Market RES

WP5 expert workshop

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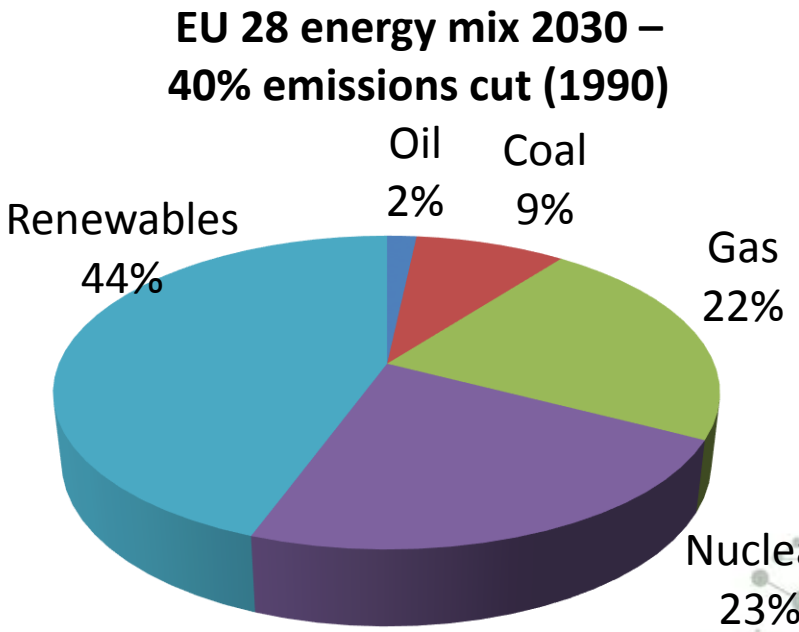
May 22nd, 2015

Co-funded by the Intelligent Energy Europe Programme of the European Union

EU 2030 energy strategy

EU 2030 targets

- A 40% cut in greenhouse gas emissions compared to 1990 levels
- at least a 27% share of renewable energy consumption
- a 30% improvement in energy efficiency (compared to projections)



Source: Enerdata

A competitive, secure and sustainable economy and energy system

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> WP5 objectives

Peter Ahcin

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WP5 Objective

As current RES support schemes are phased out after 2020 new kinds of market mechanisms will have to be implemented that will in accordance with the EU energy policy:

1. Promote a competitive market with large shares of renewables and without support mechanisms.

2. Guarantee security of supply by providing market incentives to invest in generation.

WP5 will define a framework in which the effectivenes of market mechanisms can be studied and provide the first results.

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> KPIs

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WP5 Objective

Evaluate the most promising market design alternatives in terms of:

- Economic efficiency
- Effectiveness at integrating a high share of RES-E and achieving climate objectives
- Effectiveness at ensuring security of supply
- Robustness against diverging possible developments
- Implementability (compatibility with regulation, cost,…)
- Fariness (distribution of costs and benefits, price discrimination,…)

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> Transition to an electricity market dominated by fixed costs

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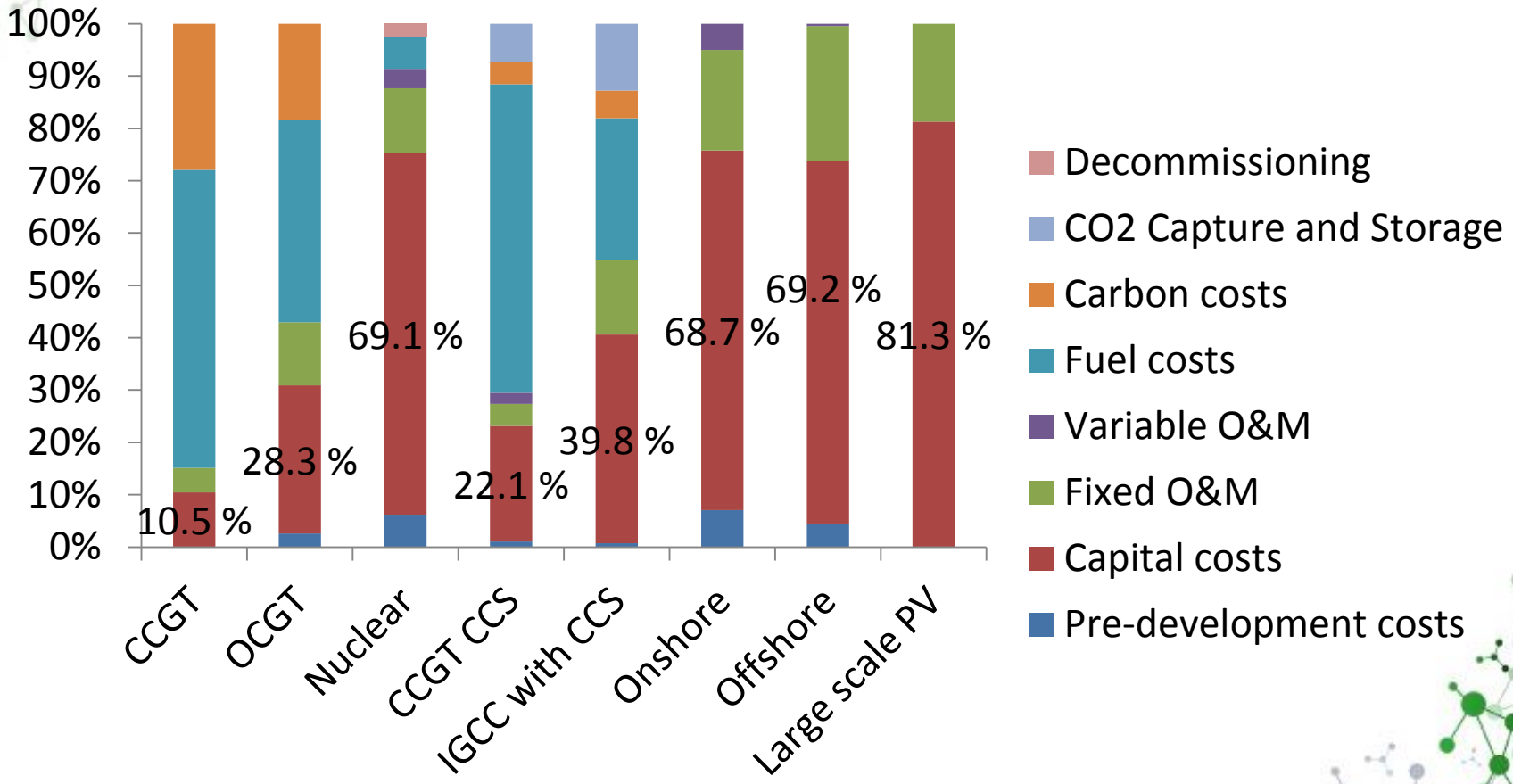
Cost breakdown of electricity generation

Levelised Cost Estimates for Projects Starting in 2019 in UK



Source: Electricity generation costs 2013,DECC, UK.

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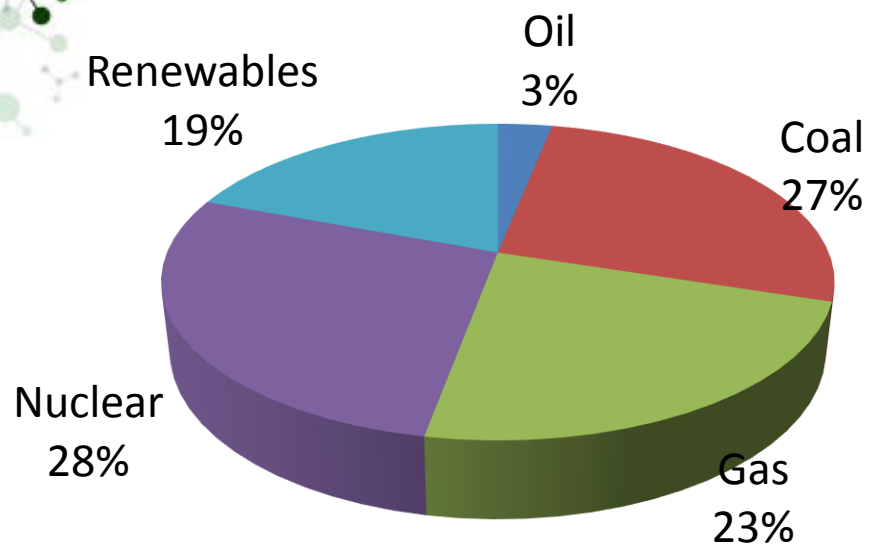
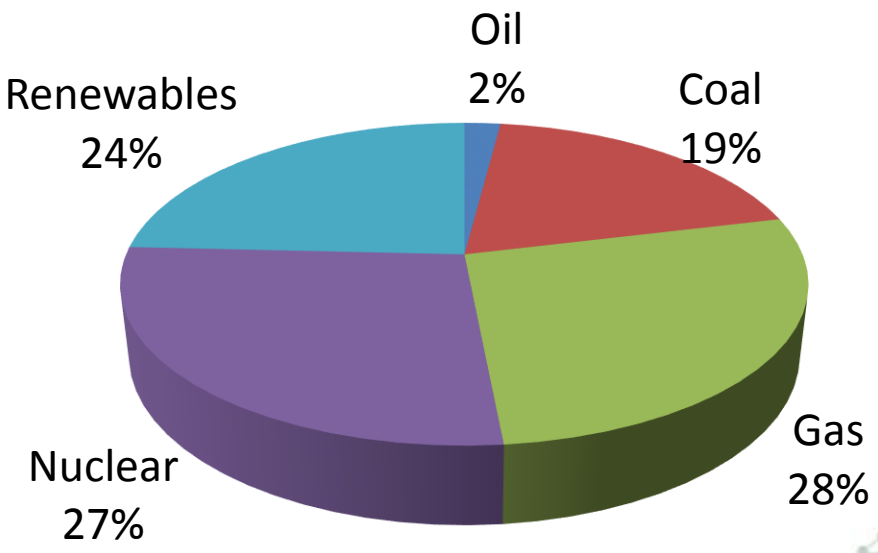
Rising share of capital costs in electric energy mix

EU 28 energy mix 2008



Capital costs: 50,2%
Variable costs: 30,2%

EU 28 energy mix 2012



Capital costs: 51,0%
Variable costs: 29,9%

Sources: Electrical power visions 2040 for Europe, EUREL, EU Energy Market in 2014, EC.
Costs and Benefits to EU Member States of 2030 Climate and Energy Targets, Enerdata, UK.

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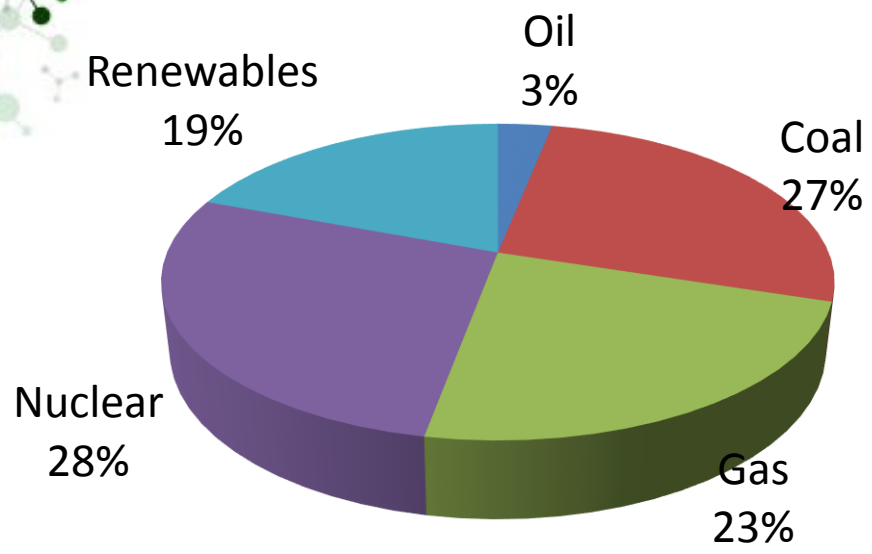
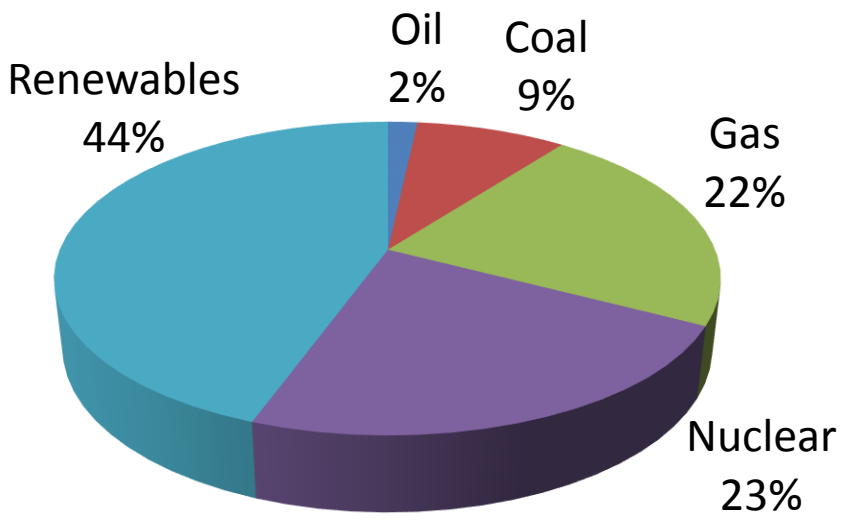
Rising share of capital costs in electric energy mix

EU 28 energy mix 2008



Capital costs: 50,2%
Variable costs: 30,2%

EU 28 energy mix 2030 – 40% emissions cut over 1990



Capital costs: 57,7%
Variable costs: 22,6%

Sources: Electrical power visions 2040 for Europe, EUREL, EU Energy Market in 2014, EC.
Costs and Benefits to EU Member States of 2030 Climate and Energy Targets, Enerdata, UK.

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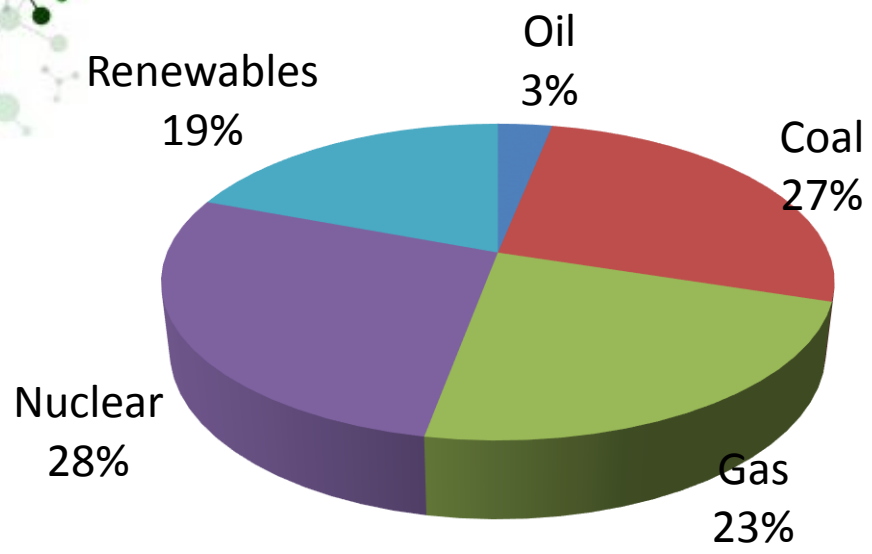
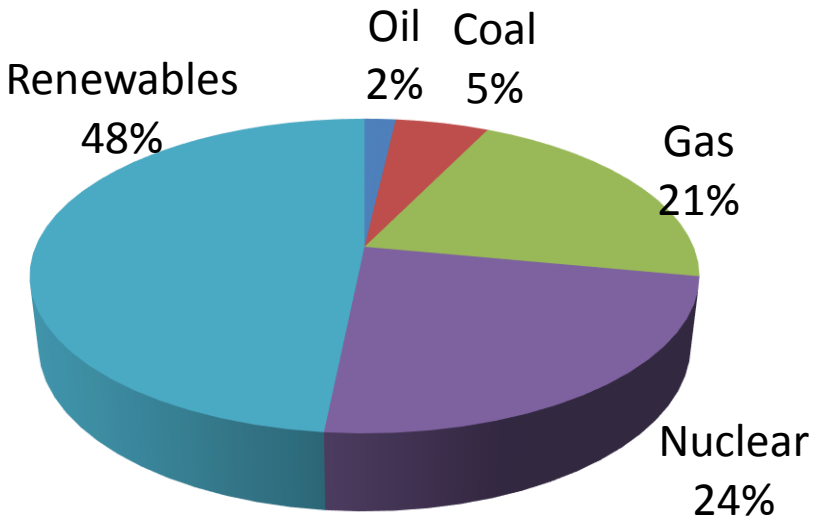
Rising share of capital costs in electric energy mix

EU 28 energy mix 2008



Capital costs: 50,2%
Variable costs: 30,2%

EU 28 energy mix 2030 – 50% emissions cut over 1990



Capital costs: 59,4%
Variable costs: 21,0%

If storage and RES are to replace the remaining fossil fuels the respective values become 74% and 3,8%.

So

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Effect of cost of capital on wholesale electricity prices

	Cost of capital (WACC)[1,2,3]				
	12%	14%	10%	9%	8%
Energy price as share of reference	100%	109%	92%	87,5%	84%

1. Share of CAPEX in total cost 57,7% (40% emissions cut)
2. Nominal before taxes!
3. Length of financing period 30 years.

Increased risk (WACC 14%) instead of reduced risk (WACC 9%) results in a difference of 24% in the final energy price.

Risk reduction will become increasingly interesting for reducing the cost of electricity.

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Contracts for Differences UK

Foreign Direct Investment

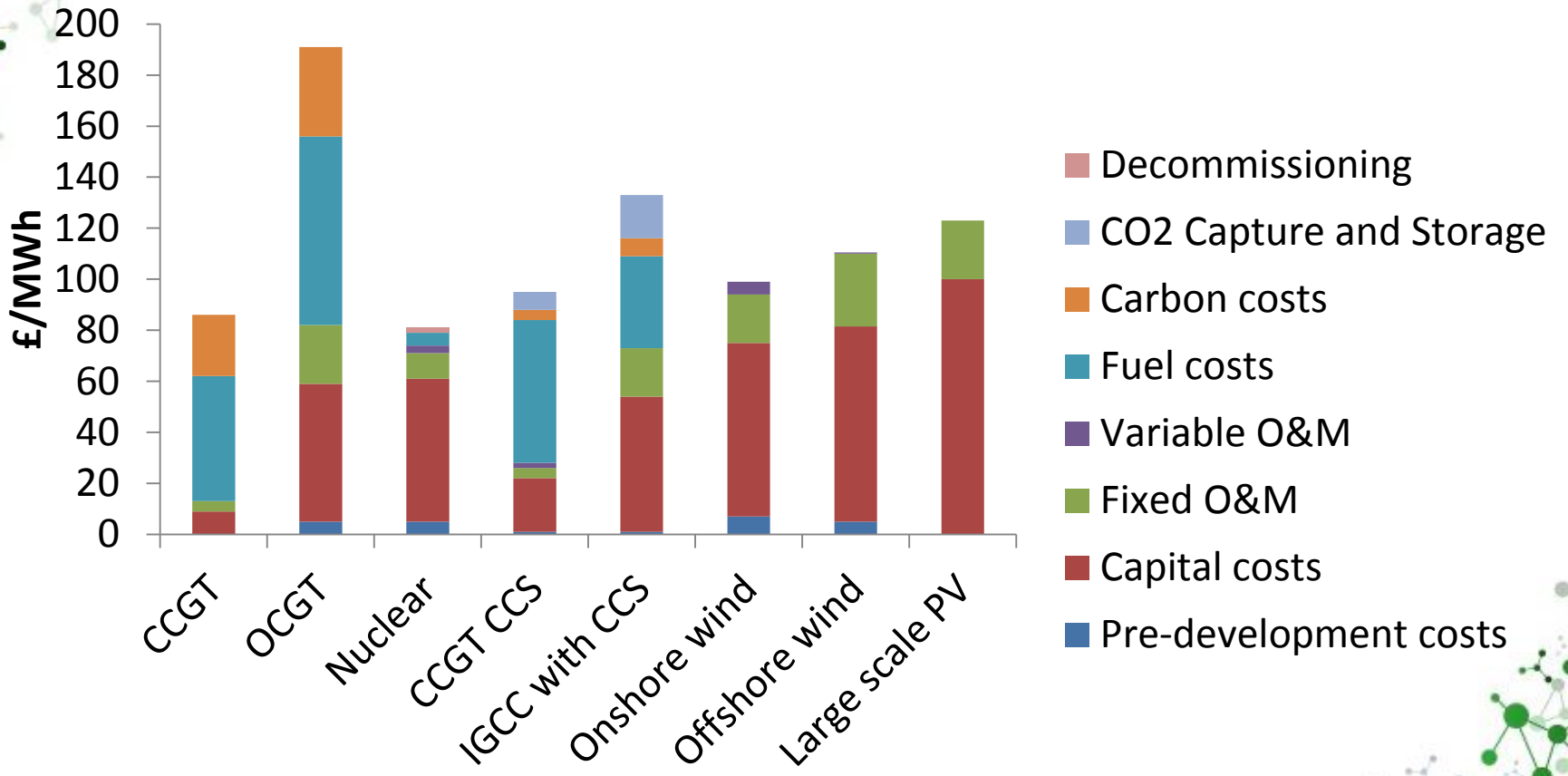
Security of supply

25.000 jobs

Reduce WACC from 12%-14% to 10%

Cost breakdown of electricity generation

Central Levelised Cost Estimates for Projects Starting in 2019



Source: Electricity generation costs 2013,DECC, UK.

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> Research methodology

Aurèle Fontaine

May 22nd, 2015

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Research methodology:
two complementary perspectives

(i) Economic efficiency…

- main quantitative KPI when assessing market design options
  → focus of quantitative work under this WP
- What does the system that **minimizes costs / maximizes social welfare** looks like?

→ Optimization problem (*optimal mix*) under constraints (e.g. RES penetration)

- Short-term (optimal management of existing assets)
- Long-term (optimal investments)

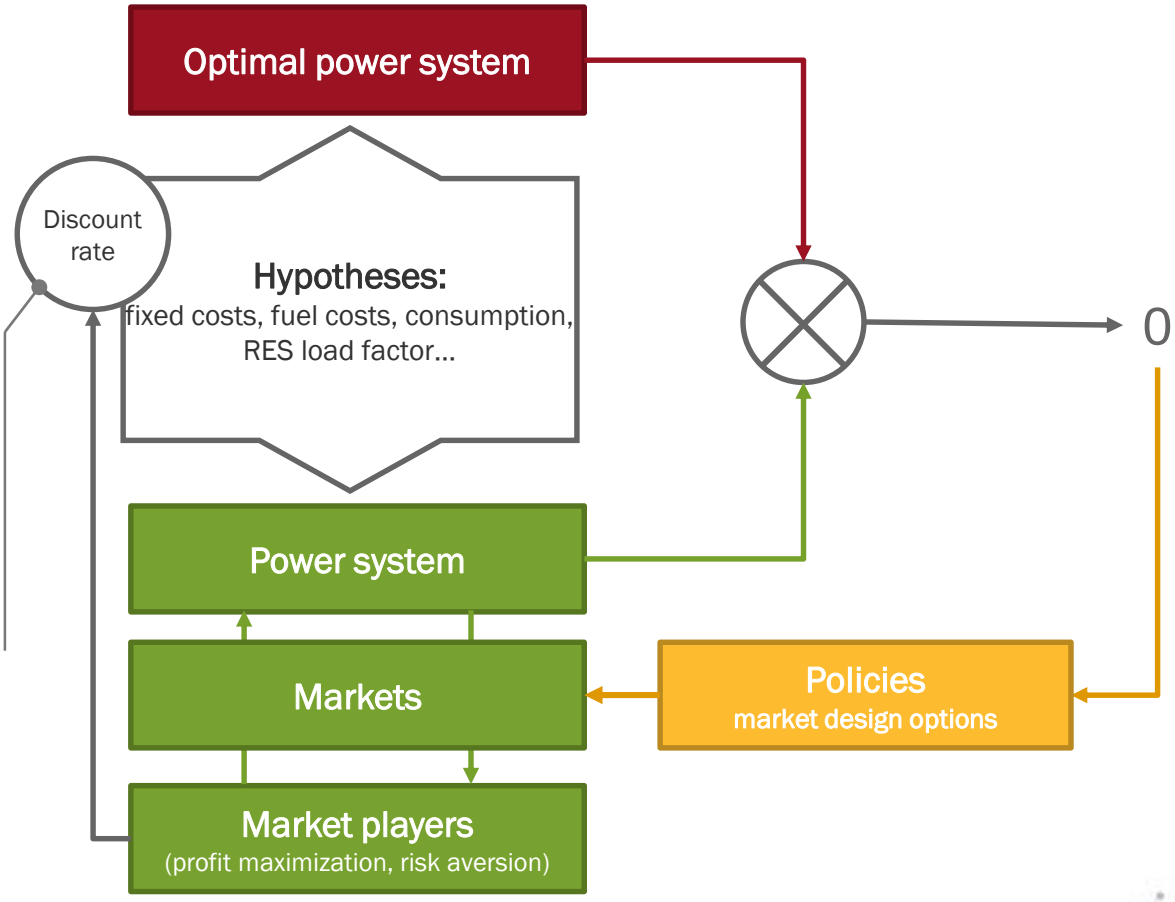
… v. (ii) market players' decisions

- The optimal situation has to be reached on the basis of distributed decisions made by market players maximizing their profits
- Profits depend on the market design

Practical criterion for assessing market designs:

→ Get the system as close as possible from the optimal one

Research methodology:
two complementary perspectives



Discount rate is a key factor in the fixed costs of technologies; it depends on the risk associated with project which can be amplified or mitigated by market design. Therefore the optimal power system may change accordingly.

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> Tools

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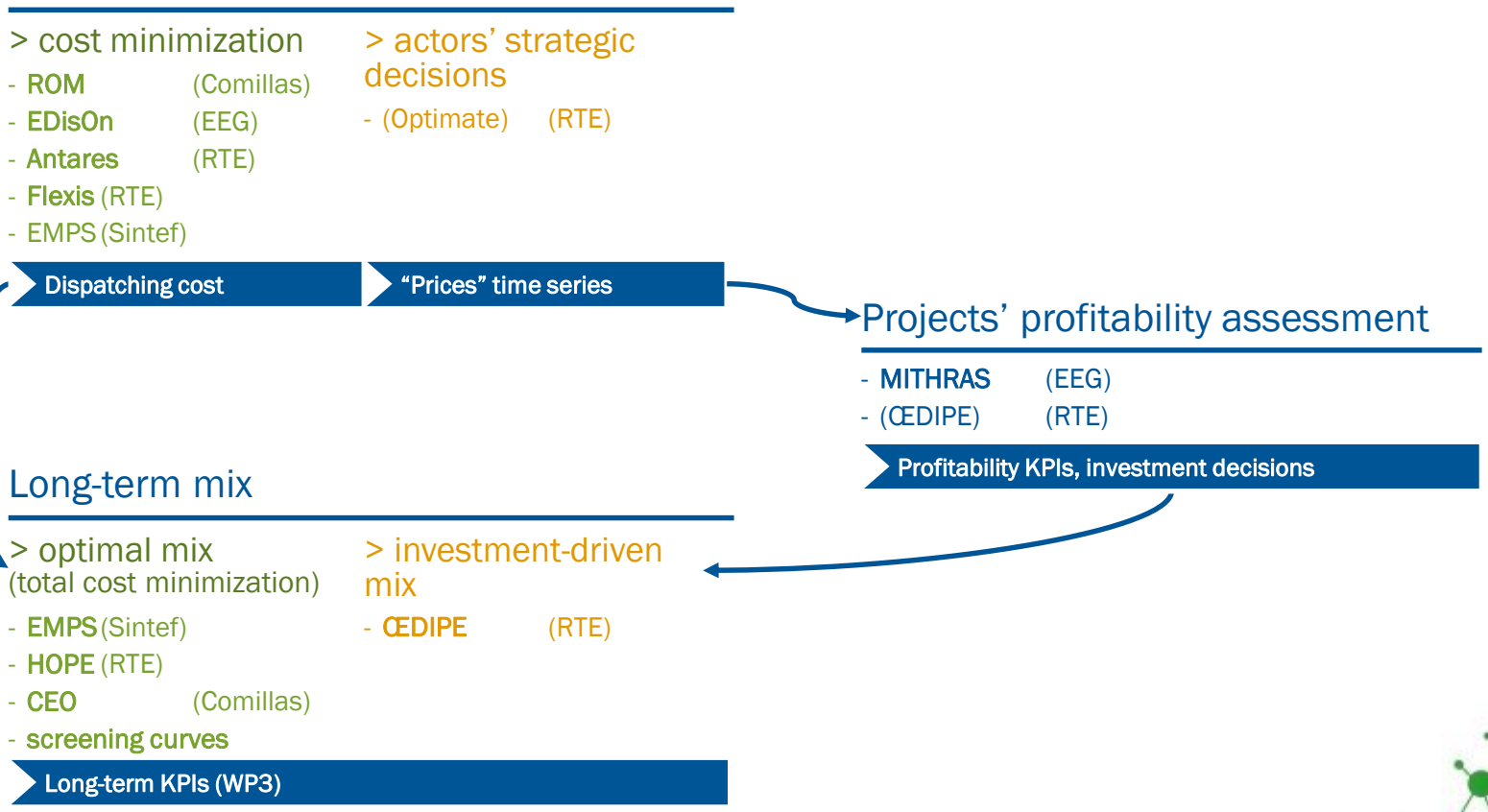
Classification of tools to be used in WP5



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> Scenarios and market design options for 2030

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May 22nd, 2015

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Scenarios for 2030

Requirements

- Few scenarios (3-4) for resources reasons
- Contrasted enough to encompass a wide range of possible futures
- Compatible with all tools / comprehensive
  - Fixed & variable costs of projects, discount rate
  - Consumption, interconnection, availability of gen. units
  - RES power factors…

Scenarios set will therefore comprise:

- 1 “reference” or “median” 2030 scenario
- 2 or 3 alternative 2030 visions
- 1 reference 2020 scenario, used as a starting point in investmen-oriented studies

Market design options

(1) Market for RES: how to fulfil 50% RES by 2030?

- Direct support (FIP) v. emissions tax/quotas

(2) Energy-only market with 50 % RES

What is the impact of the development of RES on the wholesale price?

- Level of revenues of each technology: tough question since most optimal mix tools assume each one is exactly profitable…
- Volatility, level of risk and adjustment of the discount rate

(3) Market with RES: how to still ensure economic efficiency and SoS?

May the energy only market short of something…

- How to ensure the appropriate level of investment in generation?
- How to ensure the proper development of:
  - demand response
  - storage
  - transmission network

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> Parallel work sessions

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Results, event calendar and all related news can be found on: www.market4RES.eu

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Thank you very much for your attention

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