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# AlpEnergy

## Virtual Power System (VPS) as an Instrument to Promote Transnational Cooperation and Sustainable Energy Supply in the Alpine Space

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# Abstract

Overall aims of AlpEnergy project are developing and pilot implementation of concepts for Virtual Power Systems (VPSs), including technology, cooperation and business models; developing a concept for 100% renewable energy supply for municipality using a VPS; involving utilities, independent power suppliers (e.g. farmers) and electricity consumers (e.g. diaries, brewery sector), environmental and energy agencies, political decision makers etc.; developing and test prototypes for VPS hard-, soft- and hardware suitable for the entire Alpine Space; assessing the sustainability and transferability of VPS solutions and their potential contribution for the development of Alpine regions; disseminating the obtained results in the Alpine Space through intensive networking, involvement of a large number of observers and followers, and a wide range of communication activities (seminars, summer schools, symposia, newsletter, website).

# ALaRI Participation

ALaRI role in the project is related to the IT aspect of the VPS concept in sense of determining and defining of Information flow in VPS. More precisely, developing an ICT model of VPS according to guidelines adopted and defined by the consortium. ALaRI role is conceived as three step engagement. We should:

- Contribute to definition formulation of VPS concepts and models
- Create VPS solution framework
- Basing on previously developed VPS models define Information flow

These tasks are mapped into project work description in Working Packages four (Analysis and Modeling) and five (Design and Development) as assessing ICT plans of proposed systems. The foreseen milestones according to these phases of the project are:

- The document on state-of-the art of VPS concept in Europe and discussion on exact VPS definition adopted for the project
- Determination of all elements of the Information flow model of VPS in terms of ICT
- Assessment of the ICT plans for the proposed system

## 1. ALaRI contribution in 2008

In scope of initial phase of the project of VPS defining, ALaRI has coordinated efforts with project leader (BAUM GmbH) and as result we have reviewed Virtual Power Plants (VPP) and VPS state of the art in Europe. The existing definitions and related work on VPPs are reviewed and proposed definition of VPS has been given. The document has been serving as a base for the discussion among members of consortium on the precise VPS definition. The ultimate outcome of these efforts is presented in the form of the VPS White Paper which is now an official document.

After the initial phase of introducing to the state of the art in the field and precise defining of VPS concept we are now in phase of analysis of the problem from different aspects and defining exact problem statements. With other project partner we perform determination of system actors and their connection and interactions in terms of ICT issues. This step is crucial for enabling successful work in next phase of the project which concerns modeling of the system, its components and their interactions.

In parallel to this we are assessing different modeling tools and methods used for modeling Information flow. For these purposes we consider using SysML (System Modeling Language) a customization of UML for analysis, design, verification and validation of a broad range of systems and systems-of-systems (which includes hardware, software, information, proces-

ses and facilities). We are also assessing possible use of MARTE for modeling of distributing resources allocation. Moreover, we are analyzing energy flow modeling tools as Umberto and SimaPro. The aim of this research is to analyze and assess these methods and concepts and determinate the most suitable for the purpose of the project. This field represent brand new topic in research in an emerging field of energy efficiency management which makes it very challenging but at the same time as such it requires huge research efforts.

## 1.1. Meetings

During the first six months of the project we participated to two meetings inside the AlpEnergy project. These meetings greatly helped creation of a White Book to which development we actively contributed (both in terms of the general context and by drafting the section on Swiss situation).

### 1.1.1. Kickoff Meeting of the project

The kickoff meeting of the project was held in Salzburg on the 6-8 of October 2008. All the entities participating to the project were present. We had a major role in illustrating together with BAUM Group result of our research on state of the art in VPP context. The whole meeting was structured in a way that partners could get contacts and deep insights or their respective activities and that specific national (technical and political) information could be gathered and be a starting point for the detailed definition of the project. The main outcome of such meeting has been a first tentative definition of Virtual Power System that could be so general to accommodate the particular exigencies of all the regions involved in the project. The program of the projects (i.e. internal meetings, summer schools etc.) was established. The logo of the project was chosen upon vote. It was decided that a technical subcommittee would meet in a month time in Milan in order to fix the technical information discussed in this meeting

### 1.1.2. Technical meeting

The technical meeting was held in Milan on the 6th of November. The partners involved in technical activities participated to such meeting that was focused on refining the information coming from the various region involved and organizing them coherently in a White Book format. The definition of VPS as discussed in Salzburg meeting, was deeply analyzed considering the technical and commercial (e.g. possibility to act at the transport level or only at the distribution level) specificities of the various regions.

## 2. Planned activities

Upon precise and adequate problem statement listing, we plan to focus on issues relevant to Information flow modeling aspects. In that sense the first task will be determination of main actors in the system and their interaction. This concerns in particular communication and networking issues. Definition of a general abstract model will follow.

The overall goal of the project is development of a framework which takes into account a wide range of local environmental characteristics in form of parameters and available general VPS models. The outcome of this framework is a simplified VPS model oriented towards AlpEnergy requirements allowing adapting available technologies to considered regions. Basing on specific case inputs the framework then instantiates an optimized VPS model for the considered region.