Study Roadmap towards Modular Development Plan on pan-European Electricity Highways System

.Florence Forum 23 May 2011

entsoe

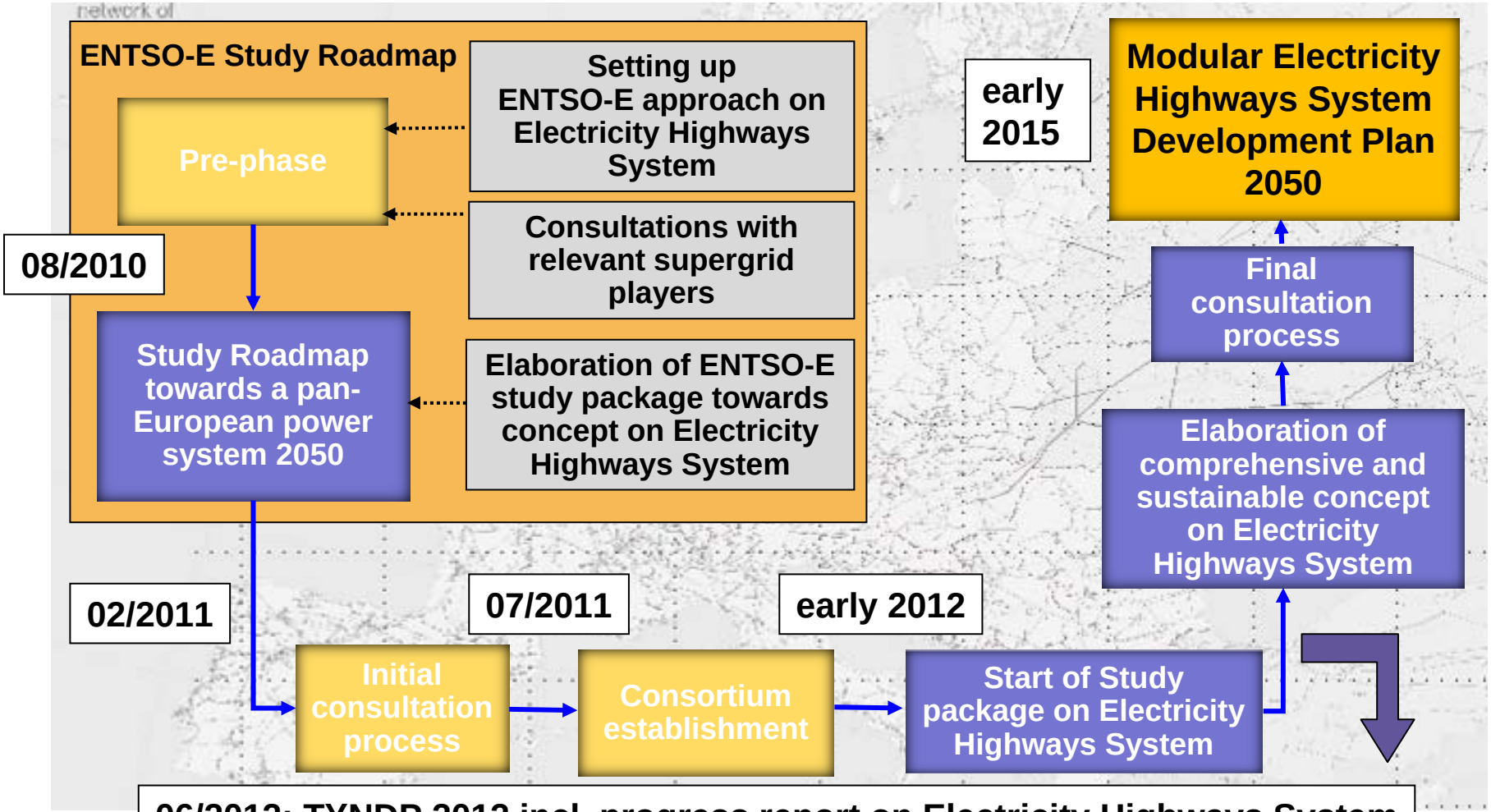
Reliable Sustainable Connected

General framework

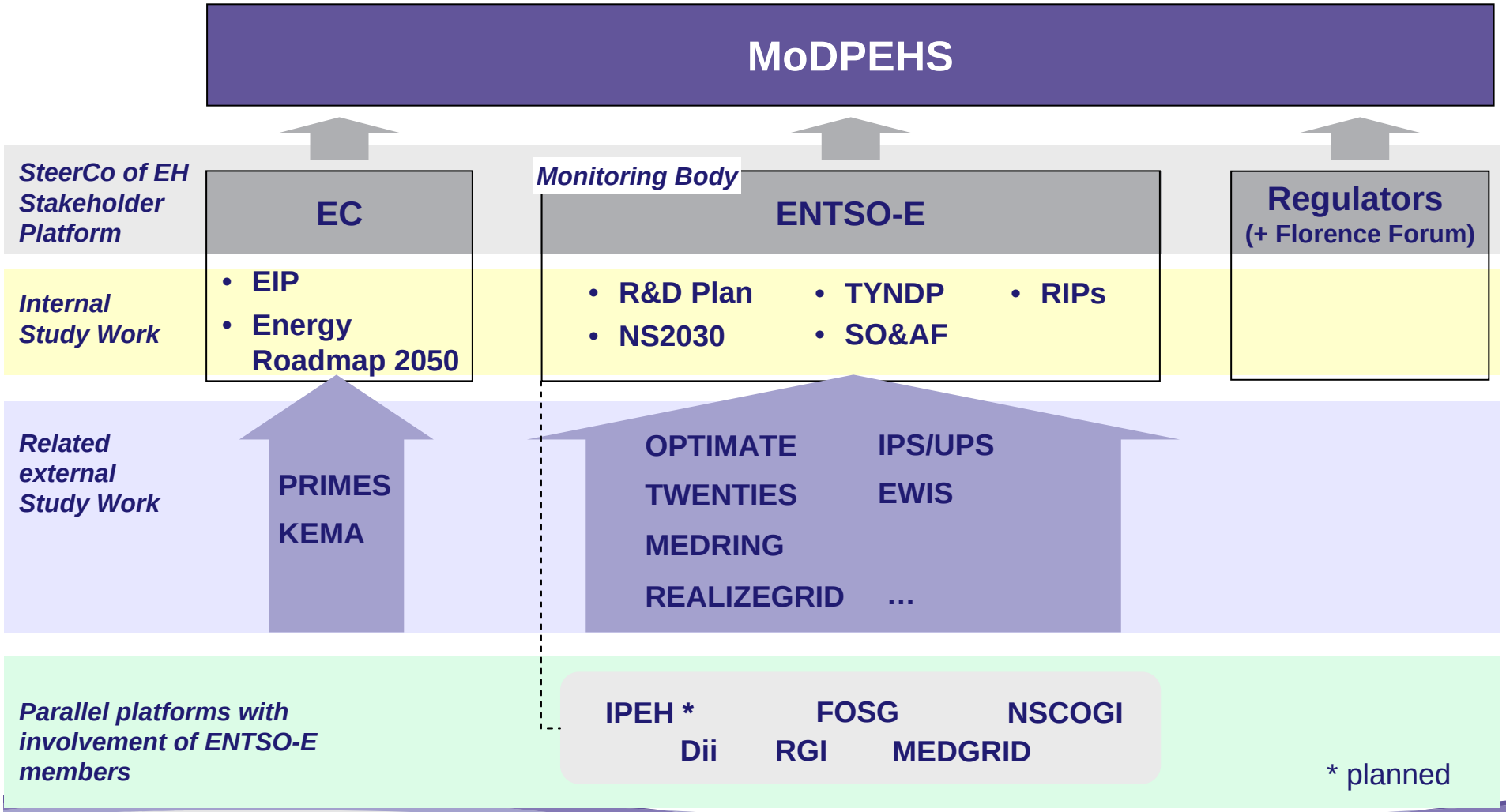
In the conclusions of the 19th forum :

- The forum supported the proposal to set up a dedicated “Electricity Highwats Platform led by the EC in cooperation with ENTSO-E and the Regulators and with the involvement of all relevant stakeholders
- The platform should focus on
  - establishing mid- and long-term generation development scenarios
  - assessing ENTSO-E’s concepts of pan-European grid architecture
  - analysing consequences of deployment
  - supporting necessary research and development
  - designing an appropriate legal, regulatory and organisational framework
- The Forum invited ENSTO-E to present, during the 20th Florence Forum its proposal for an “Electricity Highway Roadmap” addresssing the topics to be covered under this platform and establishing a concrete work plan”

At a glance – The ENTSO-E Study Roadmap approach



Surrounding Electricity Highways studies environment in Europe

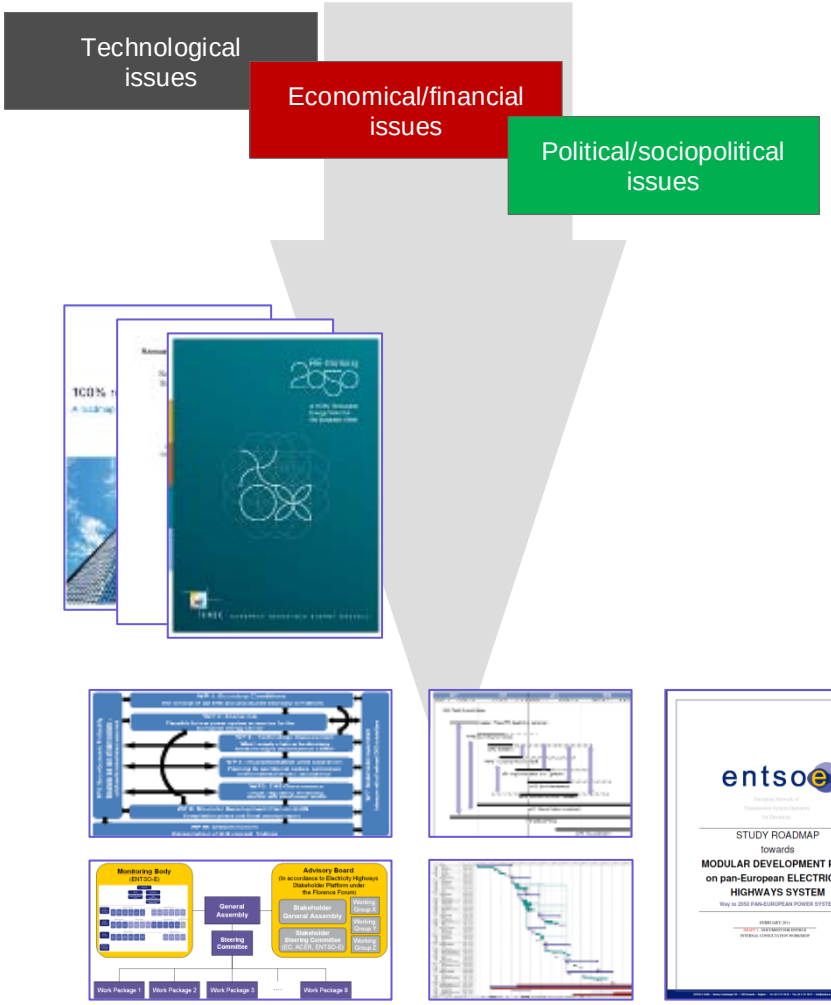


Three Work Streams on the way to Study Roadmap

1. Issue identification and analysis for developing the work programme

2. A critical review of methodologies used in existing supergrid studies

3. The development of a recommended work programme for the elaboration of the MoDPEHS



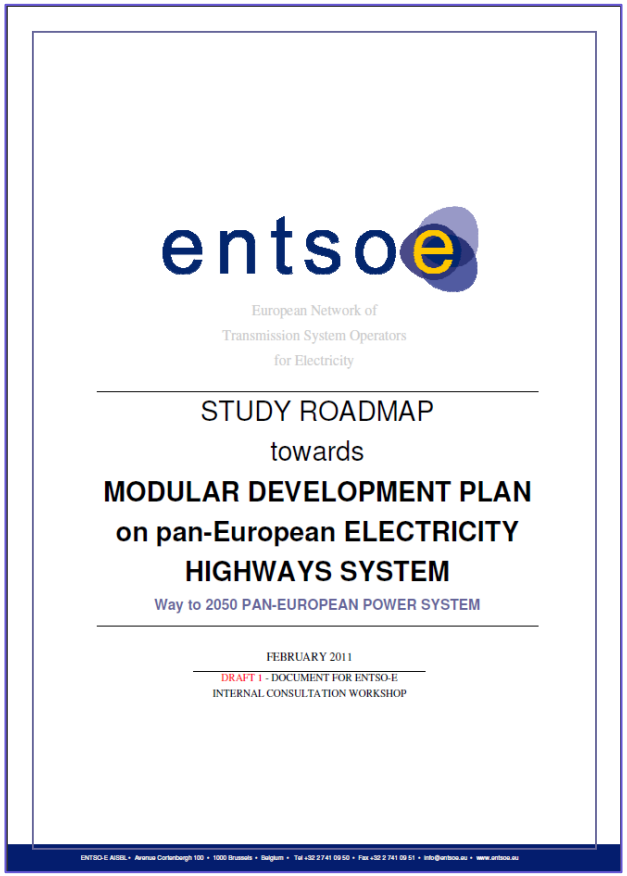
The Study Roadmap follows a FP7 like structure

Programme Governance

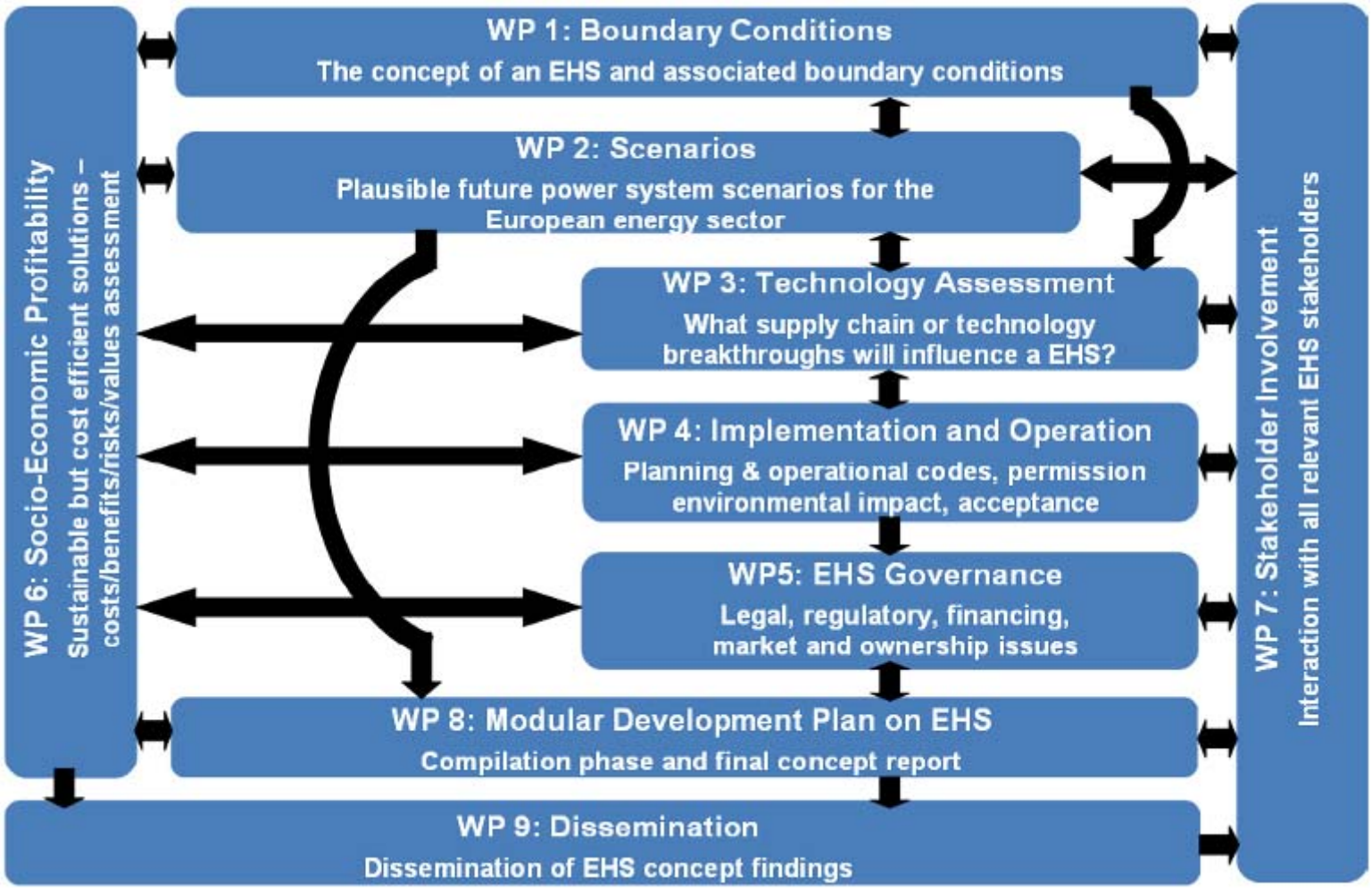
Programme and Dependencies

Work Package „XY“

1. Introduction
2. Rationale for Inclusion in ENTSO-E Study Roadmap Package
3. Project Objectives
4. Project Scope
5. Project Deliverables

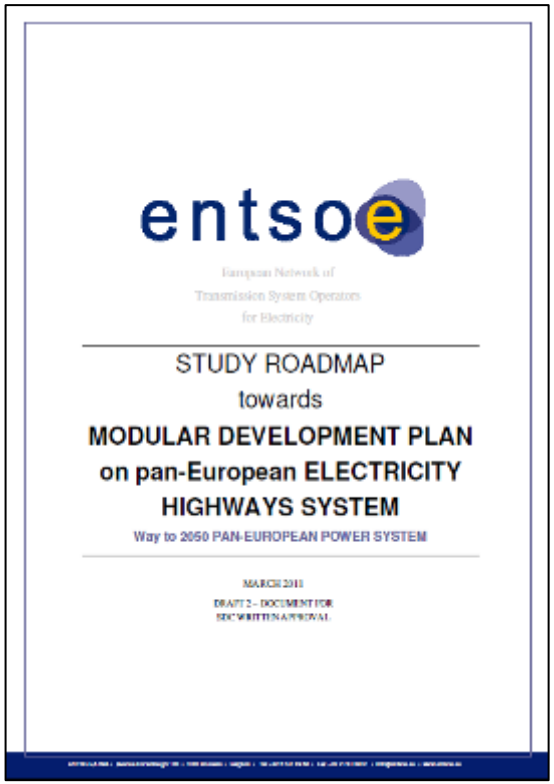


The MoDPEHS programme structure



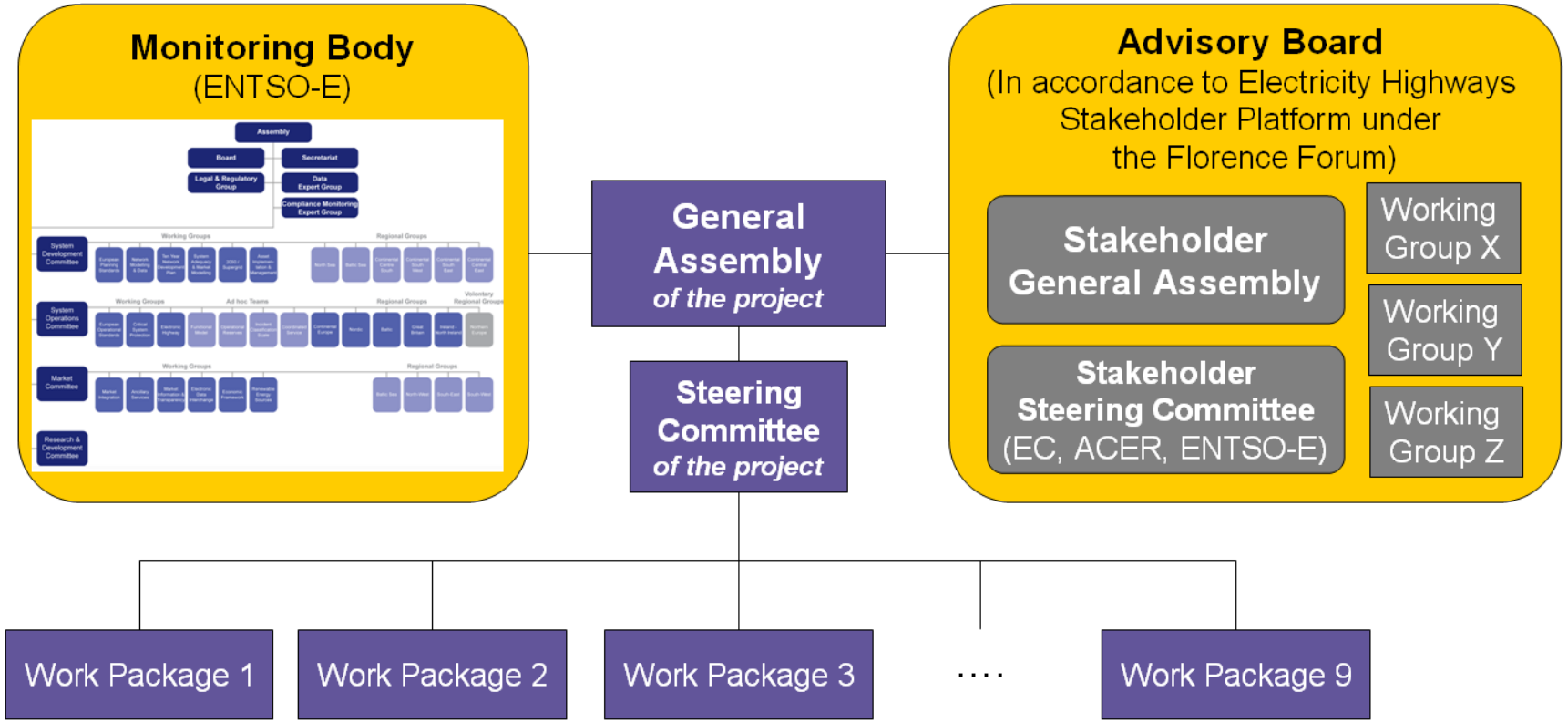
Expected Key Outcome of MoDPEHS

- analyze and justify **bulk power transmission needs** taking into account **future generation** and its spread throughout the whole transcontinental region**,**
- propose **concrete implementation, operation and governance solutions** for needed grid investments throughout Europe and to neighboring areas
- in the interest of security, efficiency, feasibility and sustainability, consider the **whole energy supply chain** incl. relevant technical/technological, economical/financial, ecological, political/sociopolitical and geopolitical/security issues
- follow a **modular approach**: 2030, 2035, 2040, 2045 and 2050
- and finally, propose **general strategic Electricity Highways architectures** incl. technology options

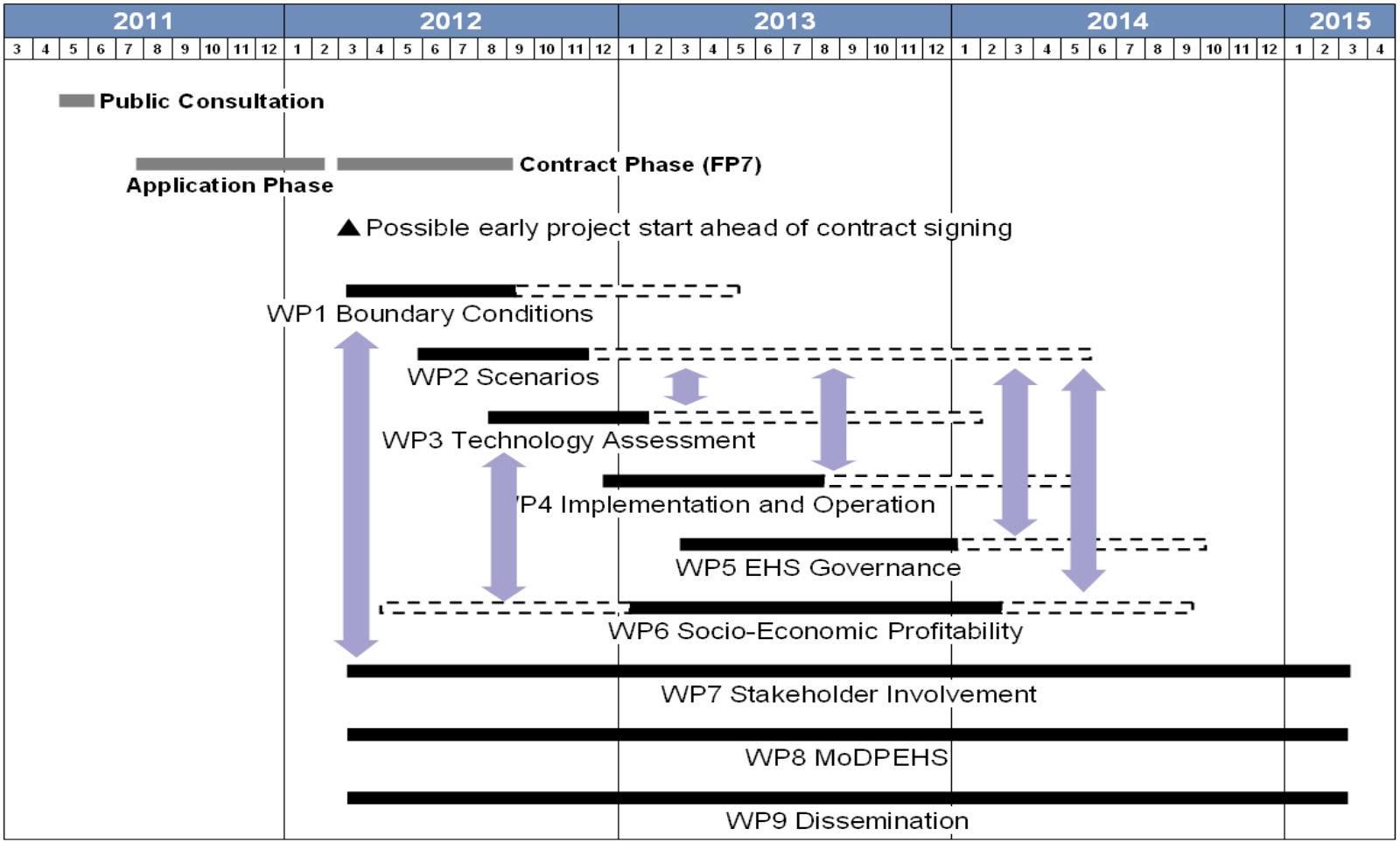


The overall Governance Structure as proposed

Effective control and monitoring measures ensure efficient working procedures of the highly complex and interrelating Work Packages.



Rough time schedule towards the first MoDPEHS

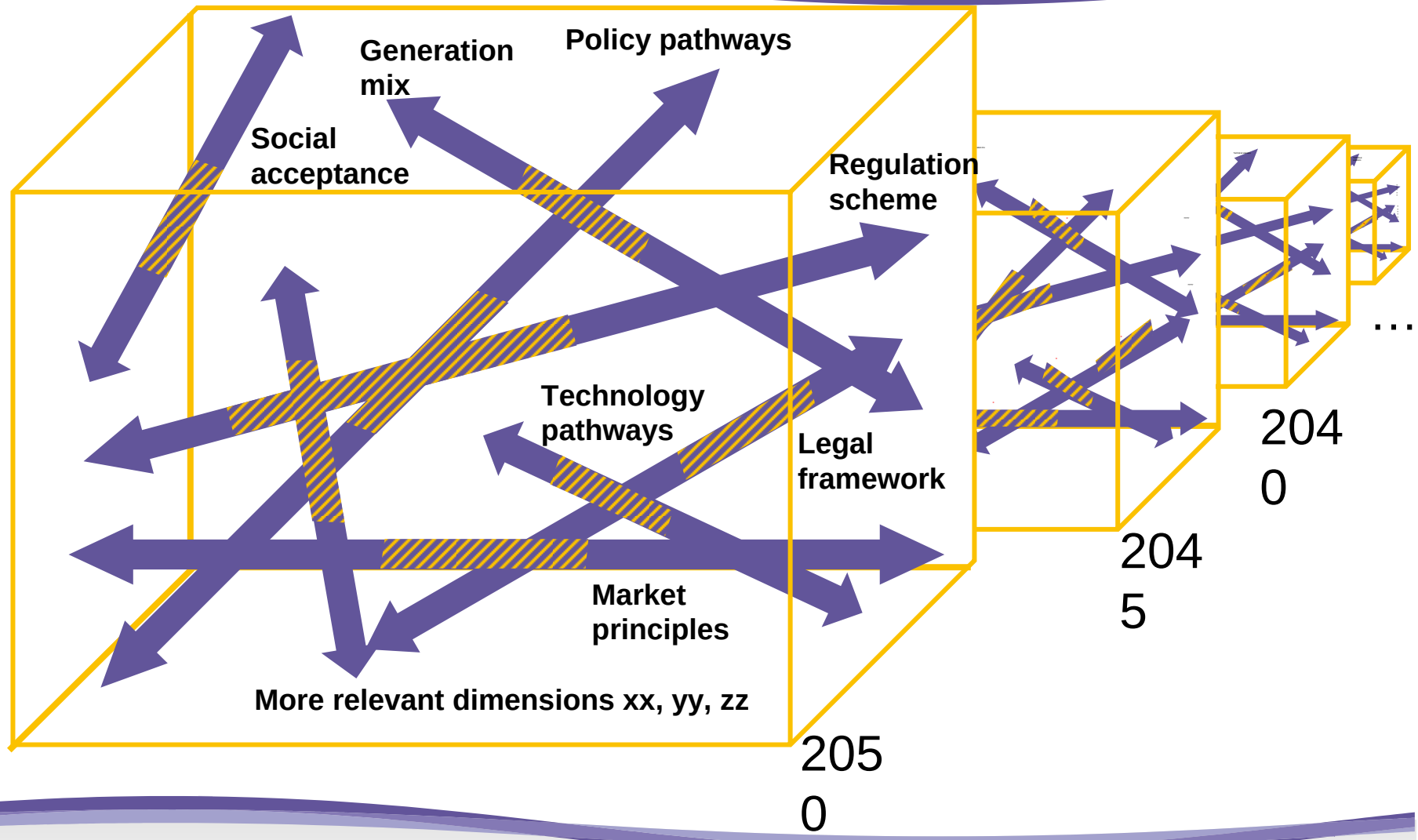


Very Next Steps

	2011						
	05	06	07	08	09	10	11
Public Consultation	2.5.11 - 3.6.11						
Public Consultation Workshop	10.5.11						
Early deadline for main remarks	20.5.11						
Report at Florence Forum	23.5.11						
Publication of Study Roadmap			Mid July				
FP7 Information Day			Early July				
Publication of Call for Proposals			Mid July				
Consortium establishment							
Finalize FP7 application and submission of proposal							

Thank you for your attention !

WP1 : Setting boundaries in multi-dimensional scenario room



WP 2 : scenarios will take into account all dimensions of the electricity system.

All dimensions of the electricity system must be taken into account in developing the analysis, including credible and secure long term scenarios associated with:

- Installed capacity of ***generation units***;
- ***Generation mix*** and respective ***gradients***;
- ***demand*** assumptions;
- ***regional spread***;
- ***Im-/export*** incl. interconnectivity;
- ***System flexibility*** incl. ***storages*** scenarios;
- Possible ***production technologies***;
- Infrastructure and general ***grid architecture options***
- ***Political*** framework; and
- Relative ***economic impacts***

WP 3 : Technology Assessment – The Objectives

- Detailed understanding of the ***range of technologies*** likely to influence infrastructure design over the ***next 10 to 20 years***
- Anticipated level of innovation and the support that will be required to ***accelerate the delivery of emerging technologies***. So, their incorporation can be considered, with degrees of probability, in subsequent detailed ***'roadmapping'*** phases of ENTSO-E's program.
- The key drivers for technological developments are the delivery of a low carbon electricity sector (and associated environmental targets), ongoing concerns regarding security of supply and network reliability, power network innovation to improve quality standards.

Transmission **Storage** **Generation**

Technologies that could significantly influence pan-European power system development to 2050

Transmission

- HVAC
- HVDC
- Cable
- Overhead line technologies (upgrading)
- combined HVAC/HVDC routes
- Gas insulated lines
- Voltage options and selection
- Reactive compensation
- System stabilizers
- Superconductivity
- …

Storage

- Storage, e.g. types, cost, efficiency, power vs. energy
- Hydro
- Battery
- Large scale and distributed
- CAES (Compressed air energy system)
- Demand side technologies
- …

Generation

- Photo Voltaic
- Concentrated Solar Power
- Wind, onshore and offshore
- Geothermal
- Hydro with/without storage
- Fossil fuelled generation with/without CCS
- Nuclear power, (in particular fusion nuclear)
- Biomass and bio fuels
- Various forms of distributed and micro generation
- Wave power generation

WP 4 : Implementation and Operation
Questions to be answered

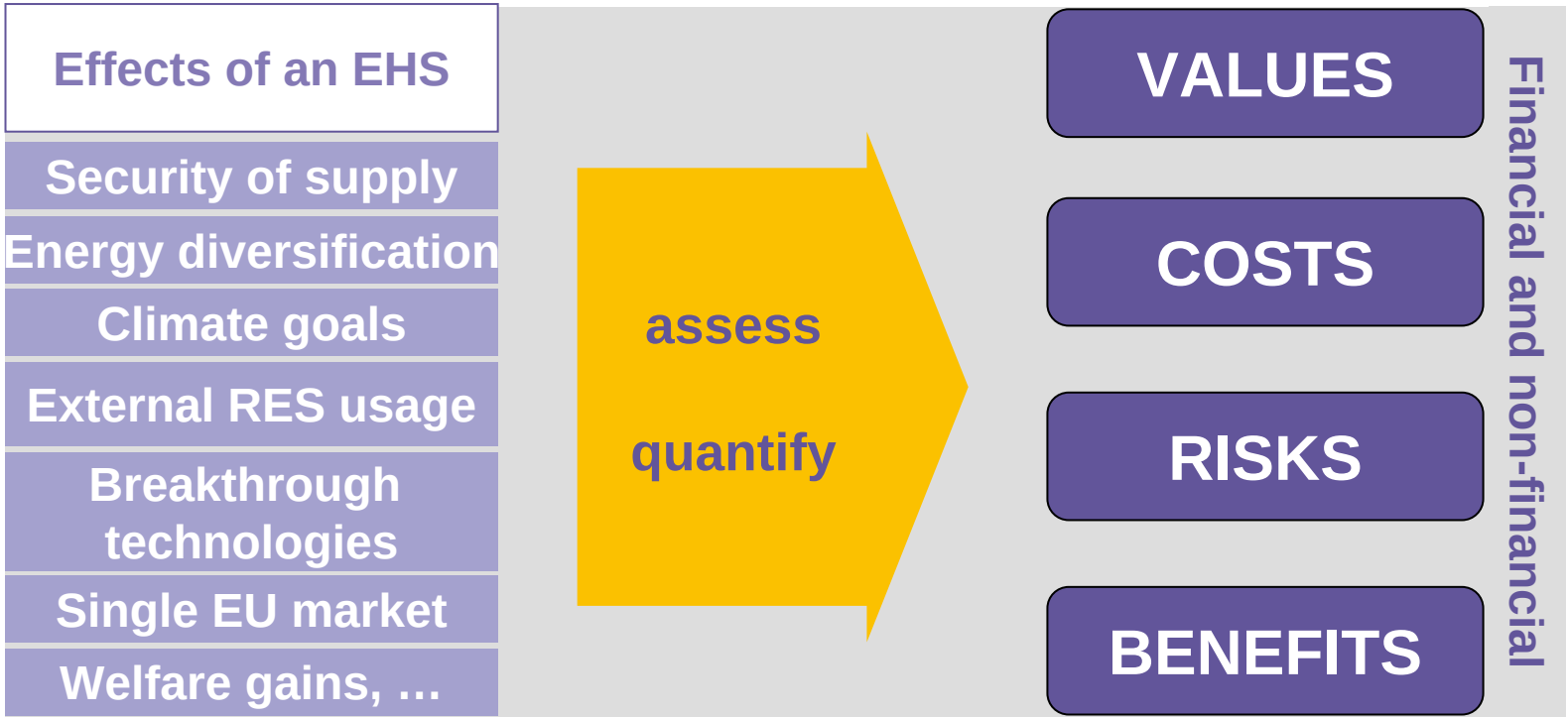
- Are the existing ***criteria, methodologies and approaches*** for assessing the needs of future Electricity Highways fit-for-purpose and do they work alongside existing regional and national approaches?
- What are suitable ***Network planning requirements*** for the purpose of an Electricity Highways system?
- How could a concrete modular (2030, 2035, 2040, 2045, 2050) Electricity Highways realization concept look like - using existing transmission routes / bundling of routes with other infrastructures / etc.?
- Which are suitable ***operational requirements***?
- What are ***permission requirements*** also considering the different priorities as local aspects (Natura 2000) vs. regional/global aspects (RES integration as climate measure)
- What is the ***environmental impact*** for each kind of considered transmission technology?
- How can the issue of lack of ***social acceptance*** be overcome?

WP 5 : Governance structure questions to be answered

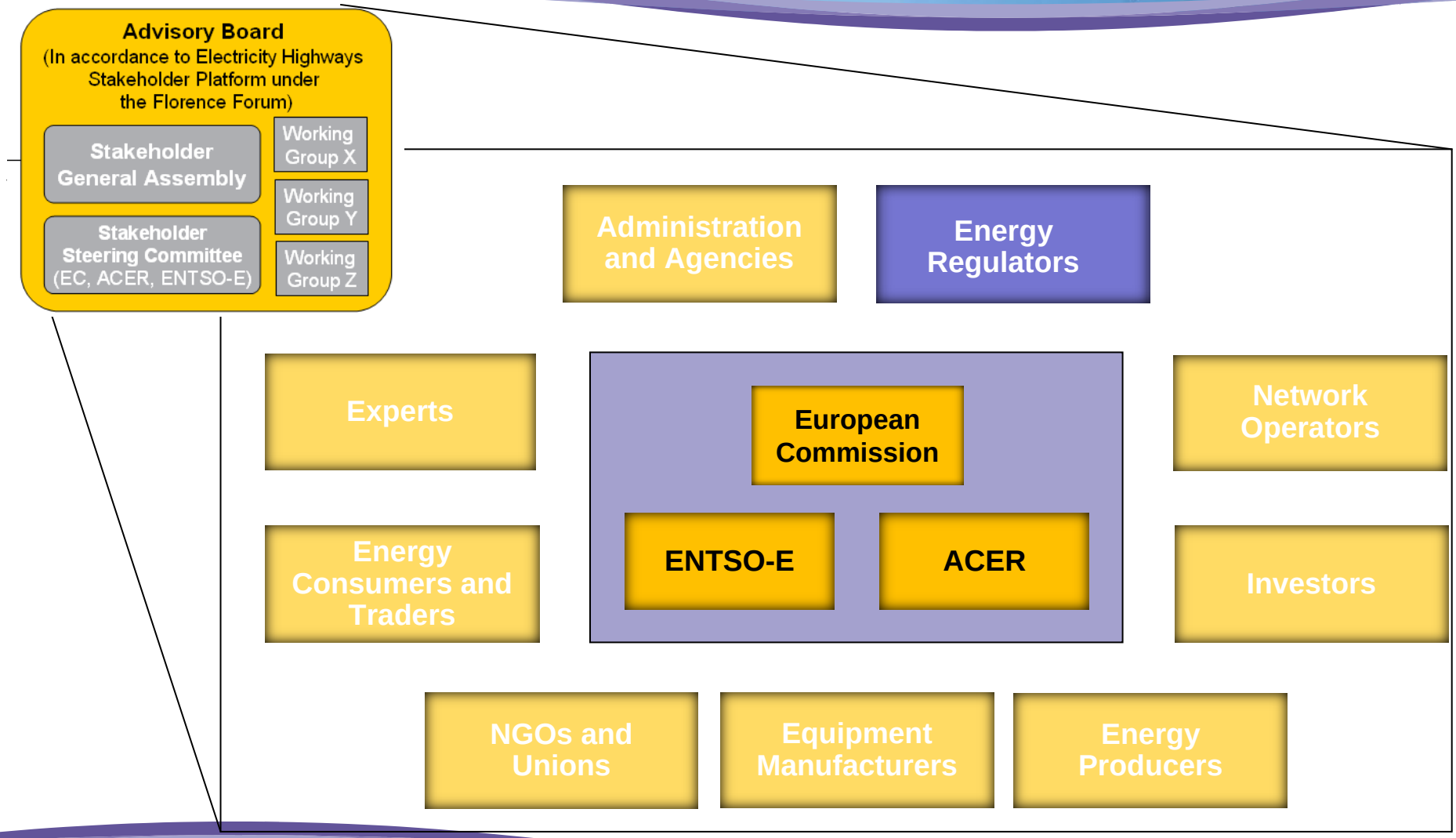
- What ***legal/corporate form*** would be most appropriate?
- ***Tax*** implications?
- ***Financing*** implications?
- ***Public funding*** implications?
- ***Regulation*** implications, esp. how will the investments be judged by the regulatory authorities?
- Principles for ***cost allocation***? – Compensation of countries for infrastructure, which is build for transnational reasons?
- Role of ***financing institutions*** as European Investment Bank or experienced national banks in supporting EHS investments?
- What ***market concepts*** are needed for the most efficient operation of the future grid?
- Is there a need for a ***European approach*** to ***redispatching***?

WP 6 : Socio-Economic Profitability

Definition of scale of investment required compared to the long term benefits that are likely to be realized by individual states, and collectively as a combined European entity.



Stakeholder Involvement is a crucial point



ENTSO-E involvement via Monitoring Body