INTEGRATION OF DEMAND SIDE MANAGEMENT, ENERGY EFFICIENCY, DISTRIBUTED GENERATION AND RENEWABLE ENERGY SOURCE

Task XVII: Background and objectives
Expert meeting, Espoo, Finland, June 14-15

Teknologiasta liiketoimintaa

Seppo Kärkkäinen

History

At the IEA DSM Executive Committee meeting in April 2006 in Copenhagen the executive committee members

- unanimously approved the initiation of the Task and nominated Seppo Kärkkäinen as the Operating Agent. The Task was given number XVII
- decided that the Task Definition Phase may include a negotiation procedure and
- decided that an Experts meeting (workshop) should be held in September 2006.

The negotiation phase has taken clearly more time than originally planned. At the EXCO meeting in Maastricht in October 2006 there were not yet enough countries to arrange expert meeting. The target for the meeting was November 2006 in Madrid, but also this was postponed

Background/Motivation (1)

Energy policies in various countries are promoting energy efficiency, distributed generation (DG) and renewable energy resources (RES) which is resulted in an increasing share of DG and especially intermittent type of DG like wind power, solar, small hydro and CHP (small and micro-CHP).

This kind of no predictable electricity generation is causing increasing problems both

- in electrical networks (in local distribution networks and transmission networks including cross-border networks) and
- at market: national and local balances between supply and demand are difficult to manage due to this kind of generation which can increase the electricity cost of actors having intermittent DG in their supply portfolio.

Background/Motivation (2)

Solutions to decrease the problems caused by the intermittent nature of some DG include

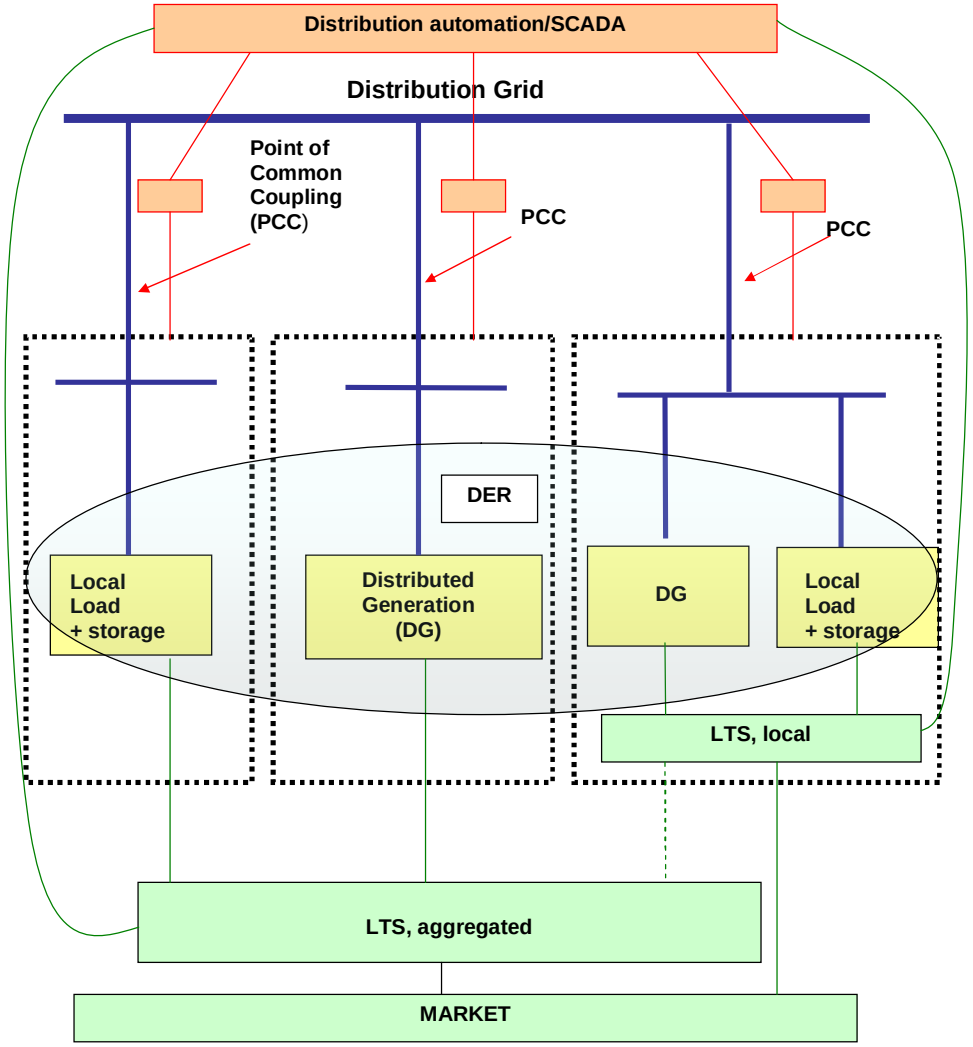
- to add back-up generation
- to add energy storages into the systems (centralised or distributed storages (DS))
- to use flexibility in electricity consumption (demand response DR)

In this sense distributed generation (DG), distributed energy storages (DS) and flexible loads/demand response (DR) can be seen as an integrated distributed energy resource (DER). Combining the different characteristics of these resources is essential in decreasing the problems caused by DG and increasing its value in the energy market.

DER including DG, DR and DS

The figure describes situation where DG is connected to the network and traded into market. The use of DR and energy storages (DS) can decrease the problems caused by DG and increase its value in the market

Similar situation exists also at transmission and system operator level



Connections to other IEA IAs

IEA has several implementing agreements dealing with DG (wind, photovoltaic, chp,…), energy storage and DSM. An integrated system based approach is, however, mainly missing. Wind IA has Tasks dealing with the power systems operation with a large amounts of wind power and integration of wind and hydro. New IA on electrical networks (ENARD) is also started in 2006

Inside IEA DSM Agreement there are several Tasks (especially tasks VIII, XI, XIII and XV) in load shape cluster where DG is included as a resource for DR, but the question how to handle the integrated distributed energy resources in not actually studied.

Objectives of the proposed Task

The main objective of the proposed Task is

- at the first stage to study how to achieve the suitable integration of distributed generation, energy storages and flexible demand, and thus increase the value of distributed generation and demand response and decrease problems caused by intermittent distributed generation (mainly based on RES) in the physical electricity systems and at the electricity market. The Task deals with distributed energy resources both
  - at local (distribution network) level and
  - at transmission system level where large wind farms are connected.
- The objectives of the second stage of the Task are to provide to the different stakeholders the integration based solutions and examples on successful best practices to the problems defined above.

Approach (1)

The first step in the Task is to carry out a scope study collecting information from the existing IEA Agreements, participating countries and other sources (research programmes, field experience, information collected through Cigre working groups, etc), analyse the information on the basis of the above mentioned objectives and synthesize the information to define the more detailed needs for the further work.

Approach (2)

The information to be collected and analysed includes at least

- Characteristics, potential, experiences and plans of different types of (intermittent) distributed generation, problems caused by them in physical electricity systems and at electricity market
- Characteristics and state of the art of different energy storage technologies
- Characteristics, potential and utilisation of Demand Response and Energy Efficiency (IEA DSM Tasks)
- Business models for the utilisation of DER
- Barriers to the utilisation of DER

Approach (3)

On the basis of the collected information a systematic analysis is carried out

- to produce the state of the art to the integrated approach of the utilisation of DER and problems related to it and
- to define the detailed further work.

This kind of approach presumes the co-operation between different IAs related to DG, storages and DSM. Experts are needed from each area.

At the end of the scope study a workshop with the stakeholders will be arranged to get feedback and inputs from outside to the conclusion and the definition for the future work.

The first approximation for the duration of this scope study is one year.

Expected results of the first stage

The main deliverables of the first stage are

- State-of-the art of the integrated concept of DER and problems related to it
- Feedback from the stakeholders at the workshop and workshop proceedings
- Synthesis report
- Definitions of the detailed further work.

Estimated resources needed

Operating Agent:

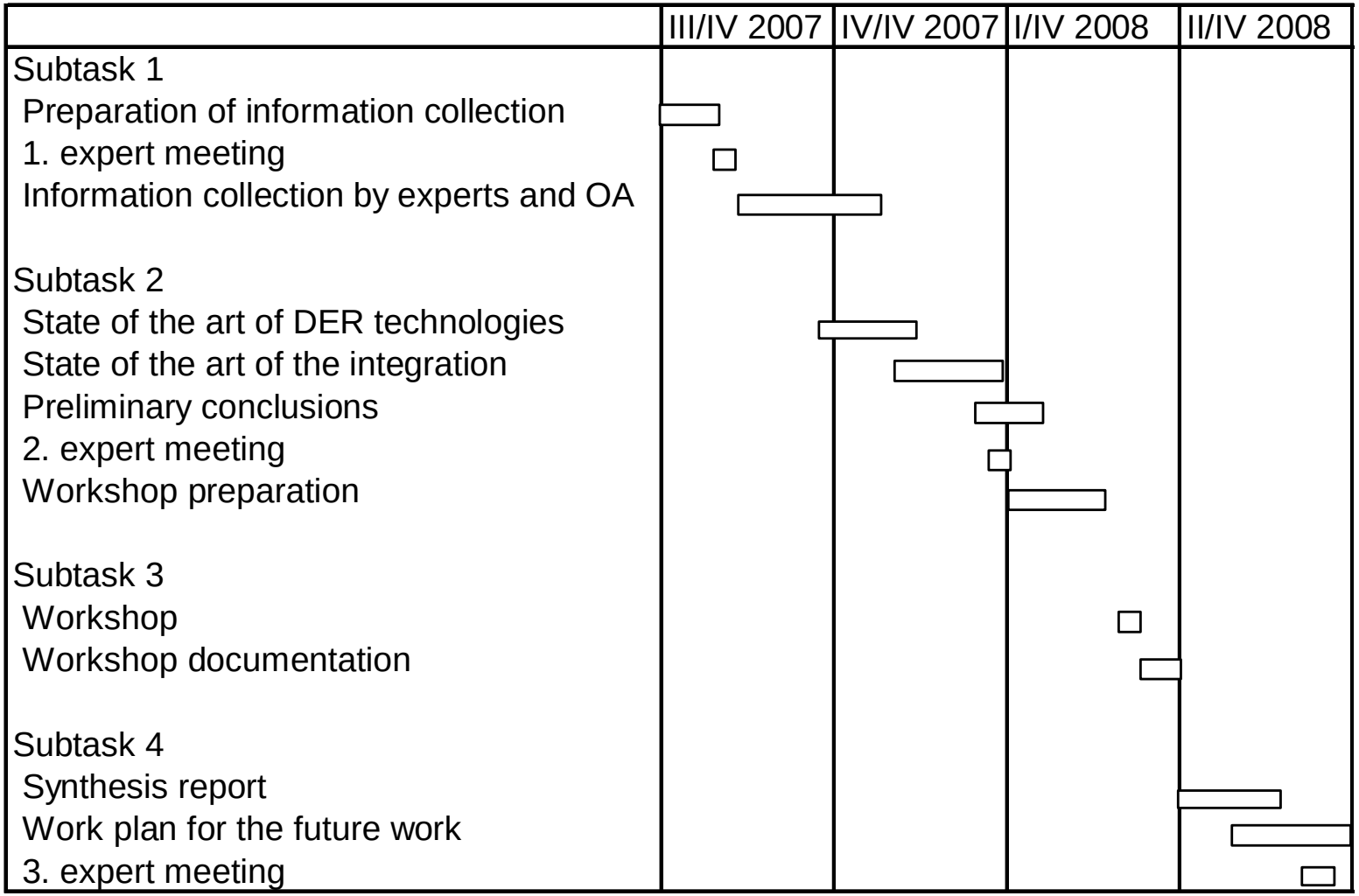
Personnel costs (6 person-months)	75000 €
Travels	3000 €
Workshop	5000 €
Total	**83000 €**

The costs are devided evenly between participating countries

Country experts: 6 person-weeks

Time schedule

Expected duration of the first phase is one year



Present status of participation

	Expert nominated	Under discussion	No response yet	No	Expert	Company	
Australia		x					
Austria	X				Andreas Lugmaier	Arsenal Research	Andreas.Lugmaier@arsenal.ac.at
Austria	X				Hubert Fechner	Arsenal Research	hubert.fechner@arsenal.ac.at
Belgium		X					
Canada			X				
Denmark		X					
Finland	X				Risto Komulainen	VTT	risto.komulainen@vtt.fi
France			X				
Greece		X					
India		X					
Ireland				X			
Italy	X				Giancarlo Scorsoni	GSE	gscorsoni@gsel.it
Korea	X				Young-Seok Jung	KIER	jung96@kier.re.kr
Netherlands	X				Rene Kamphuis	ECN	kamphuis@ecn.nl
Norway			X				
South Africa			X				
Spain	X				Carmen Rodríguez Villagarcía	Red Eléctrica de España	carmenrodri@ree.es
Spain	X				Enrique Soria	CIEMAT	enrique.soria@ciemat.es
Sweden		X					
United Kigdom		X					
United States	X				Alison Silverstein	for DOE	alisonsilverstein@mac.com
United States	X				Gil Bindewald	DOE	gilbert.bindewald@hq.doe.gov
United States	X				Stan Calvert	DOE	Stan.calvert@hq.doe.gov
United States	X				Dick DeBlasio	NERL	dick_deblasio@nrel.gov