appears that in general decommissioning cost is not consider as major driver in the PV investment. Normally, it is not included in the business plan as if anything it should have a positive impact (the costs of decommissioning is lower that what one will earn by recycling components). There are however, lots of uncertainties which could be driven by regulatory requirement or for example, in installations where the land or rooftop is leased and there is the obligation to leave the ground/roof as you found it.

Comments on MAR’s presentation

- The Solarcity model (securitization) that is successfully applied in the US and is based on the tax reduction would probably not work in the EU. Regional considerations should be considered too in order to proceed to necessary adaptions.

- An interesting comment was raised that today’s utilities do not have a good business model for this transition phase – from conventional to renewable portfolio. This is the case for very
big organizations that had a very strong business in the past which was based on conventional. How can you then invest on their balance sheets and for 20 years?

- If the market switched to corporate loans then standard process for the risk assessment exists already.

**Point 4: What is the importance of technical risks versus commercial, financial, legal or regulatory risks?**

- Gathered from the PAB, when it comes to technical risks, the concerns are:
  - O&M scope, pricing and competency
  - Module degradation
- Other comments:
  - For risk assessment, technical risks are just subpart of a larger list which also contains other types of risks (30) and of the non-technical risks are probably more important than, or of similar importance from the lender’s perspective, the technical ones. Technical issues are usually overshadowed by issues such as reduction or elimination of subsidies. A representative example on that was the case of Chile where the spot price fell significantly and made many projects not bankable anymore – unless you have a PPA with a mining company.
  - Albeit the previous point, technical risks could be driving the go-no go decision (many projects are lost due to technical risks as one financer pointed out). Moreover, for the projects that happen, technical risks are risks one has to live with afterwards.

**Point 5: Due diligence cost for project vs reducing project cost**

- Technical due diligence (TDD) cost is not the highest cost in financing. Legal due diligence (LDD) is much more costly in comparison to the technical one and thus banks tend to be flexible on the LDD scope. It is in general difficult to reduce budget for TDD and LDD. Some financers do not rely on TDD as they have their internal requirements.
Additional Inputs, Wishes and Comments

Comments

- **FHO**: standardization of component (mainly module) supply contract and project contract.
- **JPO**: sharing of experiences from different PABs.
- **NPE**: no further comment.
- **LMI**: would like to see best practices in health and safety as this will become a big topic in NL.
- **MPE**: no further comment.
- **FFE**: no further comment.

Additional inputs

Those points were collected at the end of the meeting in blank pages that were distributed to the PAB members at the beginning of the meeting. The members were asked to fill in thoughts on challenges for the project and what they would like to see included as part of the results.

- **Input 1**: Electricity price projection. Leverage and pricing.
- **Input 2**: Unanimous media to share experience between professionals. Very useful!
- **Input 3**: Good selection of discussion topics. Business models are not #1 topic for the project. Deeper information from stakeholders could be asked.
- **Input 4**: Request project to select on bundle portfolio as one business model case to study.
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