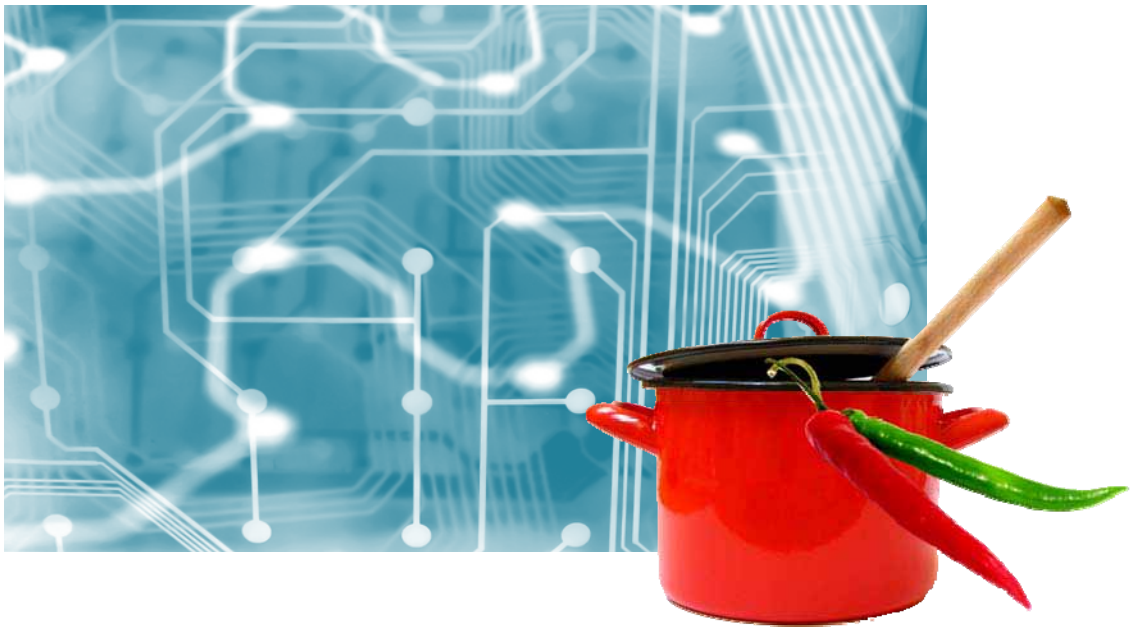
NACHHALTIG wirtschaften

Bundesministerium
für Verkehr,
Innovation und Technologie



National Smart Grids
R&D Initiatives in Europe

Results of the 1st Smart Grids ERA-Net Workshop
on 30th March, 2010

M. Hübner, N. Prüggler

Berichte aus Energie- und Umweltforschung

17/2010

Imprint:

Owner and Publisher:
Austrian Federal Ministry for Transport, Innovation and Technology
Radetzkystraße 2, A-1030 Vienna, Austria

Responsibility and Coordination:
Division for Energy and Environmental Technologies
Head: Michael Paula

This publication is available on http://www.nachhaltigwirtschaften.at

"European Walk to Smart Grids Excellence"
WORKSHOP SERIES

Funded by the European Commission

National Pictures & European Dynamics of Smart Grids

Results of the 1st Smart Grids ERA-Net Workshop

March 30th 2010, Amsterdam

Conducted within WP 4 - Joint Activities by

Austrian Federal Ministry for Transport, Innovation and Technology
Michael Hübner

University of Applied Sciences Technikum Wien
Natalie Prüggler

Kindly hosted by

NL Agency
Otto Bernsen

Fotos by

Dr. Piotr Swiatek

Workshop Participants

Name		Organisation
Mats	ANDERSSON	Nordic Energy Research
Rainer	BACHER	Bacher Energie
Otto	BERNSEN	NL Agency
Stéphane	BISCAGLIA	ADEME
Oihana	BLANCO	Innosbasque
Henrik	DAM	European Commission Research Directorate General
Ruud	de BRUIJNE	NL Agency
Erika	GLASENČNIK	Ministry of Higher Education, Science and Technology
Michael	HÜBNER	Austrian Federal Ministry for Transport, Innovation and Technology
Aare	IGNAT	Estonian Science Fondation
Jeanette	MØLLER JØRGENSEN	Energinet.dk
Michael	MOSER	Bundesamt für Energie, BFE, Sektion Energieforschung
Frank	NILSEN	The Research Council of Norway
Oivier	ONKIEHONG	NL Agency
Natalie	PRÜGGLER	University of Applied Sciences Technikum Wien
Gaelle	REBEC	ADEME
Pau	REY	Zabala
Gunta	ŠLIHTA	Latvia Academy of Sciences, Institute of Physical Energetics
Ivan	SMON	Ministry of the Economy, Directorate For Energy
Piotr	SWIATEK	Project Management Agency Juelich
Statis	TSELEPIS	Center for Renewable Energy Resources, CRES
Guy	VEKEMANS	VITO
Peter	VERBOVEN	Flemish Smart Grid platform
Anh	VU	ERDF Network Division, The European Electricity Grid Initiative

Introduction

Europe has set itself ambitious 2020 targets and a comprehensive policy-framework to develop a low-carbon economy, which aims for an 80% cut in greenhouse gas emissions by 2050. This will not be reached without technology innovations which can only be enabled by research & development for a more secure and reliable energy supply system. The **European Strategic Energy Technology Plan** is one of the European Commission's major responses to these challenges, trying to bundle the forces on the European and national level.

The underlying goal of Smart Grids ERA-Net is to foster and enable European R&D and demonstration in the field of Smart Grids on the basis of the increasing **cooperation of the national research programmes in Europe** and so to position the European Smart Grids know-how as optimally as possible within this world-wide competitive business.

The "**European Walk to Smart Grids Excellence" – WORKSHOP SERIES,** organised within the framework of Work Package 4 of the Smart Grids ERA-Net project (www.eranet-smartgrids.eu) and primarily targeted at the programme managers, aims at:

- Creating a durable European communication platform for programme managers,
- Encouraging international collaboration and co-operation between them, and so
- Fostering European R&D in the field of Smart Grids.

Within the framework of the **1st Smart Grid ERA-Net Workshop** the European dynamics and various national pictures of Smart Grids were presented. Furthermore, valuable results of an in-depth discussion about how the future options and possibilities of co-operation in the field of Smart Grids among the national research Programmes and with European Initiatives are derived.

Workshop Agenda

1. European Dynamics of Smart Grids

- ***Status and Outlook of the SET-Plan, possibilities for contributions and the European Smart Grids Task Force***
- ***Henrik Dam, European Commission DG RTD***
- ***The European Electricity Grid Initiative & its dissemination***
- ***Anh Vu – ERDF Distribution France, The European Electricity Grid Initiative***
- ***Plenary Discussions***

2. National Research Strategies of Smart Grids

- ***Overview on National R&D Programmes, WP2 – Information Exchange***
  Oihana Blanco, Innobasque, Basque Country
- ***Overview of complementarities, gaps and strategic opportunities for National and Regional Programmes, WP3 – Strategic Activities***
  Rainer Bacher, Bacher Energie, Switzerland
- ***The Joint Energy Research Programme in Norway & the Nordic Countries***
  Frank Nilsen, Research Council of Norway
- ***Mission, Strategy and Approach of the Flemish Smart Grid Platform***
  Guy Vekemans, VITO, Belgium
- ***Smart Grid Pioneer Regions in Austria & Research Cooperation Smart Grids D-A-CH***
  Michael Hübner, Federal Ministry of Transport, Innovation & Technology, Austria
- ***Concept for Controlling the Power System 2025***
  Jeanette Møller Jørgensen, Energinet.dk, Denmark
- ***Smart Grids in France: The French Road Map & the R&D Demonstrator Fund***
  Stéphane Biscaglia, ADEME, France

3. Smart Grid Country Pictures & Conclusions for Concrete ERA-Net Activities

Group Works & Plenary Discussions

- ***Mind-map for Group Discussion, WP4 – Joint Activities***
  Natalie Prüggler, UAS Technikum Wien, Austria
- ***Post-IT: A Thought Experiment, WP4 – Joint Activities***
  Natalie Prüggler, UAS Technikum Wien, Austria

List of Contents

1. European Dynamics of Smart Grids

PRESENTATION

Status and outlook of the SET-Plan, possibilities for contributions and the European Smart Grids Task Force

Henrik Dam, European Commission DG RTD

Status and outlook of the SET plan, possibilities for contributions from MS and the Smartgrids Taskforce

Henrik Dam, European Commission,
DG Research
Smartgrid ERANET Workshop
Amsterdam
30th April 2010

Content

- SET plan, context
- Current status
- Potential contributions from Member States
- European Commission Smartgrid Task Force

SET plan context

Context

- 2020 targets: the three 20%
- 2050 target: developed countries should cut their GHG emissions by 80% by 2050 - G8 in Aquila
- Today's EU primary energy supply: 80% dependent on fossil fuels (coal, oil, gas, the main sources of CO2 emission)
- A critical challenge: from 80% dependency on fossil fuels to 80% reduction in GHG emissions in 40 years!
  - A reinvention of our energy system
  - A need to move to a low carbon economy – not easy, cheap or swift
  - Technology and the efficient use of the resources are essential for this transition

EU's response : the SET Plan

- The SET-Plan, adopted in November 2007, is the technology pillar of the EU's energy and climate change policy
- Objective is to accelerate the development of low carbon technologies leading to their market take-up
- Vision of a Europe with world leadership in a diverse portfolio of clean, efficient and low carbon technology – as a motor for growth and jobs
- Set in a global context

SET-Plan measures

- Joint strategic planning:
  - Steering Group
  - Information system: SETIS
  - Annual SET Plan summits
- Effective implementation:
  - European Industrial Initiatives
  - European Energy Research Alliance
  - Trans-European Energy Networks and Systems of the Future – transition planning
- Increase in resources: both financial and human
- Reinforce International Cooperation

Investment has to increase

- Need for a step change in investment
- From 3b€ to 8b€ per year (public and private)
  - = an additional investment of 50b€ over the next 10 years
- Translates into huge global market opportunity

Basic Principles of EIIs

- Led by industry
- Boost research and innovation
- Accelerate deployment of technology
- Deliver progress beyond business-as-usual
- Define & realise clear targets (quantified objective)
- Contribute to political goals (energy & climate change)

European Industrial Initiatives

- **Six new European Industrial Initiatives:**
  - European Wind Initiative
  - Solar Europe Initiative
  - Bio-energy Europe Initiative
  - European Electricity Grid Initiative (EEGI)
  - European CO2 capture, transport and storage initiative
  - Sustainable fission initiative (Gen IV)
- **Illustrative examples:**
  - Fuel cells and hydrogen (JTI on-going)
  - Fusion (ITER on-going)

Current status

Establishment and launch event

- Event organised to formally establish and launch the EIIs
- Launch in two steps:
  - Most mature EIIs launched at the SET Plan Conference in Madrid, 3-4 June 2010, under the Spanish Presidency
  - Other EIIs launched at the SET Plan Conference in Brussels, 15-16 November 2010, under the Belgian Presidency
- Launch marked by a Joint Declaration (EC, committed MSs and Industry) together with the Governance Structure, the TR and the first IP

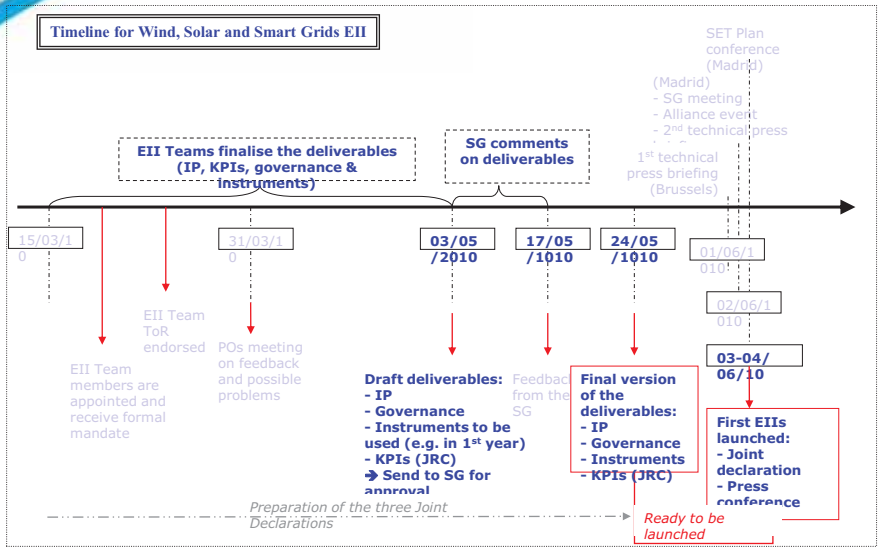
Joint Declaration

- One joint declaration per EII
- Non-legally binding 'commitments' between the Commission, committed MSs and industry
- Not formally 'signed' to avoid potential institutional and legal problems
- Content in line with the Communication on "Investing in the Development of Low Carbon Technologies (SET Plan)" as well as the draft Council Conclusions

Joint Declaration

- Common template to be adapted to each sector:
  - Reminder of the sector's Technology Roadmap - objectives and indicative budget
  - Endorsement of the sector's IP 2010-2012 derived from the TR - a basis to get the initiative started
  - Collective agreement on the proposed governance architecture
  - 'Commitment' of Industry, MSs and EC to support of the initiative

Current status



Potential contributions from Member States

Potential contributions from Member States

- Actively participate in the EEI Teams
- Indicate availability of instruments and resources
- Adapt procedures, where necessary
- Adhere to the 'joint launching declaration'

Available instruments

Common EU Roadmap and Implementation Plan

Public funding partners	Project typology	Instruments
EC	High EU added value	FP, CIP-IEE
EC and MS	Large projects, EU added value, shared interests	FP (ERA-NET+), coordinated calls, Art 185…
MS and MS	Localised shared interests	NER300, ad-hoc arrangements, EERA etc
MS	Supporting domestic industry	national programmes, NER300, structural funds
EIB	Large projects	EIB loans, RSFF, guarantees, equity

Common EU reporting, monitoring and assessment – KPIs

Possible public intervention (1)

- **Public funding partner: EC**
- **Project Typology: High EU added value**
- **Instruments:**
  - **Framework Programme (FP)**
  - **Competitiveness and Innovation Framework Programme / Intelligent Energy Europe Programme (CIP-IEE)**

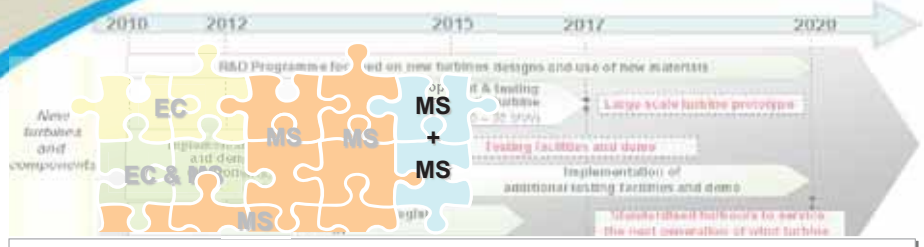
Possible public intervention (2)

- **Public funding partner:** EC & MS together
- **Project Typology:** EU added value, large projects, shared interests
- **Instruments:**
  - Framework Programme (e.g. ERA-NETs, third party financing)
  - Joint or coordinated calls

Possible public intervention (3)

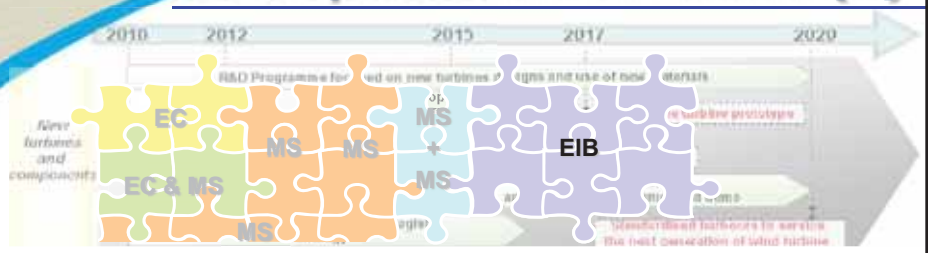
- **Public funding partner:** Member States alone
- **Project Typology:** supporting domestic industry
- **Instruments:**
  - national programmes
  - NER 300
  - structural funds

Possible public intervention (4)



- **Public funding partner**: Several MS together
- **Project Typology**: localised shared interests
- **Instruments**:
  - ad-hoc arrangements
  - NER 300 (trans-boundary projects)
  - Joint or coordinated calls
  - EERA (research institutes)

Possible public intervention (5)

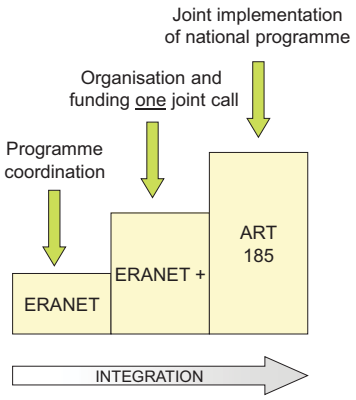


- **Public funding partner**: EIB
- **Project Typology**: Large projects
- **Instruments**:
  - loans, guarantees, equity, Marguerite Fund, Risk Sharing Financing Facility …

Possibly in combination with any of the stakeholders

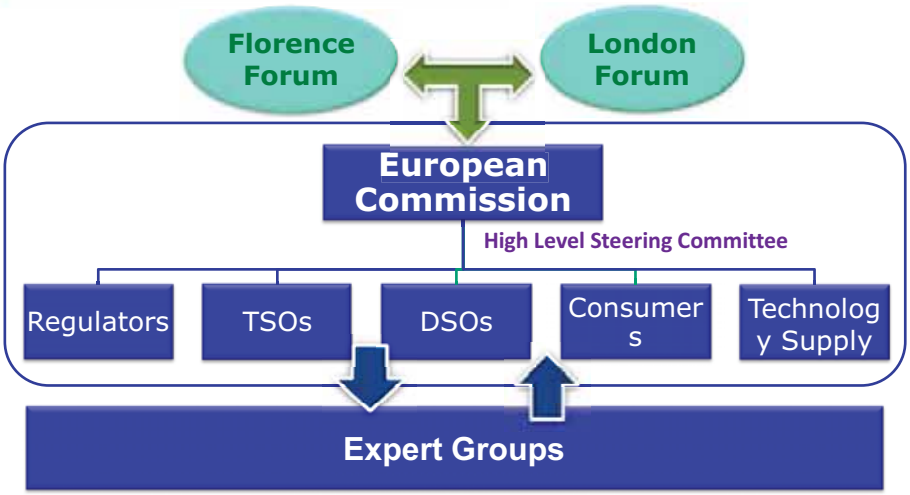
ERANET - ERANET + - ART 185

- **Develop and strengthen coordination of public research programmes:**
  - **ERA-NET: encourage and finance the coordination of national or regional research programmes**
  - **ERA-NET+: incentive to the organisation of <u>one joint call</u> between national or regional research programmes, this time financing only a small part of the coordination and focussing mainly on financing research**
  - **Art 185: complete integration of the structure (lengthy co-decision process)**



EC Task force on Smartgrids

Task Force for Smart Grids



Task Force- Work

Key topics and initial efforts :

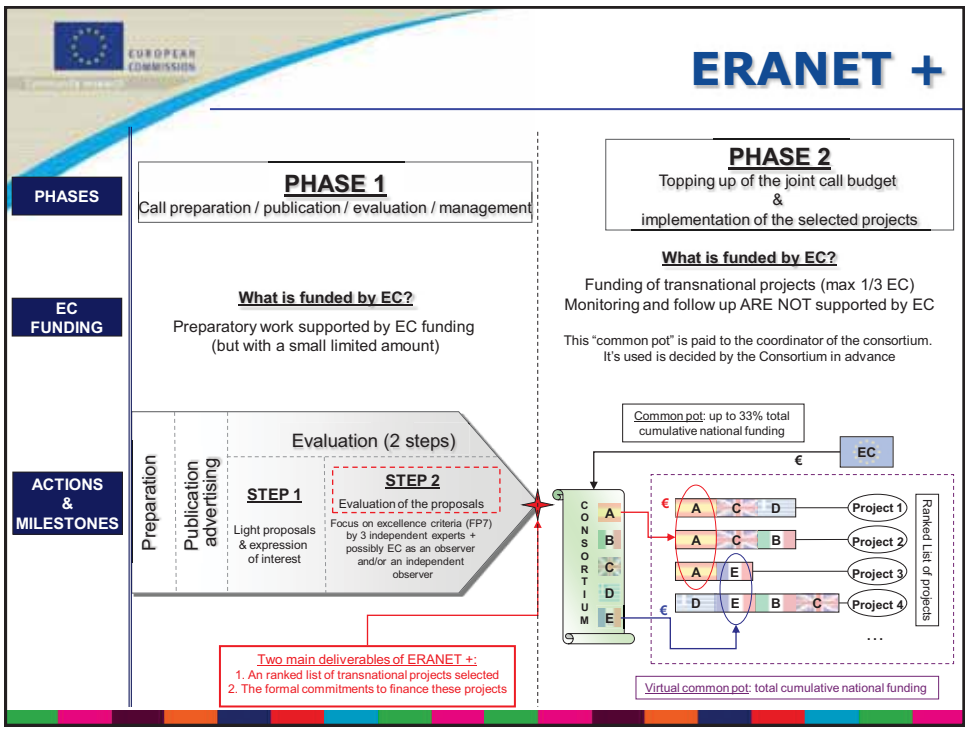
- Expected services and functionalities
- Empowering consumers
- Supporting power system security
- Regulated and competitive markets
- Implementation and coordination of first steps

Task Force- Expert Groups (2010)

1. **Functionalities of Smart Grids and Smart Meters.**
2. **Regulatory recommendations for data safety, data handling and data protection.**
3. **Roles and responsibilities of actors involved in the deployment of Smart Grids.**

Backup Slides

ERANET +



DISCUSSION

The main focus of the discussion was about potential contributions from Member States to the Strategic Energy Technology (SET) Plan and the European Industrial Initiative (EII) as well as to its sub-division European Electricity Grid Initiative (EEGI). Furthermore, it was discussed which legal and financial instruments for encouraging contribution are available. The main question arose about where financial contributions for the implementation of the SET Plan could come from and which financial mechanism from the patchwork of national and European mechanisms is available.

It was highlighted that some projects of the current Framework Programs (FP) are already contributing to the EII goals and the Member States (MS) should continue fulfilling current national roadmaps for reaching 2020 objectives by using existing instruments, FP7 projects and budgets.

On the other hand the MS should actively participate in founding initiatives like the EII and communicating what they expect from it. The MS declaration of special interest in particular fields of smart grids, as e.g. contributions to functional demonstrators in the EII on electric vehicles, would be optimal. One possible argument for a Member State's strategic interest is an already running or intended national program which can be combined with EII goals.

Additional discussed topics were the way to implement smart grids in society and the fact that households and small companies still do not know what a smart grid is. The issues that ways have to be found to connect these groups and find opportunities for pricing incentives within the regulated environments were seen as essential.

PRESENTATION

The European Electricity Grid Initiative & its dissemination

Anh VU – ERDF Distribution France, The European Electricity Grid Initiative

The European Electricity Grid Initiative

Outline

Electricity Networks in the 21-st century : towards 2020

External

20-20-20 EU Goals
Electricity **consumption growth**
Large increase of unpredictable **renewable energy** sources
Security of supply
The **Third Energy Package**

Internal

- Reduce the **total costs** of the power system
- Replacement of **ageing infrastructures**
- Integrate **low-carbon generation** sources
- Support **energy efficient demand side technologies**
- Enable the **active participation** of customers to the energy market
- Enable the **electrification** of the **transport sector**
- Increase the network **flexibility** to face 2050 scenarios

The European Electricity Grid Initiative (EEGI)

Outline

European Electricity Grid Initiative: the founding members

The European Electricity Grid Initiative
The RD&D Program

The TSOs and DSOs have designed a **joint Research, Development and Demonstration program** that addresses:

Technology to make networks smarter and stronger

Market design to allow integration of DER, active demand and active participation of customers.

Organization and data exchange at pan-European level to maintain reliability at affordable cost

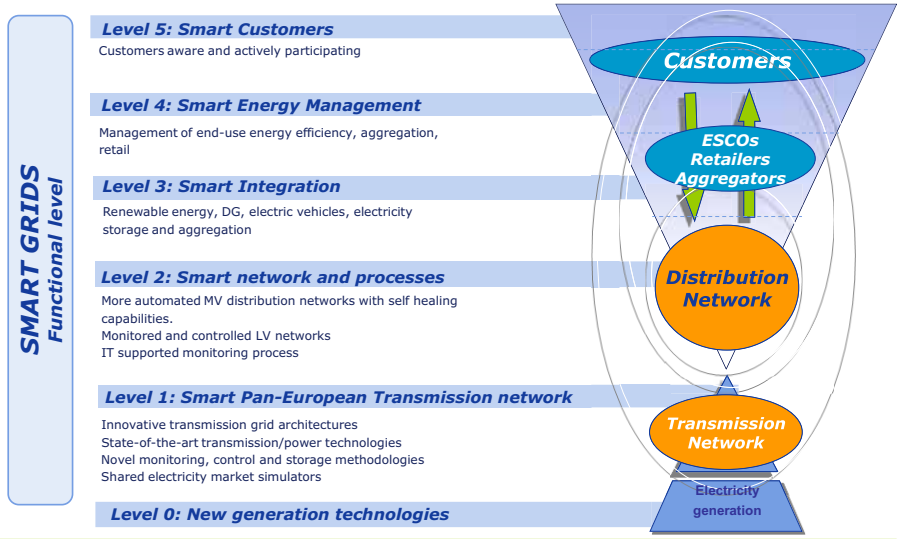
Novel regulation proposals to further optimize European electricity customer welfare

European Electricity Grid Initiative: RD&D at EU level

EEGI is shaping the European Industrial Initiative on Electricity Grids by:

- proposing a European **framework** for a common research and demonstration program in support of faster and cheaper smart grids implementation
- highlighting the shared **action plans** covering the main steps of this development.
- identifying the medium and long term **investments** necessary for the **roll out of a European integrated Smart Grids infrastructure**

Smart Grids Model



Outline

- Electricity Networks in the 21-st century
- The European Electricity Grids Initiative
- Smart Grids Model
- TSOs Demonstration and Research Projects
- DSOs Demonstration and Research Projects
- Joint TSO/DSO activities
- Integration with the other European Industrial Initiatives
- Budget and funding
- Conclusions and next steps

TSOs innovation clusters

Cluster	Levers	Scope of the innovation cluster
1	Pan-European Grid architecture	Novel approaches to develop a pan-European grid
2	Power technologies	Affordable technologies to make the transmission system more clever and flexible
3	Network management and control	Critical building blocks to operate the interconnected transmission system in real-time with high reliability levels
4	Market rules	Market simulation techniques to develop a single European electricity market

The TSO implementation plan

Project	YEAR 2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1		A tool box for new network architecture assessment									
2	REALISEGRID	Tools to analyze the pan European network expansion options									
3			Demonstrations of Power technologies for more network flexibility								
4			Demonstrations of Power technologies for new architectures								
5	SAFEWIND, WINGRID IS-POWERS TWENTIES →			Demonstrations of renewable integration (ct'd)							
6	PEGASE			Tools for a Pan European network observability							
7		Tools for coordinated operations with stability margin evaluation									
8				Improved training tools for improved coordination							
9		Tools for Pan European network reliability assessment									
10				Tools for pan European balancing markets							
11				Advanced tools for congestion management							
12	OPTIMATE			Tools for renewable market integration							
13				Tools to study market integration of active demand							
14		Innovative approaches to improve the public acceptance of overhead lines									
Costs €m	35	38	72	80	90	90	85	45	25		

11

Outline

- Electricity Networks in the 21-st century
- The European Electricity Grids Initiative
- Smart Grids Model
- TSOs Demonstration and Research Projects
- DSOs Demonstration and Research Projects
- Joint TSO/DSO activities
- Integration with the other European Industrial Initiatives
- Budget and funding
- Conclusions and next steps

12

DSOs Functional Demonstration Projects

DSOs SMART GRIDS MODEL

SMART GRIDS *Functional level*

Level 5: Smart Customers
Customers aware and actively participating

Level 4: Smart Energy Management
Management of end-use energy efficiency, aggregation, retail

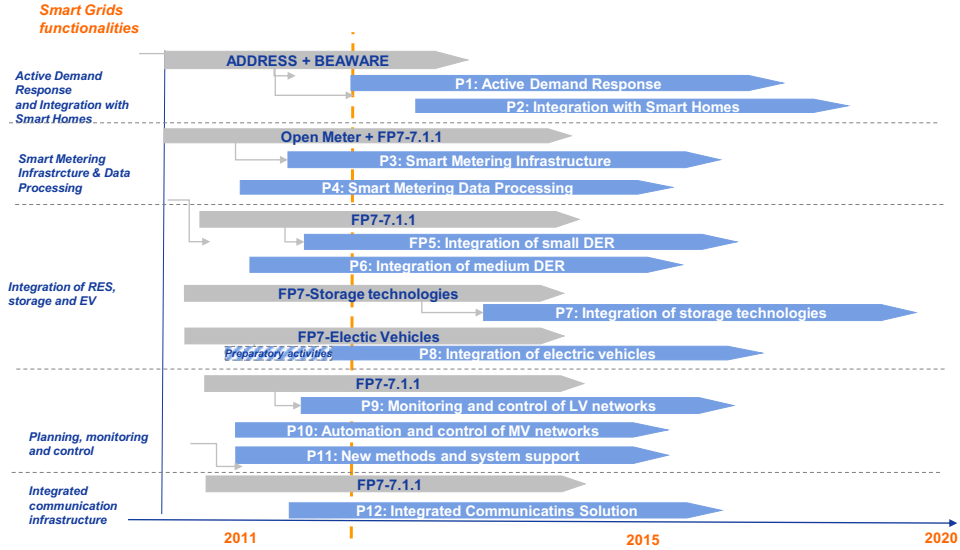
Level 3: Smart Integration
Renewable energy, DG, electric vehicles, electricity storage and aggregation

Level 2: Smart Distribution network
More automated MV distribution networks with self healing capabilities.
Monitored and controlled LV networks
ICT supported processes

Functional demonstrators

1. Active Demand Response
2. Energy Efficiency from integration with Smart Homes
3. Metering infrastructure
4. Smart metering data processing
5. DSO integration of small DER
6. System integration of medium DER
7. Integration of storage in network mgt
8. Infrastructure to host EV/PHEV
9. Monitoring and control of LV network
10. Automation and control of MV network
11. Methods and system support
12. Integrated communication solutions

Identification of priority functional projects

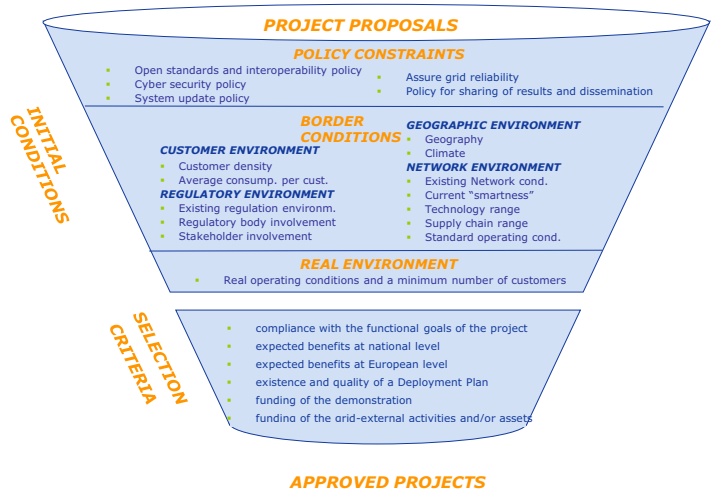


Program benefits and KPIs

Benefits	Potential KPIs	Functional demonstrators											
		1	2	3	4	5	6	7	8	9	10	11	12
1. Increased sustainability	Quantified reduction in CO2 emission	■	■	■	■	■	■	■	■				■
2. Adequate distribution capacity	Hosting capacity of DER	■		■		■	■	■		■	■	■	■
	Reduction in DER cut-off due to congestion	■		■		■	■	■		■	■	■	■
3. Uniform grid connection and access	Reduction in time to connect new user			■		■	■			■	■		■
	Uniform grid connection rules			■		■	■		■	■	■		■
4. Higher security and quality of supply	Reduction peak demand ratio	■	■	■	■				■				■
	Increased share of renewables					■	■	■		■	■		■
	Reduction in interruptions per customer									■	■	■	■
	Increased voltage quality performance					■	■	■					■
5. Enhanced efficiency and better service in electricity supply and grid operation	Reduction in network losses						■			■	■		■
	Increased Demand side participation	■	■	■	■								■
	Increased availability of network components									■	■	■	■
	Actual availability of network capacity									■	■	■	■

■ **Primary contribution** ■ **Secondary contribution**

Project selection process



Outline

- Electricity Networks in the 21-st century
- The European Electricity Grids Initiative
- Smart Grids Model
- TSOs Demonstration and Research Projects
- DSOs Demonstration and Research Projects
- Joint TSO/DSO activities
- Integration with the other European Industrial Initiatives
- Budget and funding
- Conclusions and next steps

The TSO/DSO implementation plan

Project Number	Title	Proposed activity leader	Why ?
1	**Increased observability of the electric system for network management and control**	DSO	DSO critical to implement wide scale MV and LV observability (TSO keep their system responsibility)
2	**The integration of demand side management in TSO operations**	TSO	Specifications coming from TSOs for a successful contribution of active demand to system operations (DSO involved in the final implementation)
3	**Distributed System services coming from DSOs**	DSO	DSO will become responsible to provide such services
4	**Improved defense and restoration plans**	TSO	Legally responsible of system security
5	**Joint task force on IT system protocols and standards**	DSO	The constraints are on the quality and quantity of "real time" consumption data

Outline

- Electricity Networks in the 21-st century
- The European Electricity Grids Initiative
- Smart Grids Model
- TSOs Demonstration and Research Projects
- DSOs Demonstration and Research Projects
- Joint TSO/DSO activities
- Integration with the other European Industrial Initiatives
- Budget and funding
- Conclusions and next steps

Integration with other European Industrial Initiatives

The integration activities with the other EIIs focus on :

What can the **network** bring to **facilitate the use of new technologies ?**

What can **the new technologies bring to the network**?

What are the features of the future networks that will **secure further integration ?**

What are the **interoperability and common standards** needed?

A first attempt to define the integration activities with **SOLAR** and **WIND** has been **included in the EEGI program** proposal

Outline

- Electricity Networks in the 21-st century
- The European Electricity Grids Initiative
- Smart Grids Model
- TSOs Demonstration and Research Projects
- DSOs Demonstration and Research Projects
- Joint TSO/DSO activities
- Integration with the other European Industrial Initiatives
- Budget and funding
- Conclusions and next steps

EEGI Program budget and funding

- Program cost estimation is around **€ 2 bn in 9 years (2010 – 2018)**

Programme	Duration	Research costs (€M)	Demonstration costs (€M)	Total costs (€M)
Joint TSO/DSO	5 years starting 2010	90	140	230
TSO	9 years starting 2010	250	260	510
DSO	5 years starting 2010	240	960	1200
Total		**580**	**1360**	**1940**

- The results are beneficial for the whole European energy value chain, requiring a comprehensive funding **that must involve EC, the Member States, the regulators and industry**.

Involvement of market players

The proposed RD&D programs involve all the other market players:

- **Generators** and manufacturers involved in solar and wind generation
- **Retailers and aggregators** needed to validate new business models
- **Power technology manufacturers** and **ICT industry**
- **Consumers** with present and future needs
- **RTD institutes**

➔ Strong **coordination** must be implemented with the Solar, Wind, Smart Buildings, Storage, Electric Vehicles and Smart Cities initiatives.

The expected benefits from the EEGI proposed program

1. **Decarbonizing** electricity production at **affordable costs**
2. **Reducing** the future **investment and operational costs** of the EU electricity grids
3. Facilitating **peak consumption** management
4. Consuming electricity **more efficiently** through the active involvement of smarter electricity **prosumers**
5. Paving the way to the advent of **electric vehicles**
6. Bringing industrial benefits to **European manufacturers** by:
   - Mitigating engineering and business deployment risks
   - Converging towards European technology standards
   - Validating the technology scalability and replication rules

Conclusions

- The European Industrial Initiative on Electricity Grids is **ready to be launched in June 2010** based on the EEGI proposal.
- Guidelines for financing the program have been developed and **budgets should be dedicated** to start the first projects at the beginning of 2011
- **The coordination process** with other initiatives and stakeholders will continue in order to guarantee coherence and avoid overlaps.
- **R&D institutions are important contributors** both directly involved in the projects and to give input on new technologies and concepts that are ready to be demonstrated.

DISCUSSION

Within this plenary discussion on the one hand it was discussed how the European Electricity Grid Initiative (EEGI) is going to bring together the approximately 5000 Distribution System Operators (DSOs). As major incentives for DSOs' active participation were mentioned the need for a global balance of the system and not the development towards single technologies dedicated to a local system. With this respect, the exchange among the system operators is seen as very useful and as an opportunity to switch visions in mind, share them with others and use them to improve the systems.

The question if and how other stakeholders are included into the EEGI's discussion process was answered by stating that all stakeholders' opinion is essential to define future needs and are involved in the development of demonstrators for technology testing.

As a major challenge for the mobilisation of funding from Member States (MS) are their specific rules for TSOs (Transmission System Operator) and DSOs within their countries. The EEGI hopes that by getting European Commissions' funding European TSOs and DSOs are further encouraged to increasingly work on an international level together and share experiences to overcome barriers and enable added value all over Europe. Hence, the EEGI constitutes a vehicle for increased collaboration and in addition mobilise more resources to overcome challenges in Europe. Therefore, the Framework Programs (FP) should be aligned as well.

2. National Research Strategies of Smart Grids

PRESENTATIONS

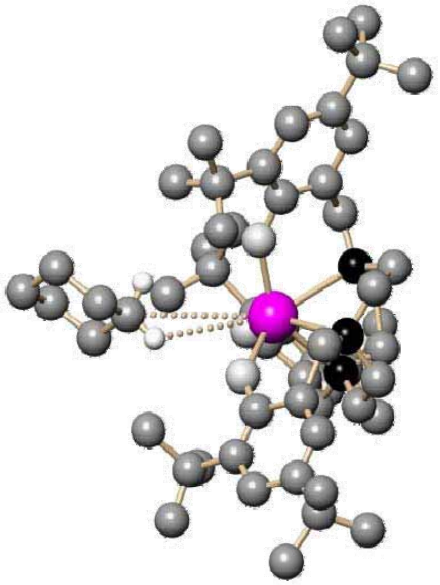
Overview on national R&D programmes, WP2 – Information Exchange

Oihana Blanco, Innobasque, Basque Country

SmartGrids ERA-Net

Overview on national R&D programmes

WP2 – Information Exchange



innobasque

INDEX

- Objectives of Information Exchange
- Tools / Questionnaire
- Results

innobasque

SmartGrids ERA-Net

Main Objectives of Information Exchange

- **CREATION OF A WEBSITE:** http://www.eranet-smartgrids.eu/

  containing easy accessible information on regional and national programmes

- **EXCHANGE OF INFORMATION AND BEST PRACTICES**
  - Aim is to ensure common understanding for future cooperation and co-ordination.
  - Record information of all participating and other programmes, covering characteristics of programme design and implementation: objectives, target groups, instrument types, eligibility etc.
  - Ensure a common understanding, and in particular a common language, among the project partners of the participating funding programmes as the necessary basis for generating the willingness and trust necessary for future co-operation and co-ordination.
- **DEFINITION OF INTER-EUROPEAN RESEARCH PRIORITIES**

Tools / Questionnaire

In order to collect all the information described, we developed a **questionnaire** which was fulfilled by the partners of the ERA-NET

STRUCTURE OF THE QUESTIONNAIRE

- General Information
- National/Regional policies

RTD Priorities

- RTD programmes
- Projects
- Calls for proposals
- Evaluation procedure
- Monitorisation procedure
- Internal cooperation

PROGRAMMES

Results

SmartGrids ERA-NET Funding Programme Information

Country / Region	Funding Programme	RTD Programmes: Type of Funding			Projects: Eligible Organizations						Projects: EligibleProjects			Projects: Type of Projects					
		Grants	Loans	Other	SMEs	Large Enterprises	Research Centres	Universities	Public Institution	Other	Individual	Cooperative	Other	Basic Research	Industrial Research	Technological Development	Technology Transfer	Transnational Research	Other
Nederlands	EOS Energy Research Subsidy	x			x	x	x	x			x	x		x	x	x	x	x	x
Switzerland	Grids	x			x	x	x	x	x		x	x		x	x	x	x	x	
Austria	Energie 2050	x			x	x	x	x	x		x	x		x	x	x	x	x	
Denmark	Nordicenergy	x					x	x	x			x		x		x			
Denmark	Energinet.DK	x			x	x	x	x	x	x	x	x			x	x		x	x
France	Programme 1	x			x	x	x	x	x					x	x	x		x	
	Programme 2	x			x	x	x	x	x		x	x	x	x	x	x		x	
	Programme 3	x	x		x	x	x	x	x		x	x	x	x	x	x		x	
France	Interdisciplinary Program on Energy				x	x	x	x	x			x		x					
Spain	Plan Nacional I+D+i	x	x		x	x	x	x	x	x		x		x	x	x	x	x	x
Norway	Renergi	x			x	x	x	x		x	x	x		x	x	x	x	x	
Greece	Competitiveness and Entrepreneurship	x			x	x	x	x	x			x		x	x	x			
Belgium	IBBT ICON projects	x			x	x	x	x	x			x		x	x				
	SBO projects	x					x	x				x		x					
	Mipvlaanderen	x			x	x	x	x				x		x	x	x	x		
	PRODEM			x	x						x	x					x		
Croacia	MZOS	x					x	x	x	x	x	x		x					
Eslovenia	NRPD	x			x	x	x	x	x		x	x		x	x	x	x	x	
Basque Country	GAITEK	x			x	x					x	x			x				x
	INNOTEK	x			x	x					x	x			x				x
Latvia	State Research Programme 2006-2009	x					x	x			x	x		x	x	x		x	

General overview of results

- **PROGRAMMES**
  - Designed in general for ENERGY and/or SmartGrids
  - Type of funding: GRANTS
  - Geographical focus: National/Regional. Only in very few cases, other nationalities participation is allowed
  - Eligible organisations: Big disparities among the partners
  - Eligible projects: Individual and cooperative
  - Duration of a project: Between 3 and 9 years

THANK YOU
FOR YOUR ATTENTION

Oihana Blanco
oblanco@innobasque.com

Overview of complementarities, gaps and strategic opportunities for national and regional programmes, WP3 – Strategic Activities

Rainer Bacher, Bacher Energie, Switzerland

Smart Grids ERA-Net Workshop

Amsterdam, March 30 2010

Agenda

1. Situation
2. ERA-Net Report D.3.2.1
3. Next questionnaire (task 3.3.1)
4. Next steps
5. Questions / Discussion

Situation – overall strategy and general description

The goal is to optimize the SmartGrids research activities within Europe

	Work package 1	Work package 2	Work package 3	Work package 4	Work package 5
Goals	• Coordination & dissemination	• Exchange of information	• Strategic activities and best practices	• Implementation of joint activities	• Transnational research activities

Objectives	• Project management & administration	• Making an inventory of the EU national & regional RTD projects & programmes (budget, conditions, etc.)	• Identification of
			  • complementarities
			  • gaps
			  • strategic opportun.
				• Comparison of EU strength compared to other nations (e.g. USA, Japan)	• Plan for national budget allocation
					• Designing a system for transnational calls

Situation – work package 3

The overall objective of this work package is to deduct a strategy for stepping up the future cooperation between nat. & regional programmes in EU

Task 3.1	Task 3.2	Task 3.3	Task 3.4	Task 3.5
• Work package management	• Identifying complementaritiess, gaps and strategic opportunities for national and regional SmartGrids programmes	• Identification of inter-European SmartGrids research priorities	• Development of a prospective framework towards joint/ transnational activities	• Analysis of evaluation, monitoring and dissemination processes

ERA-Net report D.3.2.1

The report should give an overview of the complementarities, gaps and strategic opportunities

Objectives task 3.2

- Identifying
  - complementarities
  - gaps
  - strategic opportunities

for national and regional SmartGrids RTD programmes

Approach

1. Innobasque's questionnaire
2. Bacher Energy's additional questionnaire
3. Draft version of the report
4. Finalisation of this report within the next few days

ERA-Net report D.3.2.1: Barriers (1/3)

With the help of the two questionnaires 17 barriers for national and regional SmartGrids programs could be identified

Financing

- Different available funding intensity in the countries / region
- Funding of RTD programs is sometimes limited to national/regional partners
- Some countries do not even have a separate RTD program for energy
- Only a minority of the ERA-Net countries have a separate program for Smart Grids
- In many countries RTD projects are not 100% financed by the government
- Modification in the amount of the SmartGrids R&D funding during the project compared to the accepted SmartGrids project proposal
- More than one governmental funding organization per country

ERA-Net report D.3.2.1: Barriers (2/3)

With the help of the two questionnaires 17 barriers for national and regional SmartGrids programs could be identified

Policy

- National or regional energy policies might restrict esp. “cross border research”
- Demonstration related projects are not in each country supported
- A few countries do not accept “transnational research” RTD programs
- Missing clear SmartGrids strategy in the countries

Ownership

- The ownership of the equipment in pilot projects where larger investments are needed is unclear

Enterprises

- Some countries exclude enterprises from their RTD projects (lack of practical knowledge)

ERA-Net report D.3.2.1: Barriers (3/3)

With the help of the two questionnaires 17 barriers for national and regional SmartGrids programs could be identified

Time

- Maximum duration of an R&D SmartGrids project might be a barrier for large/complex projects

Documents

- The minimum requirements for transnational consortium agreements for an international pilot project are not defined
- Necessity to write in many ERA-net countries at least a part of the application form in the native language
- The variety of documents needed by non-national applications in addition to the standard application forms

Next challenge

The main goal of this task is to identify of inter-European project research priorities in the ERA-Net member countries

Objectives task 3.3

- Identification of inter-European research priorities

Approach

1. Identification of the main actual SmartGrids research areas in the ERA-Net member countries with the help of a questionnaire
2. Analysis of the questionnaire by Bacher Energy Ltd and working out a report with the main findings

Questionnaire task 3.3.1

The questionnaire 3.3.1 consists of a technical, economical, legal and social part. In each part it is asked for the following information:

Institution

- Name of the institution doing SmartGrid research
- Email of the corresponding person of this institution
- % SmartGrids projects

Project 1

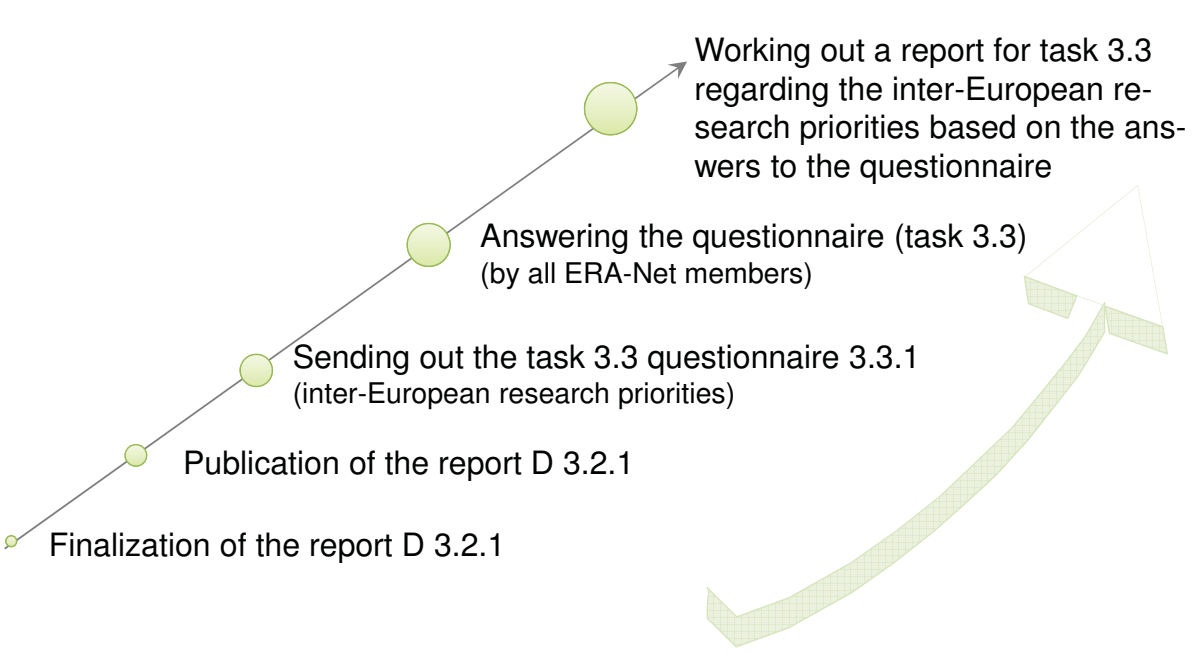
- Title of the SmartGrid project of this institution
- Countries cooperating in this project
- Short abstract of the SmartGrids project (4 lines)
- Cross-border issues of the project (yes/no)
- Distribution issues of the project (yes/no)
- Transition issues of the project (yes/no)

Project 2

- Title of the SmartGrid project of this institution
- ...

Next steps

In order to identify the inter-European research priorities we need your help



Questions / Discussion

The Joint Energy Research Programme in Norway & the Nordic countries

Frank Nilsen, Research Council of Norway

The Research Council of Norway

Main content

- Norwegian energy strategy Energi21 and how it imposes programmes like RENERGI
- The RENERGI programme – some project examples related to SmartGrids
- Nordic Energy Research – some project examples related to SmartGrids

2

The Research Council of Norway

The Research Council of Norway – a strategic governmental agency

Main tasks

- Advise the government on research policy issues
- Finance and stimulate public and private R&D
- Create arenas for cooperation and knowledge distribution

One research council in Norway, for all disciplines and segments within the research sector

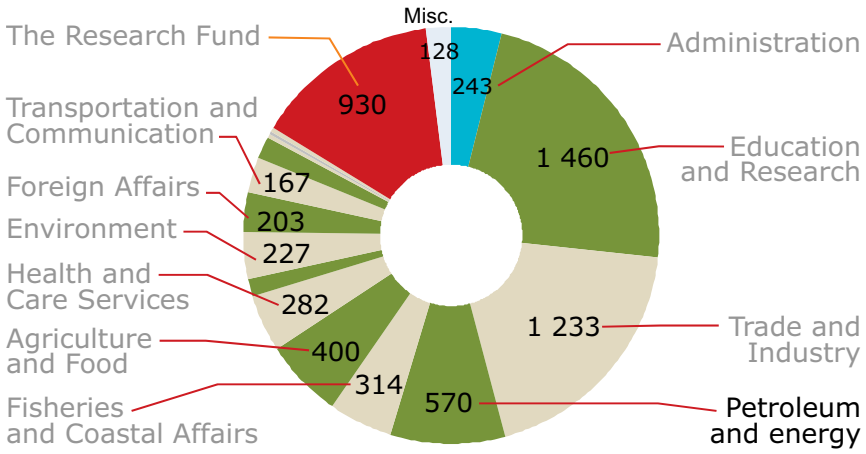
The Research Council of Norway

The Council distributes about 30 % of public expenditures on R&D in Norway

4

The Research Council of Norway

Funding received from the ministries (2009)



Total NOK 6165 mill. administration incl.

The Research Council of Norway

Several funding schemes

Centers of Excellence

Centres for Research-based Innovation

NEW!Centres for Environment-friendly Energy Research

National priorities
Large-scale programmes

Basic research programmes

Applied research programmes

Innovation programmes

Independent projects

User-directed innovation programmes

Tax deduction scheme SkatteFUNN

6

The Research Council of Norway

Instruments for petroleum and energy RD&D

- PETROMAKS — Petroleum, basic research and innovation
- DEMO 2000 — Petroleum, demonstration and piloting
- Climit — CCS competence and innovation
- RENERGI — Renewables and energy efficiency basic research and innovation
- Centers of excellence
- Centers of research based Innovation
- Centers of Environmentally Friendly Energy

7

The Research Council of Norway

National Energy Strategy

energi 21

- **Six focus areas**
  - Research on effective energy use
  - Increase climate friendly power
  - Focus on R&D within CO2-neutral heating
  - **An energy system for the future**
  - Policy framework conditions that will stimulate business investments in R&D
  - Carbon Capture and Storage

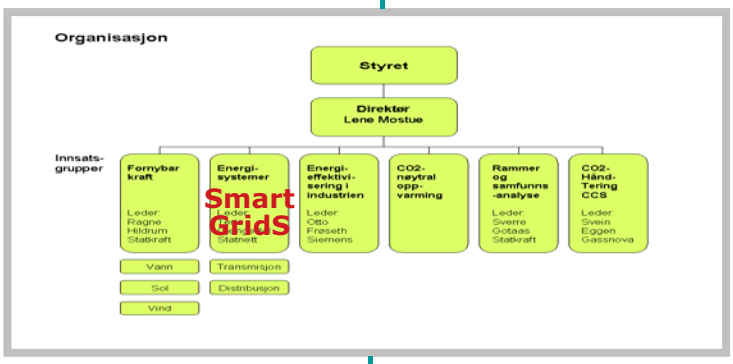
- **Broad action**

- **Demonstrations of technology**
- **Research funds for infrastructure**

8

The Research Council of Norway

National energy R&D strategy established feb. 2008 energi21



RENERGI Smart GridS
40 m € in 2010

8 X CEER
12 mill € in 2010

Climit
20 mill € in 2010

9

The Research Council of Norway

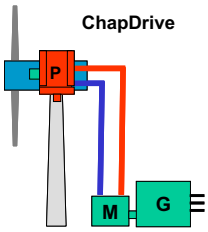
Energi21 vision
Norway: ”Europe’s green battery”

Fig. 1. Map from the Norwegian TSO, Statnett, showing a possible offshore grid development in the North Sea. The original map focuses only on the North Sea and does not include potential interconnections outside this area. Existing interconnectors are not shown. Kriegers Flak has been included here for comparison.

10

Forskningsrådet

Norwegian offshore wind industry



The Research Council of Norway

RENERGI, Clean Energy for the Future

RENERGI is one of the seven large-scale programmes

Duration: 2004-2013

- Budget 2010: 40 mill. Euro

Goals: RENERGI is to develop knowledge and solutions as the basis for

- environment-friendly, efficient and effective management of the country's energy resources, security of supply

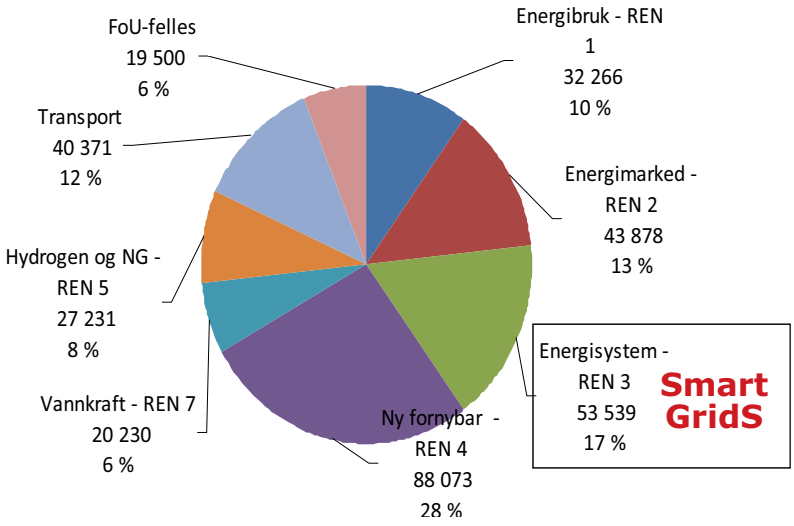
and

- internationally competitive economic development related to the energy sector.

12

The Research Council of Norway

RENERGI 2004-2013
Budget distribution 2010 (kkr)



13

The Research Council of Norway

Centres for Environment-friendly Energy Research (CEER)
- a new strong initiative in the energy sector

- Ensure efficient and responsible use of public R&D funding
- Stronger strategic direction – allow for concentrated and focused research of high international standards
- Long-term (5+3 years) – predictable
- Stimulate cooperation between education, research and industry
- Profile attracts
  - Human capital
  - Financing
- Builds on well-proven model for other research centres (SFI and SFF)

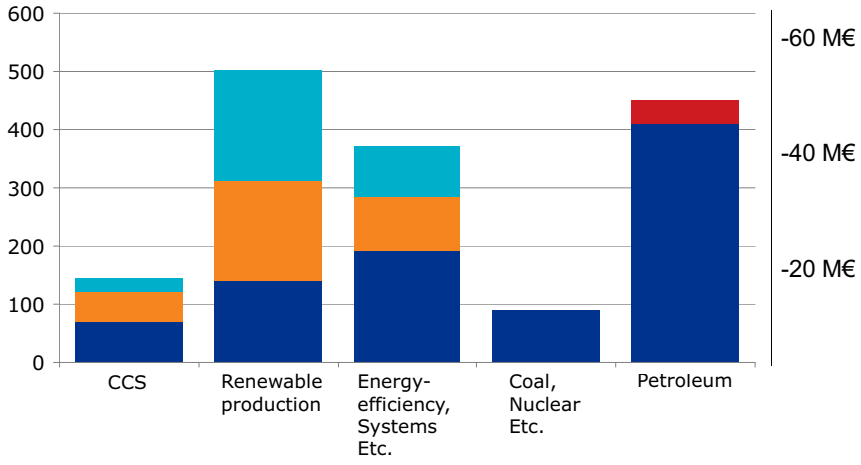
The Research Council of Norway

8 CEER centres:

- BIGCCS Centre – International **CCS** Research Centre
- Subsurface **CO2 Storage** – Critical Elements and Superior Strategy (SUCCESS)
- Norwegian Centre for **Offshore Wind Energy** (NORCOWE)
- Norwegian Research Centre for **Offshore Wind Technology** (NOWITECH)
- Centre for **Environmental Design** of Renewable Energy (CEDREN)
- **Bioenergy** Innovation Centre (CenBio)
- The Norwegian Research Centre for **Solar** Cell Technology
- The Research Centre on **Zero Emission Buildings** (ZEB)

The Research Council of Norway

Profile Energy Research
2008 + Climate agreement 2009 + Proposal 2010



16

Forskningsrådet

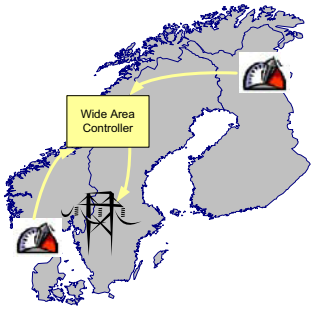
Wide Area Control Systems

- **Dynamic stability and danger of oscillations is often a limiting factor regarding transmission capacity**
- **Time stamped (synchronised) measurements from sentral nodes within the transmission network opens for a new way of controlling the stability**
- **Potential of increasing the security of supply**

Solution:

- **HVDC og SVC plants can be controled based on the above measurements in a closed loop**
- **Freedom to choose measurements from the optimal nodes within the network**

Facts:
Title: Wide Area Control Systems for control of FACTS/HVDC
Institution: ABB
Total budget: 6,1 mill. kr.
From RENERGI: 1,75 mill. kr.
Duration: 2008 – 2010



17

Forskningsrådet

Balance Management

- Motivation:
  - Optimal utilisation of cross border balancing
  - Reduction of balancing costs
  - Utilisation of hydro power for balancing
  - Increasing need for balancing power
  - Participation from , Netherlands and Belgium (4 Ph.Ds - 2 NL + 2 NO)

Facts:
Title: Balance Management
Institution: SINTEF Energiforskning
Total budget: 12,5 mill. kr.
From RENERGI: 4,6 mill. kr.
Duration: 2007 – 2010

- Main focus:
  - Mapping the different balance schemes in Nortern Europe
  - Mapping of marginal costs of balancing using thermal production or demand side
  - Alternative modells for exchange via HVDC connetions
  - Design of future market place for balance power

18

Forskningsrådet

Integration of methods and tools for security of supply analysis

- Elaborate the new concept for integrated security of supply analysis
- Develop data interface between power market analysis and the power system reliability analysis
- Develop and implement power flow and dynamic contingency analyses to provide input to power system reliability analysis
- Develop and implement the reliability of supply analyses including the evaluation and classification of events and handling of uncertainties
- Perform case studies for testing and demonstration of the methodology and for competence building.

Facts:
Title: Integration of methods and tools for security of supply alysis
Institution: SINTEF Energiforskning
Total budget: 15,0 mill. kr.
From RENERGI: 10,5 mill. kr.
Duration: 2010 – 2013

19

Forskningsrådet

Non-metallic water diffusion barriers

Polyolefins; diffusion and permeability:

- Development of non-metallic water barrier solutions for submarine high voltage cables
- To replace lead (Pb) sheat as main water barrier construction;
  - environmental and marketing reasons
  - Reduce weight and increase the loading capacity

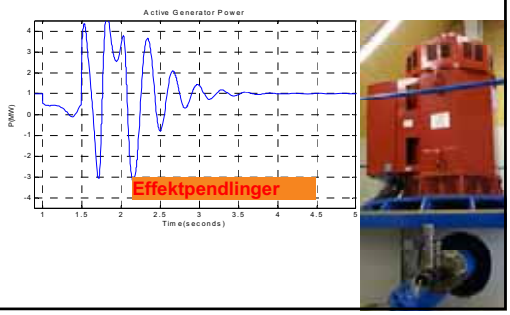
Facts:
Title: Development of high voltage polymer subsea cables for large sea depths
Institution: Nexans
Total budget: 5,5 mill. kr.
From RENERGI: 2,6 mill. kr.
Duration: 2006 – 2008

Forskningsrådet

Distribution 2020

- Fault handling in the distribution network:
  - Fault localisation
  - Earth Fault detection
  - Protection - distributed generation
- Tecnical challenges connected to distrubuted generation:
  - Stability
  - Voltage alterations
  - Protection
  - Fault detection
  - Islanding
- Site examples
- Precautions, like selection of generator

Facts:
Title: Distribution 2020
Institution: SINTEF Energiforskning AS
Total budget: 12,7 mill. kr.
From RENERGI: 7,5 mill. kr.
Duration: 2005 – 2009



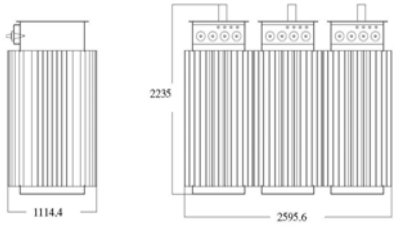
Forskningsrådet

Voltage stabilising in weak 12-24kV power lines

New booster developed:

- No moving parts
- No expensive converters
- Testinstallation late 2009 at Eidsiva
- Measuremnets, verification and test of models for simulation/iplementation during 2010
- Patents initiated.

Fact:
Title: Voltage stabilising in weak MV-networks with distributed generation
Institusjon: Magtech
Total budget: 7,0 mill. kr.
From RENERGI: 2,1 Mill. kr.
Duration: 2007 – 2009



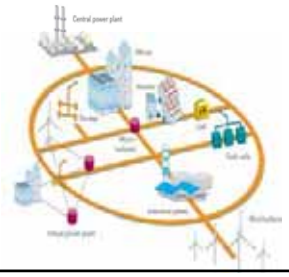
22

Forskningsrådet

Risk-Based Distribution System Asset Management

- New methods, models and tools to support asset management in distribution companies
- Will result in better decision process both strategically and operationally and better documentation of what is done.
- Form methods to take care of economy, quality and security of supply, vulnerability, environment, contracts, reputation etc.
- Results:
  - Handbook – guide for maintenace strategy in distribution network
  - Handbook – guide for reinvestments analysis in distribution network

Facts:
Title: Risk-Based Distribution System Asset
Institution: SINTEF Energiforskning AS
Total budget: 18,3 mill. kr.
From RENERGI: 10,4 mill. kr.
Duration: 2006 – 2010



23

Forskningsrådet

Condition monitoring – PD measurements

- Innovative method for condition monitoring based on radio frequency. Secure detection of partial discharge (PD) from high tension eguipment:
  - Transformers and switchgear can easily be controlled
  - Control without disconnecting the equipment
  - Increased security for personell

Facts:
Tittel: System for Electric Diagnosis of Partial Discharge on High Voltage Equipment
Institution: Doble Transinor
Total budget: 10,5 millioner kroner
From RENERGI: 4,2 MNOK kroner
Duration: 2006 – 2008

24

Forskningsrådet

Nordic Energy Research

Forskningsrådet

Nordic Energy Research

To be investigated

- How will the wind turbine/wind farm be electrically modelled and designed to fulfill the demands from the grid operators?
- How can wind turbines/wind farms participate in balancing control and provide other system control services?
- How to develop good models for adaptations and integration of large amount of wind energy into the electricity markets?

Objectives

The main objective is to develop models for studying the implications of operating the Nordic grid with a large amount of the electric power and energy coming from wind farms.

Facts:

- **Title:** Model Development for Power System Analysis with a substantial wind energy Capacity installed in the Nordic grid
- **Institution:** Chalmers
- **Total budget**: 11,1 mill. kr.
- **From NER:** 5,0 mill. kr.
- **Duration: 2007-2010**

Particiipants

ABB,Finland
Statkraft, Norway
Vattenfall, Sverige
Svenska Kraftnat, Statnett and Energinet DK
Vestas, Denmark
Energynautics, Denmark
Nelja Energia, Estonia

26

Forskningsrådet

Nordic Energy Research

Nordic Top-level Research Initiative: 450 mill kr. over 5 years

Grid aspects

- What grid investments will be necessary to cater for increased wind power including new
- techniques for monitoring and controlling of power consumption/production?
- Should wind parks be located in special areas due to grid considerations?

Facts:

- **Title:** The sub-programme "Integration of large-scale wind power"
- **First call evaluation 30.04.10**
- **Total budget**: estimate 60 mill. kr.
- **From NER:** 30 mill. kr.
- **Duration: 2010-2014**

27

Forskningsrådet

Nordic Energy Research

Main objectives

- build capacity and competence to further our understanding of energy market integration and policy interaction issues in the Nordic countries.

Sub-objectives:

- produce high-level empirical and fundamental research on specific Nordic energy-market issues;
- educate PhD-students who specialise in energy-market research
- improve theoretical and empirical foundation for regulators ' and market-participants' decisions
- improve general understanding of energy-market issues.

Facts:

- **Title:** Nordic Energy, Environmental Constraints and Integration (NEECI)
- **Institution:** Statistics Norway
- **Total budget**: 10,4
- **From NER:** 8,0 mill. kr.
- **Duration: 2007-2010**

Participants

Stockholm School of Economics, Sweden
Copenhagen University, Denmark
University of Reykjavik, Island
Helsinki School of Economics, Finland

28

Forskningsrådet

Nordic Energy Research

Main objectives of Nordic AMR Forum:

- Contribution to harmonisation of the technical rules and regulations related to implementation and operation of AMR systems
- Development of a common strategy, related to use of data formats (protocols) for transfer of metered data
- Sharing experience among Distribution System Operators, related to implementation and operation of AMR systems
- Work on functional requirements for AMR systems (as well as minimum requirements) in order to fulfill the future needs of metering and Demand Response.

Facts:

- **Title:** Initiation of Nordic AMR Forum
- **Institution:** SINTEF Energy Research
- **Total budget**: 2,7 mill. kr.
- **From NER:** 1,4 mill. kr.
- **Duration: 2007-2008**

Participants

Energi Norge, Norway
VTT, Finland
Energy Industries, Finland
Elforsk AB, Sweden
Svensk Energi, Sweden
Danish Energy Association, Denmark
Forum of Nordic Regulators

29

Forskningsrådet

Thank you for your attention!

fn@energiconsult.com

www.energi21.no

www.forskningsradet.no

www.nordicenergy.net

Mission, strategy and approach of the Flemish Smart Grid Platform

Guy Vekemans, VITO, Belgium

March 30 2010
Amsterdam

The Flemish smart grid platform

Guy Vekemans

Content

- Summary of start-up
- A strategy and action plan for 2010 and beyond
- Start-up of working groups
- Examples of activities

Vlaams Smart Grids Platform

Start up VSGP

① Smart grids Flemish policy priority, November 2009

② Feasibility study platform including working/steering group, February 2010

③ Business plan and priority project portfolio, October 2010

④ Decision Flemish financing, 4 VTE's, 2nd half March 2010

⑤ Kick off working groups industrial partners, 2nd half March 2010

⑥ Press communication by the Flemish minister, 2nd half March 2010

⑦ Official establishment of the VSGP, 1st week April 2010

⑧ First board of directors, begin April 2010

Vlaams Smart Grids Platform

A preliminary action plan for 2010

Objectives

Roadmap per working group
Interaction with policy platform,…

Inventory of industry needs + support proposal,…

Steering committee
10 founding members
DSO, energy suppliers, ICT, Technology suppliers, research, regulator

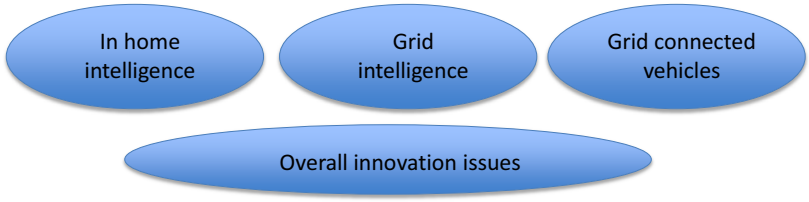
Positioning in EU-SET initiatives with own technology innovation
International promotion own innovation with FIT,…

5 large scale innovation projects (incl financing opportunities),…

4x10 workgroup meetings, 10 newsletters, updated website, TMR – watch (5 updates) , expertise mapping and promotion all partners…

Working groups

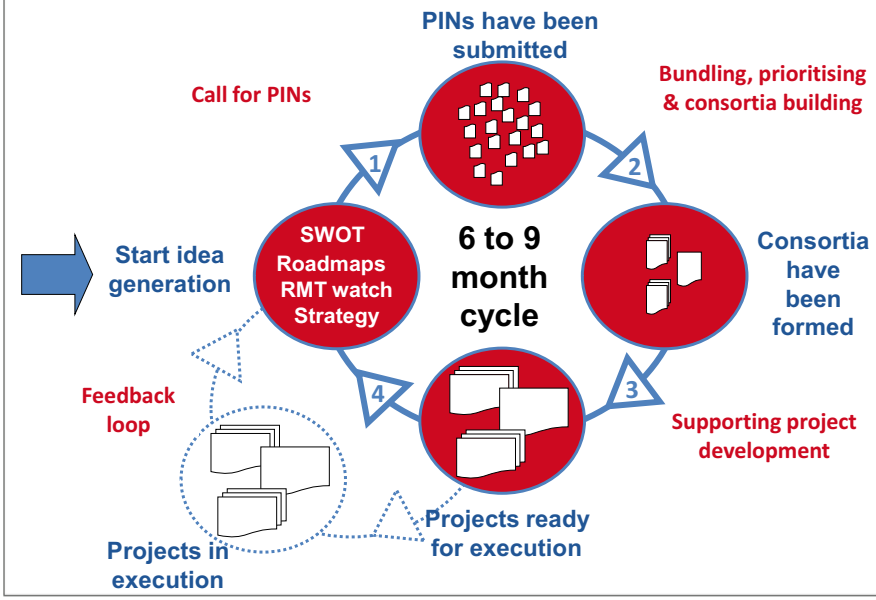
Working groups



Kick off meeting: 130 industrial participants
VSGP Member as co-ordinator
First meeting by end March 2010
Location: Alcatel Lucent
Agenda:

Common: status initiatives, financing opportunities, interaction groups,discussion approach project idea development
Per group: group strategy, selection priority projects,

Project definition cycle



Flemish initiatives – new pilot projects

linear
Intelligent Networks

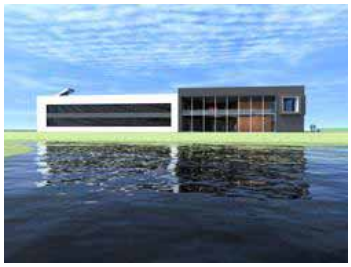
"A ticket for Flanders towards
a prominent innovation area
in intelligent energy networks"

Flemish initiatives – new platforms

vreg

Policy platform "Smart grids – smart meters"

Flemish initiatives – new platforms



Energy box demonstrator

Oostende wil broedplaats van jonge cleantech-bedrijven worden
The Energy Box, of het Huis van de Groene Energie, moeten Oostende mee in de speerpunt van het Belgische cleantech-gebeuren plaatsen.

http://www.power-link.be/oostende-zet-opnieuw-de-toon-met-ambitieuze-energy-box-0

EIT KIC Sustainable Energy InnoEnergy

Position of VSGP
By end May 2010

"The European Institute of Innovation and Technology (EIT) launches its first three Knowledge and Innovation Communities (KICs)"

Climate change mitigation and adaptation: **Climate-KIC**
Sustainable energy: **KIC InnoEnergy**
Future information and communication society: **EIT ICT Labs**

Vlaams Smart Grids Platform

EIT KIC Sustainable Energy InnoEnergy

Center for intelligent and efficient cities

eit KIC InnoEnergy

Vlaams Smart Grids Platform

Activities on short term

Studiedag energienetten 23 March 2010

lne.

transitie duurzaam wonen & bouwen

EU Sustainable Energy Week 2010 22-26 March

Presided by Flemish Smart Grid platform

Vlaams Smart Grids Platform

Activities on short term

TRANSMISSION & DISTRIBUTION EUROPE 2010

29 – 31 March 2010
Amsterdam, The Netherlands
Passenger Terminal Amsterdam

Representation in panelsession:
"The next big thing – challenges & solutions"

Vlaams Smart Grids Platform

I-Sup 2010

18-21 april 2010
Sustainable Energy – Smart grids

Key note speaker Guido Bartels –
General Manager Global Energy & Utilities, IBM
Chair of Fridwise

Flemish Smart grid platform, 21/04 afternoon – LINEAR

http://www.i-sup2010.org/program/speakers_theme_3.htm

2010 Shangai world expo
"Better city, better life"
Flemish programme
25 Mayn, smart grids conference, VSGP

Conclusions

① VSGP fully operational with 4 VTE's
② Working groups form key element
③ Imbedded in European structure
④ Open towards co-operation with other platforms

Smart Grid pioneer regions in Austria & research cooperation Smart Grids D-A-CH

Michael Hübner, Federal Ministry of Transport, Innovation & Technology, Austria

Bundesministerium
für Verkehr,
Innovation und Technologie

Smart Grid Pioneer Regions in Austria
&
Research Cooperation Smart Grids D-A-CH

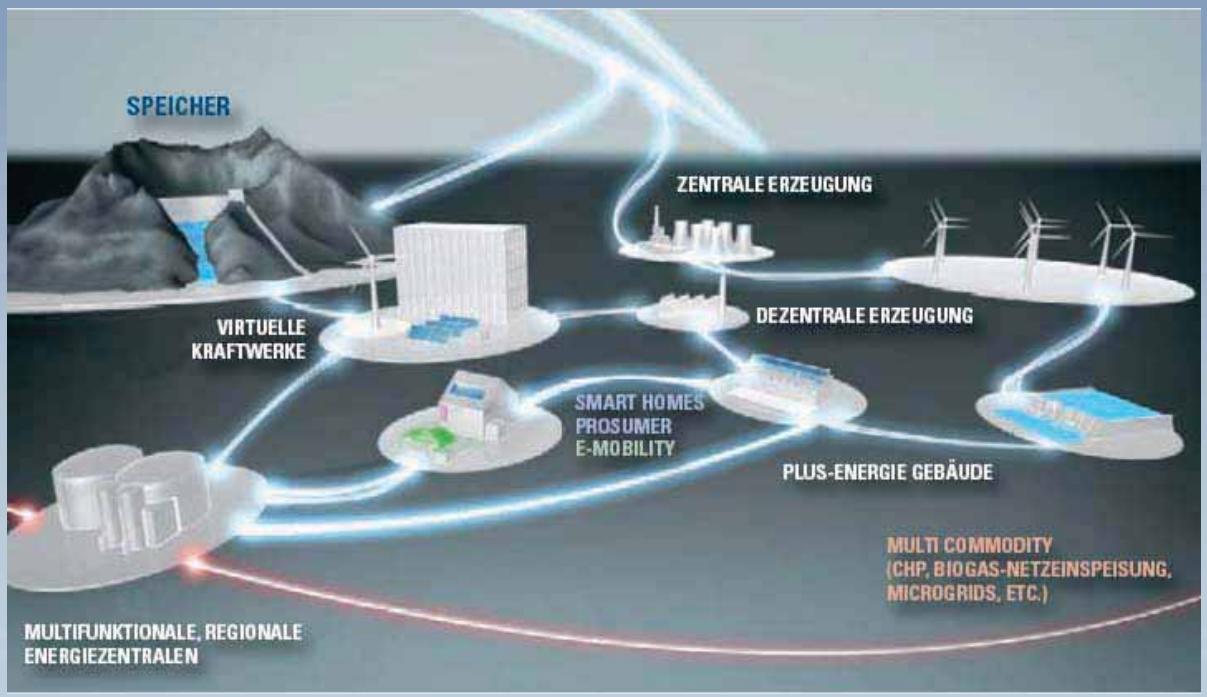
ERA-Net Workshop

Amsterdam, March 30th 2010

Michael Hübner

Strategy and Program Management
Energy and Environmental Technologies
Federal Ministry for Transport, Innovation and Technology

Smart Grids in Austria

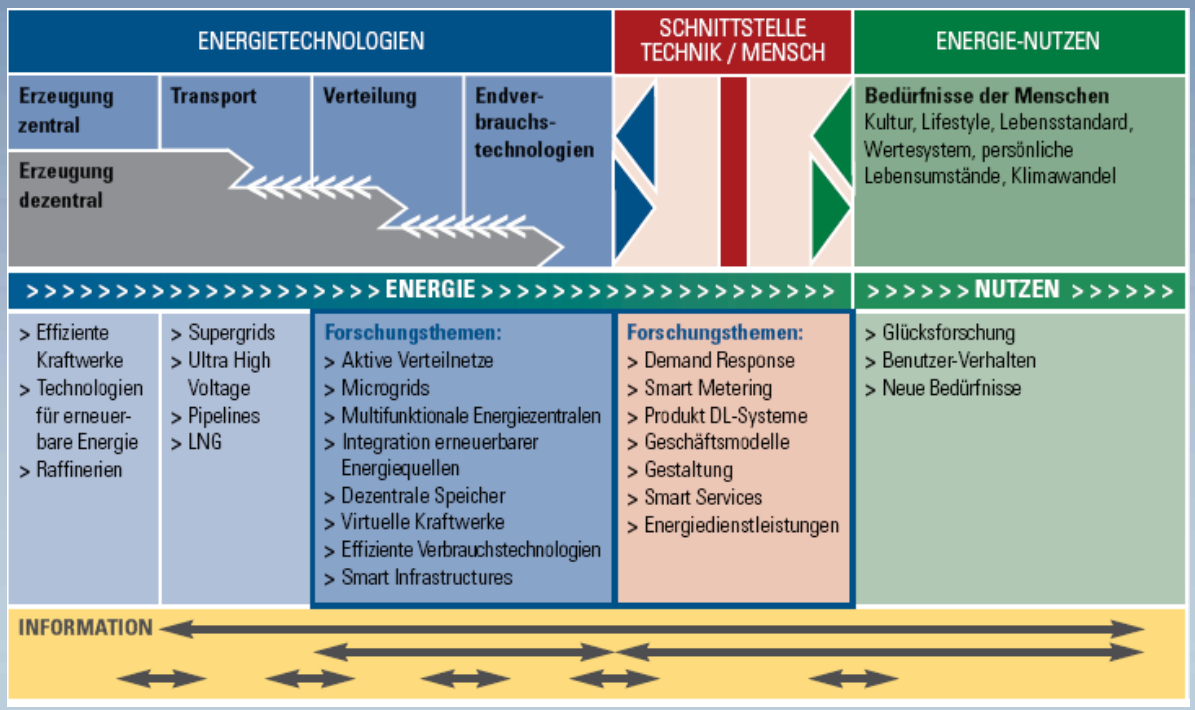


Why Smart Grids

- **Electricity Infrastructure as a basis for the achievement of policy goals towards sustainability**
- **Integration of renewables and dispersed generation**
- **Increase of efficiency in the energy system**
- **Resource optimisation in the power system**
- **Robust and secure power supply**
- **New services and technologies like electro mobility**
- **Self-sufficient energy regions**

Picture source: österreichischer Biomasseverband

Smart Grids as an Element in a Systemic Approach



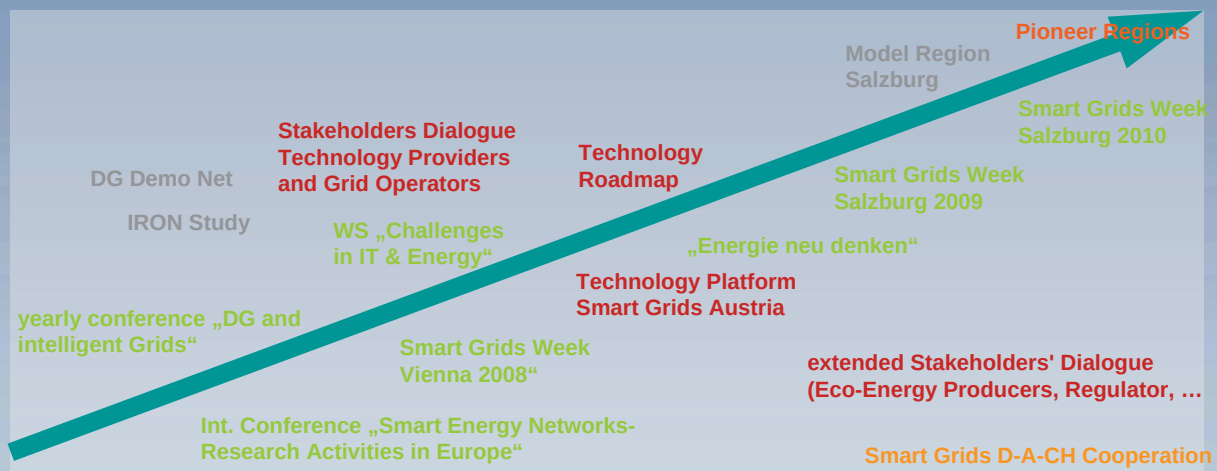
Program Strategy
"Energy Systems, Grids and End-use"

2003 → 2010

ENERGIE SYSTEME der Zukunft & klima+ energie fonds

yearly call, yearly budget ~8 Mio €

Continuous Strategy Process Smart Grids

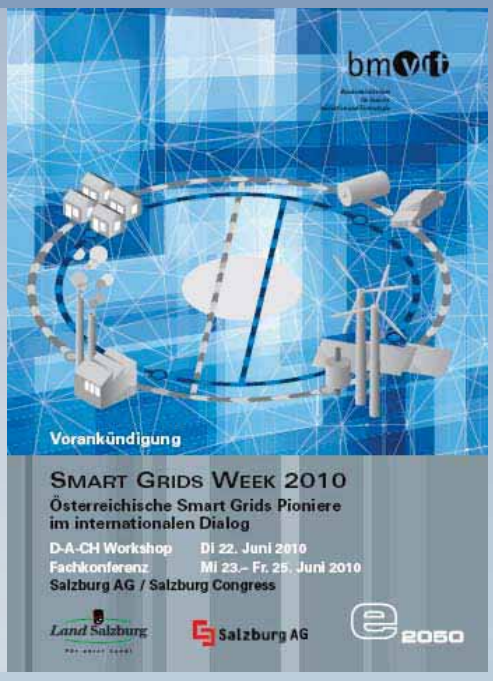


Technology Platform and Roadmap

Smart Grids Week 2010
"Austrian Smart Grids Pioneers in Dialogue"

- **Presentation of the Austrian Pioneer Regions**
- **Austrian activities in the European context of other national and EU Demo Projects**
- **First concrete steps towards implementation of the „Smart Grids D-A-CH" Technology Cooperation with Germany and Switzerland**
- **Project forum and actual calls for Proposals**

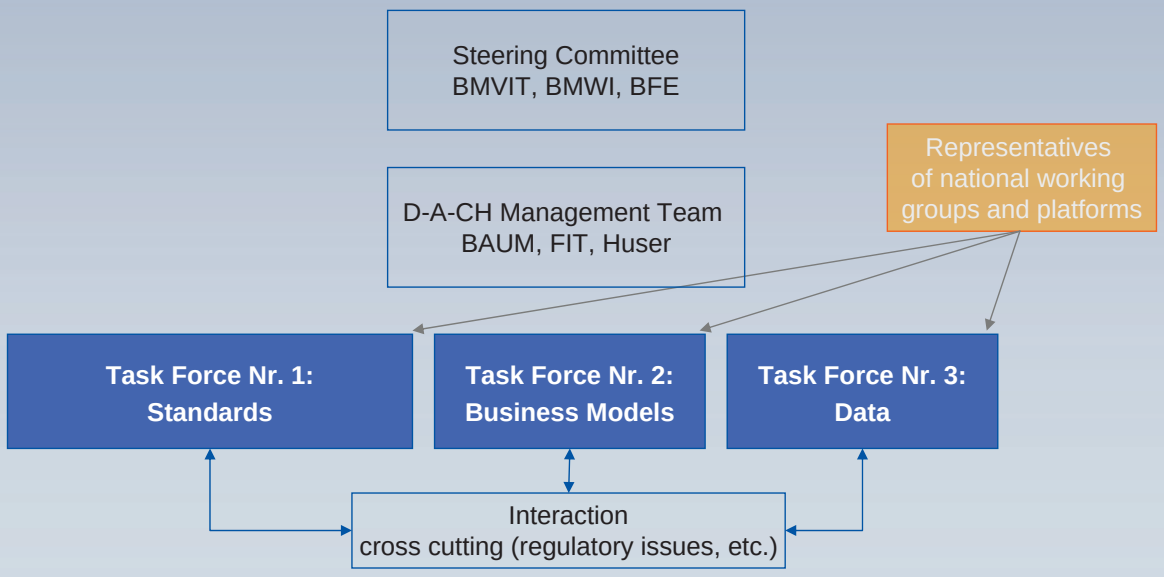
www.ENERGIESYSTEMEderZukunft.at/smartgridsweek



Smart Grids D-A-CH: Agenda

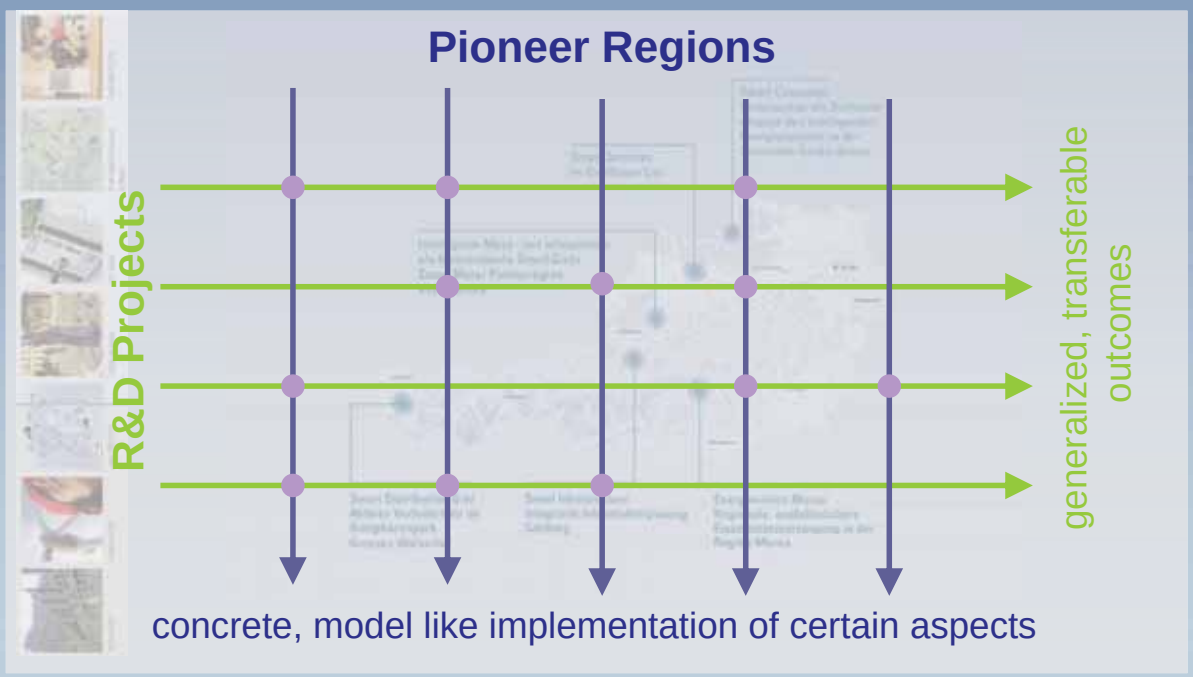
- technology cooperation with Germany and Switzerland to develop and test smart grids implementation strategies
- knowledge exchange and coordination of national technology policies
- support of knowledge exchange between national projects (model regions, competence centers, …)
- cooperation to develop solutions for cross cutting issues (interoperability, standards, security, legal aspects, business models,…)
- coordination of public activities to raise users acceptance and fostering of technology transfer

Smart Grids D-A-CH: Communication Structure

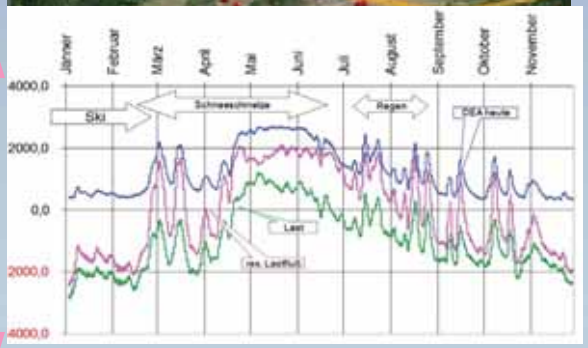


Smart Grid Pioneer Regions

Smart Grids R&D and Pioneer Regions



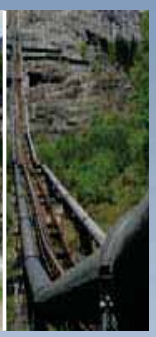
Smart Distribution Grid – Alpine Region „Großes Walsertal“

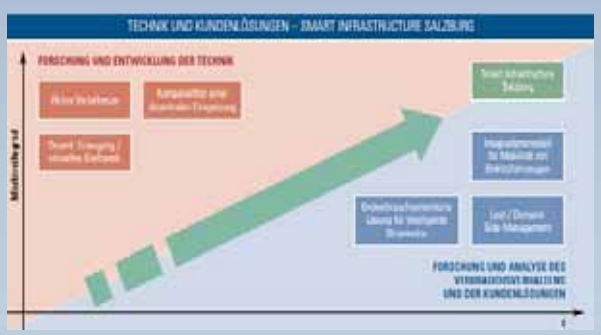


- **Scheduled small hydropower development (additional 10 MW would be possible)**
- **Boarder of capacity in the distribution grid already reached**
- **innovative voltage control**
- **„Bites statt Bagger“ – active Distribution Grid more economic solution than building new lines**

Contact: VKW-Netz AG

Smart Infrastructure – Integrated Infrastructure Planning in Salzburg





- **multi commodity approach**
- **horizontal integration – over all energy carriers and components**
- **vertical integration – energy policy / operation, extension and adaption planning / asset management**
- **Active distribution grid, consumer2grid, building2grid, virtual pp, smart heat networks, vehicle2grid**

Contact: Salzburg Netz AG

Smart Microgrid – Energy Vision Murau

- **Energy autonomy of the region intended; although investment in green power stations: if grid is down the region is without electrical power supply**
- **new partnership between local grid operator and "energy- region"**
- **new concepts for regional energy management**
- **keeping a life the supply for the most important appliances also in case of grid breakdown**

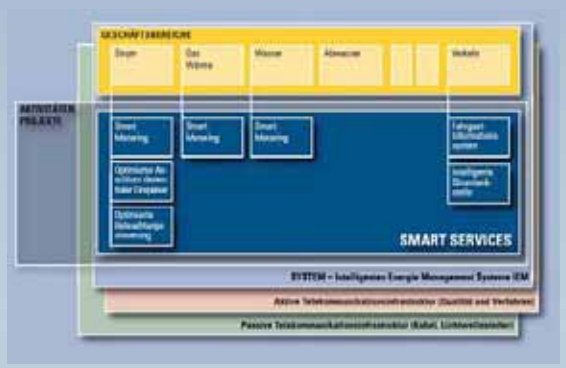
Contact: Stadtwerke Murau

Smart Consumer – the Consumer as a key player in the municipality of Groß Schönau

Contact: Gemeinde Großschönau

- **„Sonnenplatz Großschönau" – Municipality defines itself as an „Energy Region" with focus on efficiency**
- **Passive house village for test-living, 50 energy consultants out of the local people, reduction of energy consumption in communal buildings of 20-30%**
- **Demand management, demand Response**

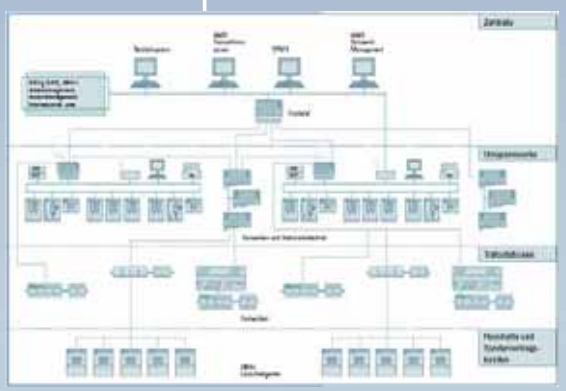
Smart Services in the area of Linz



- **Rollout of 250.000 Smart Meters (11.000 meters per year) ahead**
- **Basis: building up an intelligent communication-and Information-infrastructure**
- **Building on that- multi commodity services – control of application, local measurement, transferor data**
- **E.g.: smart passenger- info system, smart meter based energy consulting, smart street lighting for communities**

Contact: Linz AG

Smart Metering – pioneer region Vöcklabruck



- **automatic metering and information system AMIS (automatic metering and information System)**
- **new information up to billing (price, load profiles) or quality management**
- **test region Vöcklabruck, 10.000 meters installed**
- **Rollout of 100.000 meters planned**
- **smart metering Laboratory Gmunden**

Contact: Energie AG

Danke für ihre Aufmerksamkeit

michael.huebner@bmvit.gv.at

www.ENERGIESYSTEMEderZukunft.at

Concept for controlling the power system 2025

Jeanette Møller Jørgensen, Energinet.dk, Denmark

Concept for controlling the power system in 2025

- a part of SmartGrids in Denmark

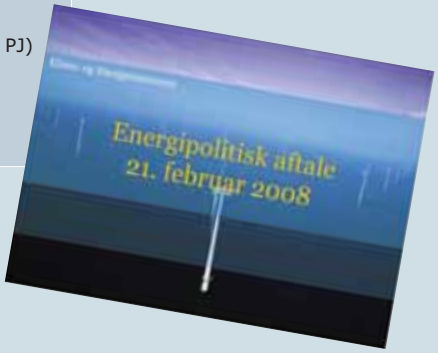
Jeanette Møller Jørgensen
Coordinator, R&D
Energinet.dk

Facts about Energinet.dk

- Independent public enterprise under the Ministry of Climate and Energy
- Own Supervisory Board
- Approx. 500 employees
- Owns and operates the motorways of energy
  - The main electricity grids
  - The main natural gas grids
- Annual turnover: DKK 8-9 billion
- The consumers contribute to our activities via tariffs on their electricity and gas bills

Energy settlement 2008

- + 1300 MW new windpower in the power system by 2012
- 30 % RE in the energy system by 2020
- 50 % RE i the power system in 2025, mainly windpower
- Biogas from 4 PJ to 20 PJ in 2020 (potential 40 PJ)
- Biomass on central CHP plants
- Smart Grids deployment ???

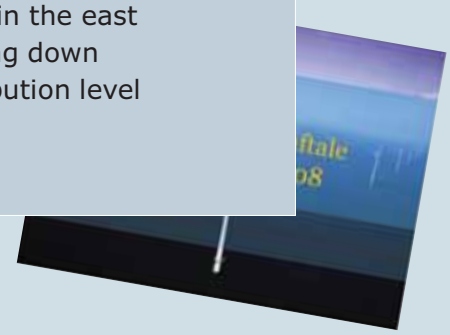


Concept for control 2025 1st SmartGrids ERA-Net Workshop

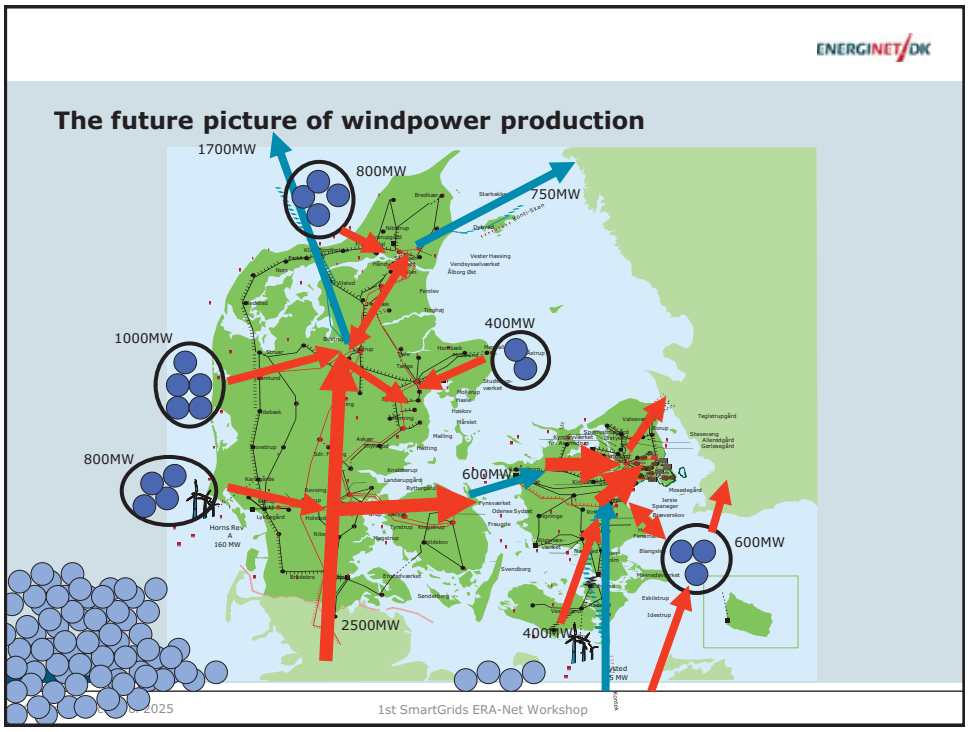
Energy settlement 2008

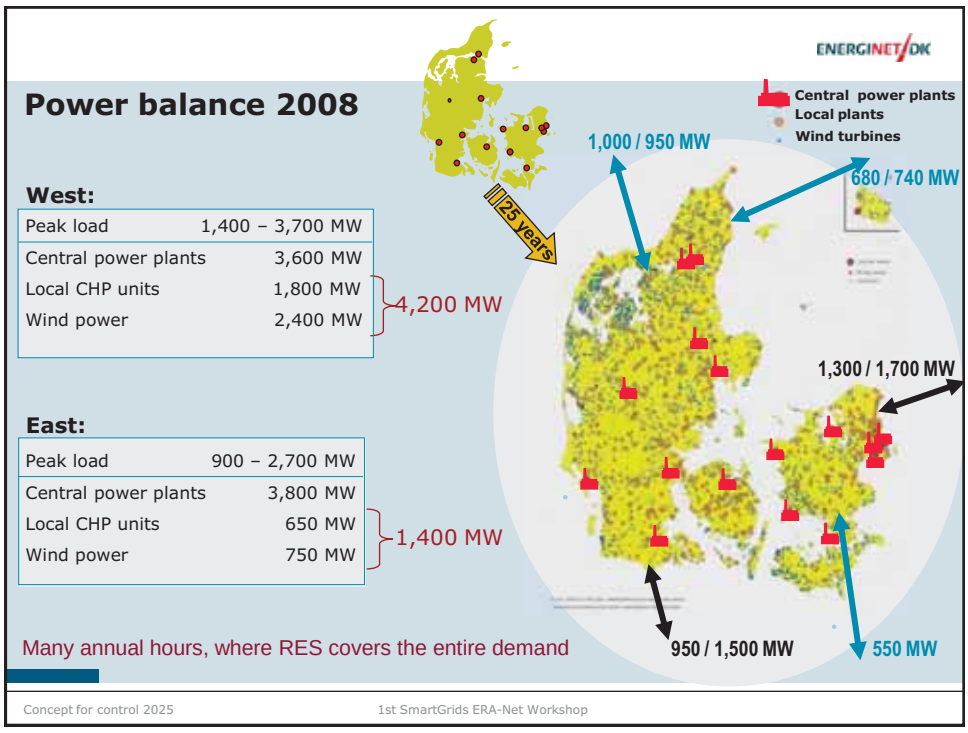
Also to include in the solution:

- Independent of fossile fuels
- Cabels
- Production in west, demand in the east
- Several big CHP plants closing down
- New RE production on distribution level



Concept for control 2025 1st SmartGrids ERA-Net Workshop

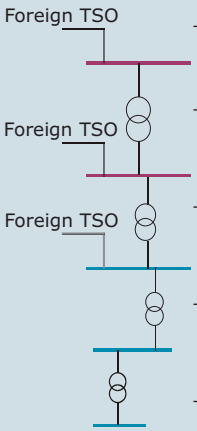

ENERGINET.DK
The future picture of windpower production
1700MW
800MW
750MW
400MW
1000MW
800MW
600MW
600MW
2500MW
400MW
1st SmartGrids ERA-Net Workshop


ENERGINET.DK
Power balance 2008
Central power plants
Local plants
Wind turbines
1,000 / 950 MW
680 / 740 MW
25 years
West:
Peak load 1,400 – 3,700 MW
Central power plants 3,600 MW
Local CHP units 1,800 MW
Wind power 2,400 MW
4,200 MW
1,300 / 1,700 MW
East:
Peak load 900 – 2,700 MW
Central power plants 3,800 MW
Local CHP units 650 MW
Wind power 750 MW
1,400 MW
Many annual hours, where RES covers the entire demand
950 / 1,500 MW
550 MW
Concept for control 2025
1st SmartGrids ERA-Net Workshop

ENERGINET.DK

Generation capacity per voltage level

as of January 2009



	West	East
400 kV	Conv. 1,501 MW	Conv. 1,205 MW
132-150 kV	Conv. 1,995 MW Wind 160 MW	Conv. 2,287 MW Wind 169 MW
50-60 kV	Conv. 141 MW CHP 540 MW Wind 18 MW	Conv. 290 MW CHP 263 MW Wind 1 MW
10-30 kV	 CHP 1,166 MW Wind 1,686 MW	Conv. 24 MW CHP 320 MW Wind 376 MW
Low voltage	CHP 72 MW Wind 552 MW	CHP 66 MW Wind 209 MW

	West	East	
Conv.	3 496	3 492	MW
CHP			MW
Wind	160	169	MW
Σ	3,656	3,661	MW

	West	East	
Conv.	141	314	MW
CHP	1,778	649	MW
Wind	2,256	586	MW
Σ	4,175	1,449	MW

ENERGINET.DK

Technically challenges towards 2025

Challenges for Power balancing:

- **Use of RE**
- **Coupling between design of market and power balance**
- **Frequency stability**

Challenges for the power system:

- **Short circuit power** Short circuit power
- **Voltage and stability of voltage**
- **Bottlenecks**

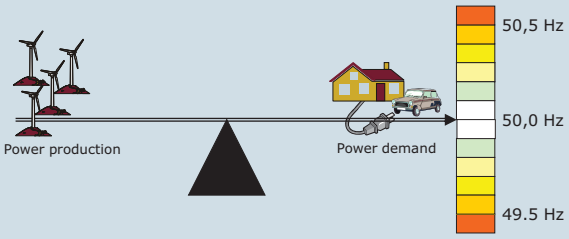
Development of the "glue" to tie issues together:

- **Standardisation of data communication and infrastructure**

ENERGINET.DK

Use of RE

New paradigme: → Demand must follow production



- To all times – inclusive when 100 % RE – the power balance must be maintained

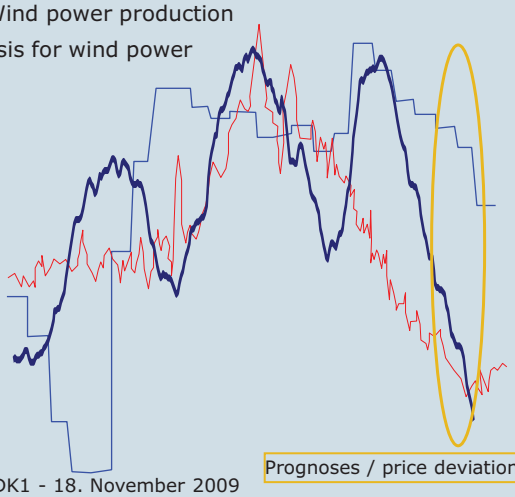
ENERGINET.DK

Coupling between market and power balance

Ligth blue: Spot price

Dark blue: Wind power production

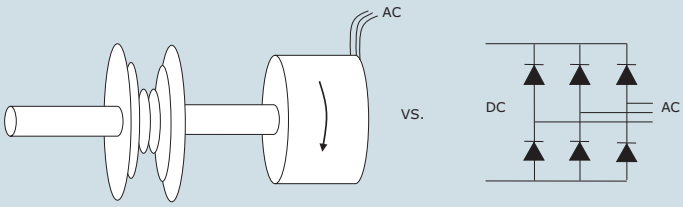
Red: Prognosis for wind power



Prognoses / price deviation up to 36 hours

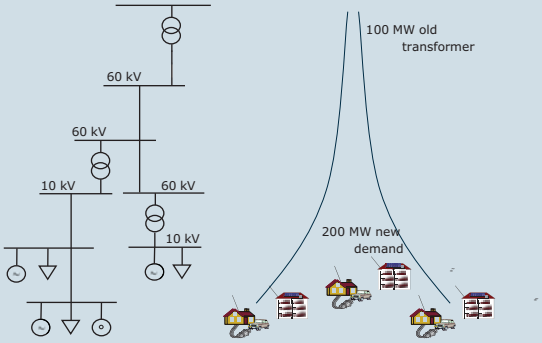
Horns Rev and DK1 - 18. November 2009

More inverter basered power production in the future in many countries



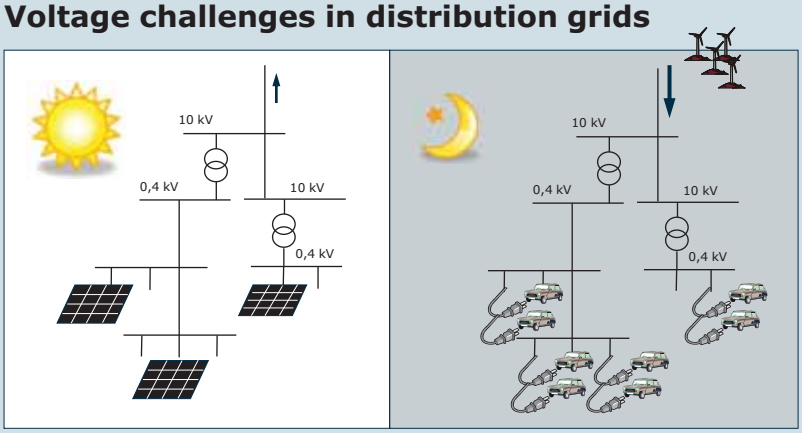
- Less inertia and less Short circuit power

Bottlenecks in distribution grids



ENERGINET.DK

Voltage challenges in distribution grids



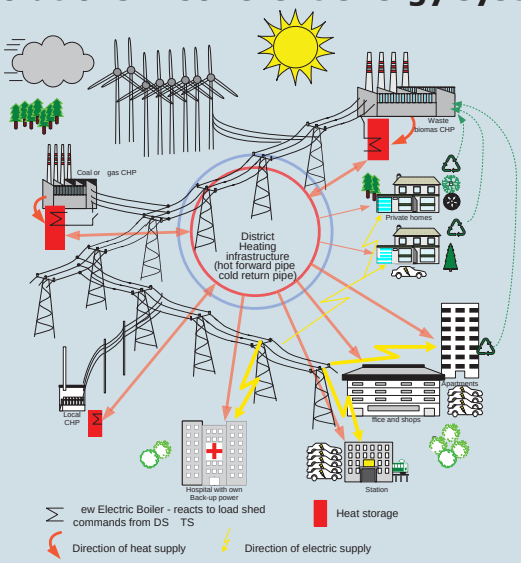
ENERGINET.DK

Sustainable solutions – Coherent energy systems

60 % of Danish households are using District Heat

Uni ue Danish position

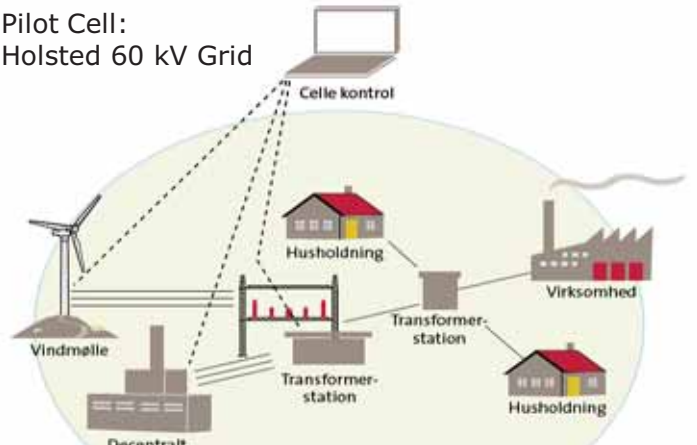
- CHP units
- Wind power
- District heat
- ew:
  - Electric Vehicle
  - Heat pumps



ENERGINET.DK

Cell Controller – World class development

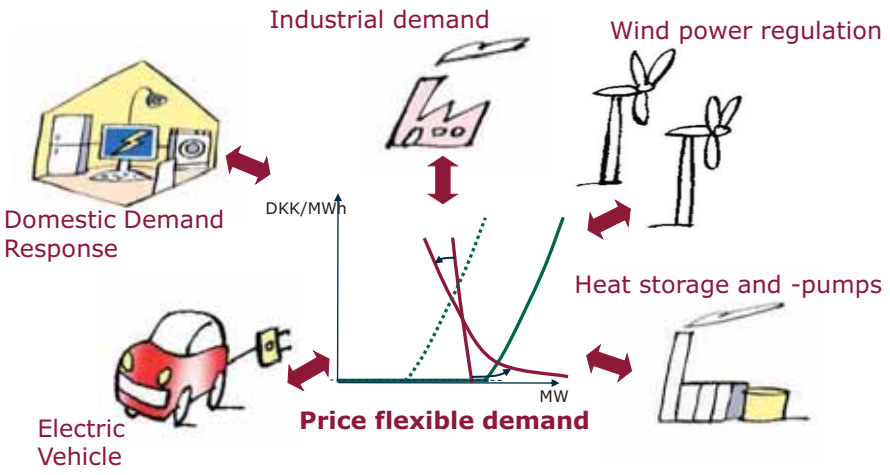
Pilot Cell:
Holsted 60 kV Grid



Installed CHP:	37 MW
Installed Wind power:	39 MW
Peak last:	61 MW
150/60 kV Trafo:	100 MVA

ENERGINET.DK

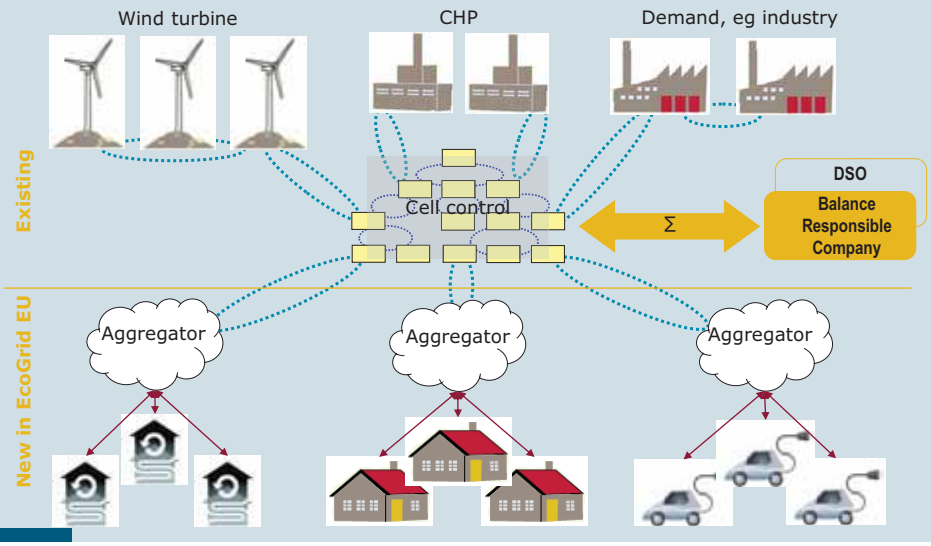
Marked based participation of all resources



EcoGrid EU
www.eu-ecogrid.net

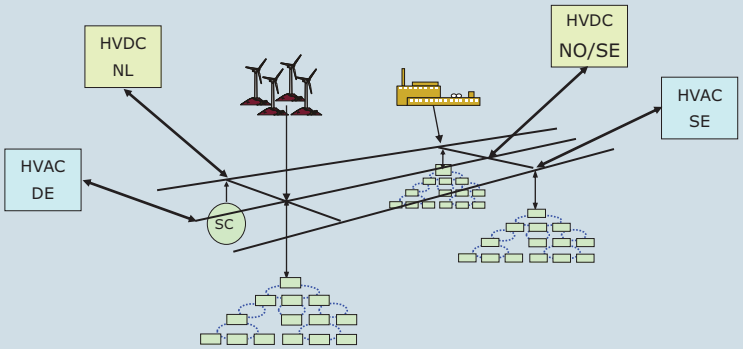
ENERGINET.DK

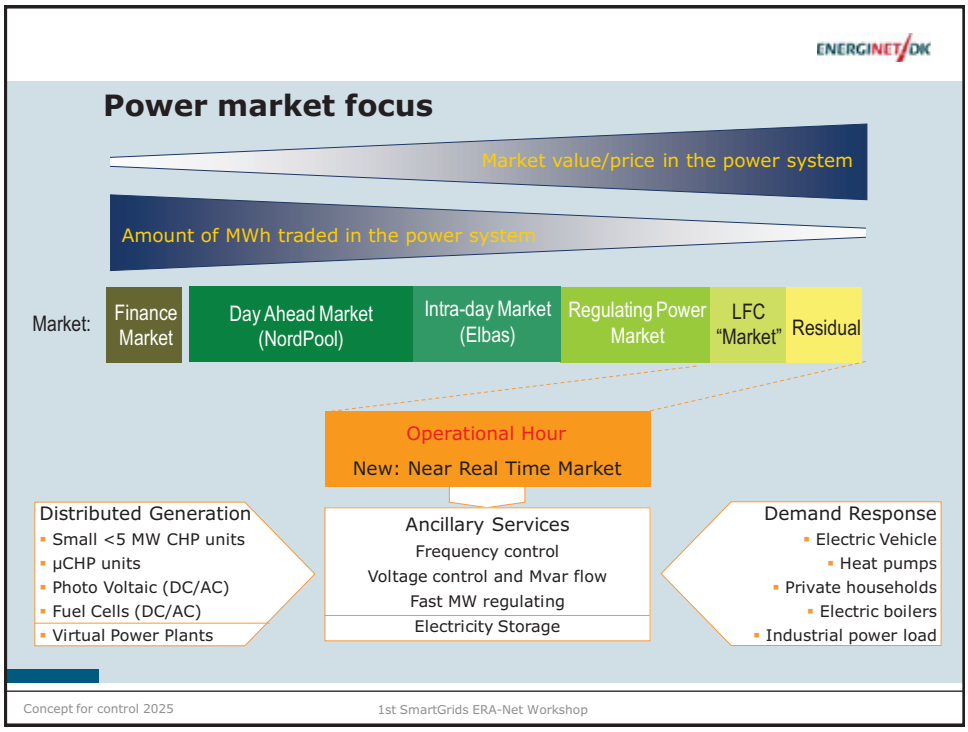
Cell control to be used in EcoGrid EU

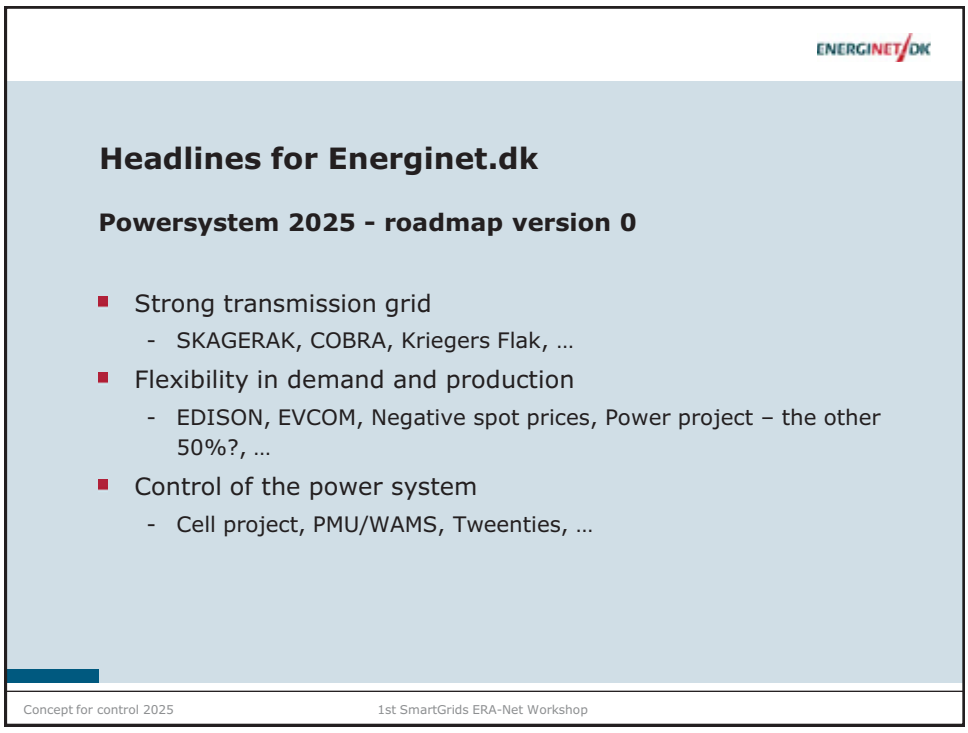


ENERGINET.DK

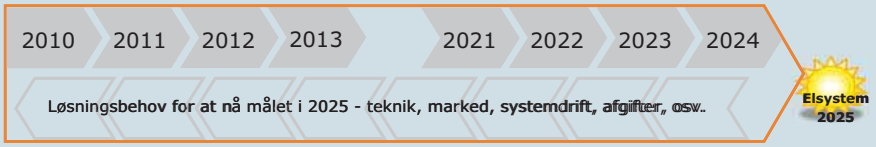
Active Distribution Network Support to Transmission Networks




ENERGINET.DK
Power market focus
Market value/price in the power system
Amount of MWh traded in the power system
Market:
Finance Market
Day Ahead Market (NordPool)
Intra-day Market (Elbas)
Regulating Power Market
LFC "Market"
Residual
Operational Hour
New: Near Real Time Market
Distributed Generation
▪ Small <5 MW CHP units
▪ µCHP units
▪ Photo Voltaic (DC/AC)
▪ Fuel Cells (DC/AC)
▪ Virtual Power Plants
Ancillary Services
Frequency control
Voltage control and Mvar flow
Fast MW regulating
Electricity Storage
Demand Response
▪ Electric Vehicle
▪ Heat pumps
▪ Private households
▪ Electric boilers
▪ Industrial power load
Concept for control 2025
1st SmartGrids ERA-Net Workshop


ENERGINET.DK
Headlines for Energinet.dk
Powersystem 2025 - roadmap version 0
Strong transmission grid
- SKAGERAK, COBRA, Kriegers Flak, …
Flexibility in demand and production
- EDISON, EVCOM, Negative spot prices, Power project – the other 50%?, …
Control of the power system
- Cell project, PMU/WAMS, Tweenties, …
Concept for control 2025
1st SmartGrids ERA-Net Workshop

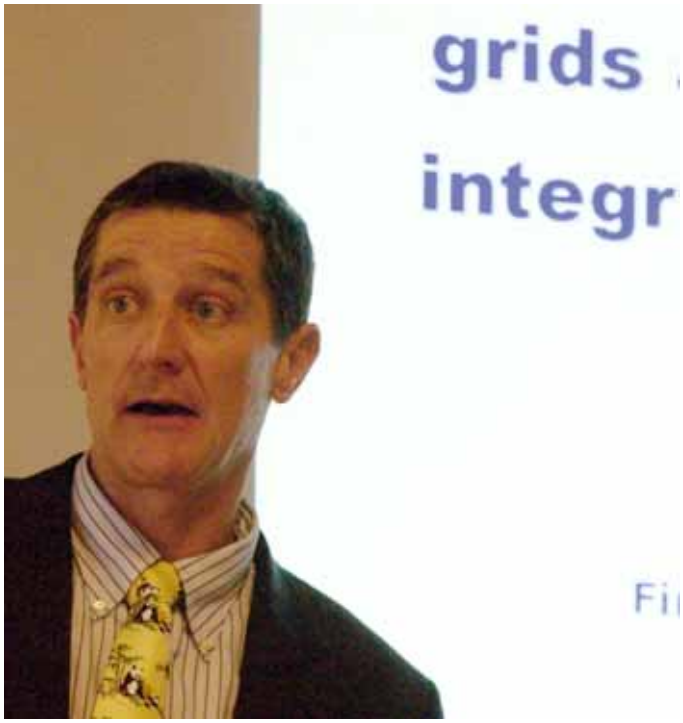
Principle for Roadmap 2025



Thank you

Smart Grids in France: The French Road Map & the R&D Demonstrator Fund

Stéphane Biscaglia, ADEME, France



French roadmap for smart grids and electricity systems integrating renewable energy sources

ADEME

First Smartgrids Era-Net workshop

30th March 2010

French Environment and Energy Management Agency

- **Public body** acting in the public and private sectors.
- Under the **joint supervision** and control of :
  - Ministry of Ecology and Sustainable Planning and Development
  - Ministry of High Education and Research
- About **1000 employees** working in:
  - 3 central sites (Angers, Paris, Valbonne) - Corporate headquarters in Angers
  - 26 Regional Directions including overseas departments
  - 3 offices in French overseas territories
  - 1 office in Brussels

ADEME's Aims

- ADEME is acting as the French Government's dedicated organization to disseminate the best technologies and practices designed to protect the environment and save energy
- ADEME aims to be the point of reference and privileged partner for all private companies and local authorities regarding environmental questions.
- ADEME is the Government's dedicated organization to implement in the whole country the decisions of the « Grenelle de l'Environnement »

Four types of activity

Develop Knowledge

By supporting the research in technology and innovation, including industry processes and competitiveness

Convince and mobilize

Through actions of communication, information, education and training

Advise

By developing advisory services, disseminated directly or via partnerships

Help in decision-making and to achieve execution

Through accompanying action and funding

The R&D demonstrator fund (1/2)

Created in 2008

Funded with 400 M€ for the 2008 – 2012 period

3 Objectives :

- **Evaluate and validate the different technological options at the demonstration stage ;**
- **Identify new R&D priorities, through demonstration assessment ;**
- **Foster the transfer of advanced R&D results to the R&D demonstrator stage and in fine to the market.**

Focused on new energy technologies :

2sd generation biofuels, Low emission vehicles, Capture and storage of CO2, Smart Grids, Marine energies, Positive energy buildings, …

The R&D demonstrator fund (2/2)

Implementation of a call for demonstrators: A four steps process.

1. **The shaping of a thematic roadmap with key private and public experts.**
2. **The writing and the launch of the call.**
3. **Technical expertise and evaluation of proposals with presentation to the fund steering committee (Ministries).**
4. **Funding of the projects (ADEME)**

To be relevant, each proposition must involve a partner from the industrial sector which would be ready to carry on and finance the possible future deployment of the technology on the market.

FRENCH SMART GRIDS ROADMAP

Methodology of elaboration

1. **Establishment of the expert group (all stakeholders).**
2. **International benchmark on the thematic (R&D, Demo, regulation,…)**
3. **Identification of key drivers for the future evolutions**
4. **Building of contrasted visions in order to include all the most probable futures (time frames, 2020 and 2050).**

Four challenges for smart grids

1st challenge : **Attain emissions reduction objectives** for anthropogenic greenhouse gases (20% reduction by 2020 and 75% reduction by 2050 compared to 1995) ;

2sd challenge : **Comply with European objectives** for the integration of RE, i.e. 23% of final consumption by 2020 (compared to around 12% today) ;

3rd challenge : **Maintain quality and security of supply,** via competitiveness objectives for power intensive sectors and public service standards for individual users ;

4th challenge : **Consideration of social issues** related to electricity supply (e.g. energy affordability, equal access to electricity).

Time frame and geographic scope of roadmap

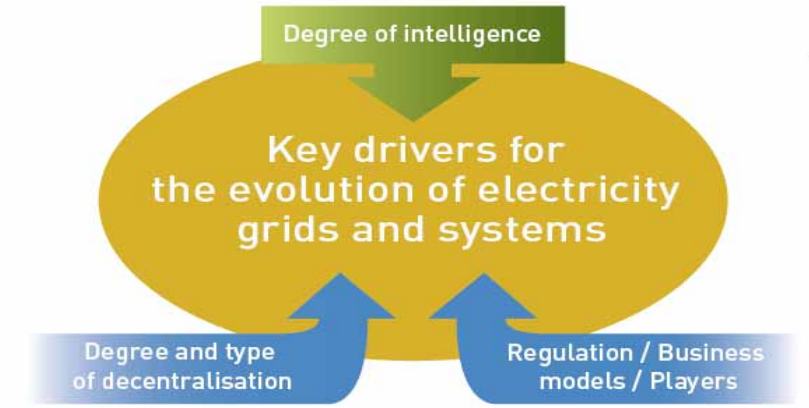
Time Frame : Up to 2020

- Relevant for **describing the major components of an electricity system** that significantly contributes to attain high quality supply and system security ;
- Relevant for **contrasting representations** of future electricity networks and systems.

Geographic scope :

- The roadmap has **a national dimension,** with particular attention to island electricity systems ;
- Nevertheless this roadmap is also set in a **European context** (SET Plan, European technology platform).

The key drivers



Regulation and business model

An Internet trajectory

- **The** number **of actors is greatly** multiplied ;
- **Each producer, consumer, service provider, storage site… is a** network node ;
- **Each network node can act on the grid under** widely defined protocols.
- **The relationships between the different actors of the system are determined** by a fully deregulated market.

An Enlightened Regulation

- **The number of actors increases,** but remains limited ;
- **Their functions and intervention are controlled by a** regulatory framework compatible with : **the emergence of new operators , increasing network intelligence, a certain degree of decentralization, the development of grid services, notably for demand side management;**
- **The relationships between the different actors of the system are determined** by a regulated market.

The roots of the 2020 visions

Improved forecasting models for wind farm generation and for photovoltaic elements and panels ;

Optimised integration of decentralised generation in grids ;

Evolution of distribution grids in order to allow strong penetration of decentralised generation ;

Interconnection of European transmission grids.

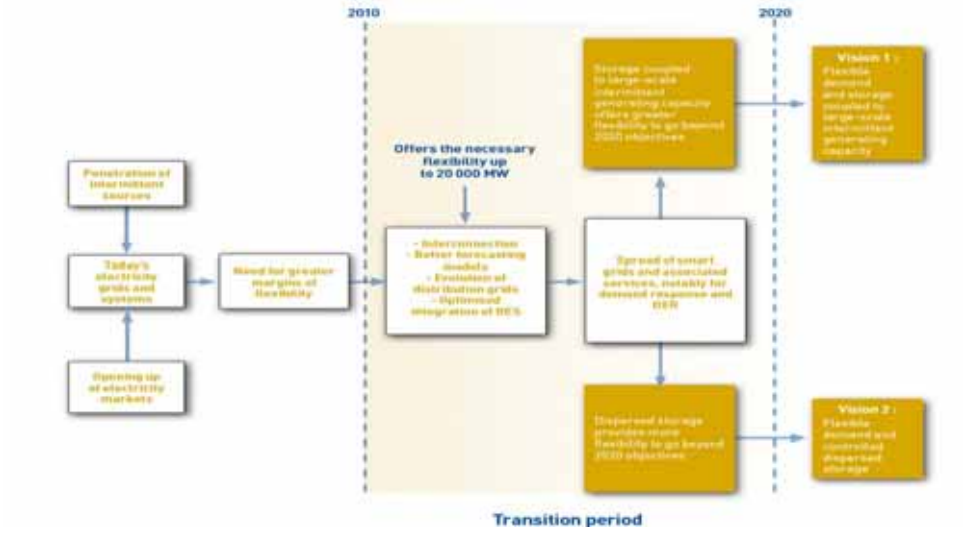
Provide enough flexibility for grids and electrical systems, up to additional capacity, of about 20 000 MW

Additional degree of freedom

- Grid and electricity system intelligence
- Centralised or decentralised storage

Additional degree of freedom

The 2020 visions

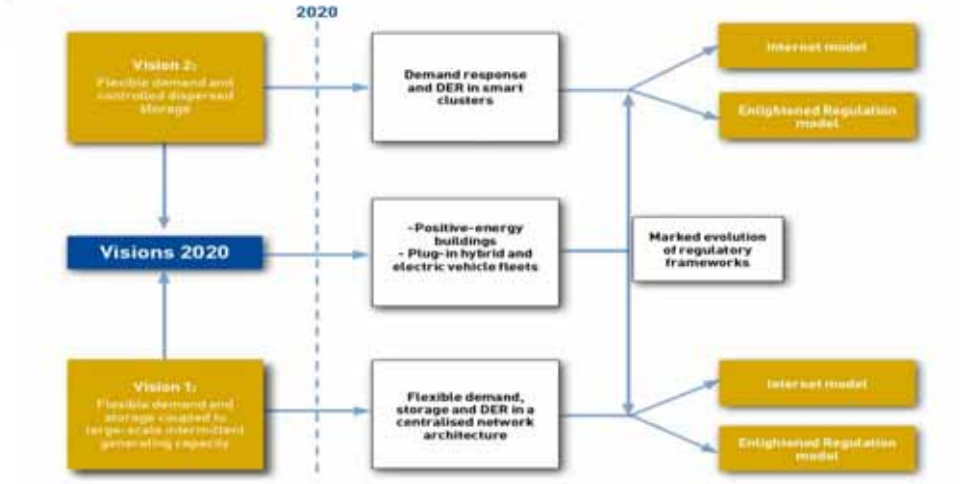


The roots of the 2050 visions

The visions for 2050 prolong the 2020 visions, on the assumption that, given the necessary time for deployment of technology into the networks and its linked long-term financial commitments, the technological options taken in 2020 will not be called into question for 2050 ;

The major shifts compared to the 2020 visions are tied to **different regulatory regimes** on the hand, and significant changes in **grid environments** on the other hand (for example, generalization of **positive-energy buildings** and **plug-in hybrids** and / or **fully electric vehicles**).

The 2050 visions



Bottlenecks

Nature of bottlenecks	Bottlenecks
Technological bottlenecks	Grid technologies: electrotechnical (energy conversion) equipment and systems
	Information systems applied to grids
	Centralised and decentralised storage technologies
	Security of smart grids and electricity systems.
Organisational/ regulatory bottlenecks	Tariff incentives for DSM and decentralised storage
	The role of different system actors and the emergence of new actors of significant size
	Regulatory frameworks governing the grid and actors in the electricity system
	Conception of new business models compatible with significant dissemination of DSM and DER
Socio-economic bottlenecks	Grid and electrical system environment (e.g. electric vehicles, positive-energy buildings)
	End-user behaviour (adoption + consumption behaviour)

Demonstrators needs : a smart grid functions approach

1st function : **Facilitate the insertion of distributed generation,** notably using renewable resources ;

2sd function : Enable **significant action to manage electricity demand** and intermittent production ;

3rd function : **Anticipate changes in the grid environment** (smart meters, positive-energy buildings, plug-in hybrid) ;

4th function : Test **new business models** that contribute to structuring actors in intelligent electricity systems (e.g. aggregators).

Thank you for your attention

3. Smart Grid Country Pictures & Conclusions for Concrete ERA-Net Activities

PRESENTATIONS

Mind-map for group discussion, WP4 – Joint Activities

Natalie Prüggler, UAS Technikum Wien, Austria

Mind-Map for Group Discussions

Smart Grid Research Environment in Europe

National Strategies

Downloading media

National Initiatives

National Programmes

National Initiatives

National Programmes

National SG Roadmaps

Thematic Clusters

Technology Platforms

Key Industry Players

Pioneer Regions

National Demonstration

ERA-Net Smart Grids

SmartGrids
ERA-Net

Joint Activities

Experts' exchange
Joint Activities
Joint Workshops
Joint Calls
International Research Cooperation
Technology platform meetings
SmartGrids
ERA-Net
Seize the NETWORK!

Think about ...

... how SG development can best succeed by building up-on:

- existing national strategies
- existing national research programmes
- existing national know-how / expertise

... and how:

- the budgets (EU & national) can be spent as efficient as possible

find answers to the following 4 questions:

And try to find answers to the following 4 questions:

1) Which goals do you aim at in the national (program) strategies?

⇒ ad 1)

- Get more researchers involved in SG research;
- Get researchers linked better to each other;
- Get a better overview of what research is done also outsinde of the program;
- Find technology nieches within the European/ Global research environment;
- ...

2) Which actions do you undertake in your country to foster SG development?

⇒ ad 2)

- Founding of national technology platforms;
- Supporting and encouraging Model / Demo Regions;
- Organize program workshops, where funded researchers present their work & ideas;
- ...

3) Which joint actions / ideas for collaboration do you have in mind?

⇒ ad 3)

- Joint workshops of national technology platforms;
- SG ERA-Net Call Workshops - presentation of funded projects;
- High level technical tours to Smart Grid demo sites;
- Further research co-operation like the D-A-CH co-operation;
- Incentivicing meetings for natinional researchers to present their national (funded) projects;
- ...

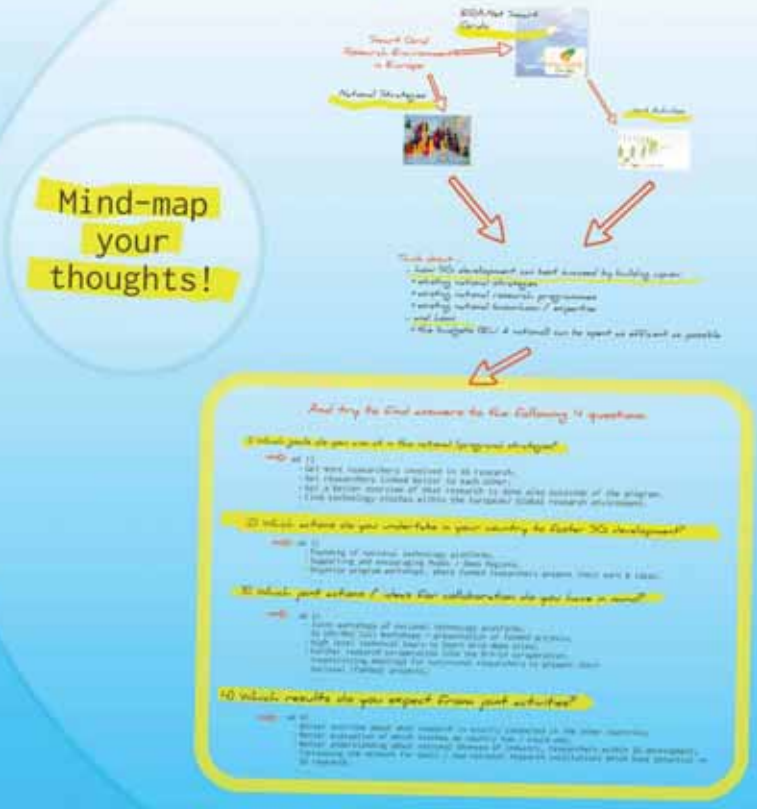
4) Which results do you expect from joint activities?

⇒ ad 4)

- Better overview about what research is exactly conducted in the other countries;
- Better evaluation of which nieches my country has / could use;
- Better understanding about national chances of industry, researchers within SG development;
- Increasing the network for small / new national research institutions which have potential in SG research;
- ...

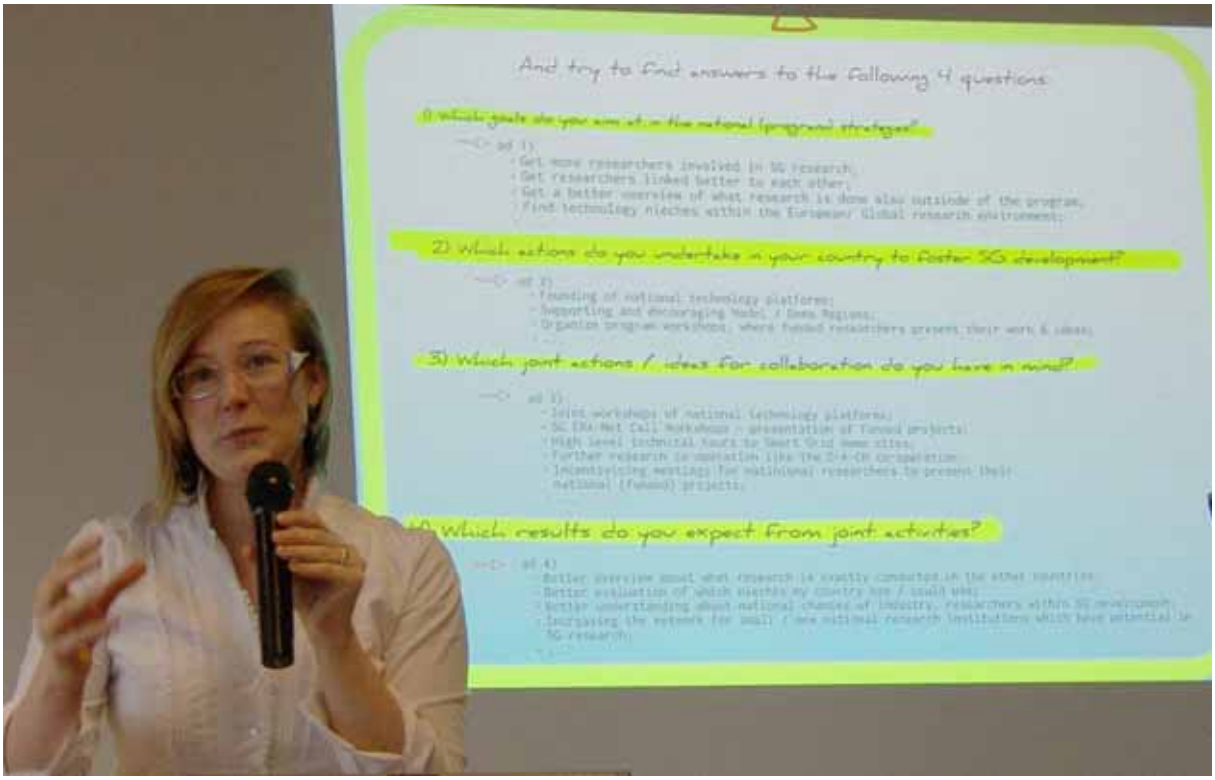
Mind-map your thoughts!

Mind-Map for Group Discussions



Post-IT: A thought experiment, WP4 – Joint Activities

Natalie Prüggler, UAS Technikum Wien, Austria



SmartGrids ERA-Net

WP 4 - Joint Activities

1st SG ERA-Net Workshop
30.03.2010 - Amsterdam

Natalie Glück

FACHHOCHSCHULE TECHNIKUM WIEN

What have we done?

1) We have collected questionnaires with

- documents of national strategies
- links in each country

SmartGrids ERA-Net

2) We have organised ...

... this 1st Smart Grids ERA-Net workshop

FACHHOCHSCHULE TECHNIKUM WIEN

What will we do?

Create several delierables:

1) Documents Lists → Country Fact Sheets
(Deliverable 4.2.1)

2) Work Shop Output → Possible Joint Activities
(Deliverable 4.3.1)

What have we already learnt?

Countries have ...
- different goals
- different energy strategies
- different technologies & nieches
- different energy supply systems
- different initiatives & roadmaps ....

We will now hear details from 5 national examples.

Let the information sink in,
Try to intuitively find out the common interests!

Post it!!

GROUP AND PLENARY DISCUSSIONS

In this third part of the workshop the participants were encouraged to elaborate potential future Joint Activities having previous presentations and discussions in mind. Hereby, the participants were divided into three groups discussing potential Joint Activities within three different sub-categories, namely

- Technology Platforms
- Cities & Regions
- Joint Research Programs

The results are summarised in the following:

Technology Platforms

In some participating countries in the Smart Grids ERA-Net smart grids technology or industry platforms were founded, such as in Austria, Belgium, France and Slovenia. But as was realised during the workshop, each platform in each country has different goals and roadmaps. This was considered as an initial barrier for potential collaboration among those platforms.

Nevertheless, a collaboration e.g. in the form of regular meetings or joint workshops is realistic and can build a chance for the identification on the one hand of common priorities but on the other hand also to find niches and hence, a gate for efficient & effective smart grids development. As key issues for collaboration can be seen the identification of similarities between particular countries which then can be used as valuable inputs for the European Industry Initiative.

Cities & Regions

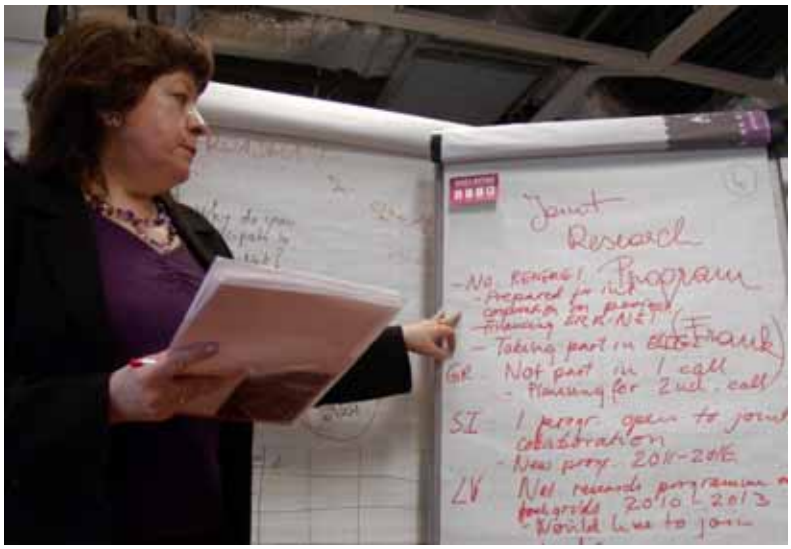
As important topics dealing with smart grids in cities and regions security of supply, low production and high consumption in cities as well as cross-border issues and islanding modes were mentioned.

High potential is seen to use the ERA-Net project to map the initiatives that are already taking place in the countries (e.g. smart cities & regions, local initiatives like smart grid model regions) and so evaluate the challenges of possible business cases linked to these initiatives.

Joint Research Programs

For cooperation on national levels it was proposed to include participants from all countries' ministries in one team. Another idea could be to encourage researcher exchange (post graduate and experienced) for particular smart grids topics.

The Baltic countries, which have a similar climate to the Scandinavian countries, would find it reasonable to encourage more cooperation especially between those states so that research and technology transfer can be increased.



Summarising, the task of finding future possible Joint Activities, careful reflection and follow-up activities has found to be the core task in an ERA-Net project. By undertaking Joint Activities, solutions inspired by ways of resolving challenges in different countries can be found.

The technology that is needed for future grid structures is common and many research challenges are common as well. Those indentified and elaborated commonly, indeed could lead to very important inputs to the European Grid Industry Initiative (EGII).