

# ENTSO-E R&D Plan – Update 2011

InnoGrid2020+

Brussels, 23 February 2012

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# Why are TSOs collaborating in R&D?

R&D and  
the 3rd EP

- The **Plan** is **required by the Third Energy Package**, both in Directive EC/72/09 and in Regulation 714/09, which underline that ENTSO-E shall prepare a R&D plan included in the annual work programme
- Needs for R&D coordination at European level:
  - ✓ **more efficient solutions** and extra efforts to face the new challenge of replacing aged assets and integrating renewable resources
  - ✓ **full-scale demonstrations** for a drastic reduction in demonstration costs
  - ✓ improved scale factor for **reducing costs** and validating technology **with manufacturers**
- **New structural collaboration** within the SET Plan framework
- **Cooperation with DSOs and all other relevant actors**

# R&D and the 3<sup>rd</sup> Energy Package



## Regulation applicable to transmission and distribution

*... In fixing or approving the **tariffs** or methodologies and the balancing services, the regulatory authorities shall ensure that transmission and distribution system operators are granted **appropriate incentive**, over both the short and long term, to increase efficiencies, foster market integration and security of supply and **support the related research activities** ... (Directive 2009/72/EC, art 37.8)*

## Commitment on TSOs

*... ENTSO-E shall adopt common network operation tools to ensure co-ordination of network operation in normal and emergency conditions, including a common incidents classification scale, and **research plans**... (Regulation (EC) 714/2009, art 8.3.a)*

*... The annual work program shall contain a list and description of the network codes to be prepared, a plan on coordination of operation of the network, and **research and development activities**, to be realized in that year, and an indicative calendar... (Regulation (EC) 714/2009, art 8.5)*

# Needs for R&D coordination at European level

Challenges for 2020  
and beyond...



**ENTSO-E  
R&D Plan**

**Unprecedented  
innovation effort**

TRADEWIND  
EWIS  
RELIANCE

OPTIMATE  
TWENTIES  
PEGASE

2000

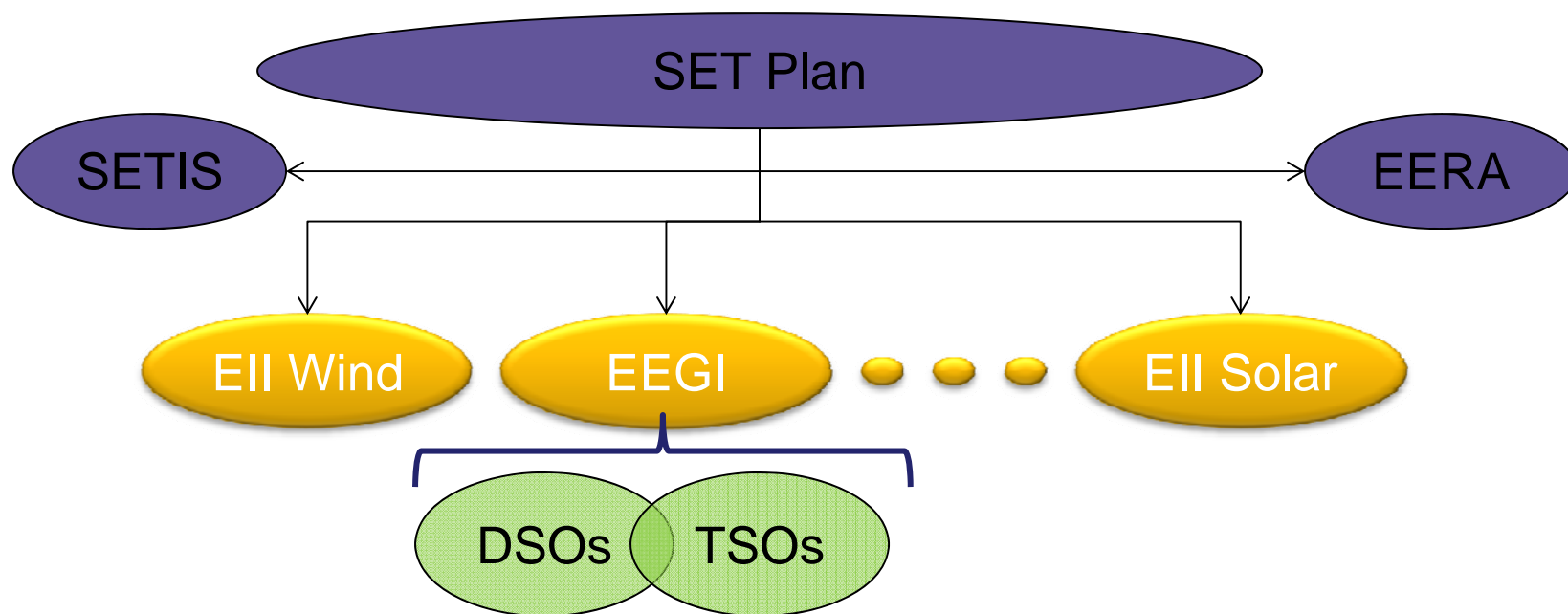
2010

2020

2030

# The collaboration framework

In the context of the SET Plan European Electricity Grid Initiative (EEGI) as a common platform for EU and MS representatives, Industry, Grid Operators, and other relevant stakeholders.



# Collaborative R&D

Under TSOs leadership, the Plan is set up in a collaborative basis, open to all relevant market players and stakeholders.

- ✓ **Joint activities** of manufacturers and TSOs will facilitate the implementation of new technology at optimized costs.
- ✓ Increasing use of **Information Communication Technology (ICT)** will contribute to secure operations, and to increase flexibility for the European transmission network.
- ✓ **Cooperation** with DSOs and end-users will open up a new large potential of demand response as the future basis for sufficient balancing resources in face of ever increasing volatile renewable generation.



# European Electricity Grid Initiative: a shared vision

## 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

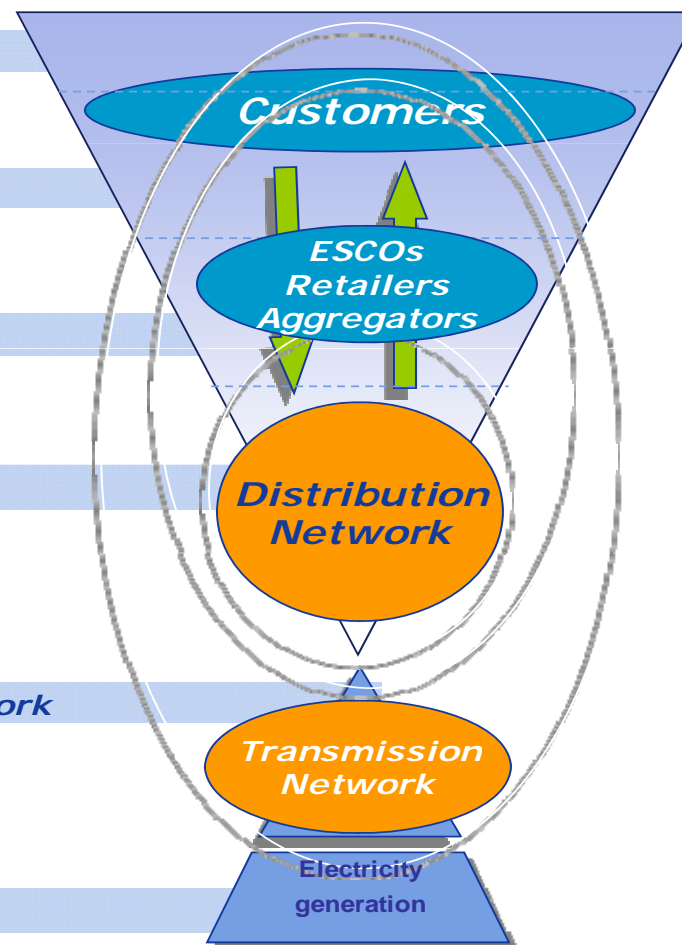
### **Level 2: Smart network and processes**

More automated MV distribution networks with self healing capabilities.  
Monitored and controlled LV networks  
IT supported monitoring process

### **Level 1: Smart Pan-European Transmission network**

Innovative transmission grid architectures  
State-of-the-art transmission/power technologies  
Novel monitoring, control and storage methodologies  
Shared electricity market simulators

### **Level 0: New generation technologies**



## A photograph of a high-voltage power transmission tower, also known as a pylon. The tower is constructed from a complex lattice of steel beams. It has a central vertical section and several horizontal cross-arms that support the power lines. The tower is set against a clear, bright blue sky. The perspective is looking up at the tower, emphasizing its height.

Functional Projects




## TSOs commitment

- **More than 20 relevant operational projects on-going today, covering a wide range of activities:**
  - ✓ from research to demonstration and
  - ✓ from Cluster 1 to 5
- **9 FP7 projects. Among them some of the most relevant in the energy industry, like EcoGrid EU or TWENTIES**
- **More than EUR 170 million mobilised in total**
- **Active participation of 25 TSOs from ENTSO-E**

# Financing schemes

- As regulated actors, **TSOs have limited access to commercial benefits** coming for the implementation of innovative technologies.
- A **long-term perspective on funding is mandatory** now in order to mobilize sufficient external players and internal TSO staff.
- The **deployment of the results** on networks across Europe is expected to be covered by **new appropriate tariff schemes** and mechanisms in accordance with the Third Energy Package.

- 
- According to the Third Package, **NRAs should ensure that network operators are granted appropriate incentives**, over both the short and long term
  - New appropriate **tariff schemes are not expected** to be active in a majority of Member States **in the period 2010-2012**. Therefore **a significant share of public funding will be needed** in a transition phase

# Governance structure

**ENTSO-E is playing a significant role in the EEGI governance structure implemented in the framework of SET Plan.**

**ENTSO-E is also partner of GRID+ project, the key EEGI support action.**

**The basic internal processes set up by ENTSO-E, in close cooperation with relevant stakeholders, are:**

- ✓ **Design and approval of the ENTSO-E R&D,**
- ✓ **Support the EC during the launching of Calls for Proposals,**
- ✓ **Monitor the R&D Plan as a whole,**
- ✓ **Disseminate the results among the technical stakeholder community and facilitate the scaling up and implementation of results by the whole ENTSO-E community.**

# Monitoring, dissemination and knowledge sharing

WG MKS is defining **Plan monitoring KPIs**. Cooperation with JRC and other institutions within Grid+ should accelerate the process.

Dissemination is considered today a relevant duty in every single project. ENTSO-E is promoting the visibility of the complete Plan.

ENTSO-E is the appropriate body to package and disseminate the new knowledge produced by the R&D Plan.

- ✓ **Project results shared** within ENTSO-E
- ✓ TSOs will grant access to new software developments and new testing facilities at a reasonable cost
- ✓ New devices, prototypes or demo facilities are owned by the TSOs participating in the project

The ENTSO-E R&D Plan is a resolute bet for **KNOWLEDGE SHARING** among the TSOs in Europe

# Key factors for success



- **Wide consensus with the RD&D activities**, including the industry, the scientific community and the EU and MS authorities.
- **Common view on the implementation plan**. Priority projects identified.
- **Larger TSO commitment** with collaborative RD&D activities.
- **Secure long term financing schemes**: EC – MS – Tariffs.
- **Sound governance structure**.
- **Effective monitoring, dissemination and knowledge sharing** mechanisms.



# ENTSO-E R&D Plan – Update 2011

Updating process and plans for 2012 edition

InnoGrid2020+

Brussels, 23 February 2012

Inger Pihl Byriel  
ENTSO-E WG R&D Plan

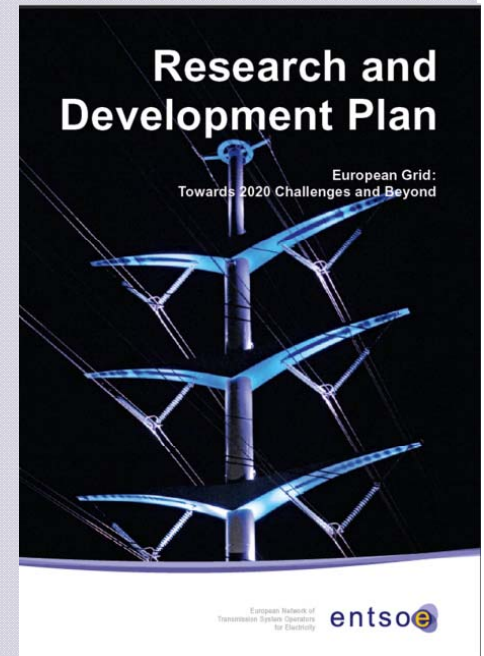




# R&D plan 2011 – update process

Update  
process

- 1<sup>st</sup> R&D Plan approved by the Assembly in March 2010
- 2011 update launched in Q1/2011,
- Drafts and internal consultation
- RDC approval - 8 Nov
- Board approval - 10 Nov
- Assembly approval - 9 Dec
- **Final publication (ENTSO-E website) -14 Dec**

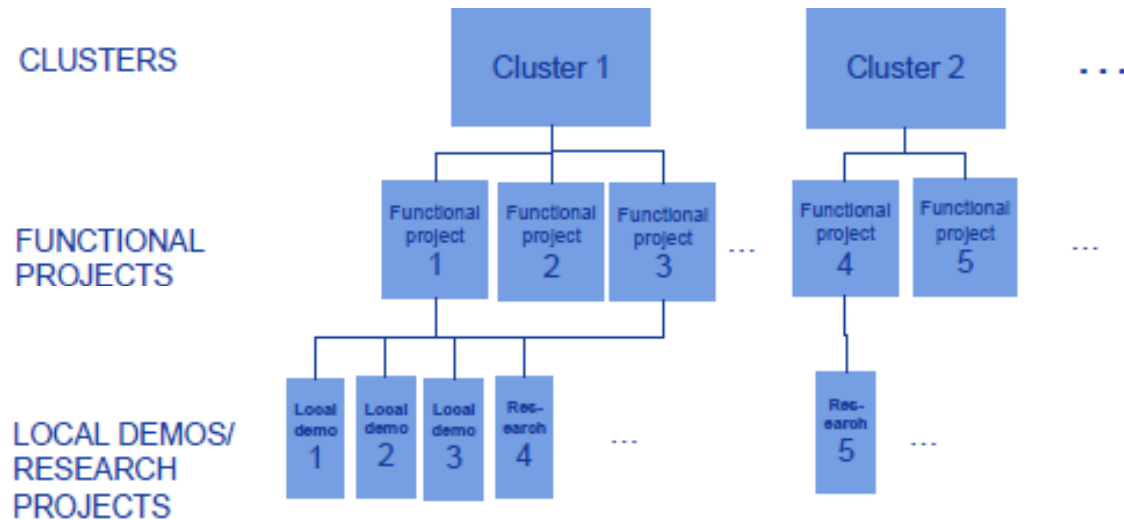


# Basic principles when updating the R&D plan 2011

- To keep the consistency between R&D Plan 2010 and Update 2011
- To implement feedbacks from ENTSO-E committees to the possible extend
- To improve the document and make it easy to read

# Structure of the R&D Plan

- The R&D Plan is structured in three levels:
  - Cluster = Collection of projects within one topic area
  - Functional project = Overall theme for operational projects
  - Operational project or local demos/research projects
- Several “operational” projects can be defined under one functional project



# Structure of the R&D Plan



Same structure as in EEGI is followed:

Cluster	Topics	Scope of the innovation cluster
1	Pan-European grid architecture	Novel approaches to developing a pan-European grid and emerging technology for pan-European offshore grids
2	Power technology	Affordable technology to make the transmission system more intelligent and flexible
3	Network management and control	Critical building blocks to operate the interconnected transmission system in real time and reliably
4	Market rules	Market simulation techniques to develop a single European electricity market
5	Enhanced link between transmission and distribution	Utilization of smart grid applications for services in order to balance the system

# Structure of the R&D Plan

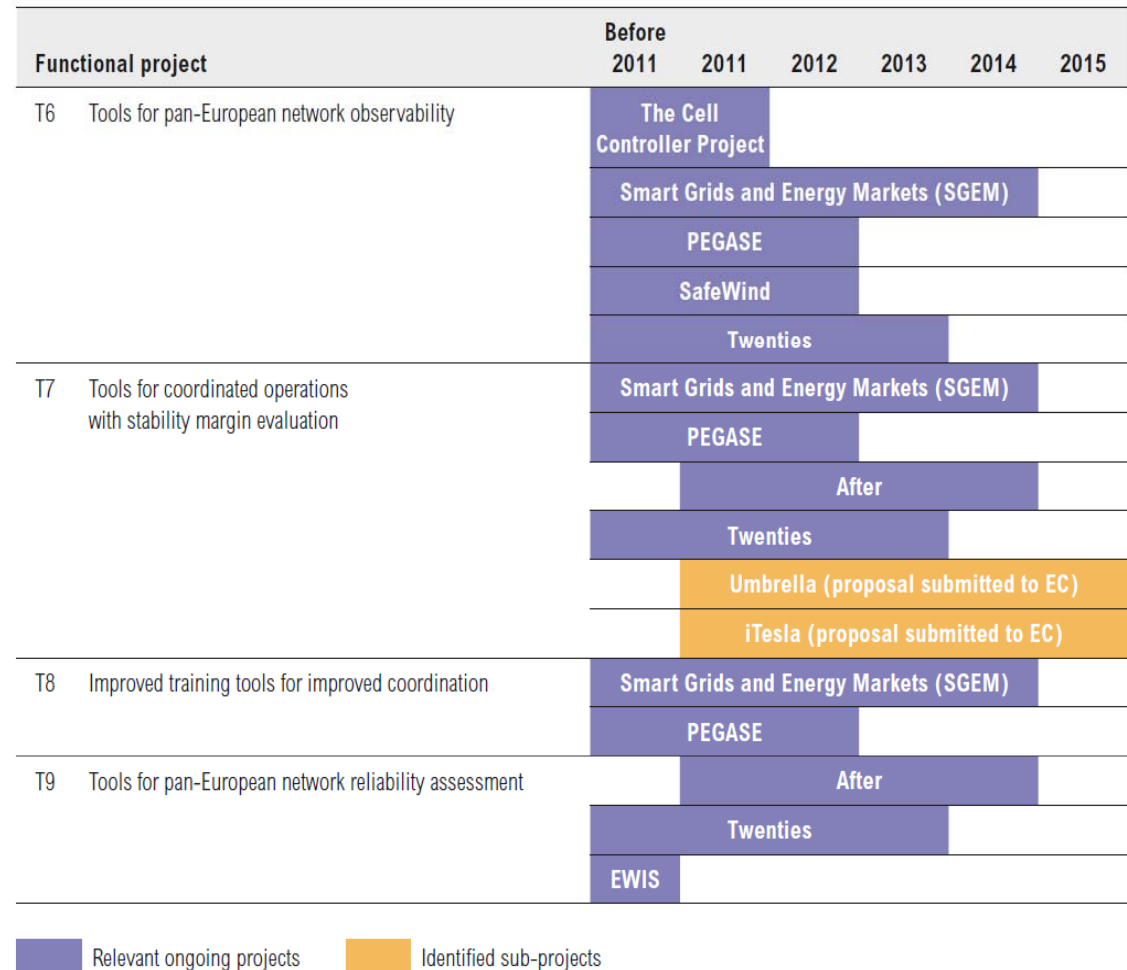
- 4 Clusters TSO part
  - 14 Functional projects
- 1 common Cluster TSO/DSO part
- 5 Functional projects
- Total estimated cost: 790 M€

Cluster	Functional project	Year											Costs (M€)
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
C1	T1			Toolbox for new network architecture assessment									19
	T2	Tools to analyse pan-European expansion options											21
	T14	Environmental impact and social acceptance of transmission facilities											50
C2	T3	Demonstration of power technologies for more network flexibility											80
	T4			Demonstration of power technologies for novel network architecture									120
	T5	Demonstration of renewable integration											130
C3	T6	Innovative tools for pan-European network observability											12
	T7		Innovative tools for coordinated operations with stability margin evaluation									24	
	T8				Improved training tools to ensure better coordination at the regional & pan-European levels						25		
	T9		Innovative tools and approaches for pan-European network reliability assessment										14
	T10			Advanced tools for pan-European balancing markets								18	
C4	T11			Advanced tools for capacity allocation and congestion management									21
	T12	Tools for renewable market integration										14	
	T13	Tools for the integration of active demand into electrical system operations											12
C5	TD1		Increased observability of the electrical system for network management and control										45
	TD2			The integration of demand side management into TSO operations									70
	TD3		Ancillary services provided by DSOs										50
	TD4		Improved defence and restoration plans										45
	TD5		Joint taskforce on IT system protocols and standards										20
<div>Functional projects</div> <div>Functional projects with high priority</div> <div>790</div>													

# Example of mapping of projects – Cluster 3



- Ongoing projects are mapped
- One project can be fit in several functional projects





# New FP7 projects supporting the ENTSO-E R&D Plan

- **Umbrella** - Toolbox for Common Forecasting, Risk assessment, and Operational Optimisation in Grid Security Cooperations of Transmission System Operators (TSOs)
  - 2011-2015
  - EU funding 3.86 M€, Project costs 5.25 M€
  - 9 TSOs, 6 other partners
- **iTesla** - Innovative Tools for Electrical System Security within Large Areas
  - 2011-2015
  - EU funding 13.23 M€, Project costs 19.38 M€
  - 7 TSOs, 14 other partners
- **GRID+**
  - 2012-2014
  - EU funding ~3 M€, Project costs 3.9 M€
  - 12 partners

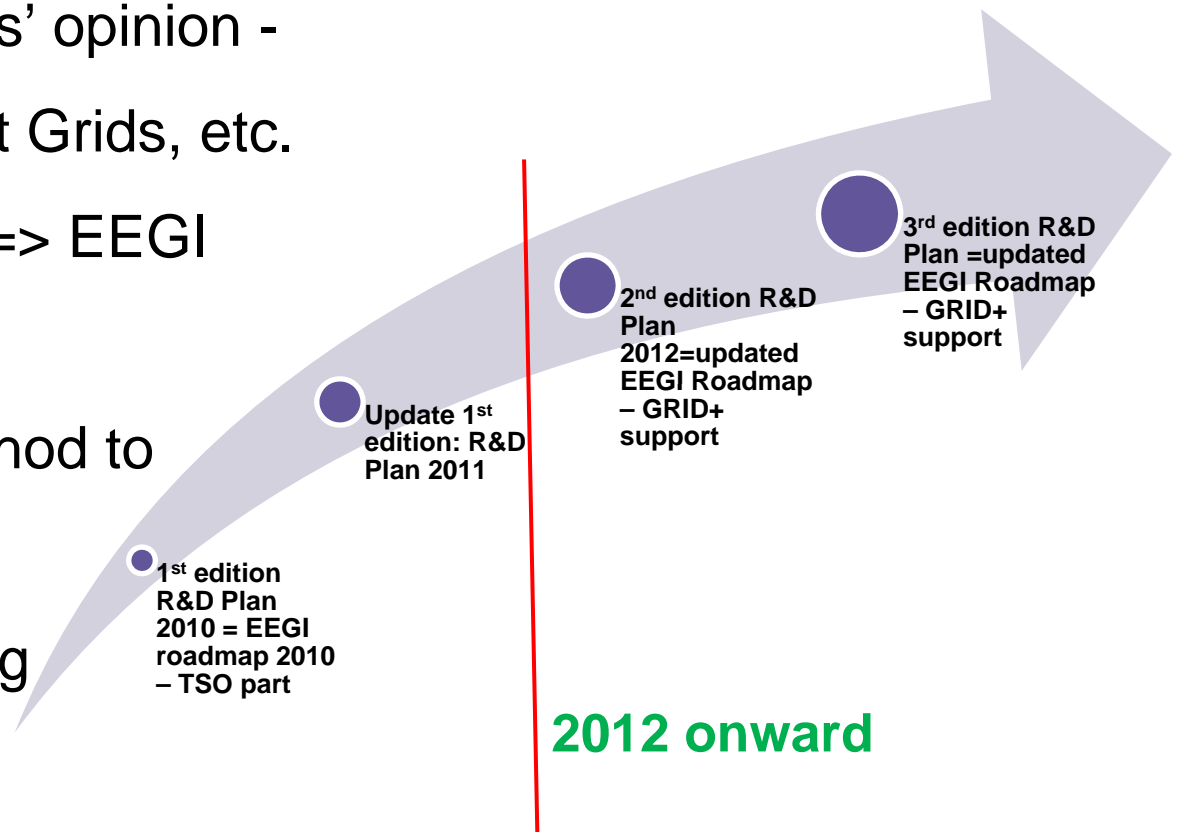
# Major Changes in the R&D plan - Update 2011



- The report has been reviewed and shortened
- A new section on Smart grids is added
- Cluster 5 from the EEGI roadmap has been added – Link between transmission and distribution
- Ongoing transmission projects has been mapped to the functional projects

# R&D Plan 2012 – Challenges of structure

- To comply with the legal mandate
- To consider stakeholders' opinion - T&D Europe, ETP Smart Grids, etc.
- To be a basis for Grid+ => EEGI Roadmap
- To find a consistent method to update the R&D Plan
- Reference for EC funding



# Future releases of the ENTSO-E R&D Package

## R&D Roadmap

- Release every 5 years; activities for the next 10 years, but taking into account a 20 years time horizon; Next new edition in 2012
- Provides global overview of needed developments; necessary links to SRA 2035 and eHighway 2050; Raw cost estimate

## Implementation Plan

- Released every year. Next new implementation plan in 2012.
- 2 – 3 year R&D planning- yearly input to FP7, Horizon 2020 work programs
- Precise (20%) cost estimate and funding proposal

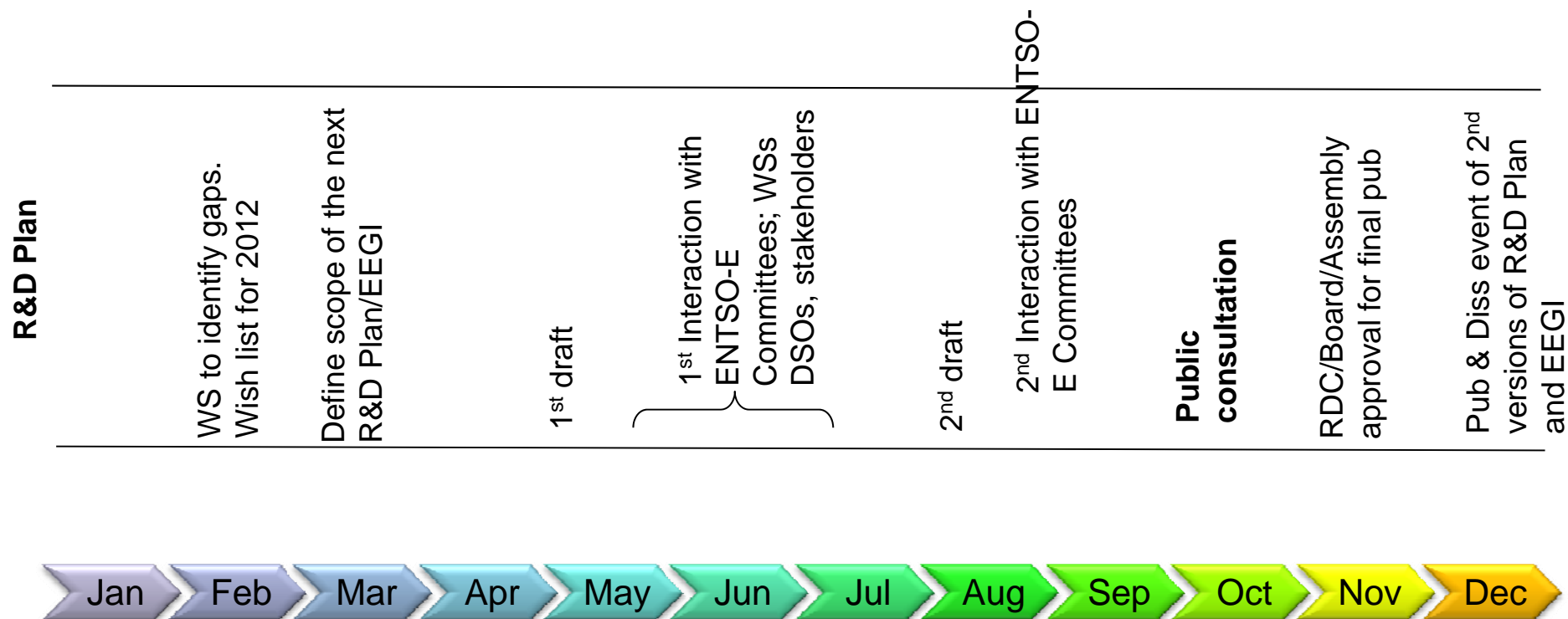
## Work programme

- Monitoring of the R&D Roadmap
- R&D activities and timetable for the next year
- Released every year – the answer to ENTSO-E task in the 3<sup>rd</sup> Package

# Main points in the initial wish list for R&D Plan 2012

- Asset management cluster
- Consider novel technologies, e.g. Storage, HVDC, FACTS, etc
- Standardization and cyber security issues
- Relation with ICT projects
- Changes based on the interaction with other European Industrial Initiatives (e.g. EWI)
- Review and prioritize functional projects considering KPIs
- Funding estimation (justifications on data, best estimation)

# R&D - Planning 2012 – Milestones





A large, illuminated wooden harp sculpture is the central focus of the image. The harp's frame is made of light-colored wood, with two long, curved legs and a horizontal top bar. It is suspended by several thin cables from a metal truss structure above. The background is dark, and the harp is lit from below, creating a strong contrast. The text "Thank you" is overlaid on the left side of the image.

# Thank you

*Photo: FinGrid Oyj*