Archimede – development of solar thermodynamic energy in Italy Archimede

Background: Enea and the great solar thermo dynamic project

Enea is a public agency operating in the fields of energy, the environment and new technologies to support country's competitiveness and sustainable development.

ENEA has set up several new projects aimed at addressing some of the major issues in the fields of energy and the environment, amongst which, a vast research programme in Clean energy, focused on Distributed energy and renewable sources (Clean carbon; Biofuels; Thermo-dynamic solar power).

This institute has been involved in developing the solar thermo dynamic project since 2000, when the Italian Government granted an extraordinary contribution to Enea, by the Law n°388/2000 for a research program, development and demonstrative production to the industrial scale of electric power by using solar energy as source of heat for high temperatures. This law stated that the phase of realization of the Archimede plant would be realised by Enea in collaboration with an industrial partner. In 2004 Enel, Italy's largest power company and Europe's second-largest utility for installed capacity, was involved in this project.

The aim of this project is to develop a technology that will produce energy by solar source, offering an efficient alternative to oil energy and a path to reducing carbon dioxide emissions. It will increase with 5 MW the power of the existing combined loop plant in Priolo, entirely through renewable source, allowing Enea to use its scientific results into a commercial standard plant and to produce green energy at market prices, with an industrial national partner.

The first production of energy is forecasted for the end 2009 or beginning 2010.

On the 26th of March 2007, Enel and Enea signed an agreement, in order to build the 'Archimede' plant in Priolo Gargallo. In this second phase of the project, Enel, became the main contractor.

Currently, the team of the Archimede project is formed by Enea, Enel and the Archimede solar Energy, a consortium of industrial suppliers.

The solar thermodynamic is a technology that faced in the past several negative remarks, mainly due to the uncertainty on the real performance of this plant and, particularly, to the heat carrying liquid solution.

In spite of the growing debate of renewable energy sources in Italy, for several years the discussion on the Archimede project, remained confined to a pool of experts.

Applying ESTEEM

The Esteem tool was applied on the Archimede project. In 2007, the tools were tested along their six steps, with Ceris/CNR as a 'consultant' to project management representative (PM), M. Mauro Vignolini, Enea.

Step 1: *Project history, context and actors'*

The ESTEEM process starts with the 'narrative' of the Archimede project. Ceris could describe the project past and present, using the interviews with the project management and material gathered by other sources.

Starting by the project narrative, defining moments have been identified, during which the project has been modified. This substep helped to clarify the events and the actors involved. It was very useful for the PM since it represented a synthetic vision of the past and present project history. It was a reflection moment on the chronological events and on the internal changes of this project.

The 'context analysis' and 'actors' table' were the tools that helped PM and consultants to have a clear idea of the barriers and opportunities related to the project, and to identify the 'key actors' involved in the Archimede project. Ceris enriched the context in which the project will be put into, looking for information sources such as national or local debates, policy initiatives and laws.

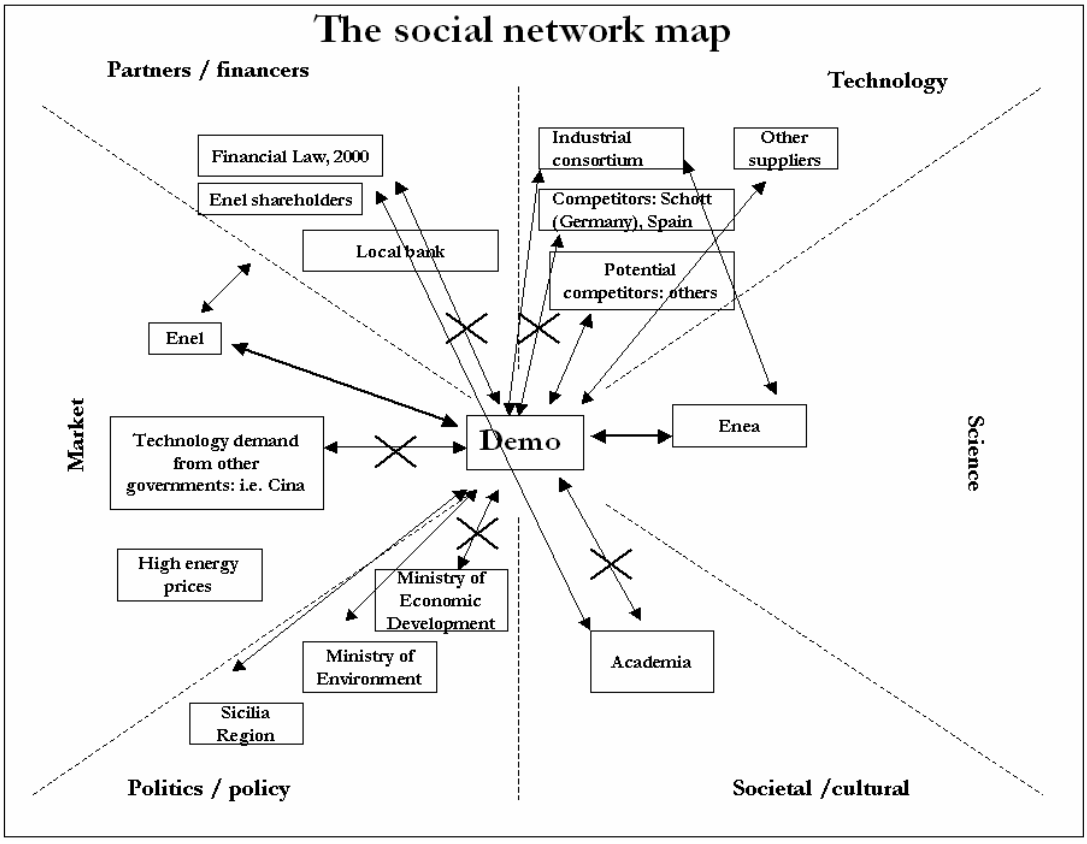

Figure 1. The present social network map of Archimede demo project

Step 2: *Vision building*

Starting from the past and present situation, the next step envisaged the project future, trying to identify major changes that could happen in its social dimensions, such as politics, societal, market science technology. Key actors were also identified accordingly.

Ceris and PM discussed about the future visions and together made the selection of the core stakeholders, on the basis of the project context analysis.

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The time considered for the future visions was no more than 5 years, that is the visions concerning the project. Ceris has chosen to follow the method of the individual interviews rather than the organization of a workshop, considering it was more suited to this case. Representatives of the Italian Ministries of Economy, of Environment, and managers of Enel (future PM) and of the Consortium of industrial suppliers (leader) were interviewed one by one.

Based on the single recorded interview, Ceris designed for each vision the future social network map. This was necessary mainly because the key actors participate with different interests.

Comparing the drafted visions, interesting remarks emerged, such as a time horizon difference between the future vision of different stakeholders: some had very short term orientations and others had rather long term ones. Equally, different level of commitments were observable (short term visions were often associated with weakest commitment).

Step 3: *Vision confrontation*
Ceris has worked on all the inputs gathered, to find a feasible direction of this project, gaining a clear view of the alignments and mis- alignments within the project.

At this point, it became clear for the consultant that the project is entering in the demo industrial phase and that there are no significant oppositions to it. In the short term the project will find a realization, due to a convergence of all the key actors, for different reasons and interests. At the same time, new roads are opening for long terms technology evolution and application.

This reflection helped to pinpoint possible conflicting issues in terms of problems and opportunity for the solar thermodynamic technology future.

Step 4: *Identifying solutions*
Closely related to the previous reflections, this step was crucial and revealed the room for action towards this pilot project.

In this demo, it proved less useful to compare the PM position with other stakeholder's options. Instead, all stakeholders were asked to position themselves freely on some critical issues, to be collectively debated. Participating in the stakeholder workshop, they could imagine interesting possible alternatives.

Step 5: *Stakeholders workshop*
The conclusions drawn from previous steps were presented during a semistuctured Workshop organised by Ceris in December 2007. The consultant considered this event as a strategic moment to test the commitment and the feasibility of new roads for the technology, highlighting the differences among stakeholders' future visions and facilitating a free confrontation.

The aim was to produce a much higher awareness of the viability of the alternatives to solar thermodynamic technology. Another goal was to jointly define the pathway of the project with regard to technology development, feasibility and long term support for the project.

One particularity of Archimede, as a project, is the high level of institutionalisation of its stakeholders. Ceris had to take this fact into account to adapt and apply ESTEEM.

CNR contacted and informed each of the participants, involving not only the core stakeholders group but also representative of the civil society: NGO's, environmental and consumer associations, industrial associations.

During this meeting all of them discussed three main issues proposed by CNR:

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- Availability of sites and production of energy from solar thermodynamic in Italy
- Techno-economical efficiency of the plants and production in Italy or export of this technology
- The role of the Italian government: what we can learn from other experiences?

The number of participants allowed an open and lively discussion on matters such as technology, market and political issues related to the project. It has been a unique occasion for the project manager to present some clarification directly to the Government on some key aspects of the technology applications. The interest of Archimede in terms of storage and high temperature as well as underline the existence of alternative storage applications, such as diathermic oil was exposed, as well as the existence of several investment projects abroad. The technology, even in its early experimental phase, seemed to have already attracted some clients. Environmental associations did not fully share the visions presented, and this dialogue will probably have to be carried out further in the near future.

Step 6: *Recommendations for action*

The reactions and remarks collected from the stakeholders were summarized. Ceris could identify three kinds of activities that did not required substantial change of the original plan:

- A short term action plan might include further investments in the thermodynamic solar technology to facilitate its diffusion, as well as some efforts in the component industry.
- A Collaboration plan aimed at mobilizing the 'right people', including a close relation and coordination between the different European , national and regional levels.
- Finally, a long term action plan, that can be supportive to the new PM, aimed to strengthen the communication channel and to check the social acceptance, organizing for example initiatives towards young people, and monitoring the European policy for the solar technology.

Benefits gained from the ESTEEM tool

The Esteem tool allowed the PM of Archimede project to enlarge his vision to socio-economic aspects and to include new stakeholders. It has been useful for putting into evidence the necessity of working stakeholders such as the public, the media, the non expert decision makers and how they can frame the technology from the early moments, building positive expectations. The workshop has been a key moment for the PM to present some clarification in a public forum on some critical aspects of the technology applications and potentiality. Esteem has produced mainly an improvement of the Archimede project communication strategy towards environmental and social associations and the large public, together with a list of recommendations directly presented by stakeholders.

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