

**BUILDING THE      **DECARBONIZED****  
**EUROPEAN**  
**ELECTRICITY MARKET**

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**NEWES, New Energy Solutions**

**RENEWABLES – POLICY AND MARKET DESIGN CHALLENGES**

**IEA WORKSHOP**

**Paris, March 27, 2012**

# **BUILDING THE **DECARBONIZED** EUROPEAN ELECTRICITY MARKET**

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- 1. INTRODUCTION**
- 2. LIBERALIZATION**
- 3. PRESENT CHALLENGES**
- 4. SOME SUGGESTIONS**

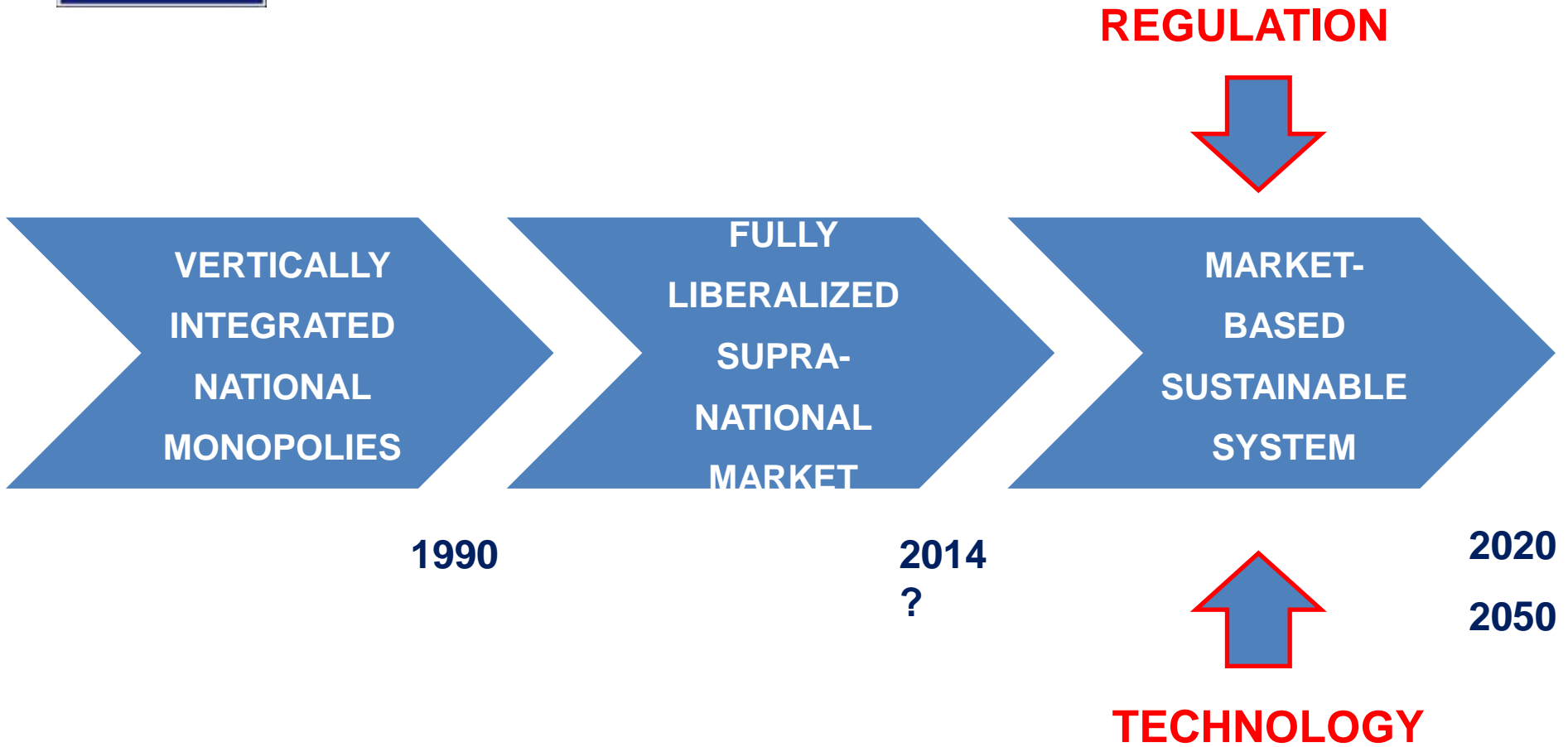


# INTRODUCTION

## WHY IS THE EU ENERGY SECTOR DISORIENTED ?

- **AFTER 20 YEARS, INTERNAL ENERGY MARKET NOT YET ACHIEVED**
- **NATIONAL ENERGY MARKETS VERY OFTEN ARE *TROMPE L'OEIL***
- **STRANGE BEHAVIOUR OF PRIMARY ENERGY MARKETS**  
**(DECOUPLING BRENT/WTI PRICES, SHALE GAS, LNG, ETC.)**
- **IMPLEMENTATION OF EXISTING EU LEGISLATION IS INCOMPLETE, DELAYED**
- **NEED TO ACCOMODATE NEW, DEMANDING EU POLICY TARGETS**
- **UNCERTAINTY CONCERNING NATIONAL ENERGY POLICY CHOICES**  
**(PRIMARY ENERGY MIX, ETC.)**
- **EVOLUTION OF NEW ENERGY TECHNOLOGIES**  
**(DECENTRALIZED GENERATION, STORAGE, SMART METERS, ELECTRIC VEHICLES, ETC.)**
- **EVOLUTION OF MODERN INFORMATION AND COMMUNICATION TECHNOLOGIES**  
**(AND RELATED BUSINESSES)**

# INTRODUCTION



# LIBERALIZATION OF ELECTRICITY MARKETS

ENERGY LIBERALIZATION

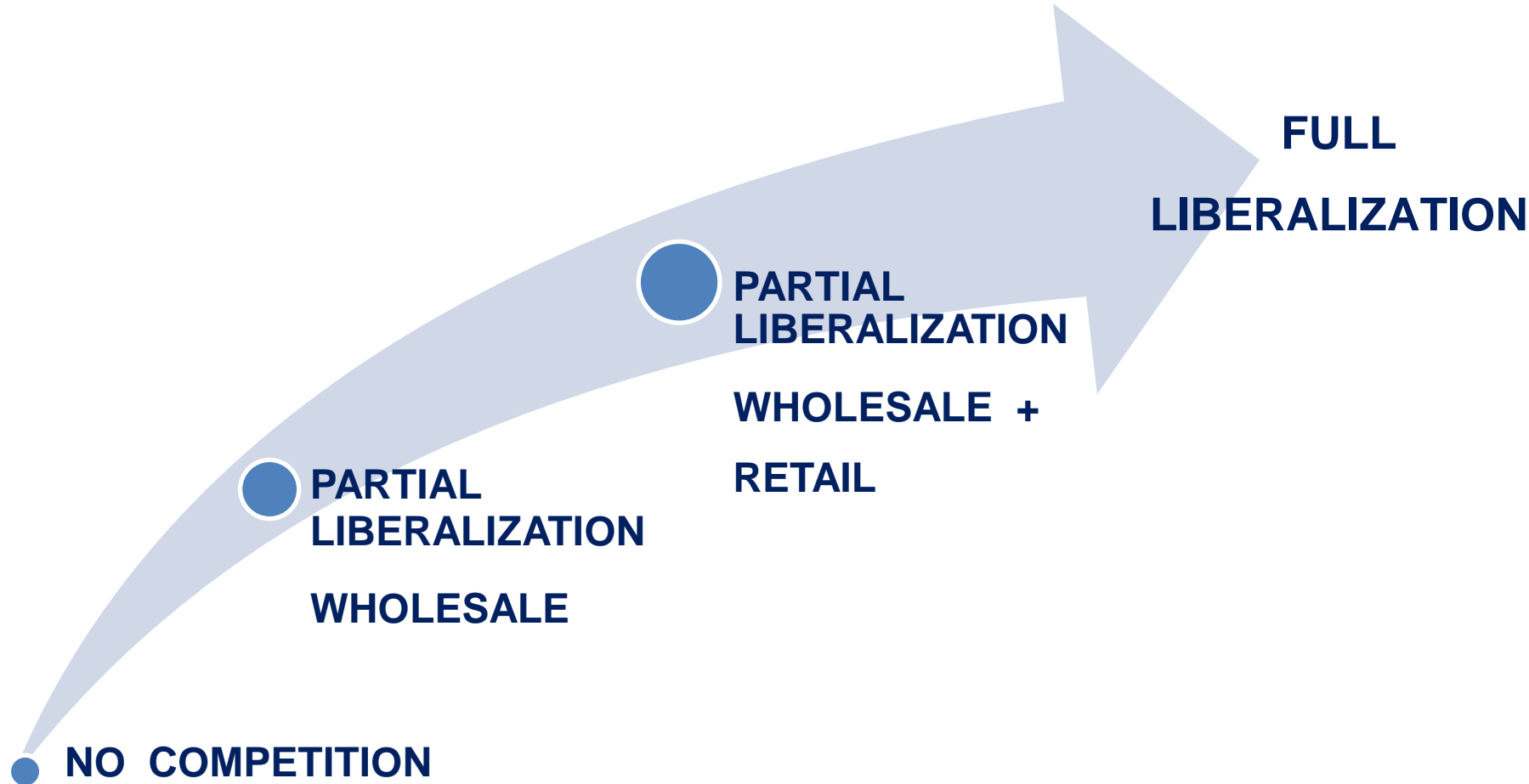
STARTED

IN THE 1980s

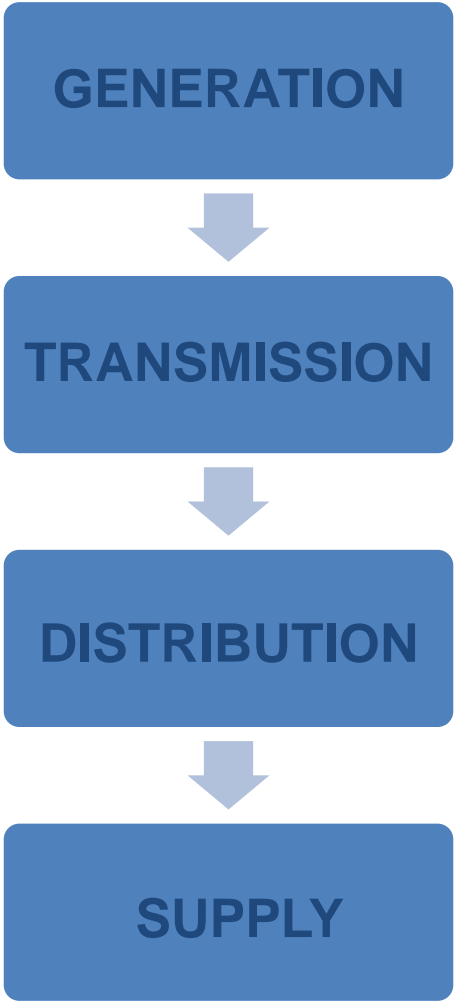
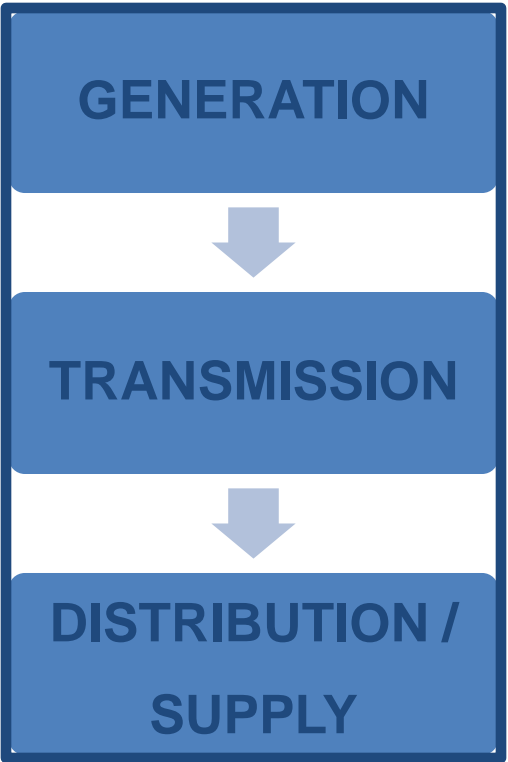
ORGANIZED ELECTRICITY MARKETS

STARTED

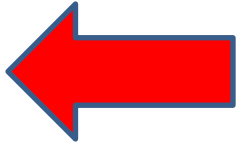
IN THE 1990s



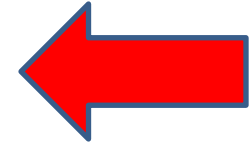
# LIBERALIZATION OF ELECTRICITY MARKETS



**COMPETITION**



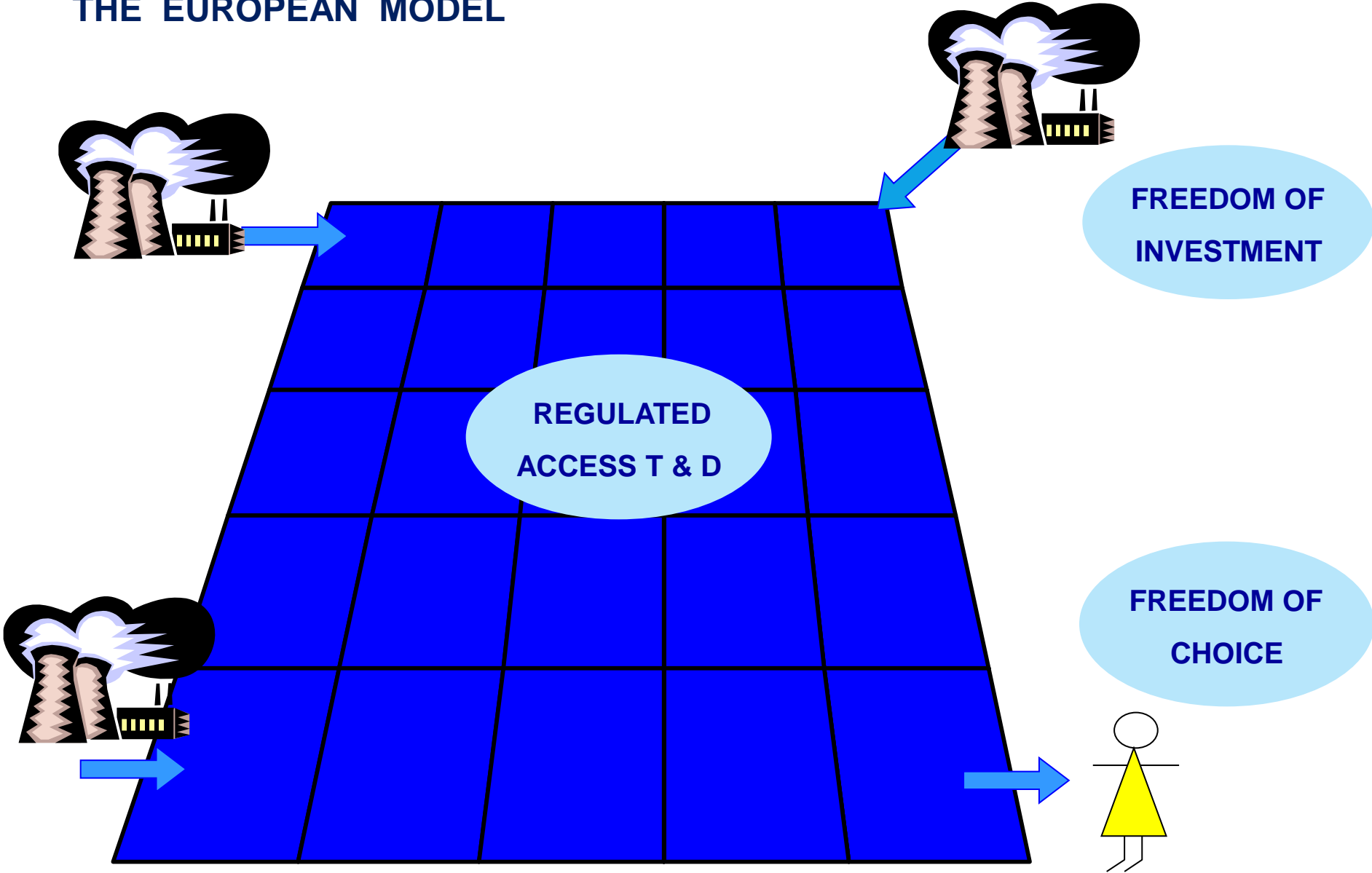
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**COMPETITION**

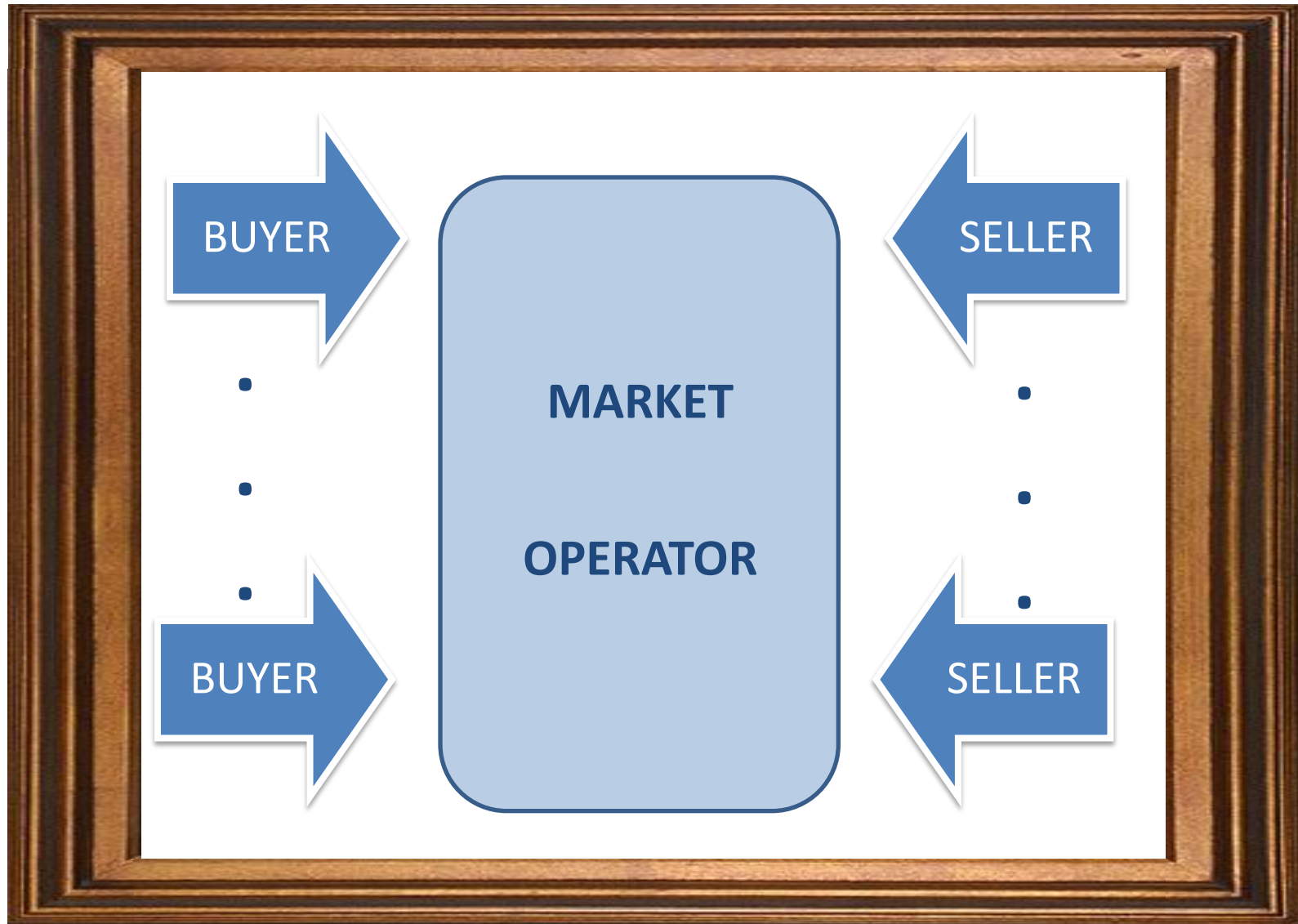
# LIBERALIZATION OF ELECTRICITY MARKETS

## THE EUROPEAN MODEL





# LIBERALIZATION OF ELECTRICITY MARKETS



**DESIGN & IMPLEMENTATION OF EFFICIENT MARKETS IS A BIG CHALLENGE**

# LIBERALIZATION OF ELECTRICITY MARKETS

## TRADITIONAL LIBERALIZATION ISSUES :

- **NON-DISCRIMINATORY NETWORK ACCESS**
- **WHOLESALE MARKET DESIGN**
- **RETAIL MARKET DESIGN**
- **MARKET POWER, COMPETITION**



**MARKET  
DESIGN(S)**

# LIBERALIZATION OF ELECTRICITY MARKETS

## UNSOLVED LIBERALIZATION ISSUES :

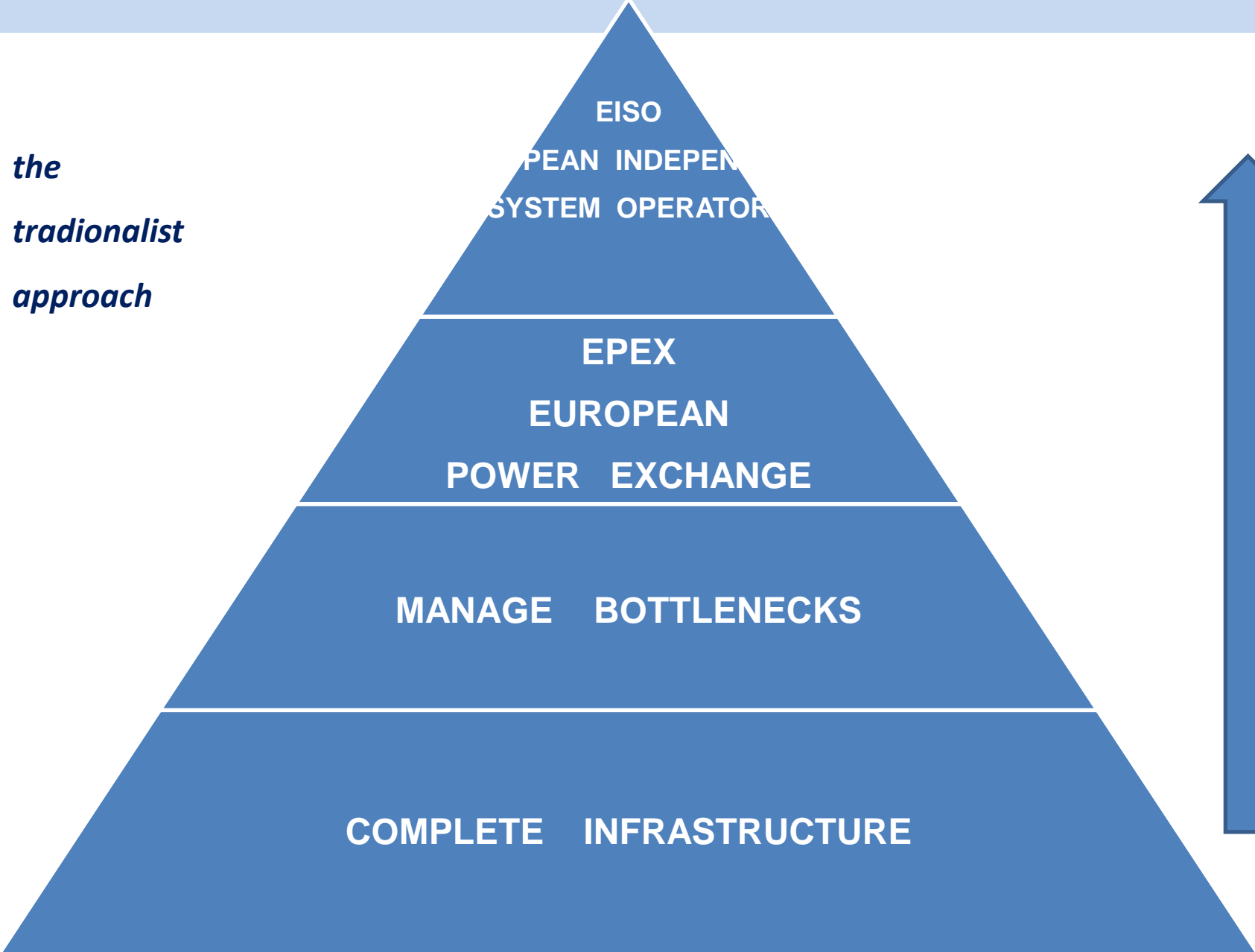
- TRANSMISSION NETWORK EXPANSION
- COORDINATED SYSTEM OPERATION
- INTEGRATED EU WHOLESALE MARKET
- CONSUMER PROTECTION
- MARKET POWER, COMPETITION



**MARKET  
IMPLEMENTATION**

# LIBERALIZATION OF ELECTRICITY MARKETS

*the  
traditionalist  
approach*



# LIBERALIZATION OF ELECTRICITY MARKETS

## NEW POST-LIBERALIZATION ISSUES :

- HIGH PENETRATION OF RENEWABLE / CHP
- DEMAND PARTICIPATION
- ELECTRIC VEHICLES
- 2050 DECARBONIZATION



**MARKET  
REDESIGN**

# PRESENT CHALLENGES

## RENEWABLES IN (REGULATORY) CONTEXT

RENEWABLES ARE ONE MORE ISSUE CHALLENGING  
PRESENT ENERGY REGULATION .

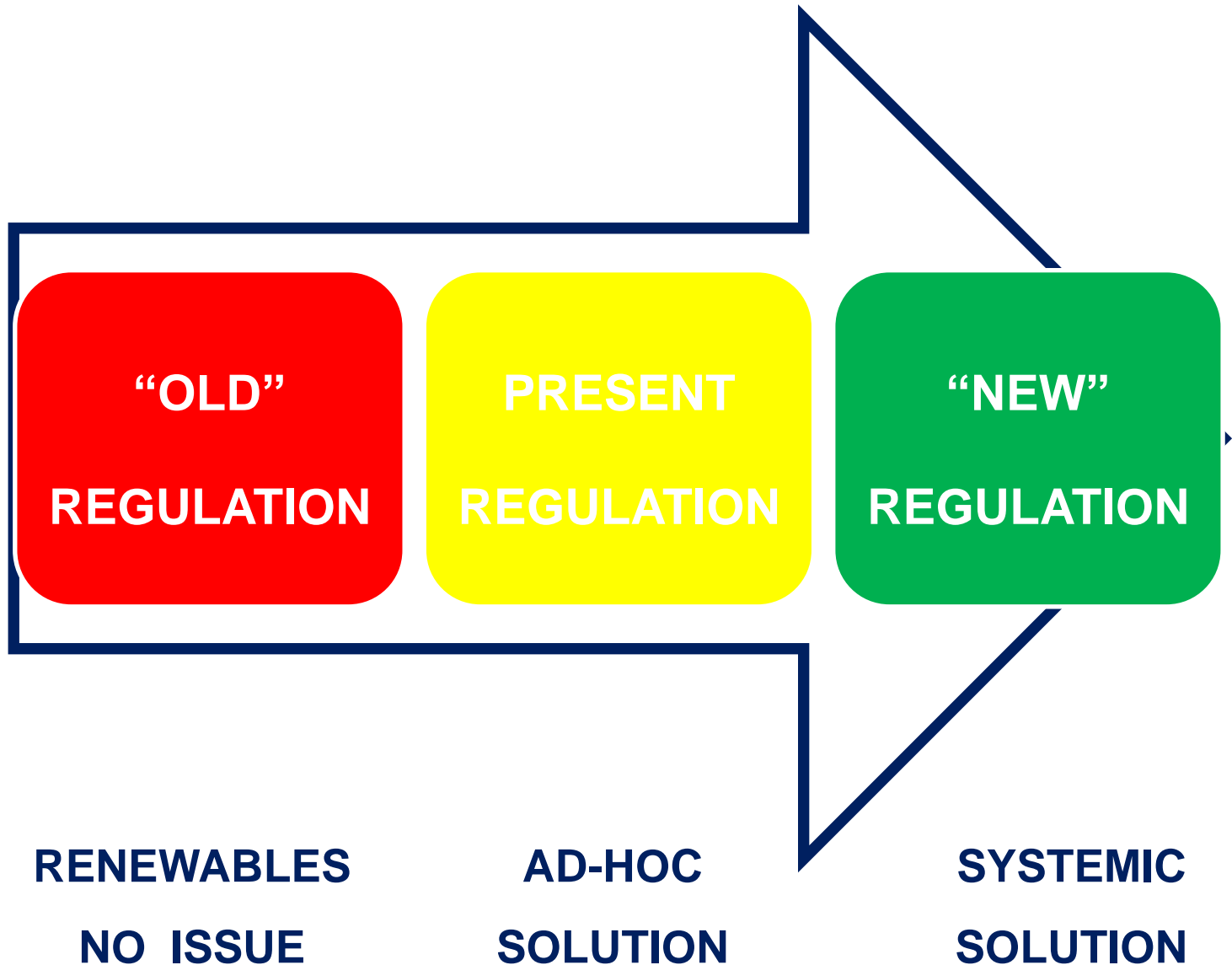
TODAY ENERGY REGULATION FACES MANY CRITICAL  
CHALLENGES (WEATHER-DEPENDENT GENERATION, DEMAND  
PARTICIPATION, ELECTRIC VEHICLES, STORAGE, ETC.);  
ADDRESSING THEM ONE-BY-ONE WILL NOT DELIVER AN  
APPROPRIATE SOLUTION.

### RENEWABLES IN (REGULATORY) CONTEXT

THEREFORE, RENEWABLES SHOULD NOT BE HANDLED ISOLATED , AS A SPECIFIC PROBLEM REQUIRING A AD-HOC SOLUTION WITHIN THE CONCEPTUAL FRAMEWORK OF PRESENT REGULATION, BUT RATHER AS ONE CONSTITUTIVE ELEMENT OF THE CONCEPTUAL FRAMEWORK OF “NEW REGULATION”.

# PRESENT CHALLENGES

## RENEWABLES IN (REGULATORY) CONTEXT





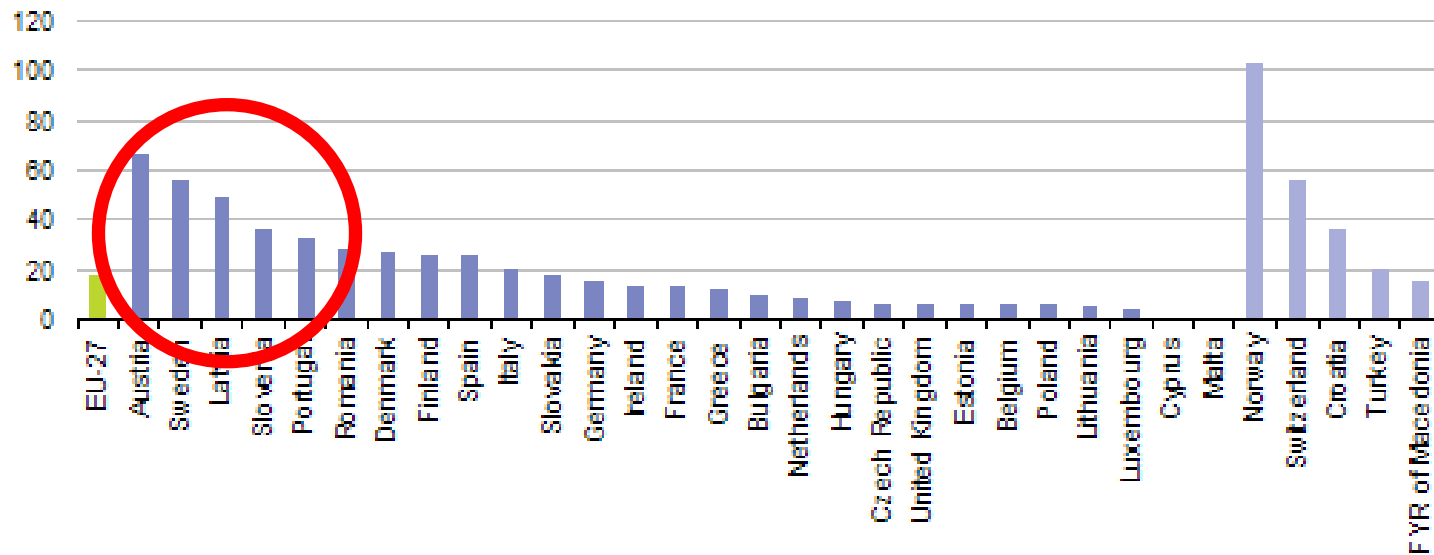
# PRESENT CHALLENGES

REGULATION HAS TO CHOOSE BETWEEN 2 DIFFERENT APPROACHES:

- ❑ THE “STANDARD MARKET MODEL” IS THE CORNERSTONE, INNOVATIONS (eg renewable, demand response) MUST BE COMPATIBLE WITH THE MODEL – OR REJECTED.
- ❑ LET THE DISRUPTIVE FORCE OF INNOVATION (INTERNET) PRODUCE THE CREATIVE DESTRUCTION OF THE STANDARD MODEL - AND INVENT NEW MODELS.

# PRESENT CHALLENGES

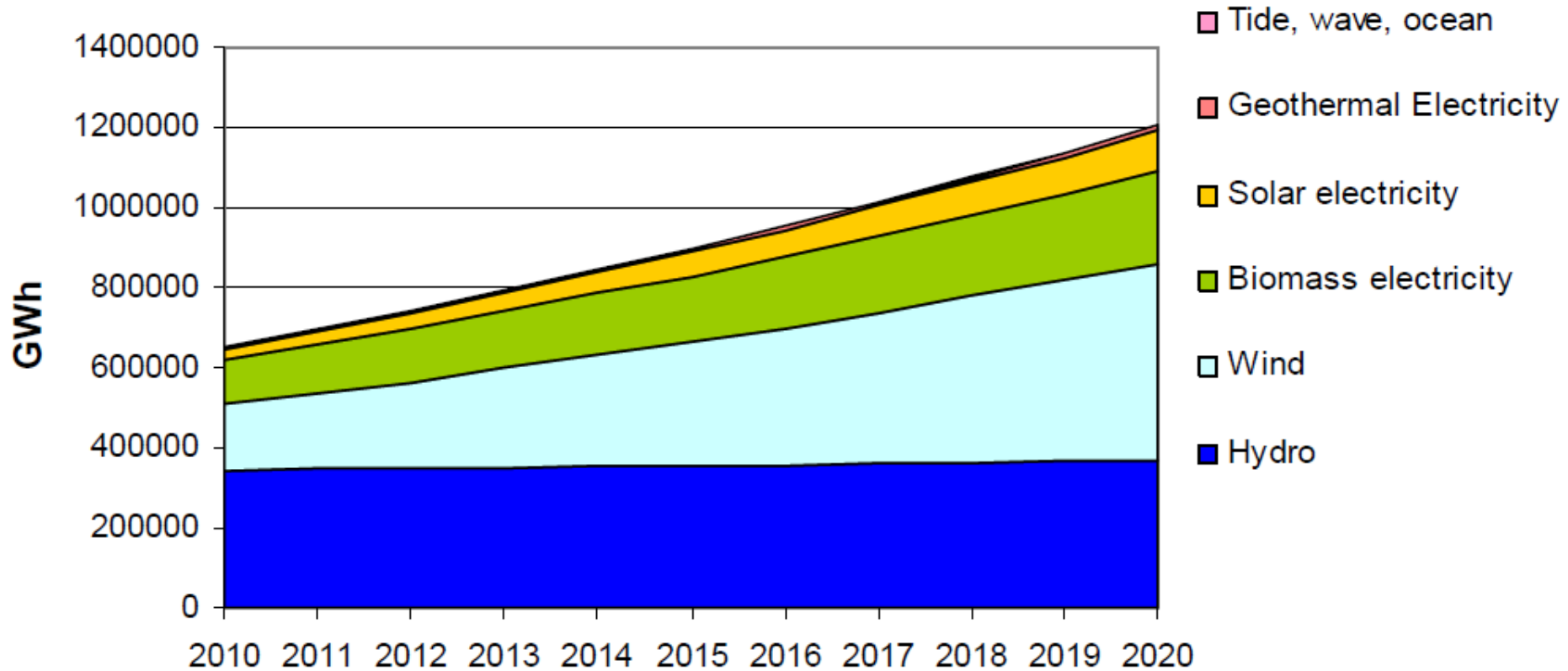
Proportion of electricity generated from renewable sources, 2009 (% of gross electricity consumption)



Source: Eurostat (online data code: tsien050)

# PRESENT CHALLENGES

## EU development of renewable energy in electricity



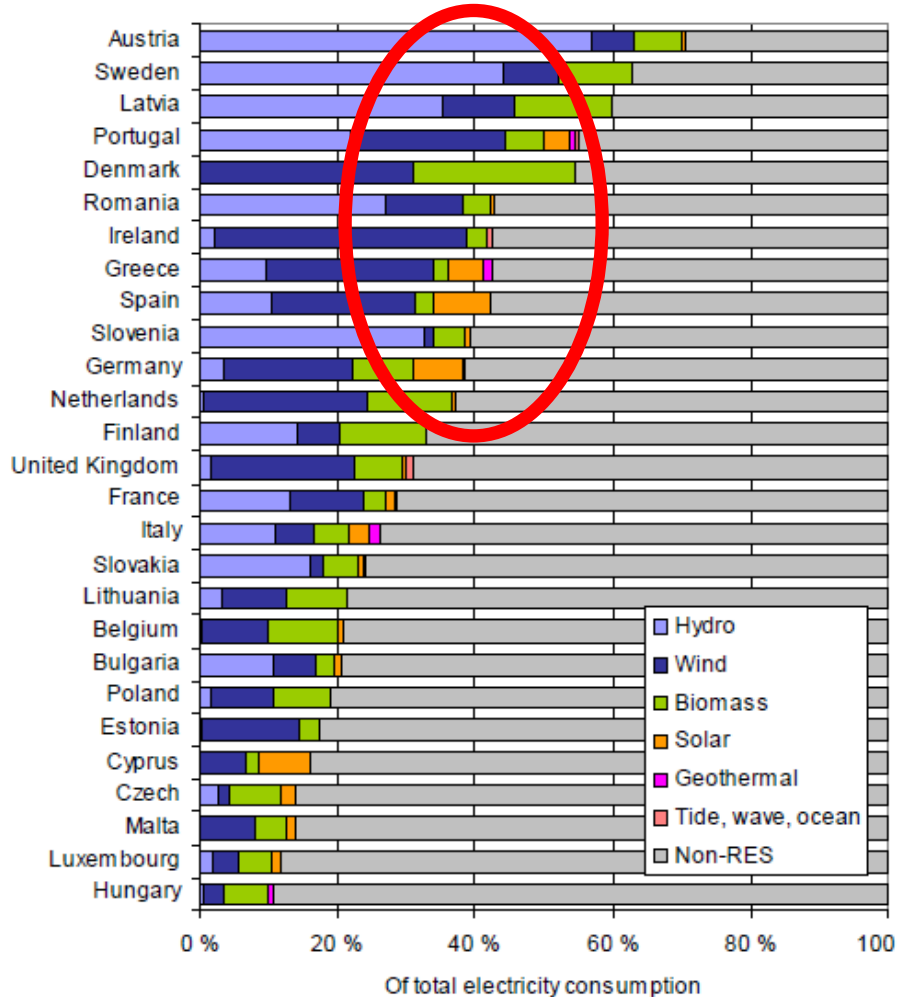


Figure 22. Projected RES-E shares of the total projected gross final electricity consumption in 2020

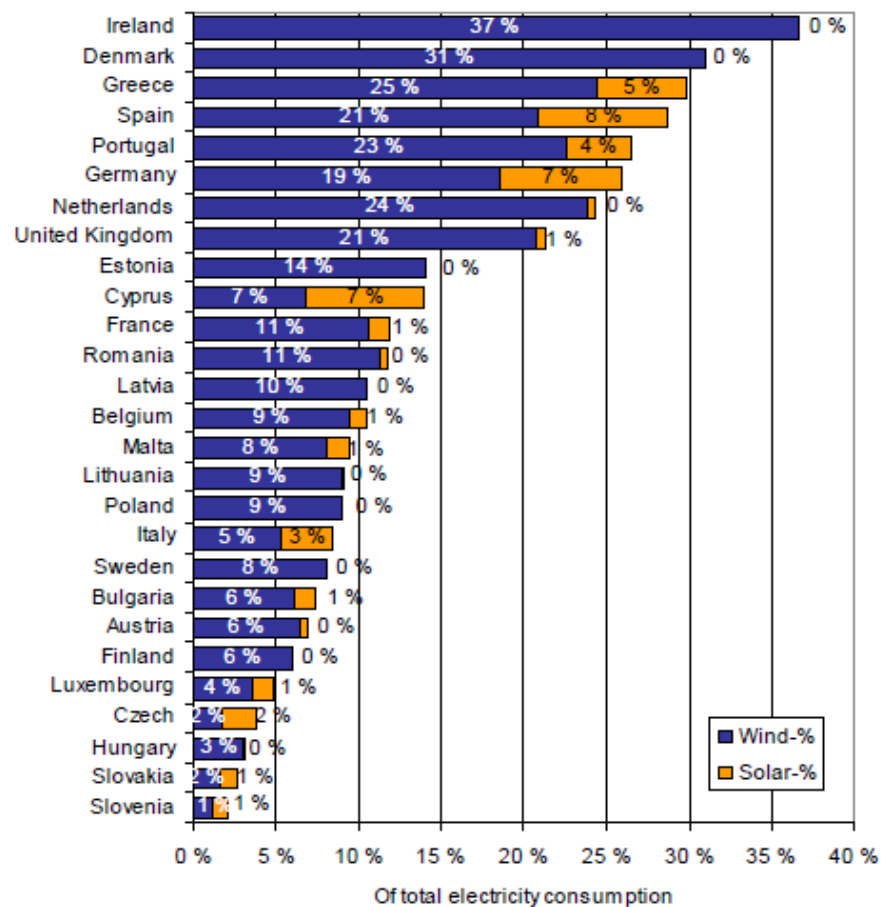


Figure 23. Projected wind and solar power shares of the total projected gross final electricity consumption in 2020.

# PRESENT CHALLENGES

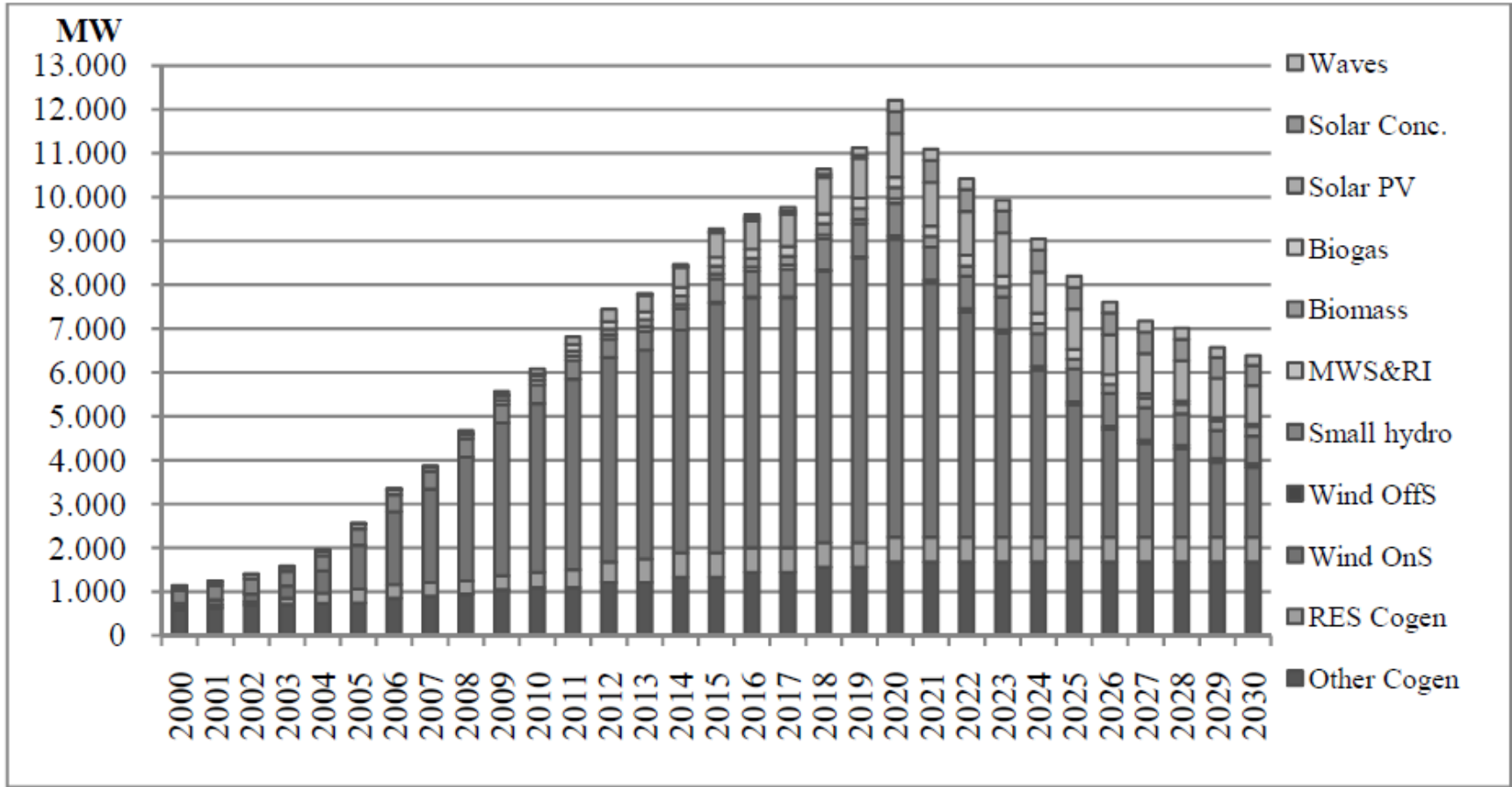


Figure 9: Special regime contracted capacity as known at the end of 2010.

# PRESENT CHALLENGES

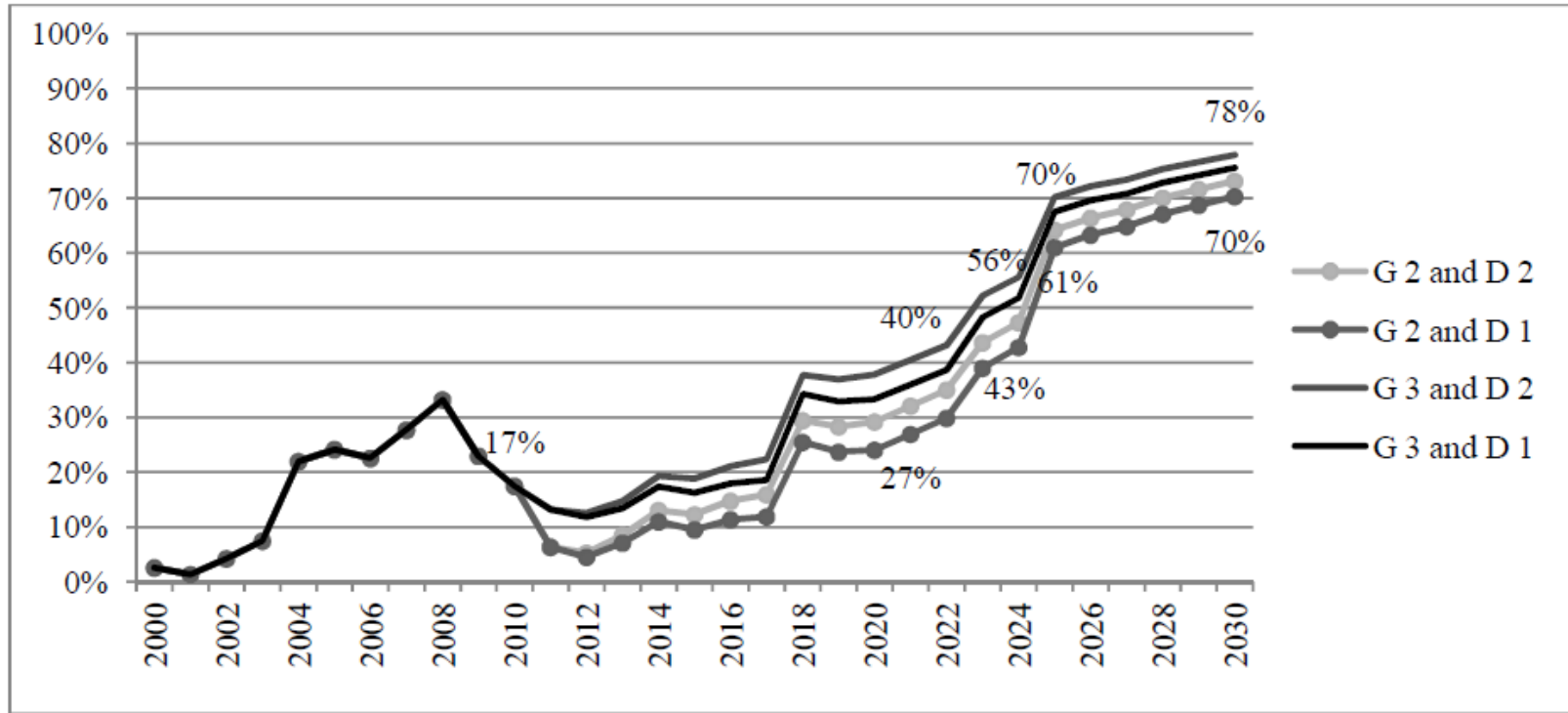


Figure 14: Market potential in Generation Scenarios 2 and 3, Demand Scenarios 1 and 2.

# PRESENT CHALLENGES



## *Article 4*

2. Shared competence between the Union and the Member States applies in the following principal areas:

(...)

(i) energy;

## TITLE XXI

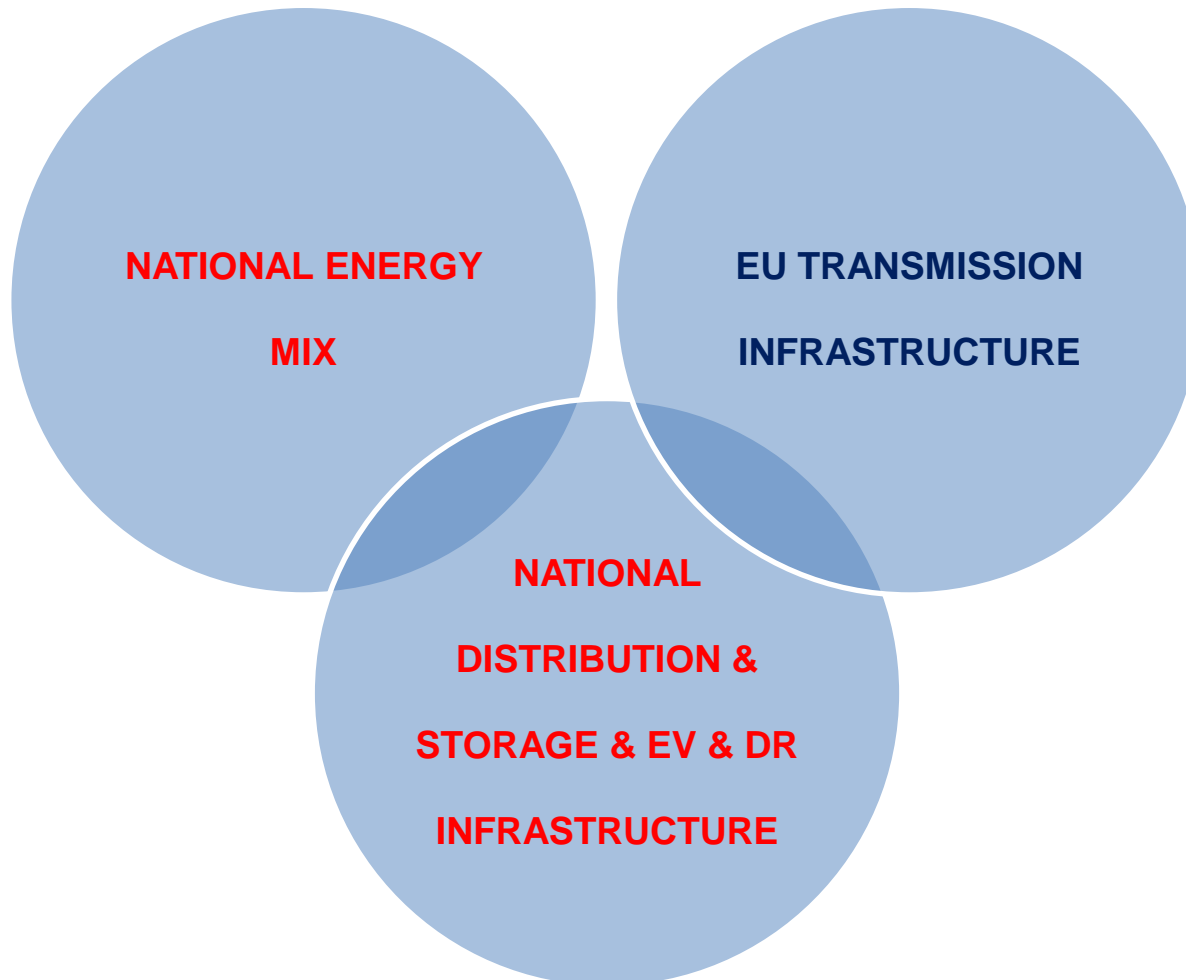
### ENERGY

#### *Article 194*

1. In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to:

- (a) ensure the functioning of the energy market;
- (b) ensure security of energy supply in the Union;
- (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; and
- (d) promote the interconnection of energy networks.

# PRESENT CHALLENGES





## PRESENT CHALLENGES

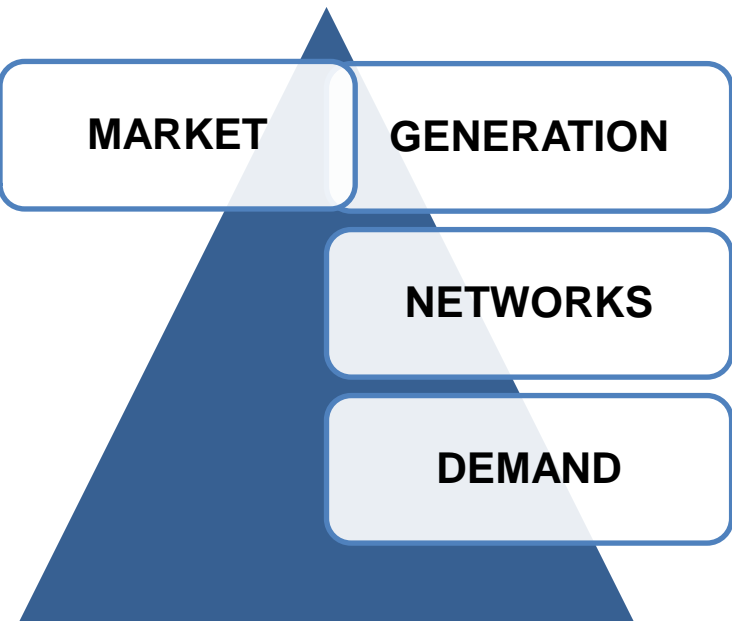
**“ Unless there is an obvious reason to do otherwise, most of us passively accept decision problems as they are framed and therefore rarely have an opportunity to discover the extent to which our preferences are frame-bound rather than reality-bound ”**

Daniel Kahneman

Nobel Prize in Economics 2002

*Thinking, fast and slow* 2011

# PRESENT CHALLENGES



THE FRAME ...



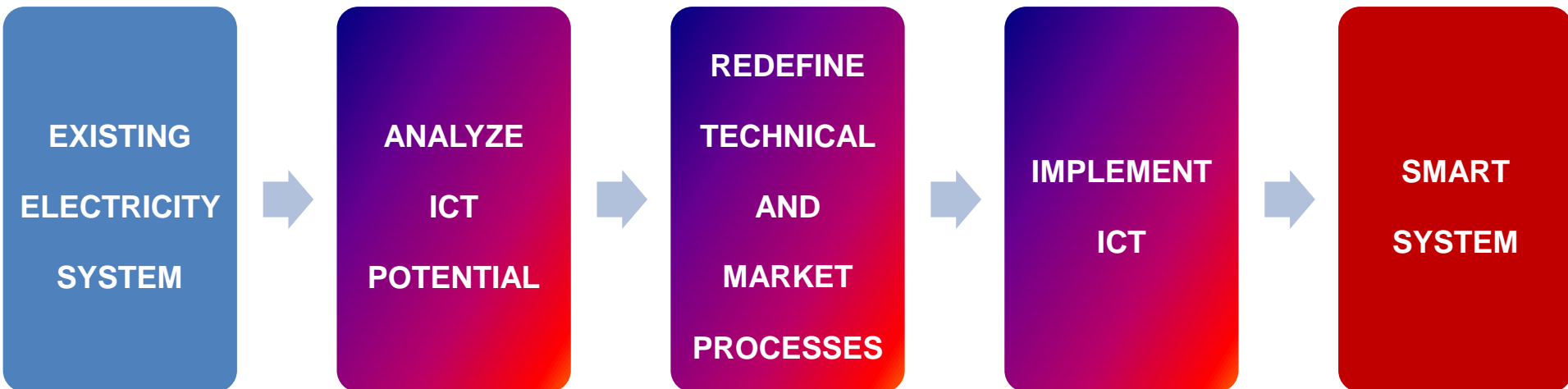
... AND THE REALITY ?

«... Y CUANDO  
LA OFERTA  
DESPERTÓ,  
LA DEMANDA  
CONTINUABA  
ALLÍ.»

AHORA  
CUÉNTAME  
UNO DE  
DESREGULACIÓN



## SOME SUGGESTIONS



**CREATING A SMART SYSTEM REQUIRES CREATIVE THINKING AND REENGINEERING OF SYSTEM OPERATION AND ENERGY MARKETS**

# SOME SUGGESTIONS


## THE “WHO PAYS” (COST / BENEFIT) PROBLEM

### REACTIVE APPROACH

EXTRA ICT  
COSTS

WHO WILL PAY ?

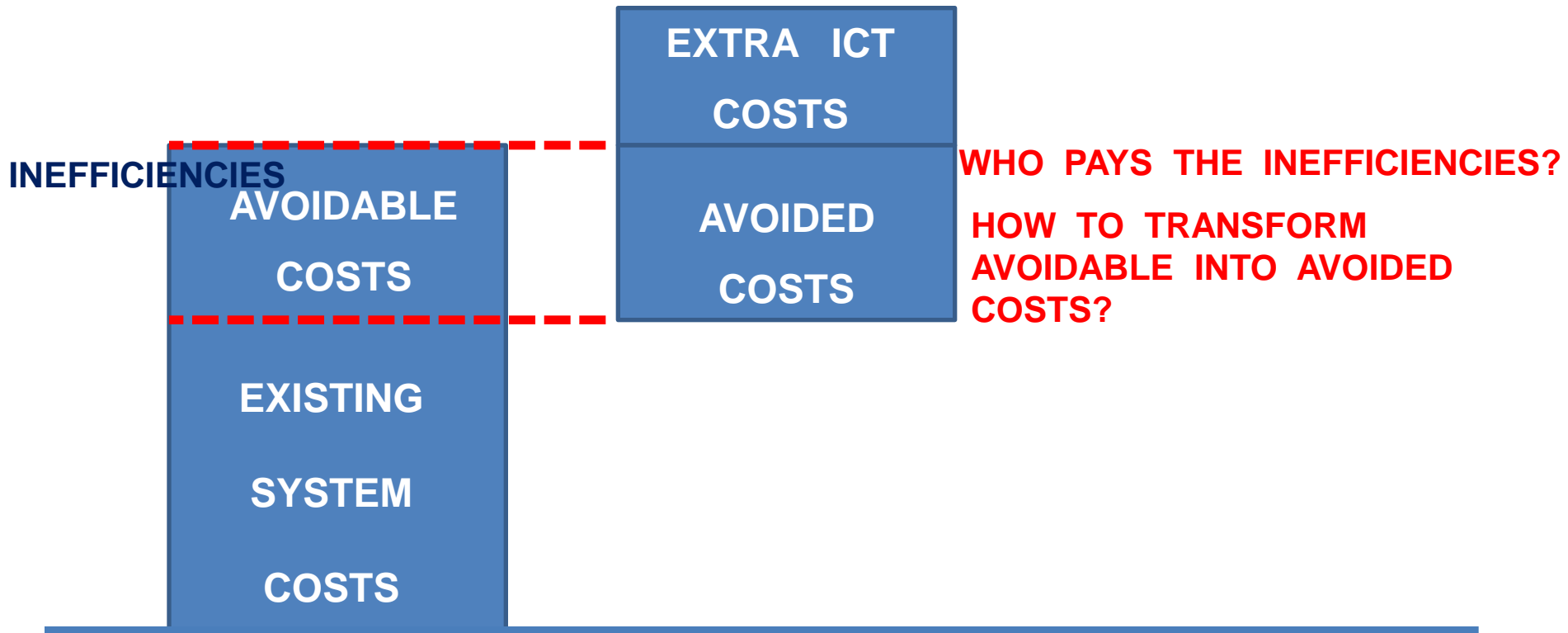
EXISTING  
SYSTEM  
COSTS



# SOME SUGGESTIONS

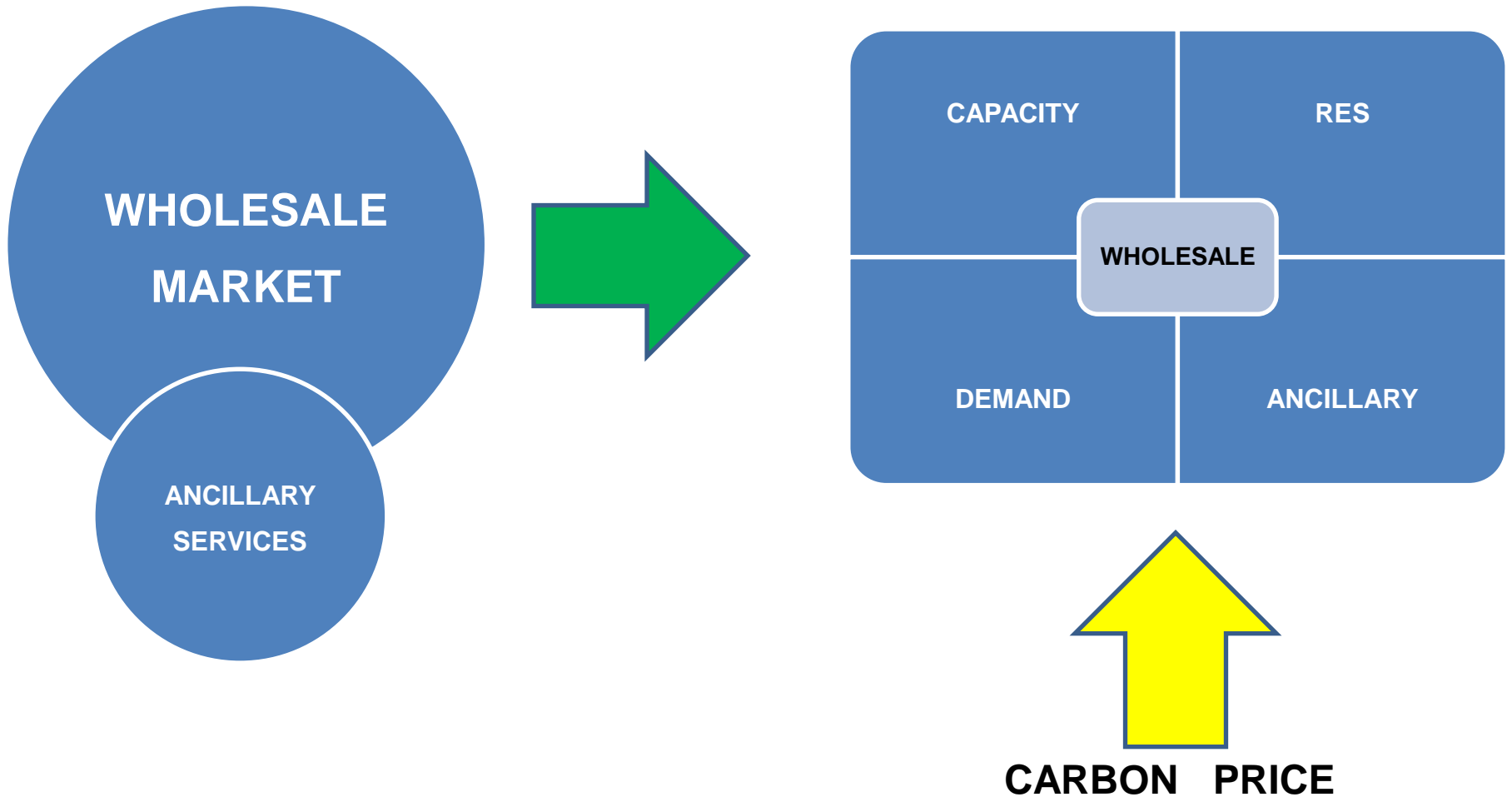
## THE “WHO PAYS” (COST / BENEFIT) PROBLEM

### PRO-ACTIVE APPROACH



# SOME SUGGESTIONS

## FUTURE ENERGY MARKETS



# SOME SUGGESTIONS

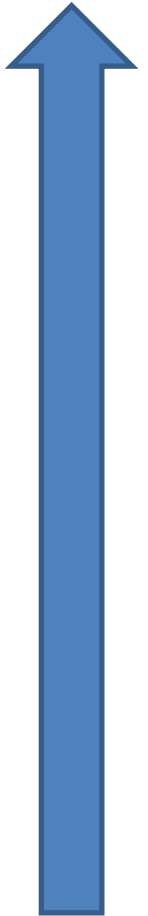
*the  
INNOVATIVE  
approach*

NATURAL  
RESOURCES  
OPTIMIZATION

EPEX  
EUROPEAN POWER  
EXCHANGE

EISO  
EUROPEAN INDEPENDENT  
SYSTEM OPERATOR

SMART INFRASTRUCTURE





# CONCLUSIONS

- **ELECTRICITY MARKETS NEED TO BE REDESIGNED**
- **EFFICIENT "GREEN" ELECTRICITY MARKET DESIGN NOT YET FOUND**
- **THE SINGLE EUROPEAN ELECTRICITY MARKET HAS NOT YET BEEN ACHIEVED**
- **PROPER EU COORDINATION OF SYSTEM PLANNING AND OPERATION, AS WELL AS MARKET OPERATION, ARE ESSENTIAL PRE-CONDITIONS FOR EFFICIENT INTERNAL ELECTRICITY MARKET**
- **ENERGY RESOURCE OPTIMIZATION WILL REQUIRE INCREASED COORDINATION OF NATIONAL ENERGY POLICIES**