

Future of State Aid Framework

Needs and issues of an energy equipment supplier

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Conseil Français de l'Énergie - Paris

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Three main activities in four sectors

Power Generation Alstom Thermal Power



Power Transmission Alstom Grid



Alstom Renewable Power



Rail Transport Alstom Transport



Alstom Thermal and Renewable Power: A Full Portfolio of Energy Technologies

Gas



Coal



Oil



Hydro, Ocean, Tidal



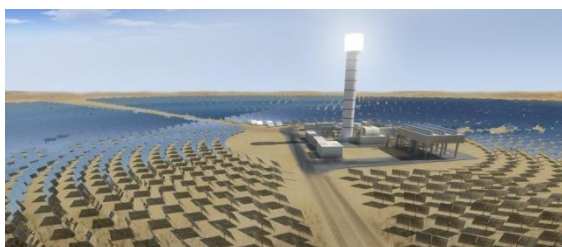
Nuclear (turbine island)



Wind on and offshore



Solar



Geothermal



Biomass



Major equipment for 25% of global installed power capacity

Acceleration of research and development

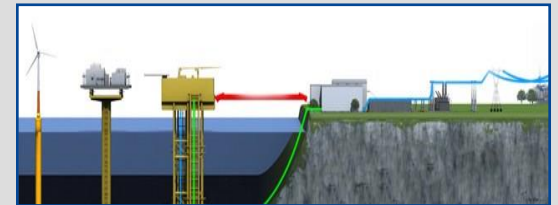
R&D expenses at €737 million

- Aiming at enhancing leadership in traditional segments
- Allowing new entry or further penetration of fast growing and high-end segments such as:
 - Third-party services in Thermal Power
 - Offshore wind
 - Hydro: acquisition of TGL
 - HVDC (high voltage direct current) and Smart Grids
 - Urban signalling system

Recent R&D efforts paying off



North Bangkok:
Upgraded GT26 gas
turbines



DolWin 3 in Germany: HVDC
offshore connection



Offshore
French tender:
launch of
Haliade 150
6MW



Urbalis Fluence:
innovative train centric
CBTC system

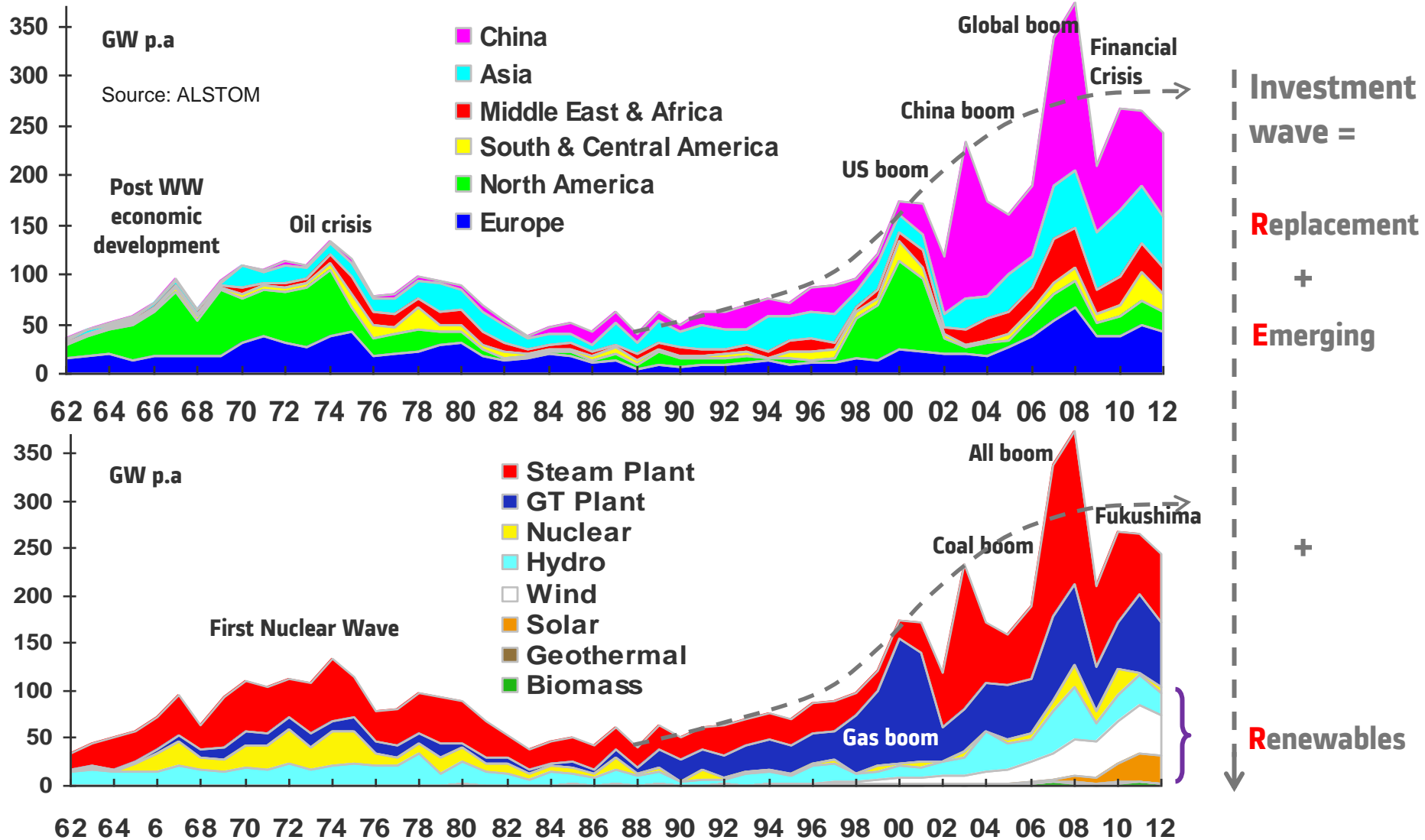
Specifics of the Energy Sector

Comments on EU State Aid Regulation

Special Issues

Market overview

50 years of market evolution (new plant)



The Electric Power Sector is a long term, long cycles and capital intensive industry

From R&D to Commercial Deployment of CCS

Technology development steps

SMALL BENCH & LAB PILOTS

*Confirm technical hypotheses ,
Optimize process design for pilots*

FIELD & VALIDATION PILOTS (15-100,000 tons per year)

*Validate key performance
parameters and System Reliability*

KEY ISSUES

- IPR / Knowledge Sharing
- Support adequacy (amount, timing, conditions)
- Policy visibility

KEY ISSUES

- Business case
- Regulation stability
- Policy visibility

**Commercial Scale
Demonstrations
(1-2 MM tons per year)**

**Full Commercial
Release**

Differentiated State Aid approach needed for R&D and Deployment

Agenda

CLEAN POWER
CLEAR SOLUTIONS

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State AID: base equipment supplier's needs

- **Set in the frame of long-term policy goals**
- **Differentiated approach for R&D&D and Deployment**
 - High intensity – time/volume limited grants for R&D + project studies
 - Grants + Revenue streams for commercial size demonstration
 - Long term stable market based mechanisms for deployment
- **No retroactive changes**
- **Protecting IPR**
- **Aid process & methodology simplicity and fast response time**
- **Technology neutral level playing field**
- **Preserving markets & competitiveness of EU industry**

EU State AID new rules : key features

➤ **Gradual Introduction of Market Based Mechanisms**

- Introduction of Competitive Bidding processes
- From Feed-in Tariffs to Feed-in Premiums
- Special regime for small installations
- No retroactivity to existing schemes

➤ **Exemption for small/early stage technologies**

- <6 MW or 6 units for wind or 1 MW for other renewables
- FIT can continue for <3MW – 3 units wind or 0,5 MW other

➤ **Including CCS**

- Covers operating costs + cross-border CO2 pipelines

➤ **Competitive bidding process**

- With flexibility provisions (e.g. in case of limited projects/sites)

➤ **Preserving competitiveness of EU industry**

- Charge exemption for energy intensive companies

➤ **Supporting cross-border energy infra-structure**

- Focus on cross-border flows
- Promote infrastructure in less developed regions

➤ **Permitting support to electricity generation adequacy**

Globally, a satisfactory outcome

EU State AID new rules : improvement areas

- **Complex « Net extra cost » / NPV evaluation of state support cap**
 - Increases complexity
 - Decreases transparency & predictability
 - Considerably extends examination timelines
- **Transparency requirements**
 - Reciprocity needed for non-EU actors
- **Matching clause**
 - Should be completed with information exchange clauses
- **Aid intensity levels**
 - Aid intensity level was decreased for loans & repayable advances for experimental development projects...

Specifics of the Energy Sector

Comments on EU State Aid Regulation

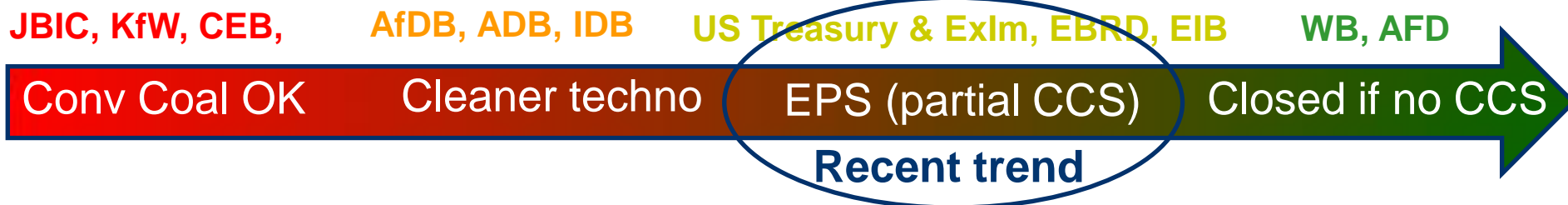
Special Issues

- Danger of IFI & ECA sectorial rules
- EU E-Market reform urgently needed
- EU Deployment simulation model needed

Issue 1 : Main IFIs coal financing policy trends

International Financial Institution / Corp.	IFC	EPS new PP	Coal financing policy
Japanese Bank for International Co-operation	JBIC	No EPS	OPEN
Kreditanstalt für Wiederaufbau	KfW	No EPS	OPEN
Chinese Exim Bank	CEB	No EPS	OPEN
African Development Bank	AfDB	No EPS	YES BUT w cleaner techno
Asean Development Bank	ADB	No EPS	YES BUT w cleaner techno
U.S. Treasury (through Env. Protection Agency)	US Tr.(EPA)	500 g/kwh*	YES BUT w EPS
Export-Import Bank of the United States	US ExIm	500 g/kwh	YES BUT w EPS + CCS
Inter-American-Development Bank	IDB	Perf. Criteria	YES BUT w cleaner techno
European Investment Bank	EIB	550 g/kwh	YES BUT w EPS
European Bank for Reconstruction and Development	EBRD	EPS likely	YES BUT w EPS
World Bank	WB	No EPS	CLOSED IF not CCS
Agence Française de Développement	AFD	No EPS	CLOSED IF not CCS

(*) Cleaner techno only for poorest countries



Issue 1: Spreading to Private Banking !

Nous ne fournissons pas de services financiers directement aux projets de nouvelles centrales à charbon, y compris les agrandissements, avec des unités individuelles de 500 MW ou plus² et une intensité carbone³ supérieure à :

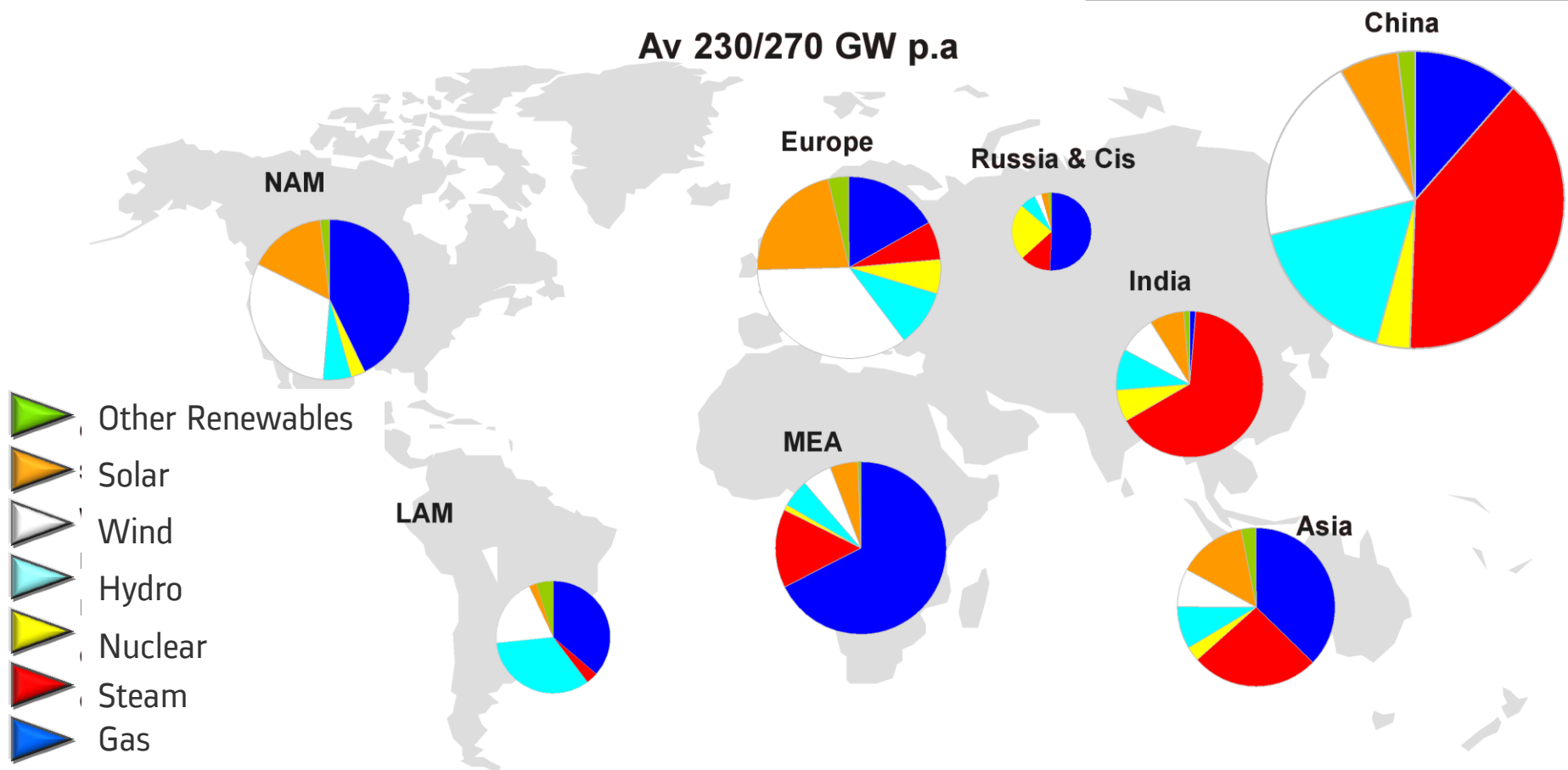
- 850g CO₂/kWh dans les pays en voie de développement ;
- 550g CO₂/kWh dans les pays développés. En fonction des technologies actuelles, cela peut nécessiter des projets de capture et de stockage de dioxyde de carbone (CSC) acceptables⁴ ou de co-génération à partir de chaleur et d'électricité ou de biomasse.

HARSH CONSEQUENCES:

- **No more financing of coal plants in developed countries unless a high CO₂ price will justify CCS**
- **No more financing of coal plants in developing countries unless rare cases of USC on imported hard coal**
- **No more financing for performance retrofits on any existing plant !**
- **Effective barrier targeting home and export markets of those Western OEM developing Clean Coal technologies....**

Climate policies should never be disconnected from industrial policies !

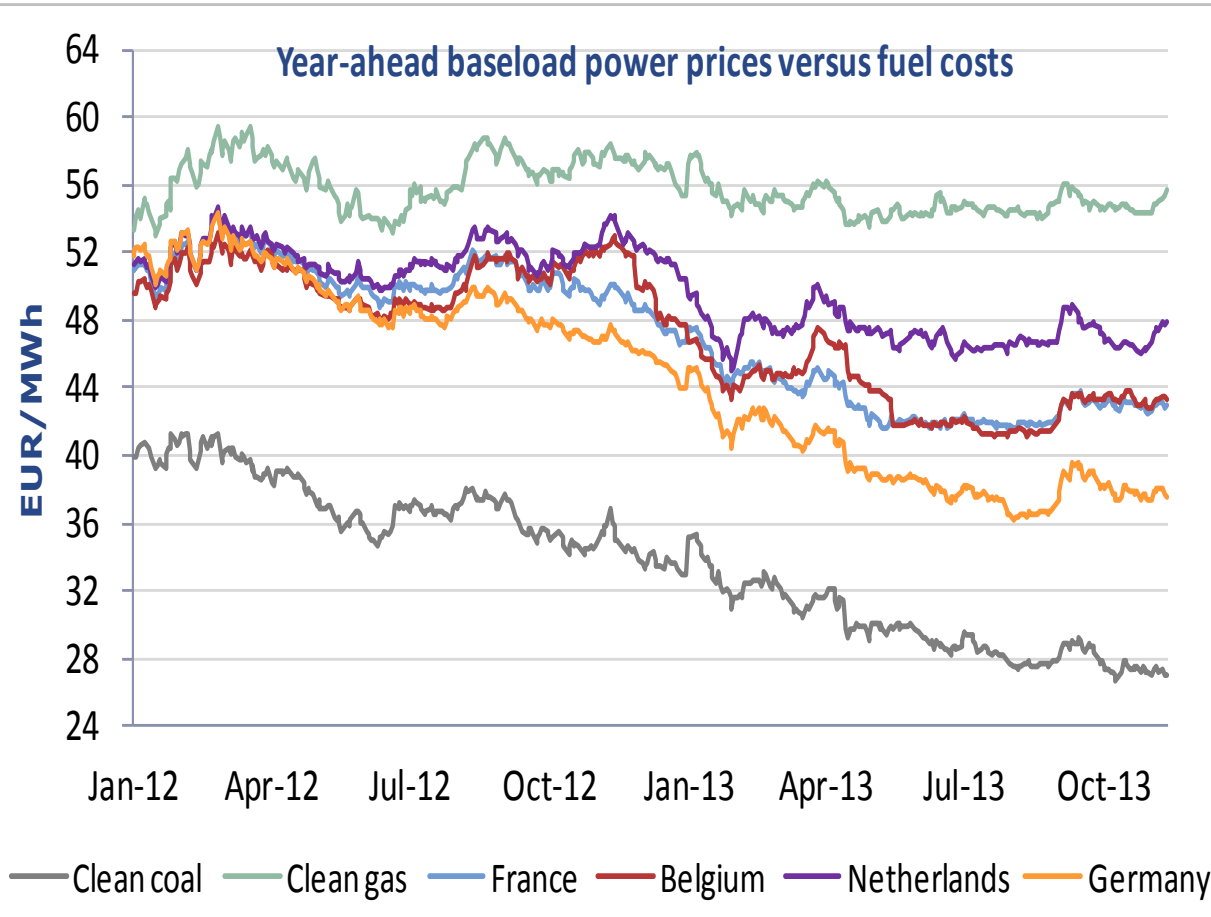
Issue 1: Looking Forward: Diversified mix, growing share of renewables and sustained coal in Asia



Source: Alstom Maca 2012
Market size excluding industrial turbines

Western IFI/ECA sectorial policies will not stop coal, they will just penalise Western OEM Exports, jobs and R&D spendings to further improve coal technologies !

Issue 2: Renewable penetration + coal & CO2 prices down \Rightarrow bearish trend of electricity prices in Europe,...

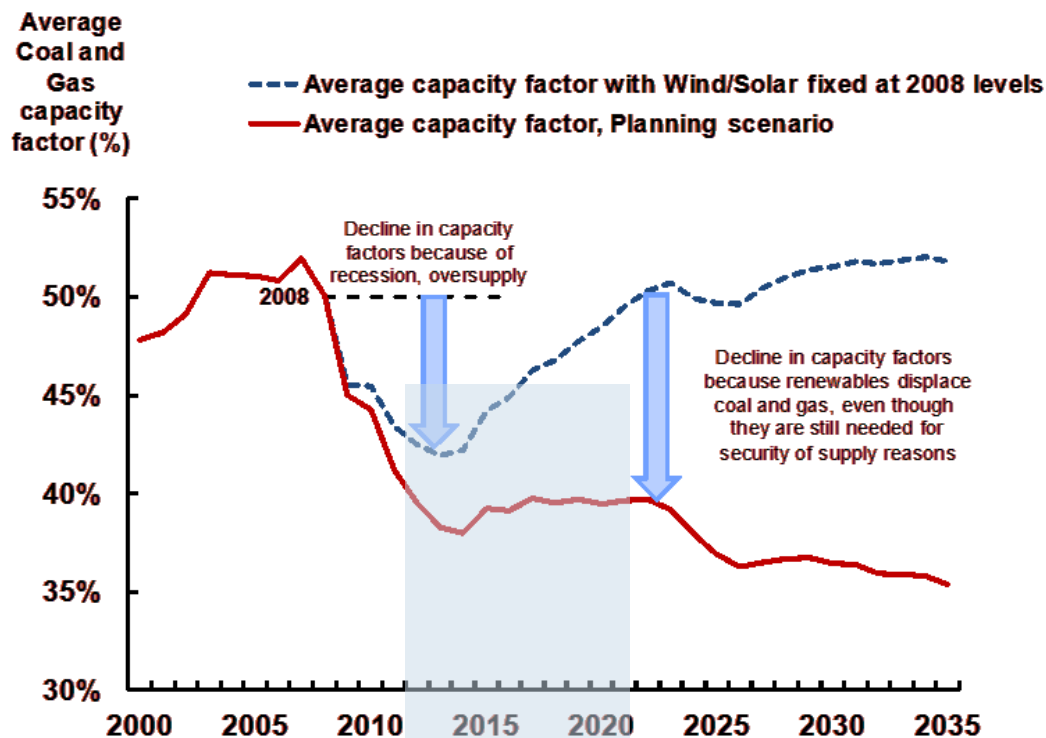


- Under pressure of lower coal and CO2 prices year-ahead prices of electricity go down in Europe, specially in Germany,...
 - ... much below cost of generation from gas...
- In France support has been found at 42 EUR/MWh,... ie the level of the regulated access price to nuclear power.

Source: Argus, Platts & GDF SUEZ Trading

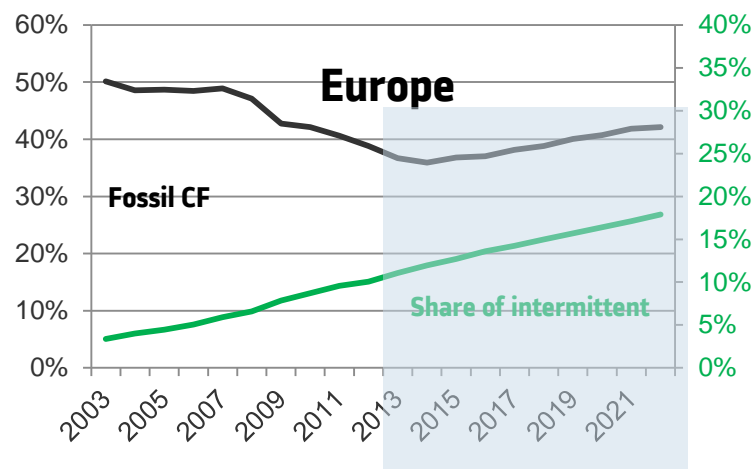
Issue 2: EU thermal plants capacity factor evolution

Impact of demand and renewables effects on average capacity factors



Source: IHS/CERA

Fossil CF slight improvement in Europe led by massive retirement...



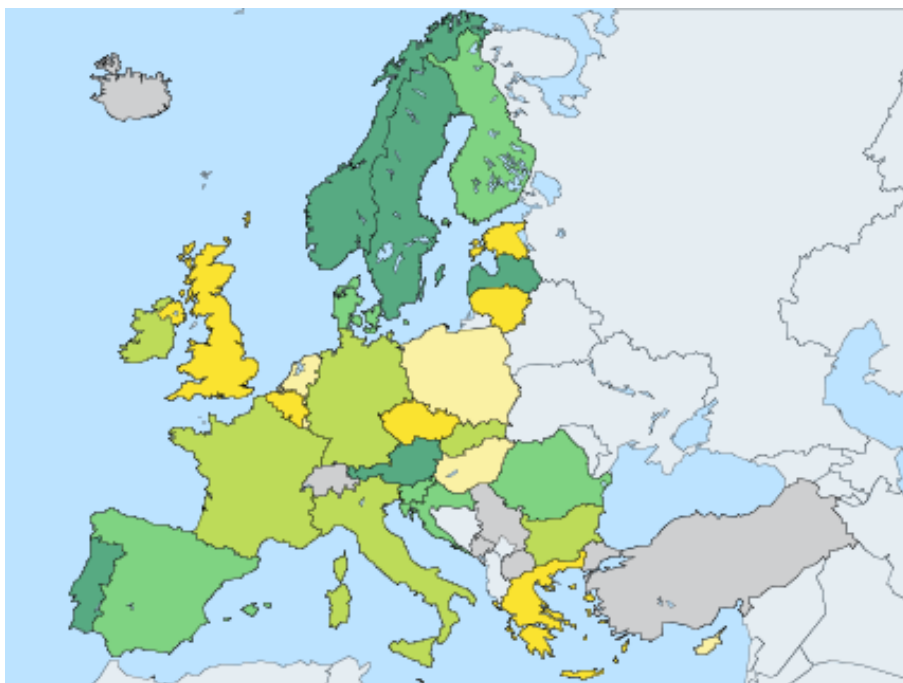
Source: Alstom

Urgent reform of E-Markets required to price both Energy and Dependable Capacity

Issue 3 : What realistic pathway and limits to renewable energy penetration ?

Electricity generated from renewable sources % of gross electricity consumption







Source: EUROSTAT – Data for 2012 published March 2014



EU (28) : 23,5 %

•Minimumvalue:1.1

•Maximum value:104.3

Legend		Cases
	1.1 - 10.7	6
	10.7 - 16.5	6
	16.5 - 27.6	6
	27.6 - 38.7	6
	38.7 - 104.3	5
	Data not available	2

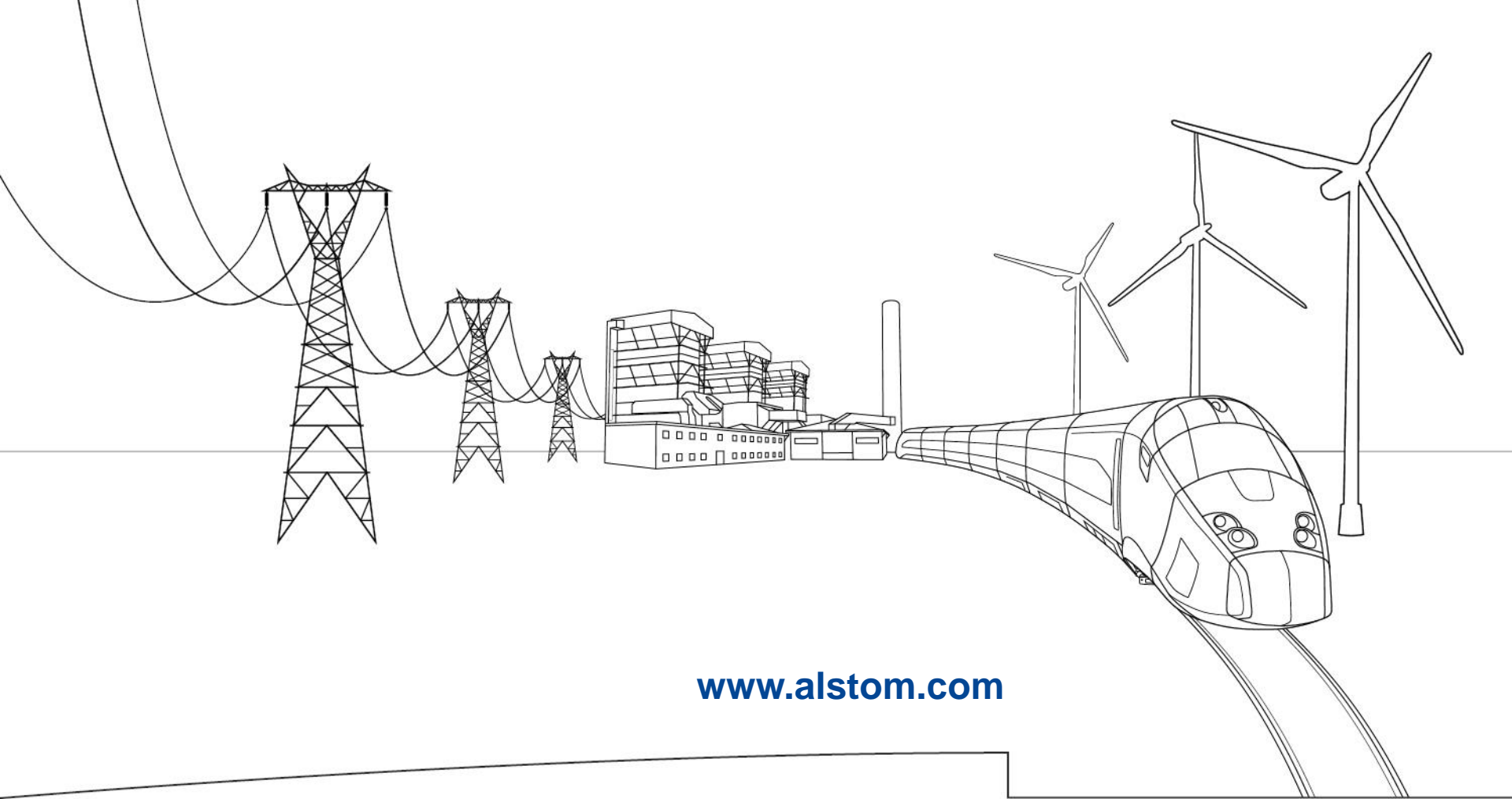
Note: EU (28) 2012 share of renewables in gross final energy consumption is up to 14.1% vs 20% EU goal in 2020

High time to take a detailed look at interconnection needs, storage, demand management public acceptance limits, cost...and prepare a coordinated EU deployment plan

Recommendations Europe

- A deep pan-European electricity markets reform is urgently needed to price both the energy and dependable capacity of each kWh delivered
- ETS should be improved to deliver a stronger and more predictable CO2 price
- EU Commission should launch a proper regional assessment of power generation adequacy and bottom-up roadmaps
- Market liberalization should allow 3rd party to operate interconnectors and bid into ancillary market
- Regulatory and permitting barriers to efficient transmission should be removed
- Smart Grids: Effective planning by grid operators and municipalities to create vision and define technologies and investments needed

We have the rules – let's deploy the funding for large-scale demonstration projects !



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