InnoGrid2020+

The EU Research & Development Dissemination Seminar

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EERA JP *"Smart Grids"*

The smart grids deployment: a joint effort with many interacting stakeholders

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OUTLINE

- **Introduction to the EERA JP on Smart Grids**
- **JP Main Progresses and Achievements:**
  - ***Broadening of R&D activity spectrum* (5 SPs)**
  - ***First JP Deliverables* (technical documents)**
- **<u>Technical Session</u>**
  "The smart grids deployment: a joint effort with many interacting stakeholders"
  - ***Present and future interactions with EEGI***
- **Upcoming Events**

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What is the

Smart Grids Joint Programme

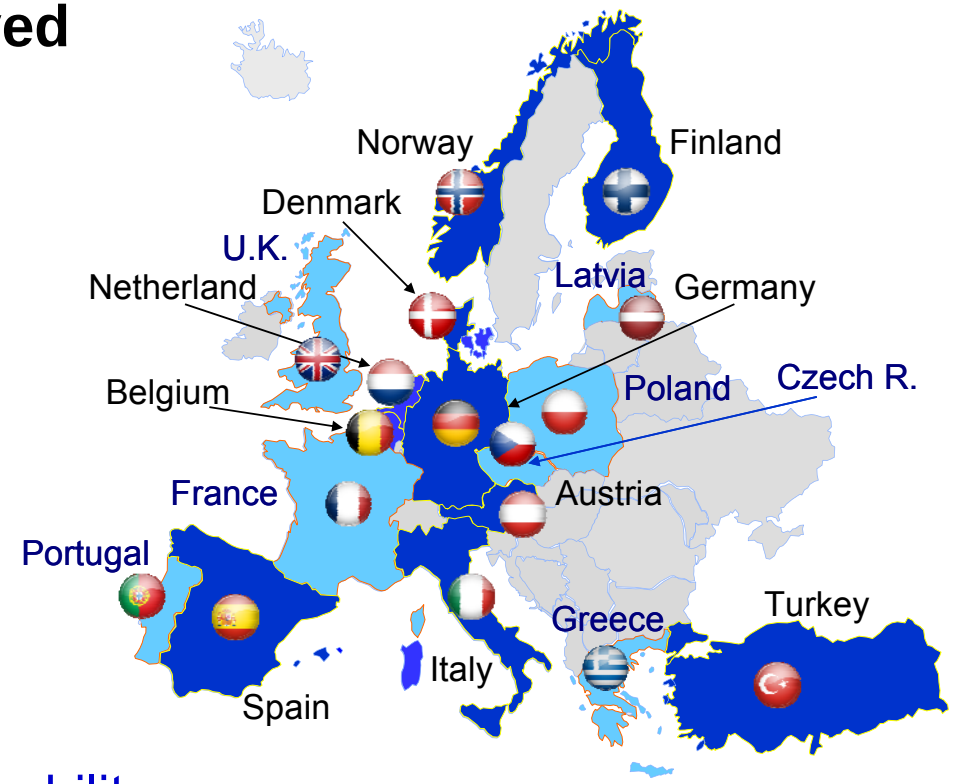
European Energy Research Alliance

- Cooperation of Energy Research Organisations (EU SET-Plan – Strategic Energy Plan)
  - Accelerate development of new energy technologies
  - Improve coordination and cooperation
  - Reduce fragmentation and duplication
  - Increase efficiency and effectiveness
  - Concentrate national efforts while maintaining comprehensive programme at European level

- Now **13** launched Joint Programmes
  - More than **120** Participating organisations
  - More than **2000** professionals full time equivalent

EERA JP on Smart Grids

- **19 Institutes deeply involved (100 py/y)**
- **16 European Countries**
- **JP sub-programmes:**
  - SP1 Network Operation
  - SP2 Energy Management
  - SP3 Control System Interoperability
  - SP4 Electrical Storage Technologies
  - SP5 Transmission Networks



Participants and New Members

Smart Grids Joint Programme

Participants - 2010:		Committed Resources
RSE	IT	9 py/y
ENEA	IT	5
TNO	NL	5
RISOE DTU	DK	5
VITO	BE	5
VTT	FI	5
AIT	AT	5
IWES	DE	5
JRC	NL	5
TECNALIA	ES	5
LABORELEC	BE	5
SINTEF	NO	5
TUBITAK	TR	5
	total:	**69** py/y

New Members - 2011:		Committed Resources
CEA	FR	5 py/y
FEI	LV	5
IEN	PL	5
INESC/LNEG	PT	5
Strathclyde U.	UK	5
	total:	**25** py/y

Future Members - 2012:		
CRES	GR	5 py/y
REŽ (*)	CZ	..
Girona U. (*)	ES	..
EDF R&D (*)	FR	..

(*) Associate Participant

JP R&D Activity

Smart Grids Joint Programme

	Activity	Main Outcomes	
SP **1** / **Network Operation**	Development of a "primary" control in presence of high penetration of DER	- Choice of effective new control structure, and - of emergency situations and control actions	SP leader: **TNO / AIT** Nr. of participants: **11** Nr. of countries: **10**
SP **2** / **Energy Management**	Optimization of network energy management in presence of DER	- Compilation of existing models: their capabilities and identification of extension needs	SP leader: **DTU / TECNALIA** Nr. of participants: **9** Nr. of countries: **8**
SP **3** / **Information and Control System Interoperability**	Evaluation of interop. issues in control system applications	- Terminology & Control Systems Interoperability: use cases	SP leader: **VITO / IWES** Nr. of participants: **13** Nr. of countries: **10**
SP **4** / **Electrical Storage Technologies**	Existing and future promising ESS technologies	- Report on ESS technologies for grid applications	SP leader: **VTT / VITO** Nr. of participants: **10** Nr. of countries: **8**
SP **5** / **Transmission Networks**	Tools and methods for planning and operation of transmission systems	- Reports on state-of-the-art and future methods, tools and technologies	SP leader: **SINTEF / RSE** Nr. of participants: **10** Nr. of countries: **9**

Important JP Activities

Smart Grids Joint Programme

First Deliverables by the JP on SG

Deliverable	Title	Measurable Objectives	Project Month	Today	At JPSC March 2012
SP1: Network Operation					
D1.1	Developing and choosing effective new control structures	Choice of effective new control structure	12	New Structure	Draft
D1.3	Emergency situations and Micro grids	Choice of emergency situations and applicable control actions for the new control structure	12	New Structure	Draft
SP2: Energy Management					
D2.1	Simulation and analysis models	Compilation of existing models including their capabilities and identification of extensions	12	in progress	Final Draft
SP3: Information and Control System Interoperability					
D3.1 ✓	State-of-the art communication technologies for smart grids	Report describing the various use cases deployed today and the communication technologies used	12	**Internal Review**	**Peer Review**
SP4: Electrical Storage Technologies					
D4.1 ✓	Existing and future promising ESS technologies	Report on ESS technologies	12	**Peer Review**	Released

First JP Deliverables
Deliverable D4.1

Smart Grids Joint Programme

"Electrical Energy Storage Technology Review"
Report: 107 pages, 16 Authors (8 Partners)


EERA
JOINT PROGRAMME DELIVERABLE

EERA Joint Programme on *Smart Grids*

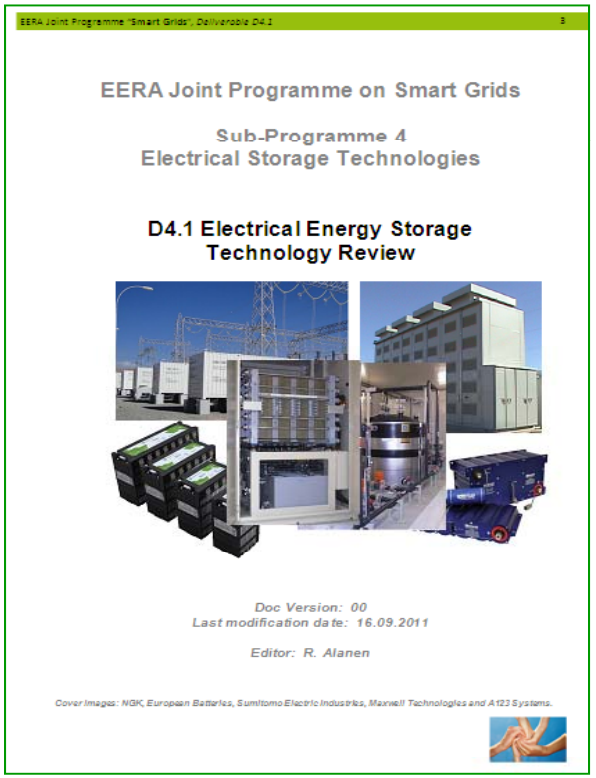
Sub-Programme 4
Electrical Storage Technologies

D4.1 Electrical Energy Storage Technology Review

September 2011

Content:

- No.12 technologies analyzed
- Technical Properties
- Economical Aspects
- Control system and Interface
- Life Cycle Aspects
- Manufacturers, Commercial Products and Solutions
- Development Trends and Future Expectations
- Potential **Application Areas in Smart Grids**


EERA Joint Programme on Smart Grids

Sub-Programme 4
Electrical Storage Technologies

D4.1 Electrical Energy Storage Technology Review

Doc Version: 00
Last modification date: 16.09.2011

Editor: R. Alanen

Cover Images: NGK, European Batteries, Sumitomo Electric Industries, Maxwell Technologies and A123 Systems.

First JP Deliverables
Deliverable D3.1

Smart Grids Joint Programme

"Overview of Smart Grid Field Tests"
Report: 103 pages, 6 Authors (4 Partners)


EERA
JOINT PROGRAMME DELIVERABLE

EERA Joint Programme on *Smart Grids*

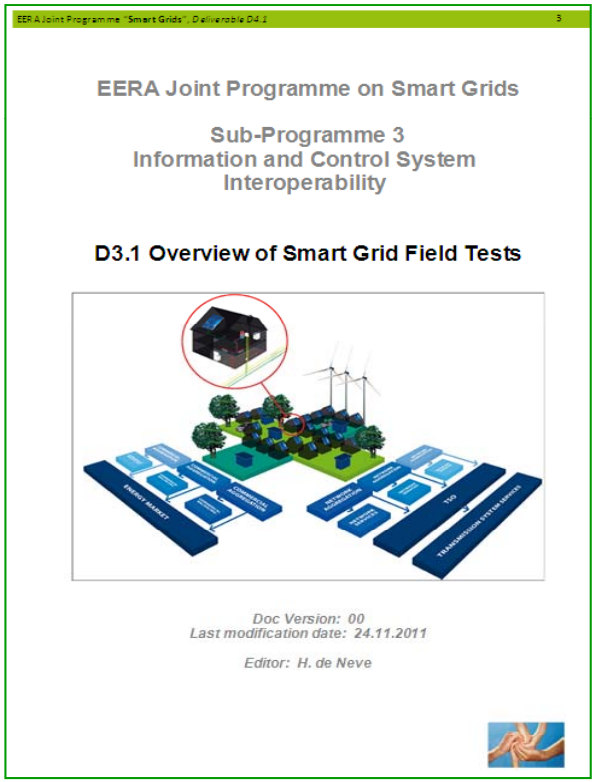
Sub-Programme 3
Information and Control System
Interoperability

D3.1 Overview of Smart Grid Field Tests

November 2011

Content:

- No. 46 Smart Grid Field tests
- Communication technologies
- Control systems and interfaces
- Interoperability concerns
- Main findings of each field test
- Extensive references for further reading


EERA Joint Programme on Smart Grids

Sub-Programme 3
Information and Control System
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D3.1 Overview of Smart Grid Field Tests

Doc Version: 00
Last modification date: 24.11.2011

Editor: H. de Neve

InnoGrid2020+
Technical Session:

Smart Grids Joint Programme

"The smart grids deployment: a joint effort with many interacting stakeholders"

As stated in the title of the session, to elaborate on the **interaction between EEGI and its stakeholders/contributors**. ①

Each speaker has 15 minutes to present his organization

explain **what EEGI can mean for your organization** ② and your members, how you would like **to input your concerns in the work of EEGI** ③, what you expect as **an output from EEGI** ④. How do you see the role of GRID+ as an instrument to realize these interactions.

Further we would welcome your **ideas about concrete collaboration with grid operators** ⑤ in the framework of projects that are of special interest for your organization and members.

InnoGrid2020+
Technical Session:

Smart Grids Joint Programme

Background:

EERA JP Cooperation among EU Research Organizations
Joint research activities on Smart Grids
Medium- to long-term R&D ⟹ future SG generation

But each JP member has a close link with the electricity system stakeholders at MS and/or EU level (TSO, DSO, Regulators, Manufacturers, …) and contract-based research activities ⟹ funded short-term R&D activity

① **EERA JP on SG – EEGI interactions** (examples)

EERA JP **DoW** Phase **I** (0 – 36 month) ⟹ EEGI (EEGI ⟺ SP5)
EEGI ⟹ DoW Phase **II** (37 – 72 month)

" **Techn. Reports** ⟹ Reviewers (EEGI) ⟹ **EEGI**

" **Annual Review** (2011) EEGI+ETP+DOE (2012) EEGI+ETP+NEDO

EEGI – EERA JP ad hoc group: "Gaps and overlaps analysis" …

Synergy, Collaboration and Content within SP4

Smart Grids Joint Programme

EERA JP DoW → SP DoW → R&D Tasks/sub-Tasks

	TASK	SUB-TASK	TASK Leader	AIT	ECN	ENEA	ERSE	LABEIN	LABORELEC	RISOE	IWES	JRC	SINTEF	TUBITAK	VITO	VTT
4.1	Electric Energy Storage (EES) Technologies	Two-way technologies: e.g., batteries, supercapacitors, flywheels, etc.	VTT			■	■		■		■		■	■	■	■
		One-way technology: e.g., solar power, heat pumps, etc.				■	■						■		■	■
4.2	Performance Testing of Storage Technologies	Performance test	TUBITAK			■	■				■		■	■	■	■
		Test cycle issues									■			■	■	■
		Standardization needs				■			■		■			■		■
4.3	Integration of Storage Resources to Smart Grids: Possible Services	Concept for grid connection	IWES	■		■	■	■	■		■	■	■	■		■
		Services for electricity market (for TSOs, DSOs, end-users, etc.)		■			■	■			■	■	■	■		■
		Impact for long-term network development		■				■			■	■	■			■
		Technical and economical issues for DER penetration		■		■	■	■	■		■	■	■		■	■
4.4	Control Algorithms for Storage Applications in Smart Grids	Control strategy for multiple storage systems	AIT				■	■	■		■				■	■
		New charging and de-charging algorithms				■	■	■	■						■	■
		Control strategy offering of storage services to market		■			■	■			■				■	■
4.5	Economic and Technical Benefits of Incorporating an ESS onto Network	Algorithm impacts on storage lifetime expectancy	SINTEF			■	■					■	■		■	■
		Economic feasibility study of choosen concepts					■					■	■		■	■
		Environmental influences				■	■					■	■			■

SP4 - GANTT CHART

Smart Grids Joint Programme

Today

1/5/2010 1/5/2011 1/5/2012 1/5/2013

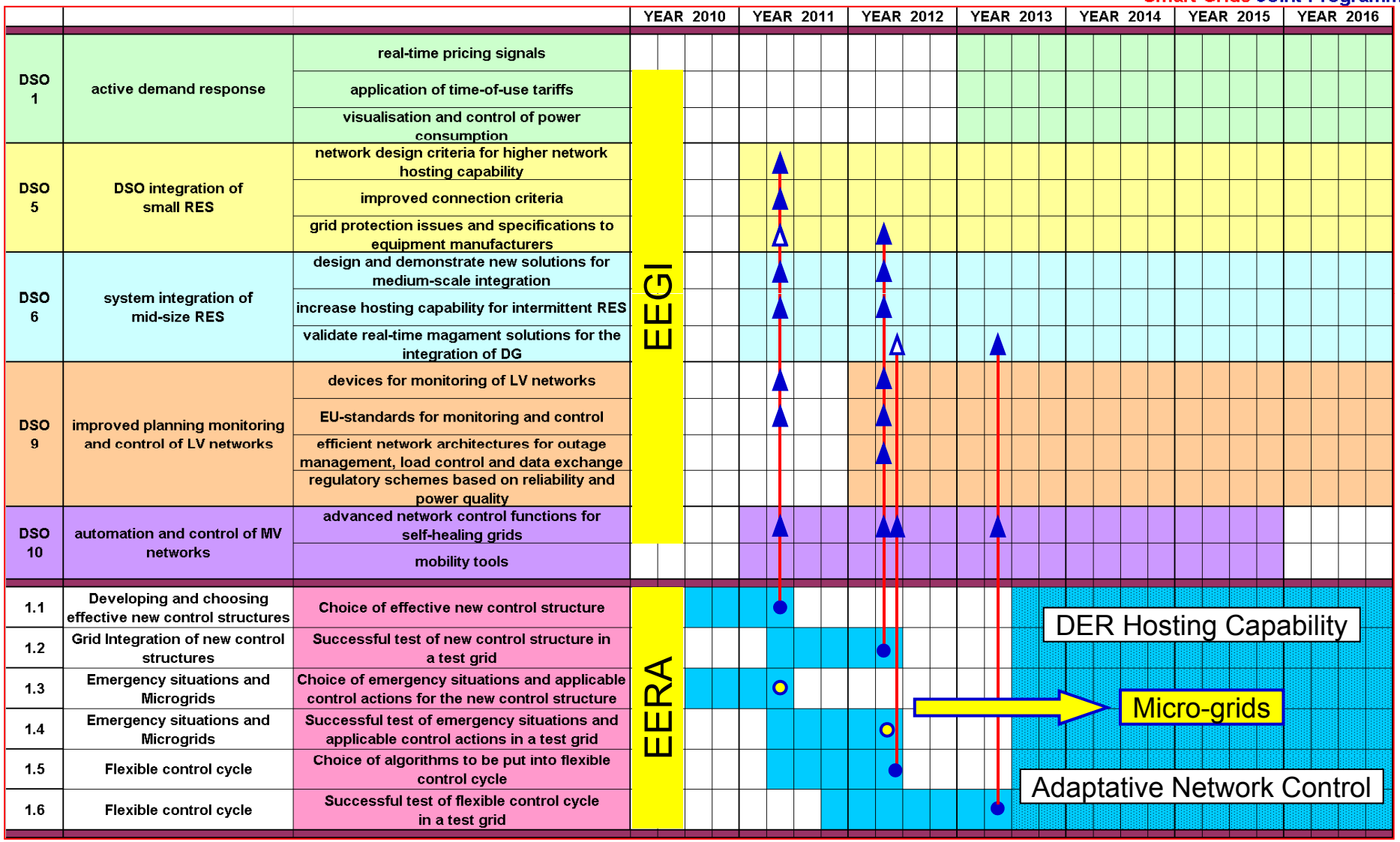
Time / Research Activity	1st year				2nd year				3rd year			
	3	6	9	12	15	18	21	24	27	30	33	36
Task 4.1				M4.1 R								
Task 4.2								M4.2 R				
Task 4.3										W		
Task 4.4										M4.3 R		
Task 4.5												M4.4 R

W = workshop R = report Mx = milestone

EEGI–EERA Program Mapping

E.g., SP 1: Network Operation

Smart Grids Joint Programme



InnoGrid2020+ Technical Session:

Smart Grids Joint Programme

② **EEGI** Represents the main Stakeholder of the EERA JP on SG

can provide:

Field testing and deployment of innovative technical solutions

Practical evaluation and implementation of EERA JP outcomes

③ Inputs to EEGI to be further improved, EEGI Team meetings

④ Outputs from EEGI e.g., feedbacks about proposed technical solutions during and after field testing experience at Demo sites or grid-scale

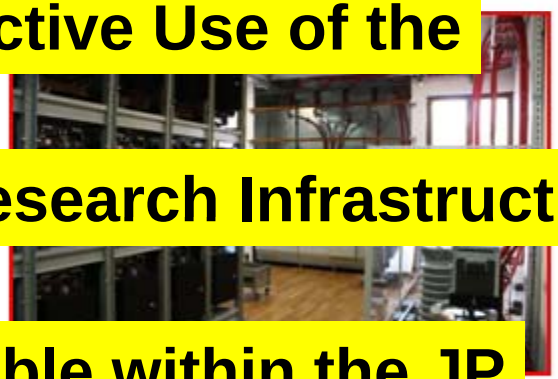
⑤ Concrete & effective collaborations (close and continuous interactions)
e.g., minimizing R&D risks – tech. solution implementation:
EERA JP research infrastructures could be used for evaluation of innovative solutions (small-scale demo) before being implemented on large-scale and costly DEMO

Research Infrastructures

Smart Grids Joint Programme









Effective Use of the

Strategic Research Infrastructures

available within the JP

Important Upcoming Events

Smart Grids Joint Programme

First semester 2012

➢ EEGI Team meeting 6	**Brussels** (January 24th)
➢ "10th Smart Grids Workshop" Technical and **JPSC meeting**	**Kassel** (February 28th)
➢ 4th ETP Smartgrids **General Assembly**	**Rome** (March 8th)
➢ **2nd EERA Annual Congress** 2nd JP on Smart Grids external Review	**Brussels** (May 2nd)
➢ "11th Smart Grids Workshop" Technical and **JPSC meeting**	**Helsinki** (June 6th)
➢ 2nd **EERA JP – US DOE** SG R&D Workshop	**Milano** (June 26th)

Thank you for your attention

Smart Grids Joint Programme

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About EERA

- Alliance that aims to accelerate development of new energy technologies
  - Strengthen, expand and optimise research capabilities
  - Harmonisation of national and EC programmes, decrease fragmentation
  - Draw on results from fundamental research
- Called for in the Strategic Energy Technology (SET) Plan
- Participation in EERA in principle open to all research organisations
  - Not just a membership; need to bring in significant R&D capacity
- Based on **own** resources (not: additional budgets EC)
- EERA aims to be light & non-bureaucratic

Joint Programming

What kind of cooperation can be foreseen?

- Harmonisation of research programmes
  - Exchange of information
  - Exchange of personnel

  } Insufficient for EERA

  - Common strategy to tackle (new) research questions
    - Too many topics for a single institute
    - Avoid duplication, ensure complementary of programmes
    - Agree on who does what (and share results)
- Facilities
  - Sharing of facilities
  - Building new facilities
    - Owned by multiple institutes

  } A breakthrough