

## 1.2 Planning For A Smarter Grid In An Uncertain Environment

# e-Highway2050: A Modular Development Plan on Pan-European Electricity Highways System for 2050

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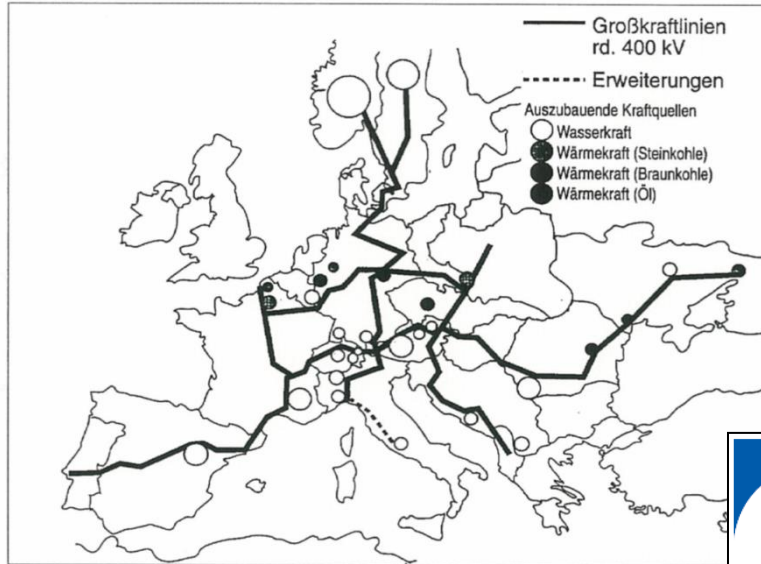
RTE  
France



"The first proposal for Pan-European transmission network was published in 1930 by German engineer Oscar Oliven during famous Second World Energy Conference in Berlin. In proposed project Oliven suggested 400 kV voltage level lines connecting hydro and thermal resources along Europe with consumption centres in length of 10.000 km. It was really Greenfield network. Today we have European Transmission Network which is some 50 times larger. In meantime many things changed. This new project seems very interesting.

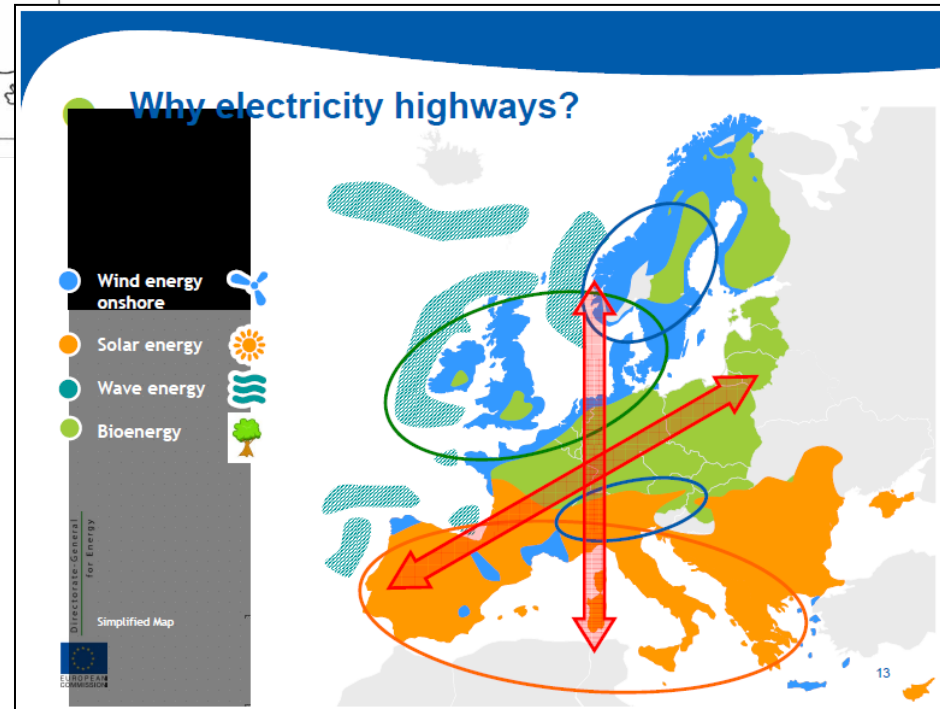
- **What experiences from existing European Transmission network could be used in your planning approach (options, uncertainties, boundaries...)?**
- **Did you consider uncertainty regarding environmental restrictions, what is at the moment one of the most exposed constraint in transmission network development?**
- **Regarding the slowly changing role of Transmission and Distribution network, what is your expectation of vision of future pan-European grid? "**

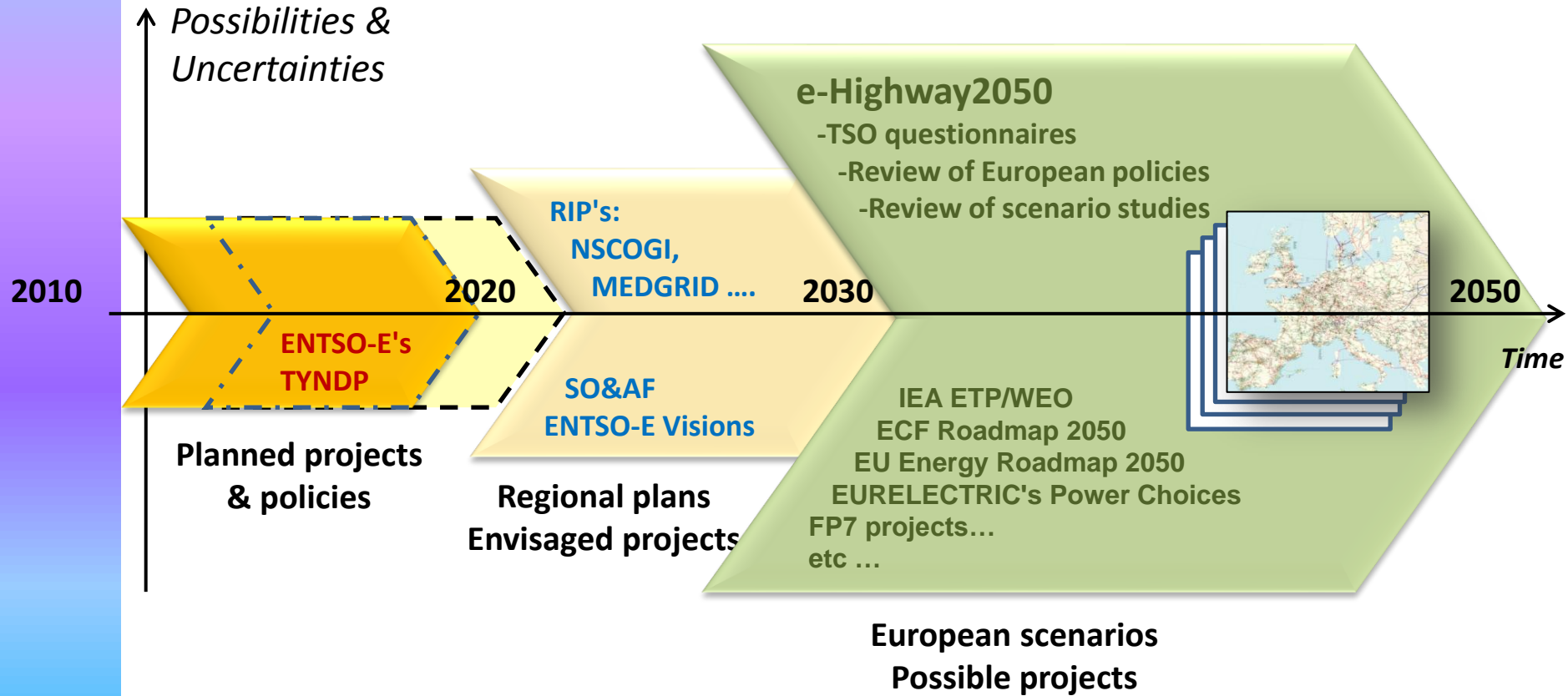




**O. Oliven (1930):  
Interconnected European  
power system**

**DG-ENERGY (2011):  
Two main drivers for  
infrastructure development  
in Europe:  
RES Integration  
& Market integration**





## Uncertainties (examples)

### Technical uncertainties

- Technology cost and performance
- Fuel cost and availability
- .....

### Economical/financial uncertainties

- Economic growth
- Venture capital availability
- .....

### Political/social/environmental uncertainties

- Public perceptions and acceptance
- International climate policies
- International vs. national policy focus
- .....

### Research, Development & Deployment uncertainties

- CCS maturity
- Multi-terminal HVDC operability
- .....

## Options (examples)

### Technical options

- RES deployment: wind, solar, biomass, .....
- Non-RES techn: Nuclear, CCS, .....
- Network techn: HVDC, FACTS, ...
- End use efficiency

### Economic/financial options

- Energy and capacity markets
- Subsidies/support schemes
- Taxes

### Political/social/environmental options

- Regulations
- Industry standards
- Information campaigns

### Research, Development & Deployment options

- Research funding
- Laboratory facilities
- Demonstration sites

*Futures*

*Strategies*

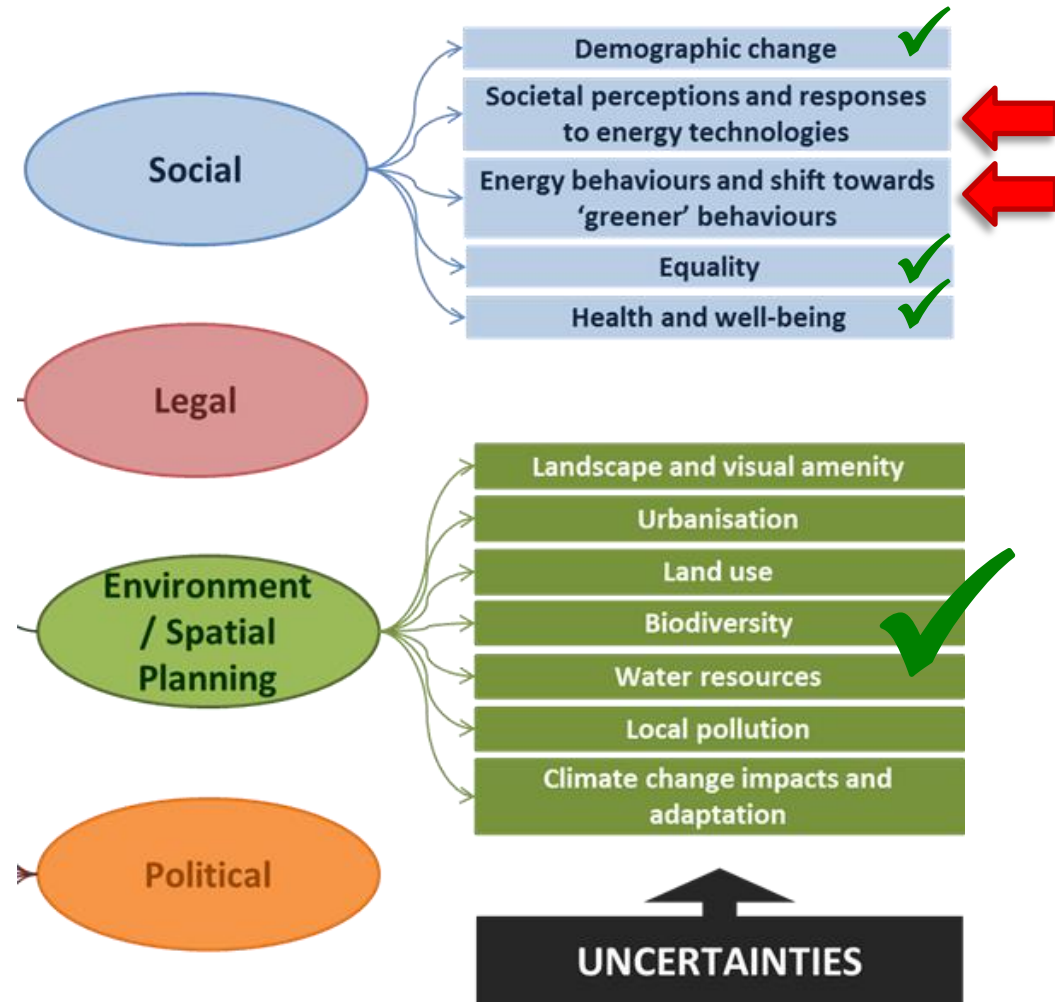
**Scenarios**





# SOCIO-POLITICAL AND ENVIRONMENTAL OPTIONS AND UNCERTAINTIES CONSIDERED

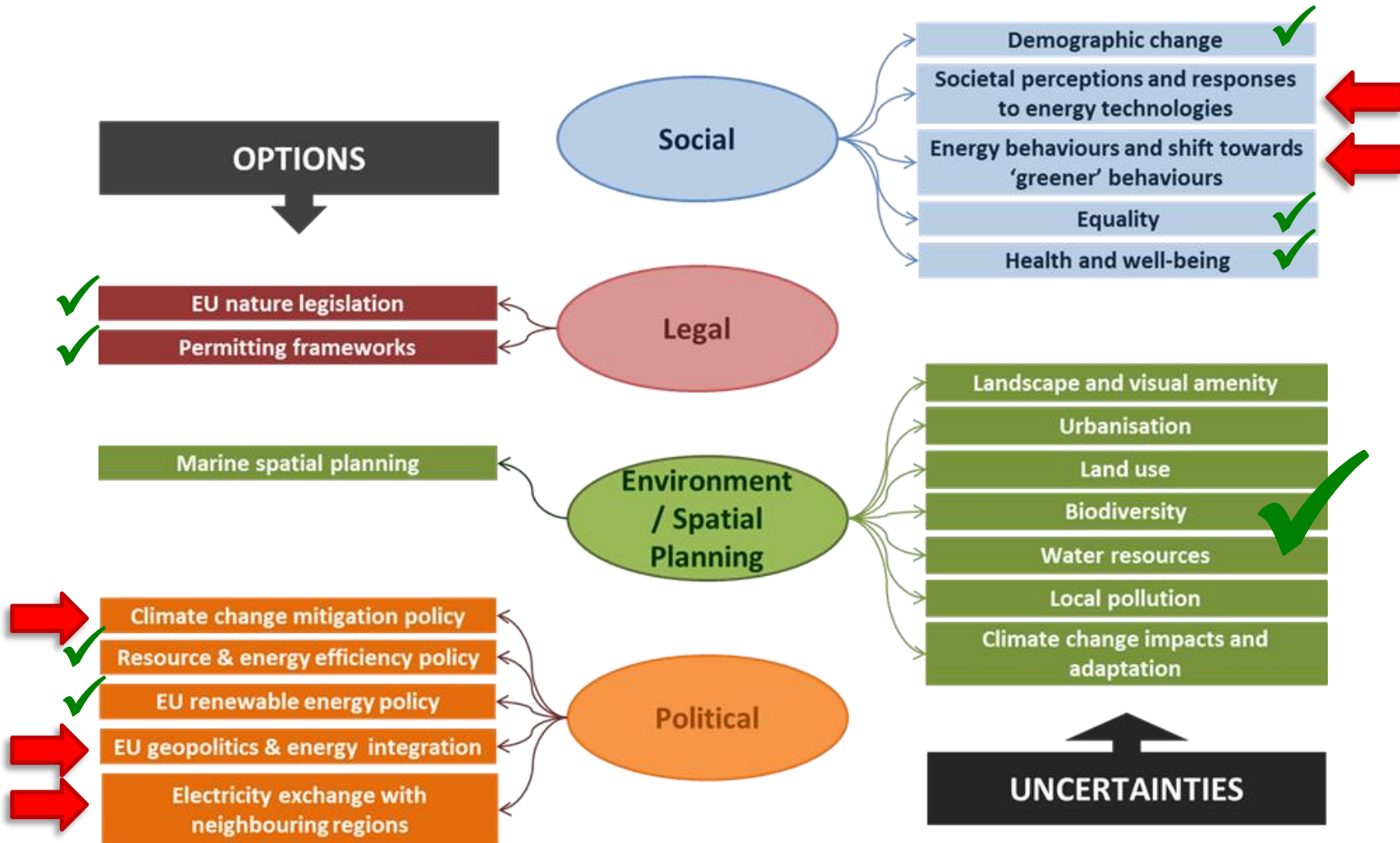
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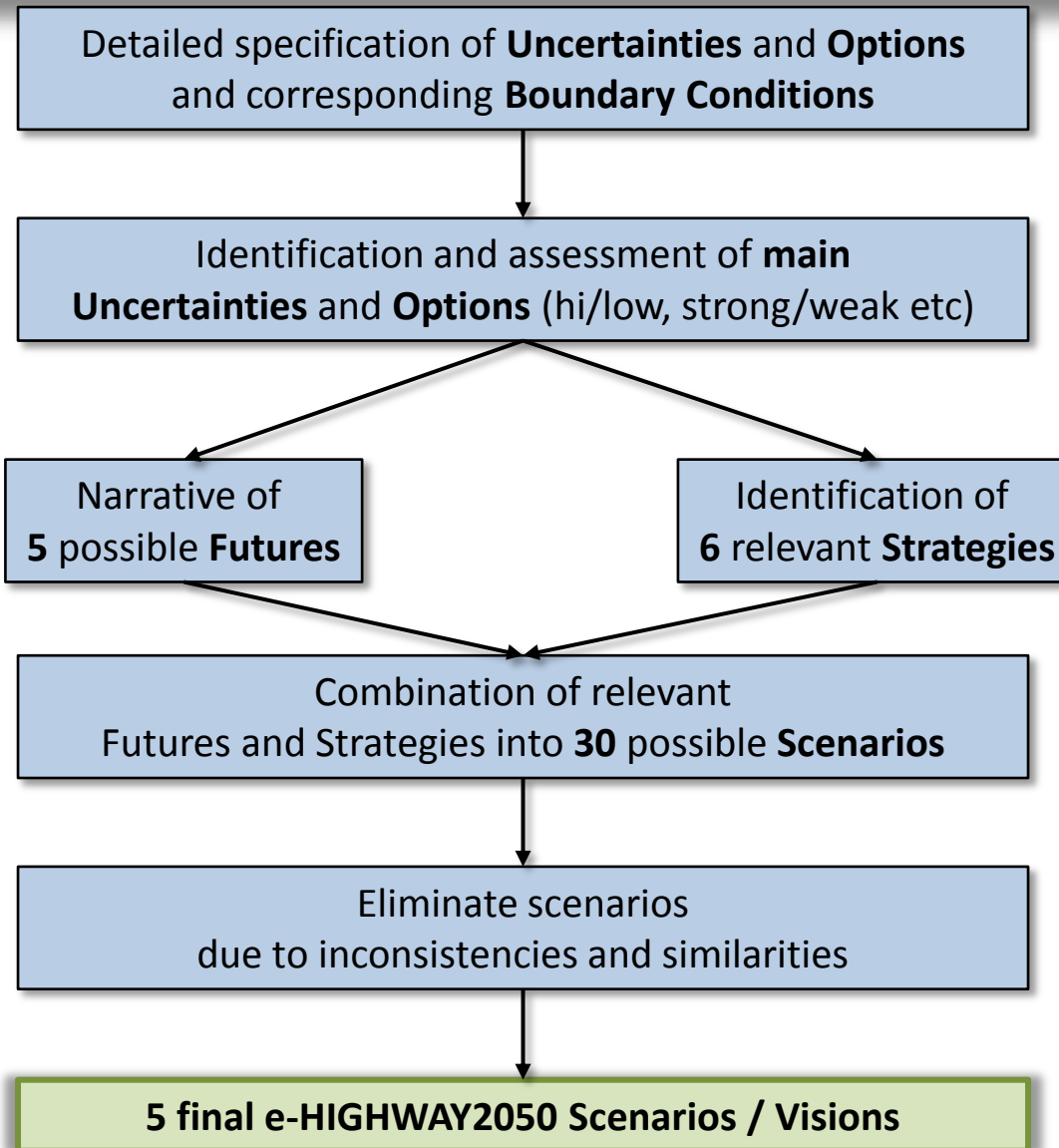




# SOCIO-POLITICAL AND ENVIRONMENTAL OPTIONS AND UNCERTAINTIES CONSIDERED

LISBON 2013





*- Random generation of possible Futures and Strategies => 1000's of scenarios!*





**(TENTATIVE)**

**Strategies**

Futures	Strategies	Strategy 1 MARKET LED	Strategy 2 LARGE SCALE RES SOLUTIONS	Strategy 3 LOCAL SOLUTIONS	Strategy 4 100% RES	Strategy 5 NUCLEAR & CCS	Strategy 6 WITHOUT NUCLEAR
	Future 1	Green Globe	*	*	*	*	*
Future 2	Green EU	*	*	*	*	*	*
Future 3	EU- Market	*	*	*	*	*	*
Future 4	Big is beautiful	*	*	*	*	*	*
Future 5	Small things matter	*	*	*	*	*	*

Futures



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