



# Multiple benefits, Multiple risks:

The macroeconomics of strategic choices over European decarbonisation paths, market reforms and infrastructure pathways

Nick Mabey, E3G

July 2013

# Key Points



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- EU decarbonisation is teaching us many unexpected lessons about the practical economics of low carbon transformation
  - **Pace:** speed of change needed is faster than the “natural” speed of markets; there is need for dynamic intervention
  - **Risk:** pervasive risk and uncertainty dominates policy and investment decisions and is driving structural reforms
  - **Multiple Benefits:** energy markets have to meet multiple objectives - this can help or hinder decarbonisation

**If done well decarbonisation should be cheap, will always be affordable, but will not be easy (or ceteris paribus!)**



- From transition to transformation
- Whose values? the political economy of low carbon
- Risky infrastructure: building the EU super grid
- One price to rule them all? risk managing power sector decarbonisation
- Green finance: re-booting EU investment

# The Low Carbon Transformation



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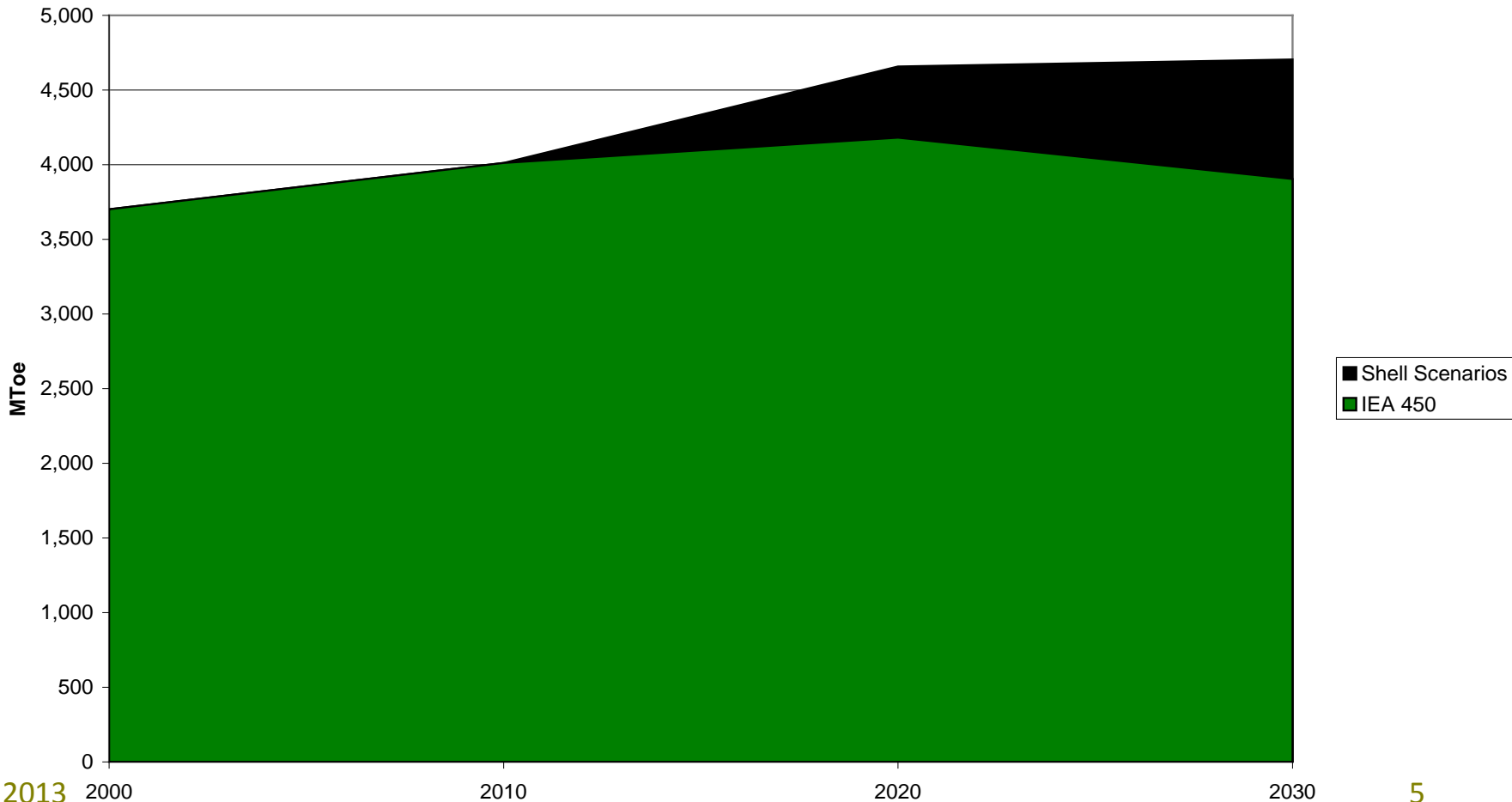
- Net-zero carbon OECD economies by 2050
- Global peak in GHG emissions by 2020 at latest
- Shift \$35 trillion from high to low carbon sectors to 2030
- Double rate of global technology diffusion
- Replace flow of payments on fossil fuels with upfront pulse of investment in clean energy technologies

**Pace and scale of shift more important than net cost**

# Transformation means faster than currently possible: peak oil demand 2020



Global oil consumption

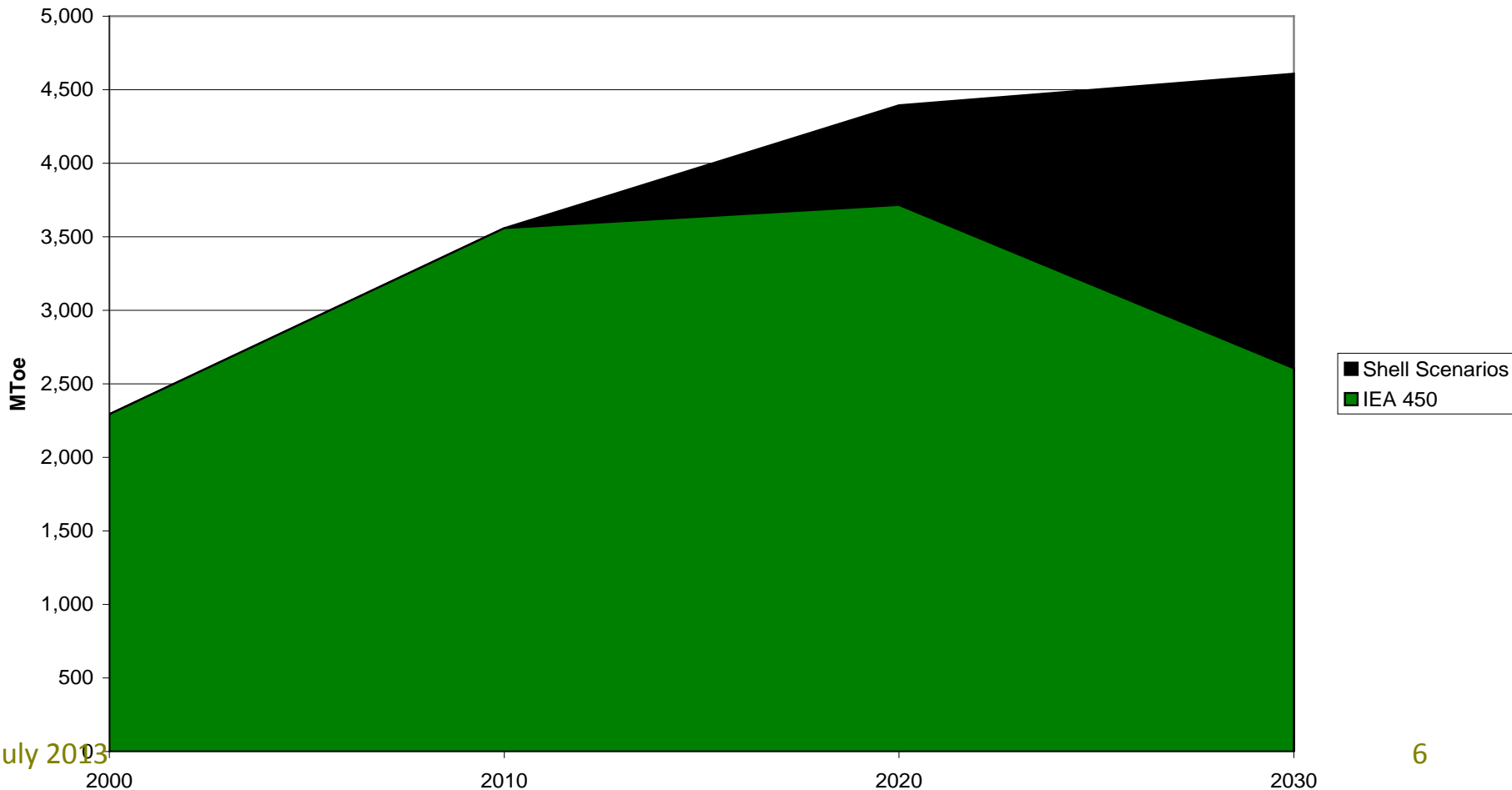


# a sharp decline in coal consumption



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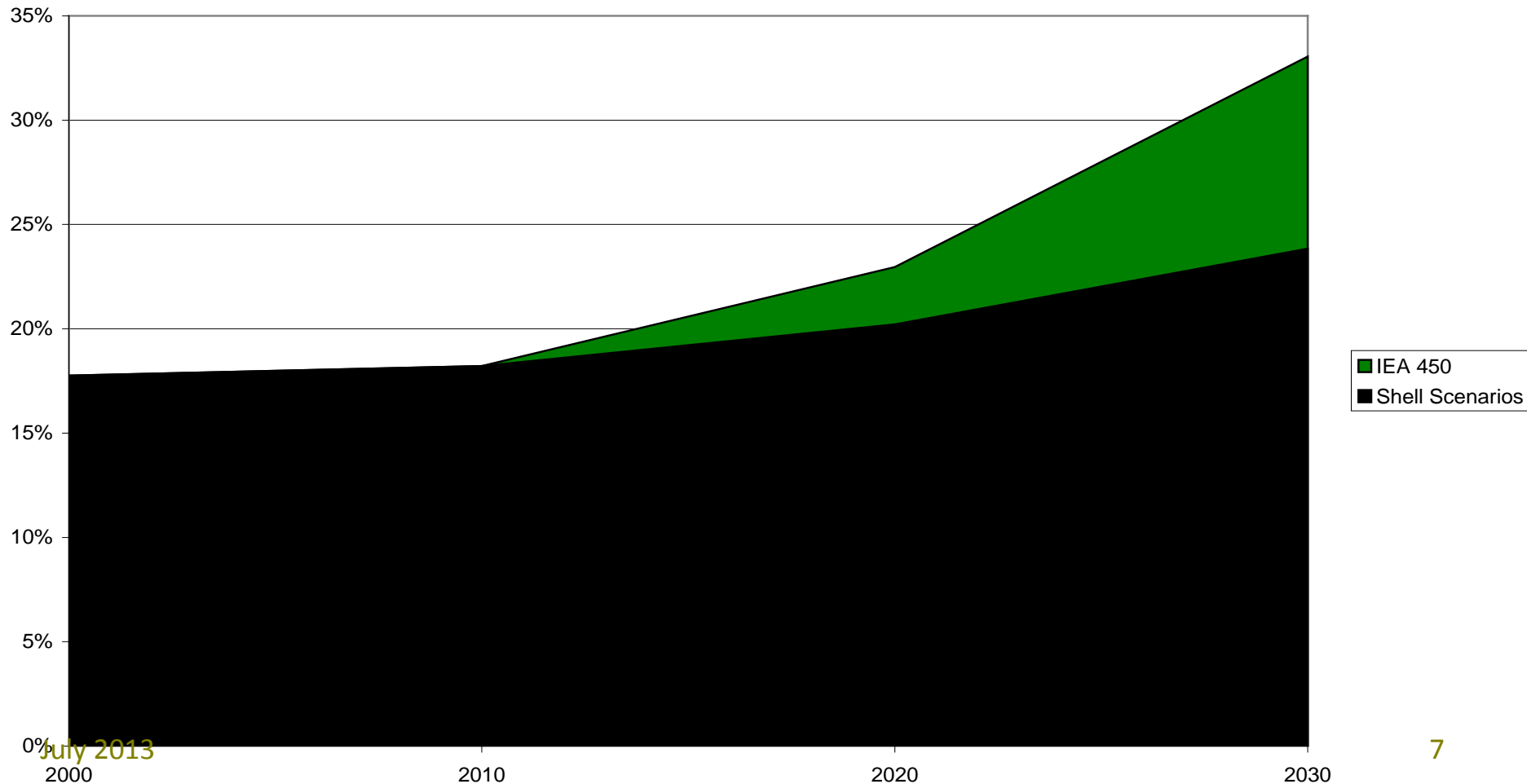
Global coal consumption



# ... and a much faster increase in the proportion of low carbon energy consumption



Percentage low carbon energy consumption



# Implications of Transformation



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- Low carbon is a macroeconomic issue not a sectoral shift
- Dynamics of markets and business models become a key challenge; role of incumbents and market/political power including “low carbon corporatism”
- “Non-equilibrium” is the norm – regulation based on market equilibrium assumptions can be a barrier e.g. State Aids
- Need to maintain service provision – e.g. energy security – through transformation can clash with decarbonisation goal

**Enough government direction to deliver, enough market freedom to disrupt**



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# Are we all green now?



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“The low carbon economy represents a massive opportunity for manufacturers and a major prize for our economy. If we can build an early lead in key areas we have the chance to export our solutions to the rest of the world,”

“But we are currently failing to take advantage of this opportunity to be a world leader in low carbon goods and services. We need government to set out its vision of manufacturing’s place in the low carbon economy, focus more on innovation and provide greater regulatory stability and predictability to unlock investment in breakthrough technologies that will deliver it.”

**UK Engineering Employers Federation February 2013**

# “Who values” not “What values”



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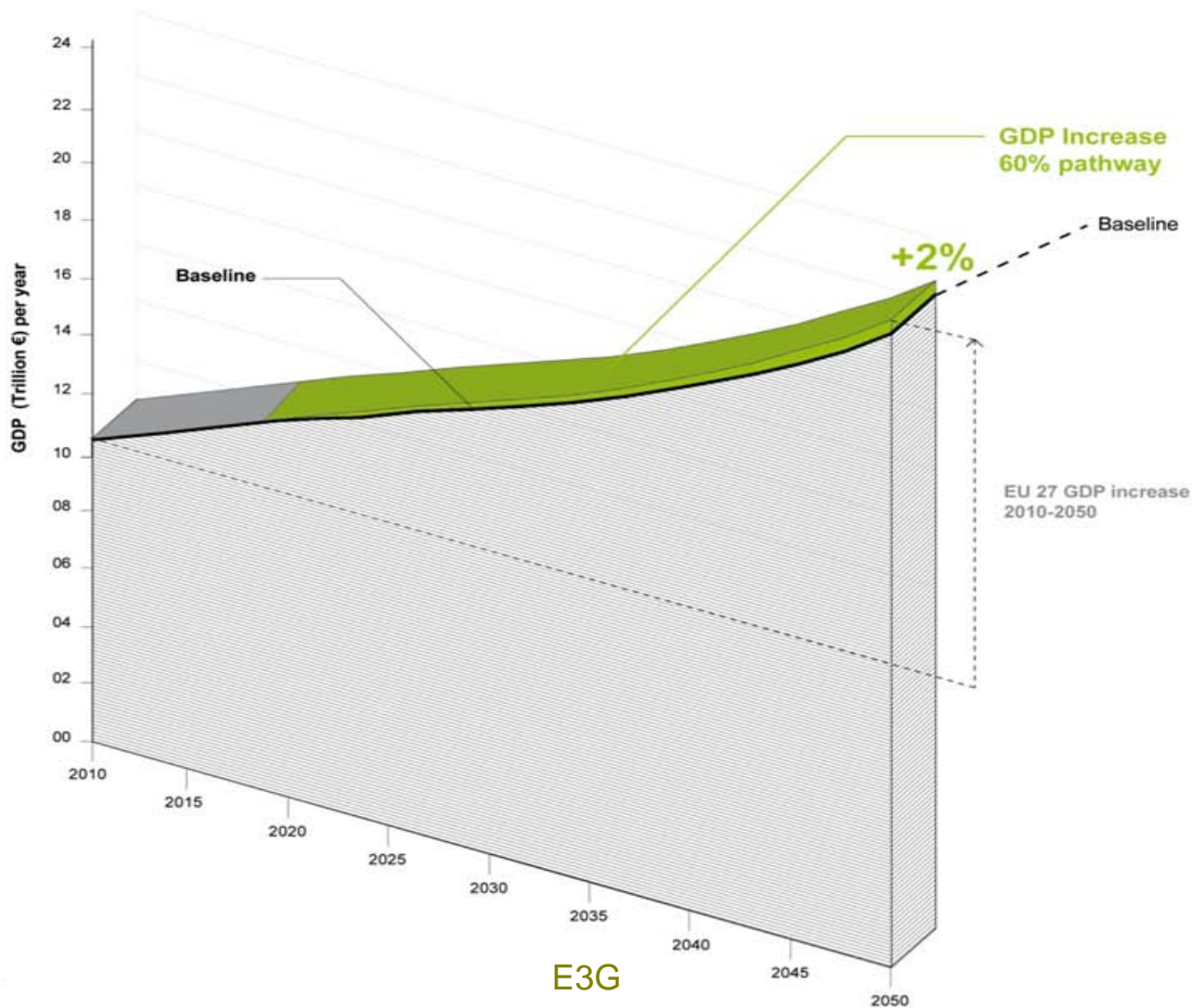
- GDP changes from EU decarb are within error band
- But this depends on delivering energy efficiency – currently only on track to 50% of target
- Resilience and positive competitiveness impacts are undervalued
- Countries, companies and workers who see few benefits from decarbonisation dominate politics

**Need active policies to tackle political economy**

# Small (positive) variation from long term EU27 GDP



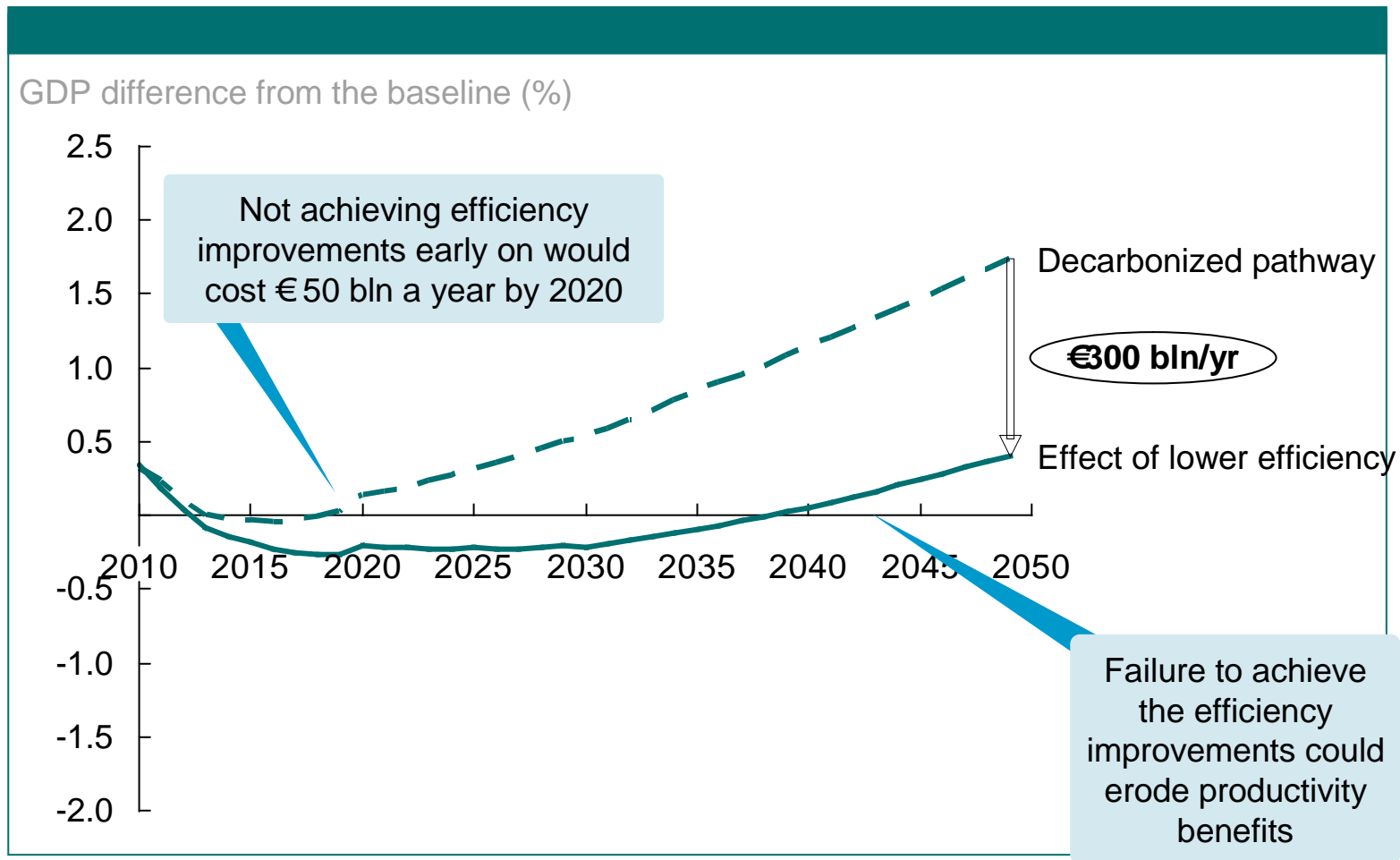
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# Failure to deliver cost effective efficiency costs economy over \$50bn pa by 2020



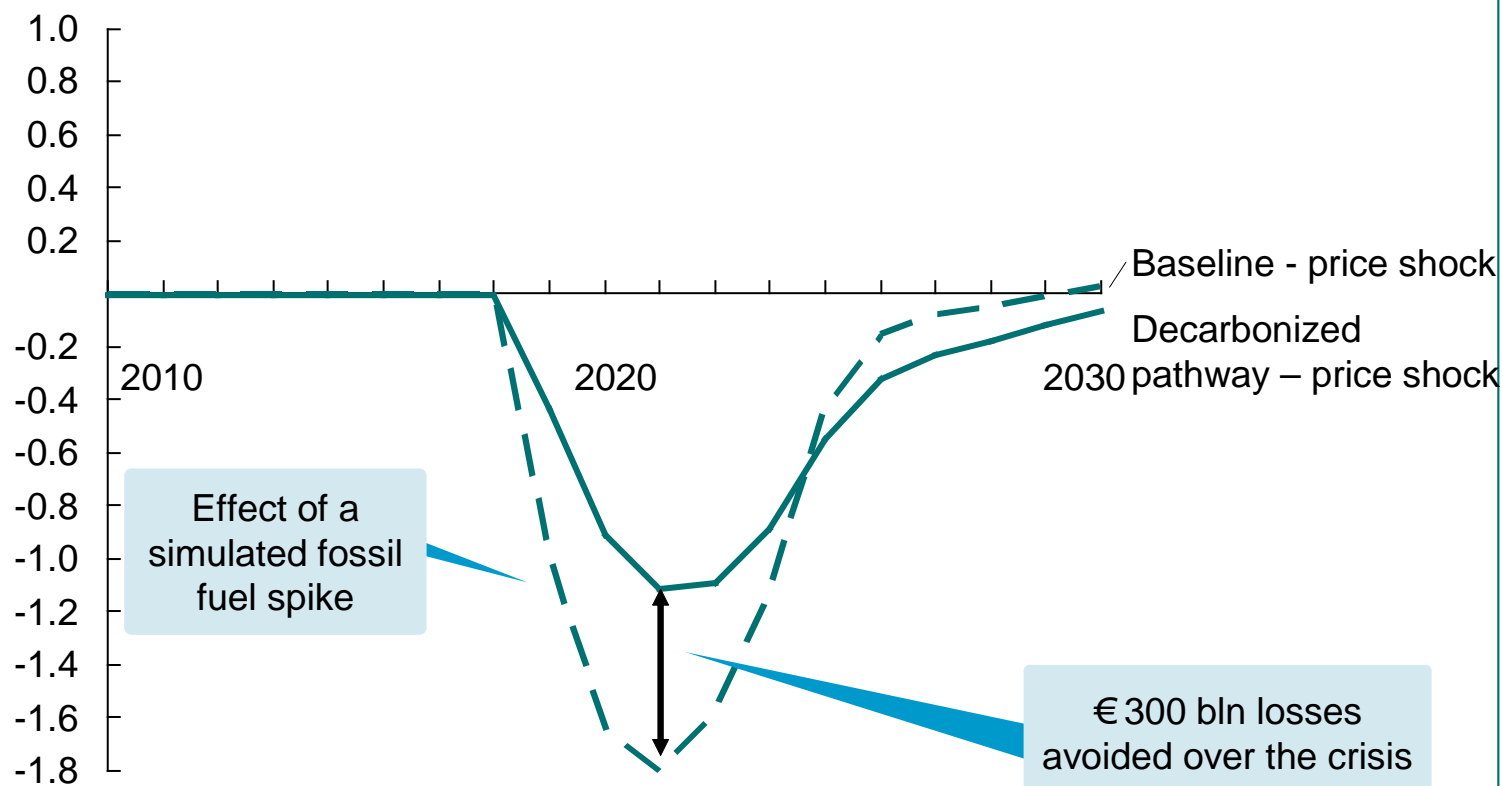
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# Competitiveness Benefits: low carbon pathway saves €300bn GDP against 2020 oil price shock

## EU-27 GDP – effect of a simulated oil price spike

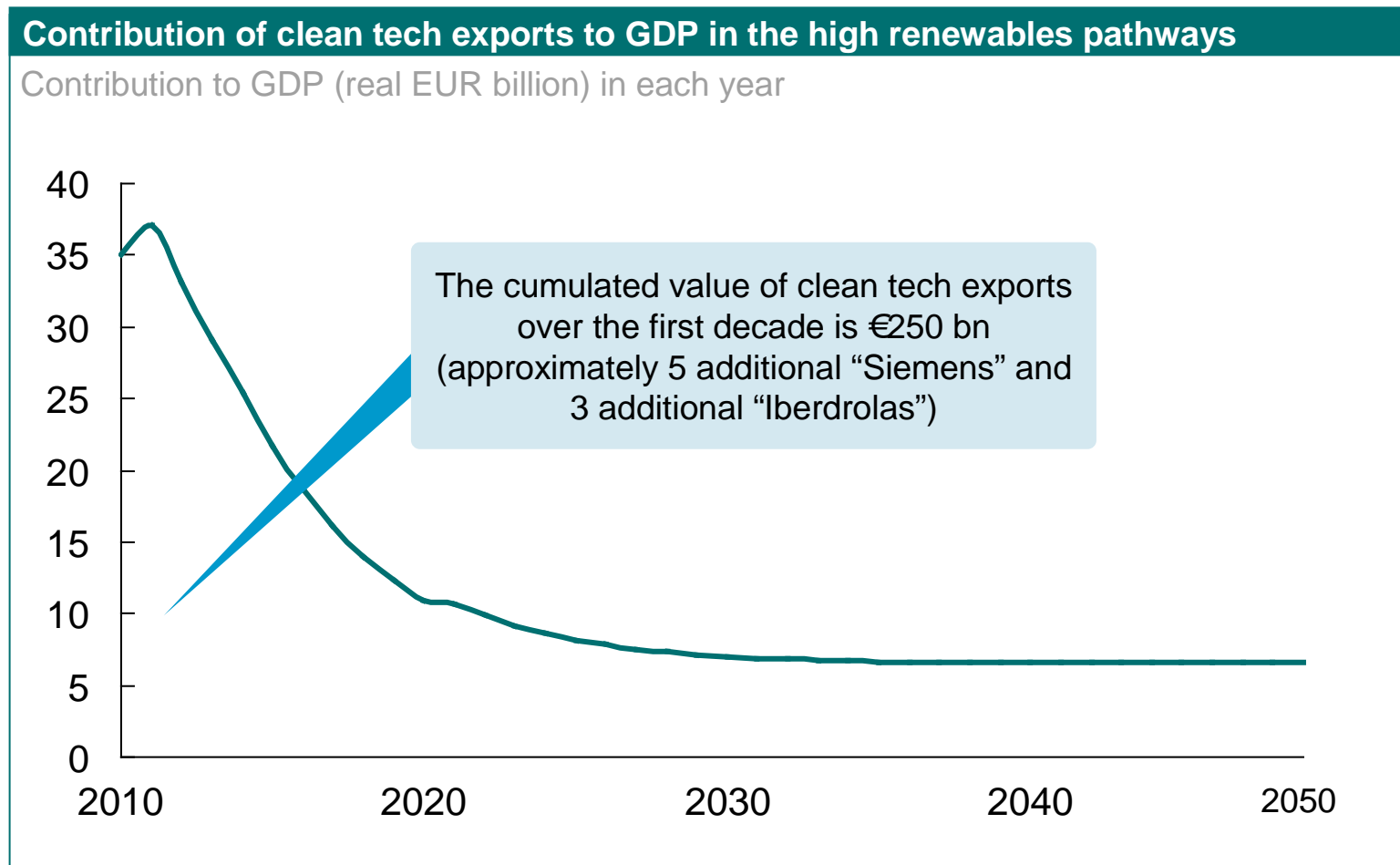
Difference in GDP (%) from non shocked GDP path – for each year



# Europe sees €250bn in benefits to 2020 from continued dominance in low carbon sectors



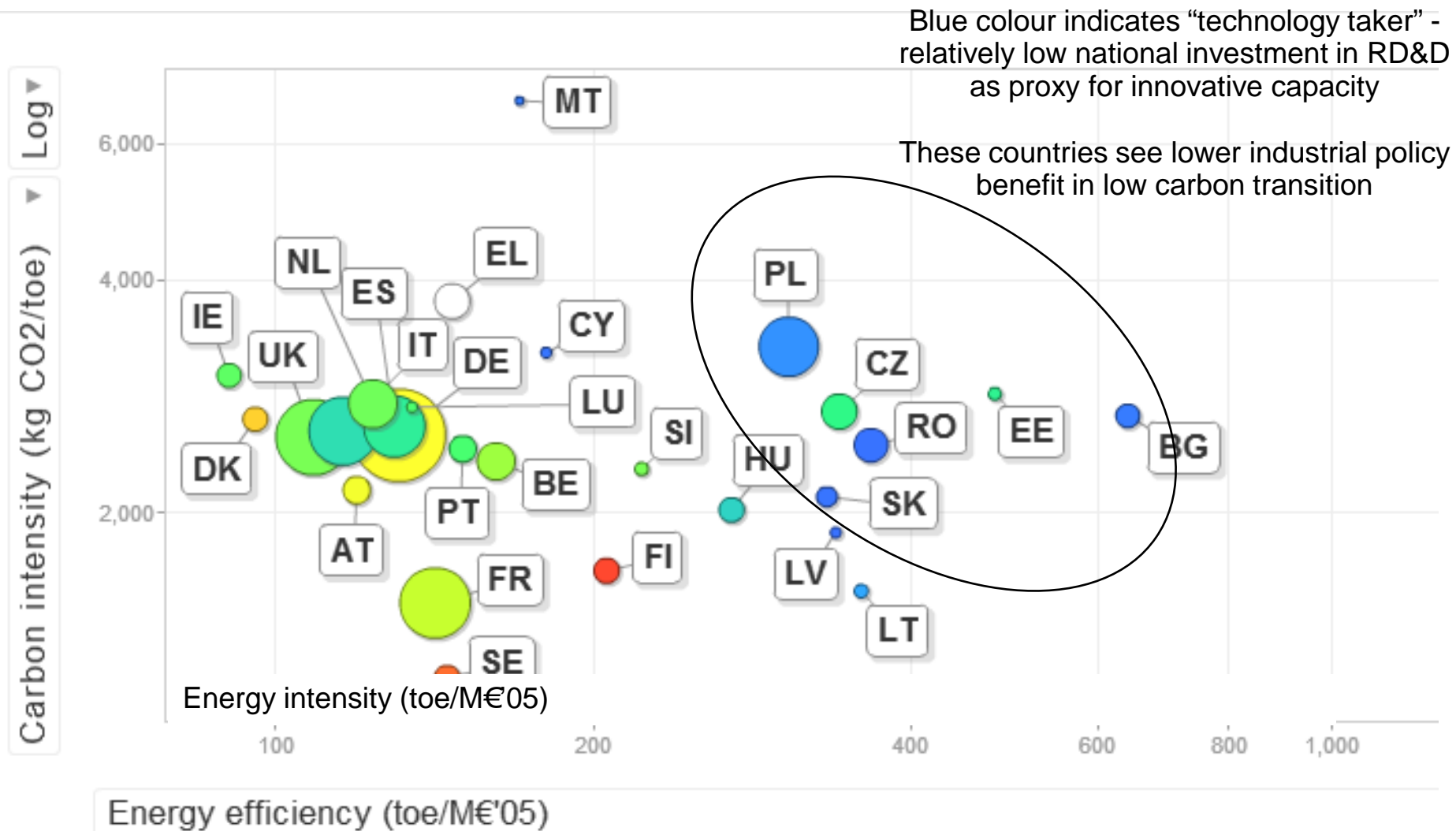
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# EU strategy needs to address “technology takers” as well as “makers”



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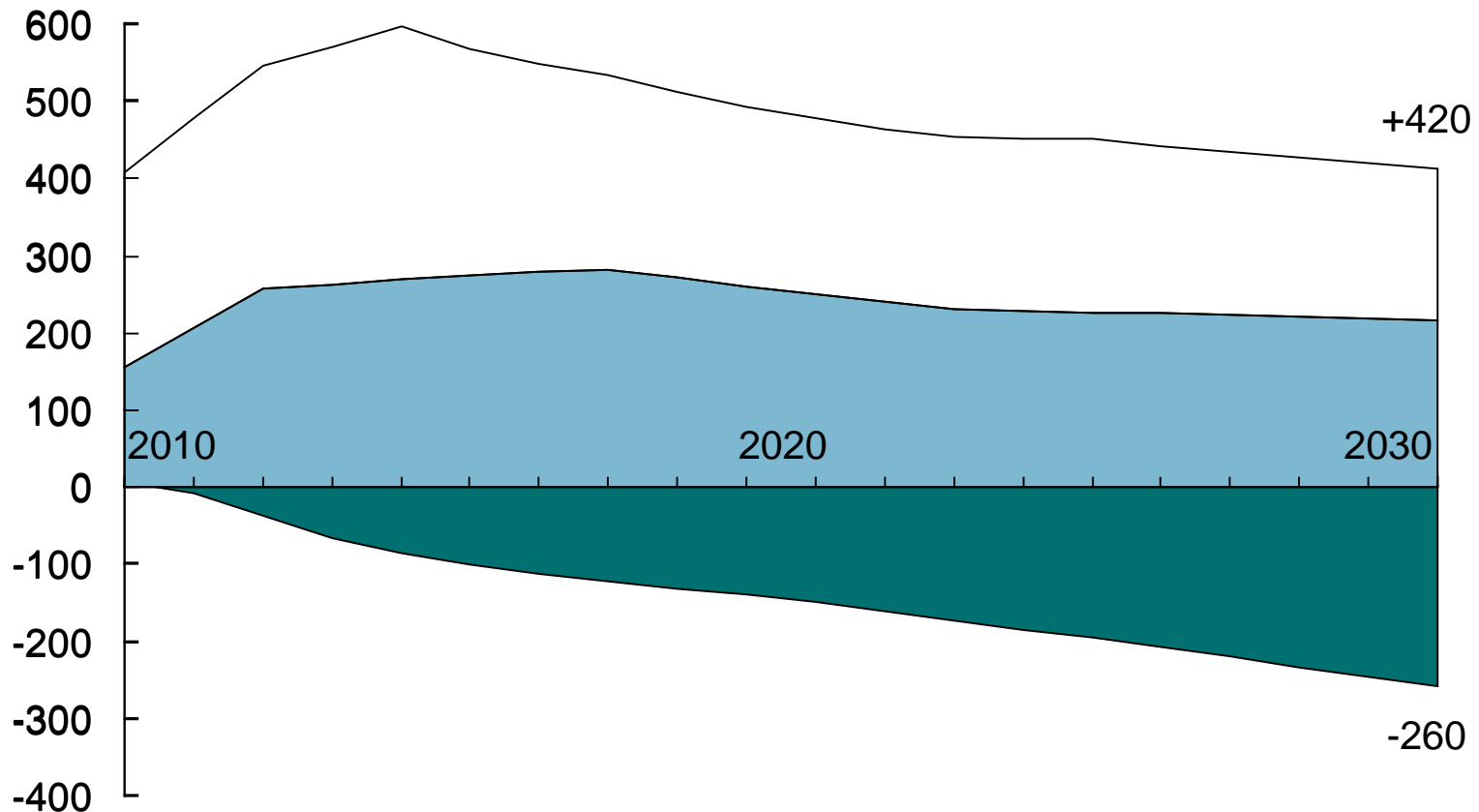
# Strong clean job growth will not create “just transition” for high carbon job losses



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Job variations in the decarbonized pathways in '000s  
Difference from the baseline

- Jobs for additional power capacity (RES+grid)
- Jobs linked to efficiency and fuel shift investment
- Jobs in coal, petroleum, gas and oil supply chain



17 NOTE: Efficiency and fuel shift investment includes all efficiency levers from McKinsey cost curves (excluding what already in the baseline), further penetration of heat pumps in residential and industry and the slow penetration of EVs

SOURCE: Oxford Economics

# Current industrial policy approaches will not support political economy of ambition



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- Active industrial policy will only work if sufficient EU demand exists to incentivise growth of new markets with 2020 and 2030 targets and policies
- Policies needed to drive supply chain transformation in high growth sectors: construction; infrastructure; smart grids and transport.
- This requires current policy to shift in three areas:
  - Move focus from incremental change in “upstream” supply sectors – steel, cement, chemicals – to building “downstream” markets in efficient services, construction and infrastructure
  - Incentivise transformational shifts to resource efficient solutions in supply-chains and business models through public purchasing/infrastructure tenders and taxation incentives.
  - Reform energy market and state aids regulation to build medium term value and resilience not just short term cost reduction

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# Uncertainty is endemic – so how do we plan for the future?

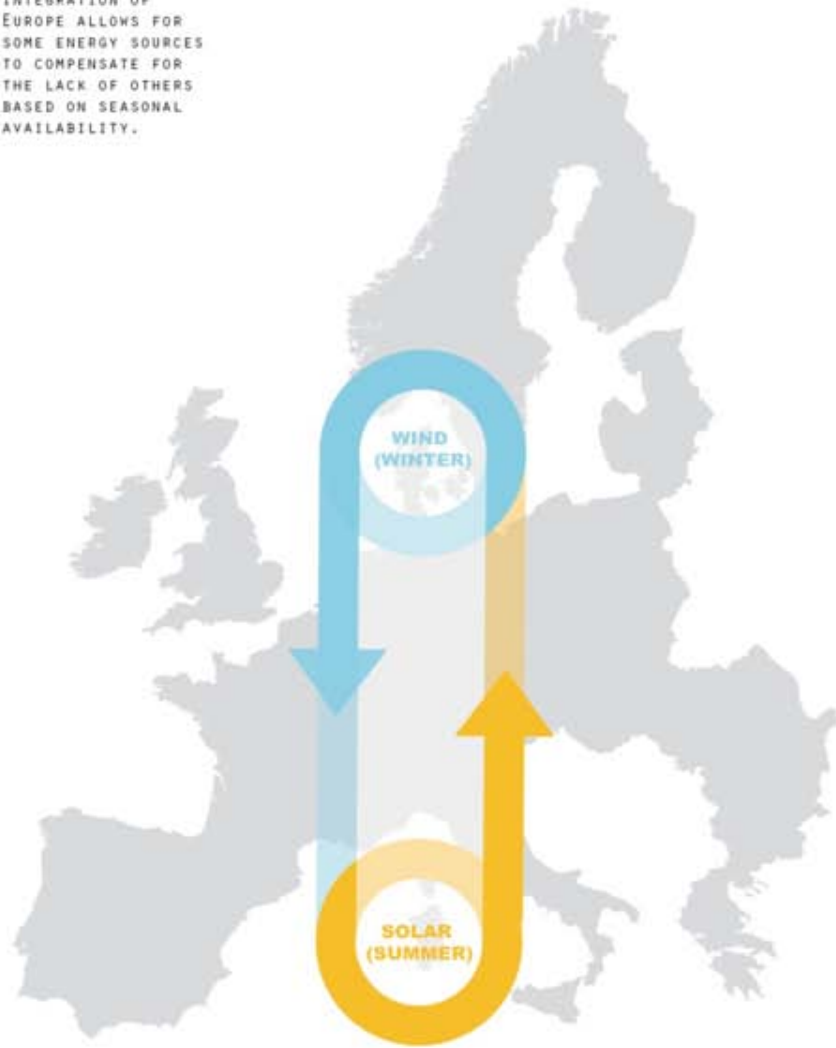


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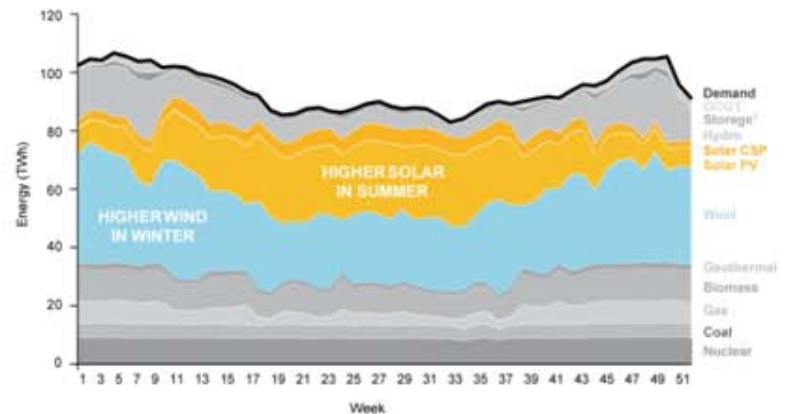
- Technology cost uncertainties remain between major low carbon generation sources to 2030
- Political uncertainty on ambition levels at EU and International level will persist beyond 2020
- Costs and availability of fossil fuels – and their infrastructure – highly uncertain
- New technologies in ICT, materials, demand could change the game

# RES DIVERSITY CONTRIBUTES TO CONSISTENT SUPPLY

OVER THE COURSE OF THE YEAR, THE INTEGRATION OF EUROPE ALLOWS FOR SOME ENERGY SOURCES TO COMPENSATE FOR THE LACK OF OTHERS BASED ON SEASONAL AVAILABILITY.



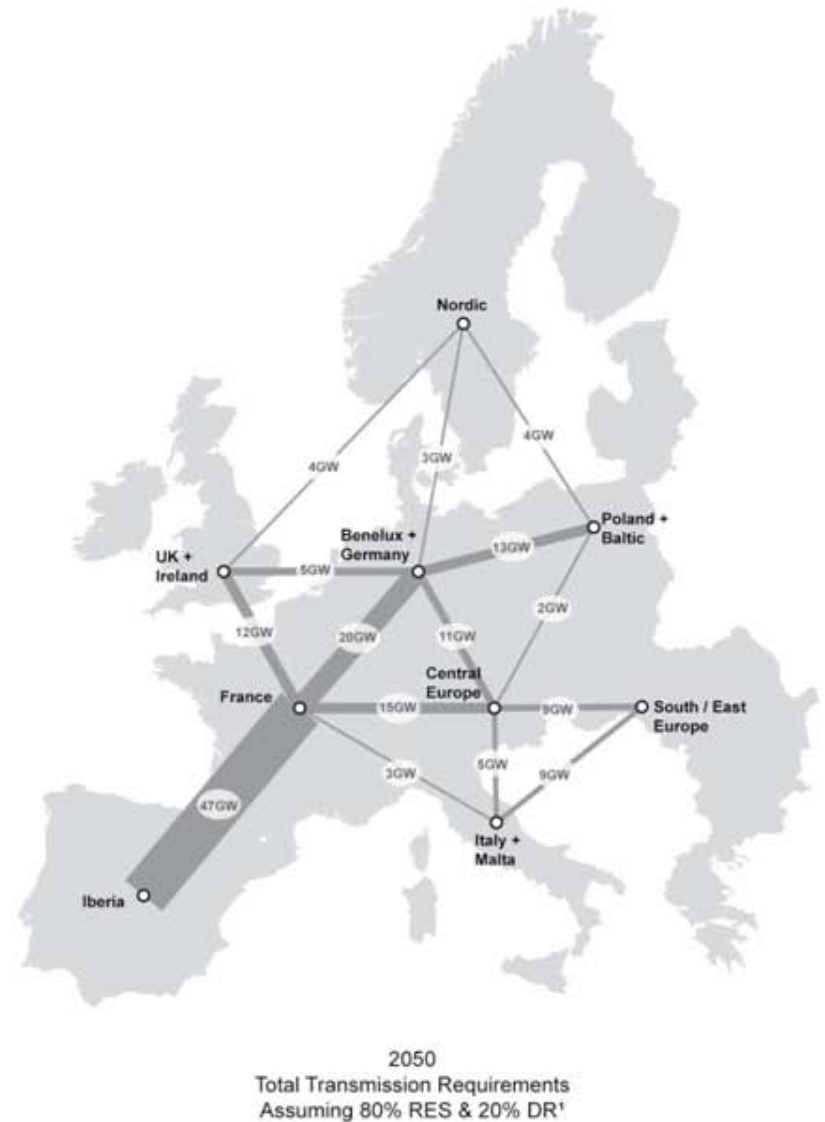
Overview of yearly energy balance, 80% RES pathway (TWh per week)



# INTER-REGIONAL TRANSMISSION REQUIREMENTS



COMPARED TO CURRENT TRANSMISSION INFRASTRUCTURE, THE REQUIREMENTS FOR TRANSMISSION CAPACITY BETWEEN THE REGIONS DEFINED IN THE TECHNICAL REPORT ARE SIGNIFICANT.



**July 2013** This paper refers to changing a customer's electricity demand in response to smart meter data through communications technologies. In the Volume 1 analysis, it is assumed that any such changes reduced the total energy consumed within the day, that is, moved it to off-peak demand rather than reduced total daily consumption.  
NOTE: Iberia-France link is challenging and maybe reduced by different contractual mix.  
SOURCE: Roadmap 2050 Technical Analysis

# Building a Strategic EU Power Grid

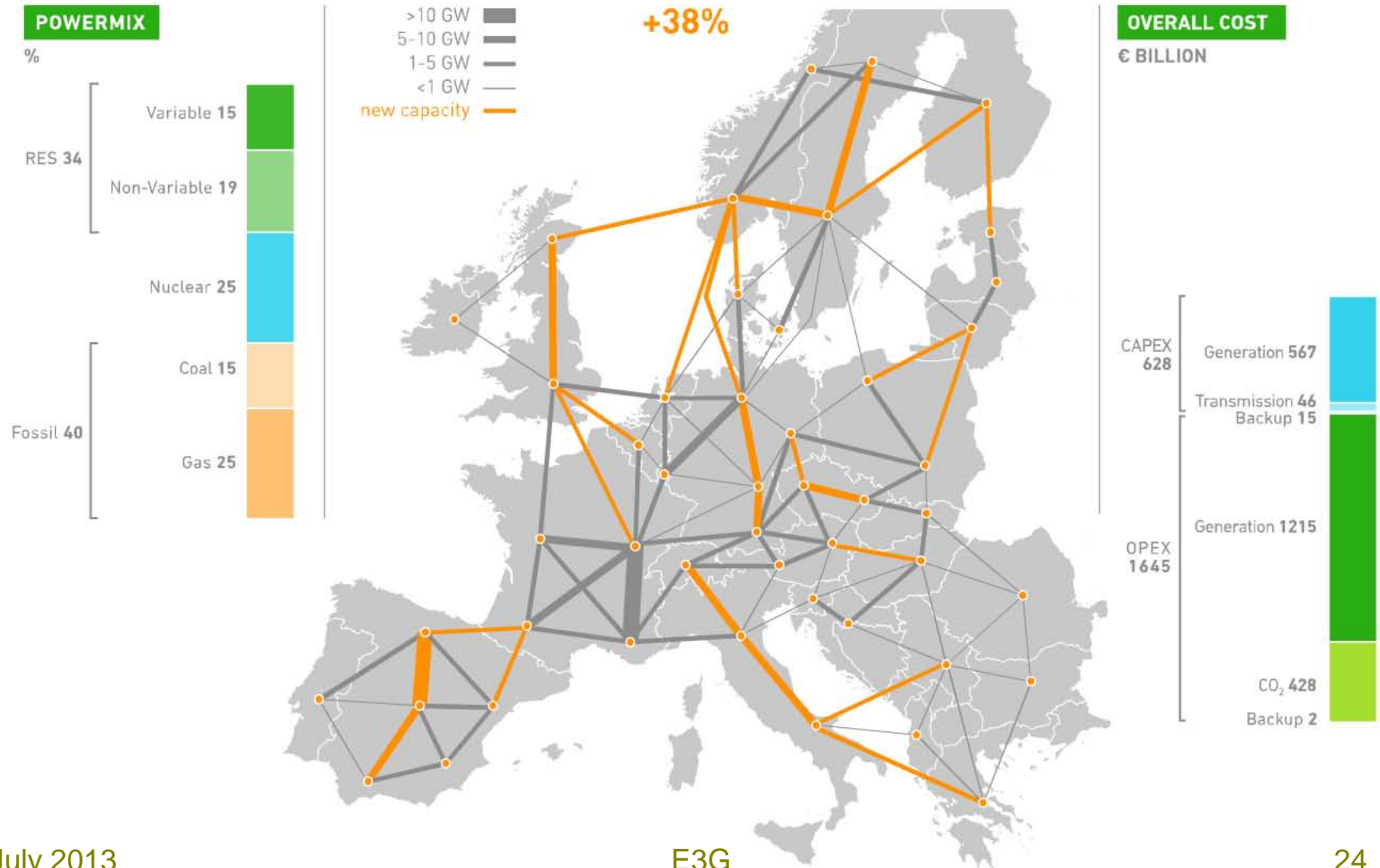


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- Fully RES system is feasible in 2050 with an EU grid
- Current system is under-connected; energy policy is highly nationalistic and costs are hard to share
- Demand response/smart grid behind schedule
- Grid operators only planning on 10 year basis – lack of ability to invest in strategic infrastructure
- EU Infrastructure Regulation solves some problems – cuts to grid funding in EU budget removes key tool

# 2020 Current plans are an adequate first step

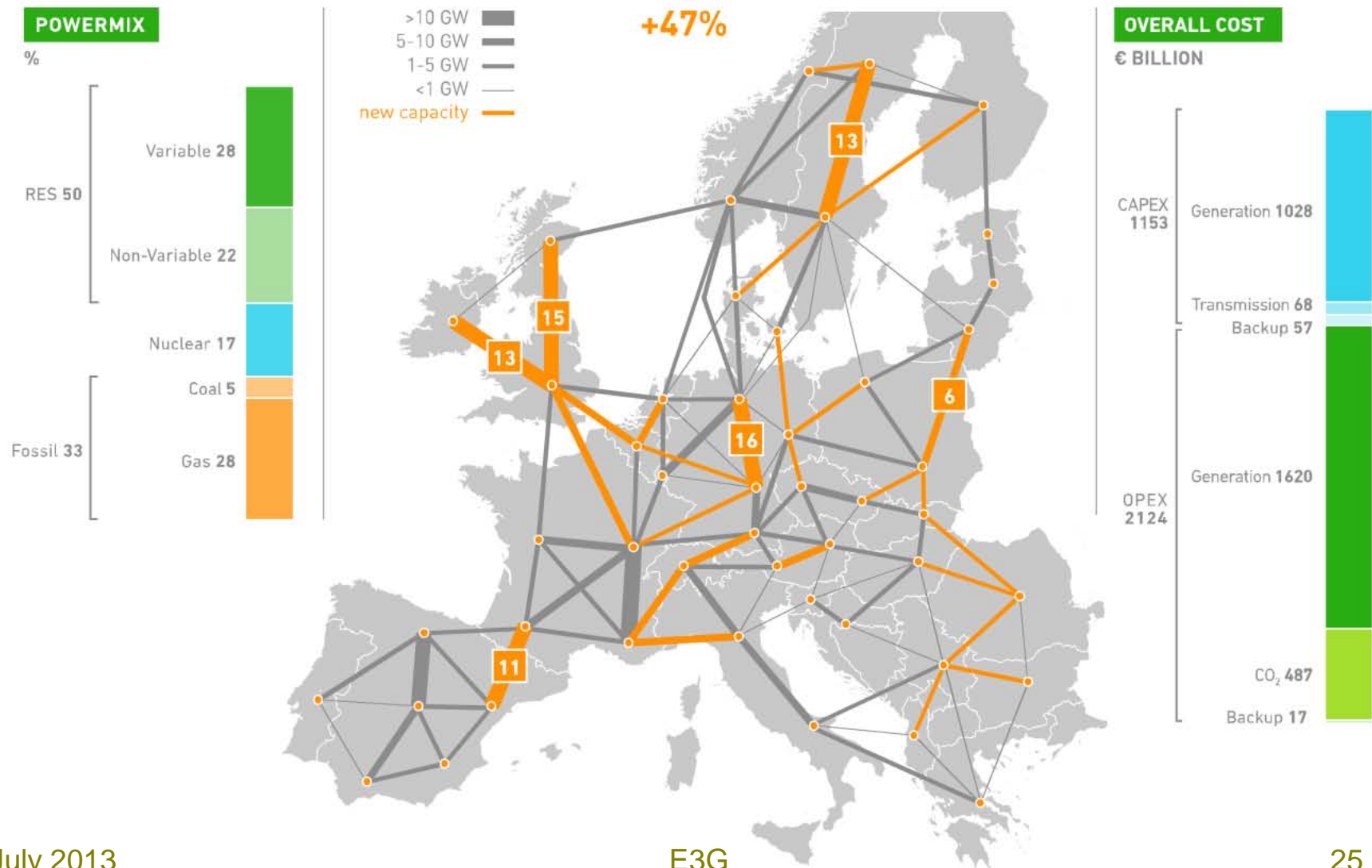
ENTSO-E + NREAPs = Balanced power system with low RES curtailment (0.6%)





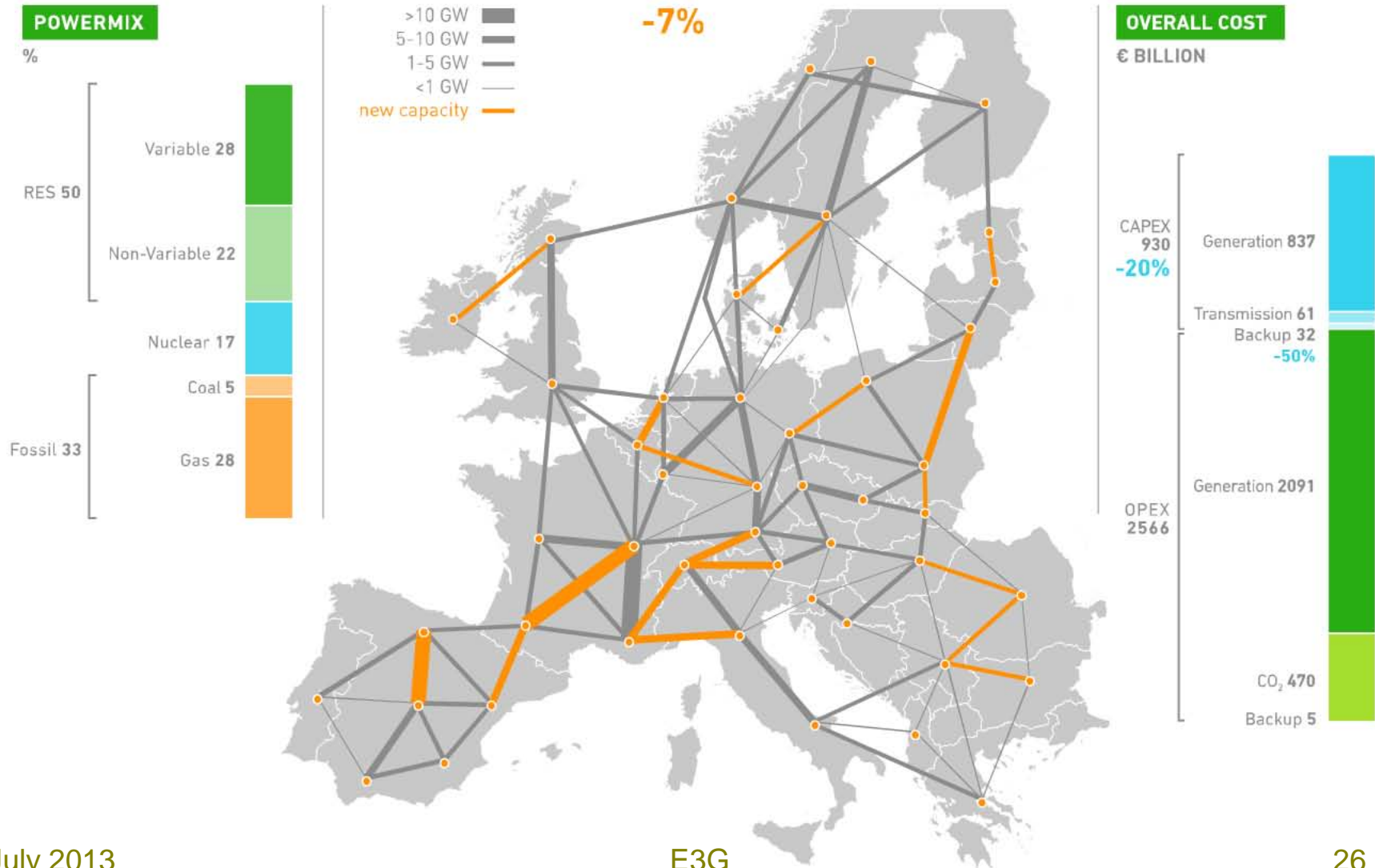
# 2030 Decarbonisation needs to accelerate in the next decade

Investments in new transmission and generation capacity continue to grow, nearly doubling in the next two decades.



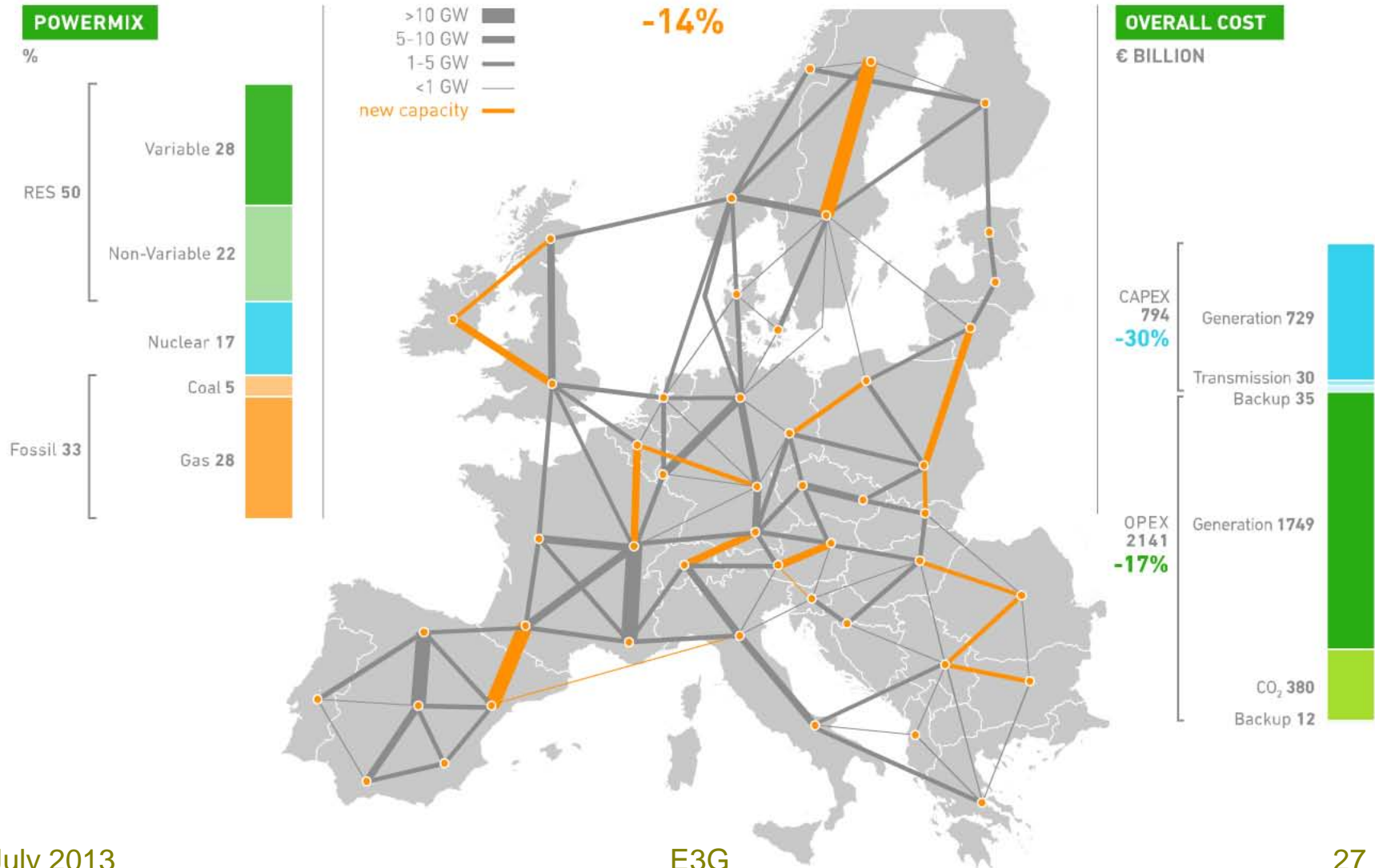
# 2030 Reducing the challenge: higher demand response

New grid capacity decreases by 7%. Overall investments decrease by 20%, with a 50% decrease in back-up capacity.

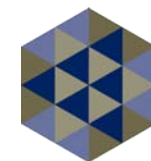


# 2030 Reducing the challenge: higher energy efficiency

New grid capacity decreases by 14%. Investments required by 30%.



# Risk Managing the EU Grid



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- “Optimal” EU grid impossible to define
- Subsidiarity concerns, energy security and planning blockages make “top down” blueprint infeasible
- Can reduce need for interconnectors with more efficiency and demand response
- Build regional interconnection - North Seas Grid

**Need to build new cooperative structures to ensure access to RES resources and grid stability**

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# Power system has multiple objectives and needs multiple instruments



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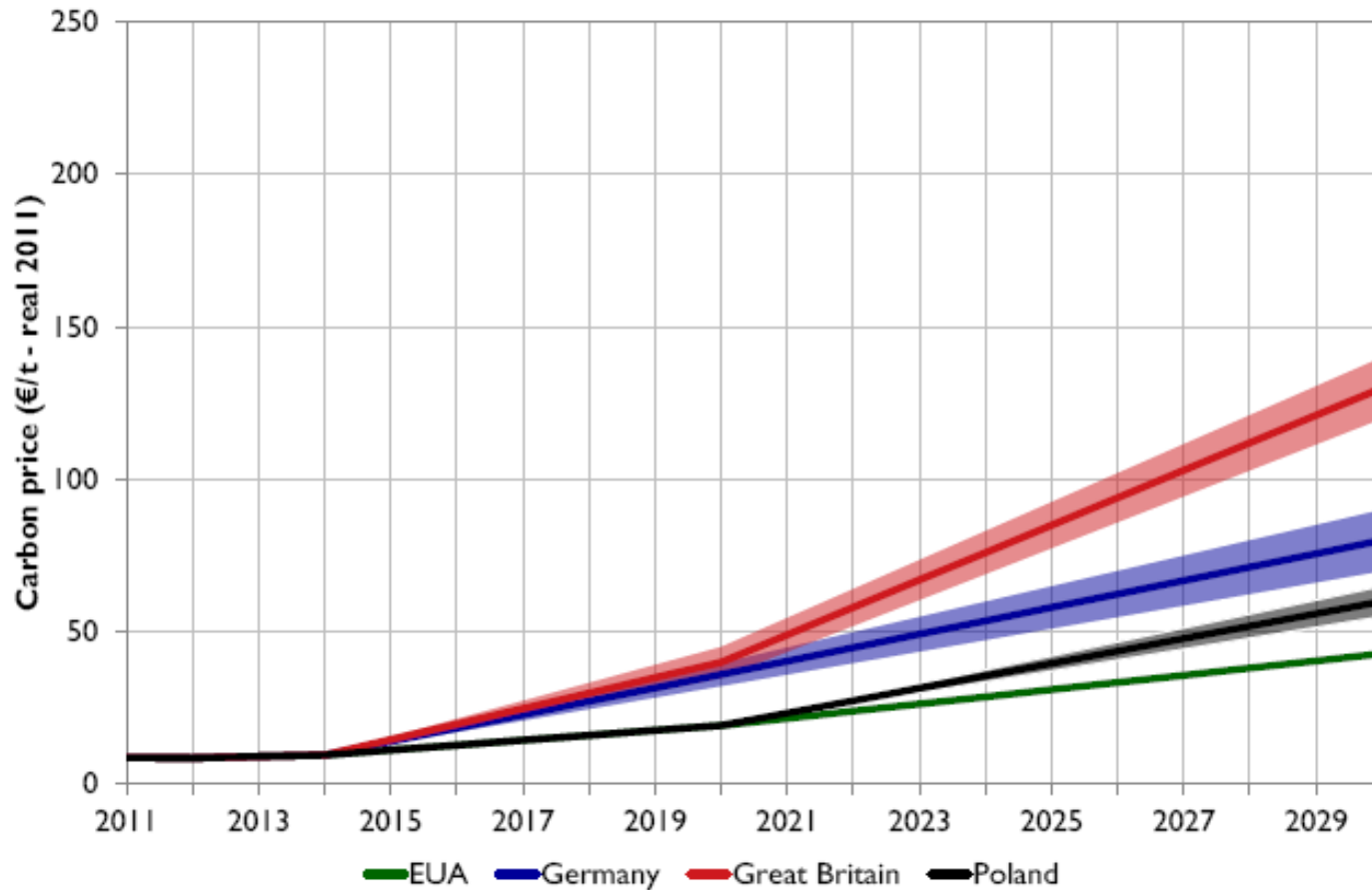
- Need to deliver decarbonisation, security and affordability all the time
- Optimal power sector pathways in different countries due to ambition, generation mix, demand growth and plant age mix.
- EU committed to “target market model” – energy price driven market plus ETS. One price to drive all investment?
- Modelling suggests security objective makes optimal national prices diverge and technology/demand policies are optimal for risk management .

**Challenge to EU Target model raises political barriers**

# Carbon price to deliver EU targets varies significantly; raises problems for single market.



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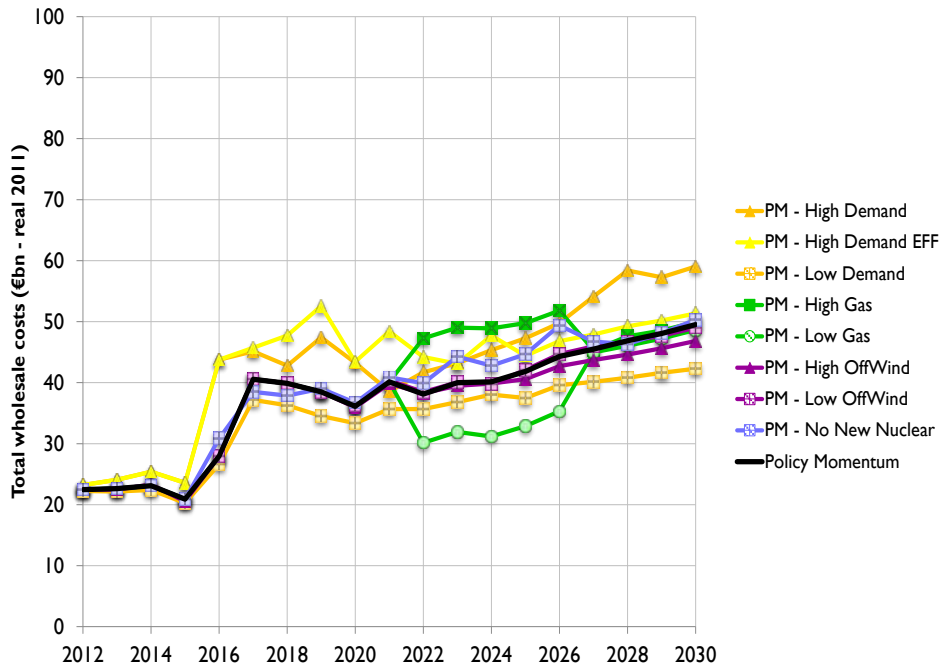
# Short term cost ≠ medium term risks



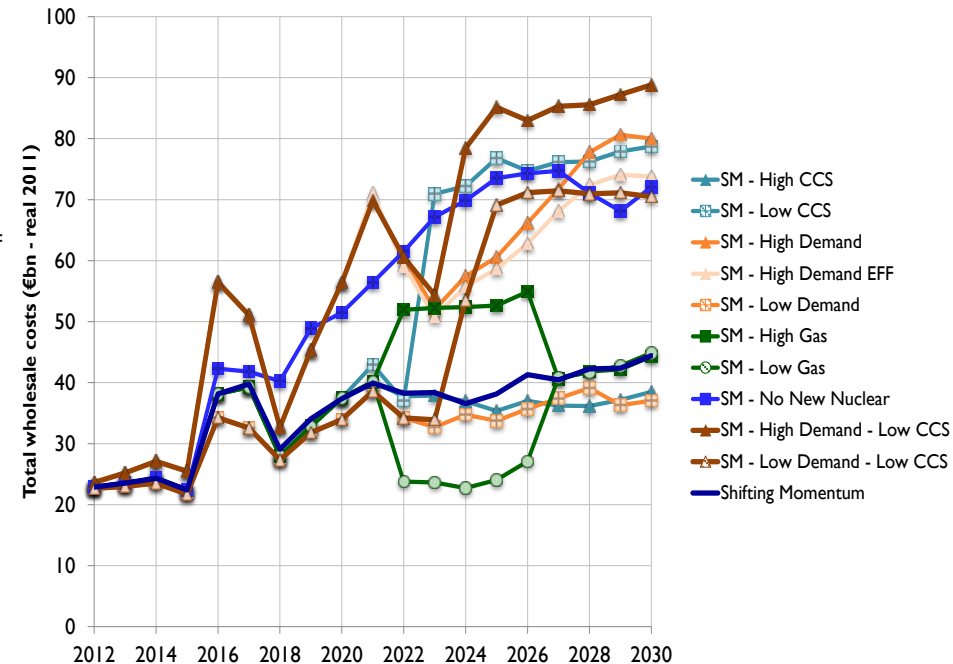
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GB – Wholesale Electricity Costs 2012 -2030

## RES Heavy UK System



## Gas Heavy UK System



Source: E3G Baringa 2012

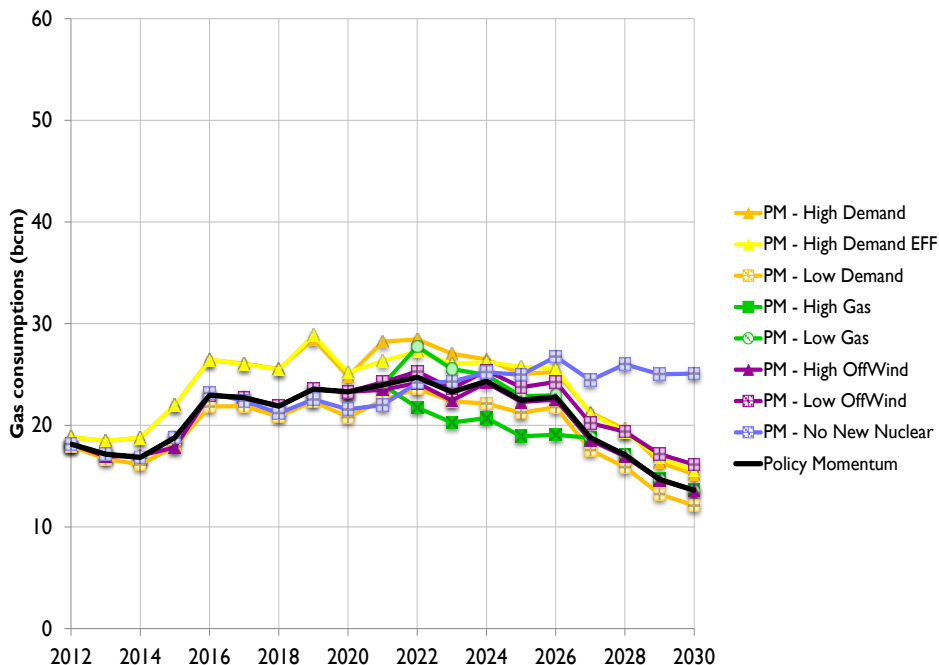


# Interdependencies of gas and electricity infrastructure planning

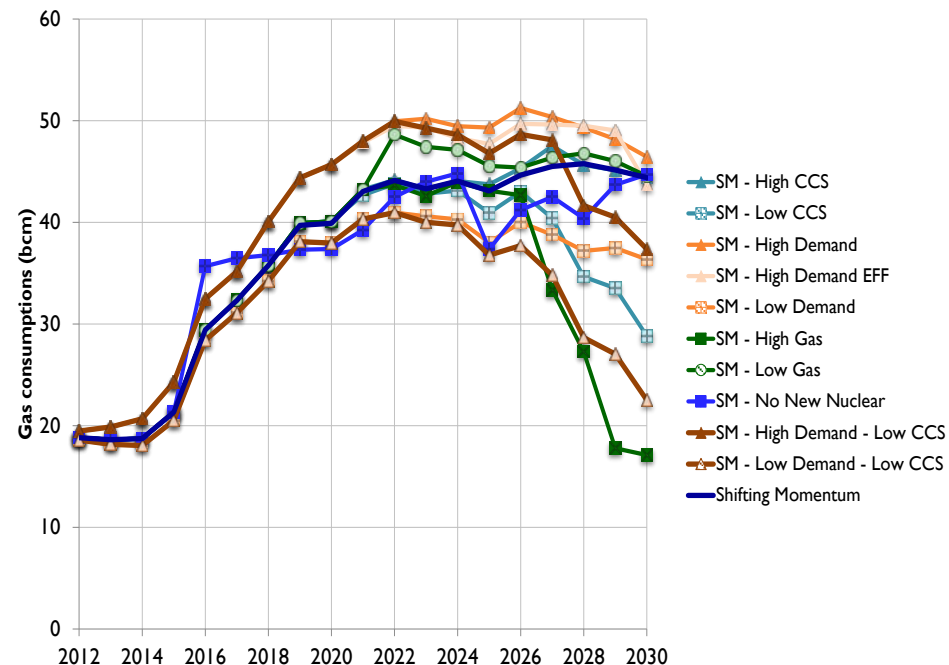


GB – Wholesale Electricity Costs 2012 -2030

## RES Heavy UK System



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Source: E3G Baringa 2012



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“Some argue that good government policies and waiting for the financial market to return to ‘normal’ after the credit crunch will be enough to deliver the necessary investment.

We disagree.

Even a return to the ‘old normal’, which is not likely would not accommodate the unprecedented scale, urgency and nature of the challenge. The only sensible plan ... is to act now to facilitate the required investment needed to safeguard our future.”



# Affordable ≠ Financeable

- Decarbonisation is affordable relative to the costs of climate change (5-20% GDP)
- Is cheap if efficiency can be delivered; this is necessary to deliver short term public support
- Multiple risks make high upfront capital needs impossible to meet; accentuated by financial crisis
- Need to build new public-private investment systems

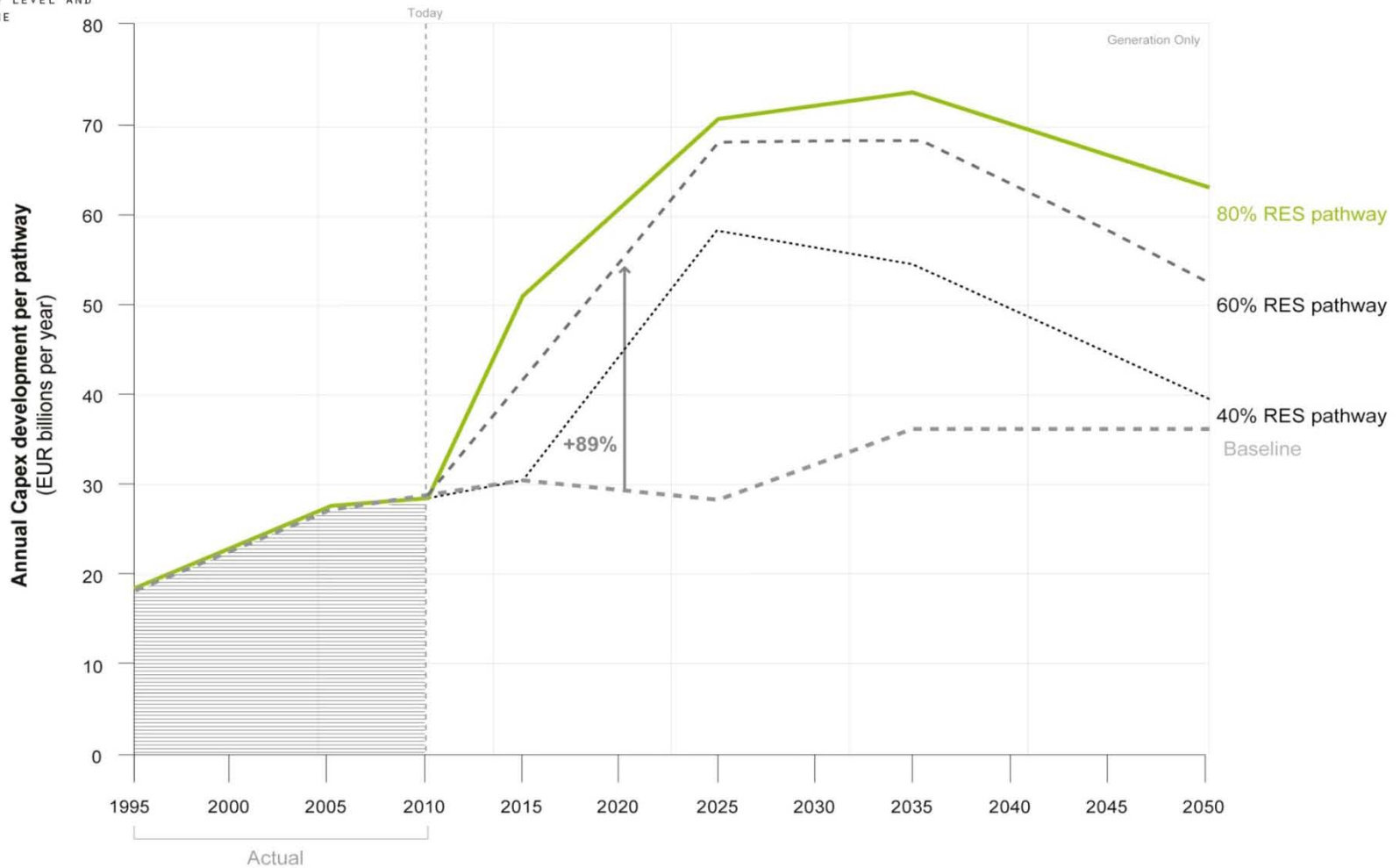
**Market Reform + Public Finance + New Private Finance**

# EU Power Sector Investment Pulse



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TO 2010 LEVEL AND  
BASELINE

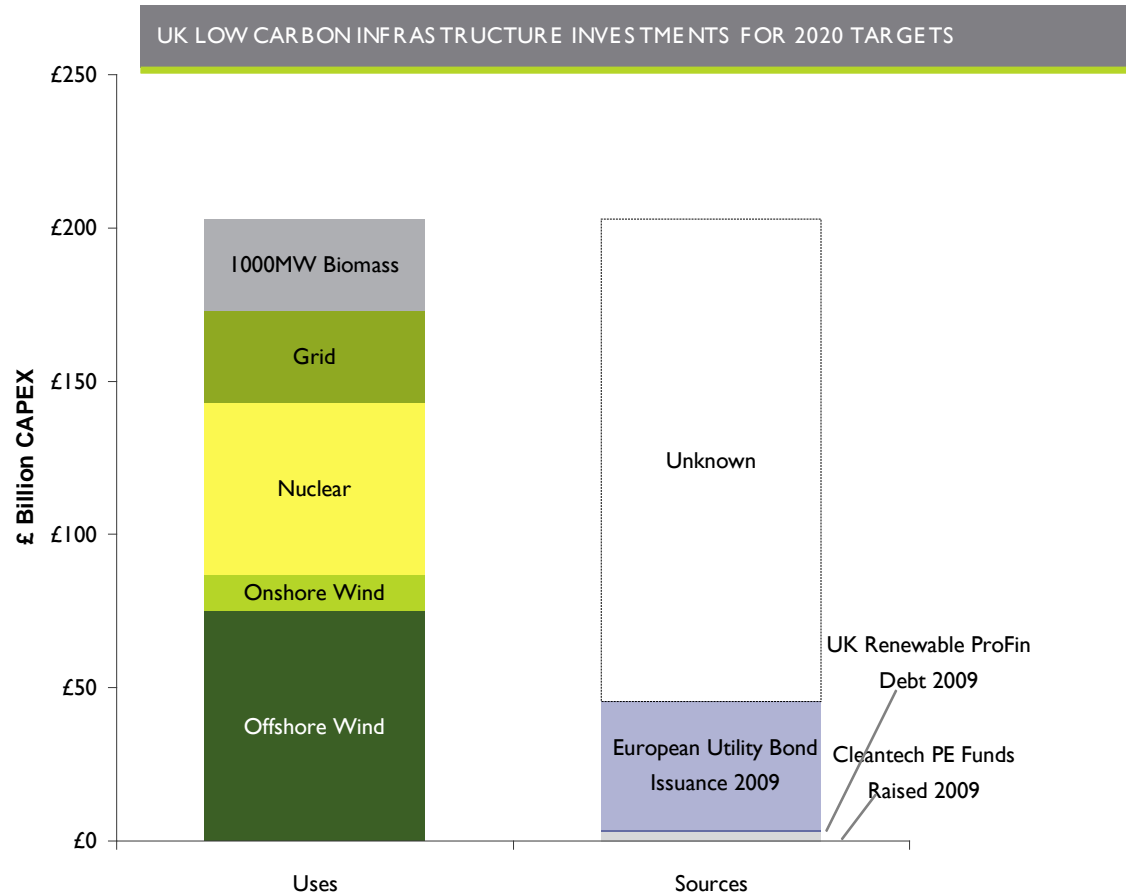


# Where will the investment come from?



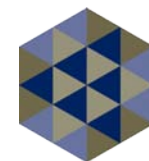
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UK needs £40-50bn pa economy wide investment compared to historic levels at £6-7bn



**We can continue to raise rewards ... or focus on lowering risk**

# Finance Challenges



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- **Front-Loaded Finance:** upfront investment in efficiency, RES etc needed to displace long term fossil fuel purchases. Strains capacity of financial system especially in post-crisis climate.
- **Managing Risk:** low carbon investment has higher political, technology, novelty and policy risks. Investors perceptions amplify low carbon risk and downplay high carbon risk.
- **Integration:** regulatory reforms needed to integrate low carbon and climate resilience into on-going infrastructure investment in cities, industrial clusters, electricity and gas grids.

**Private sector finance will not flow to right investments without direct public finance interventions and regulatory/market reforms to reduce risk**

# Broader financial regulation critically impacts green finance



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## Post-Crisis Financial Regulation has reduced investment sources:

- Capital requirements on Banks have increased
- Solvency II regulation has reduced ability of pensions funds to invest in long dated illiquid assets
- Public accounting rules for PPPs and guarantees are unclear

## Market liberalisation rules can have perverse impacts:

- European State Aid rules have limited role of UK GIB and other public banks in some areas (e.g. guarantees)
- State Aid rules may limit ability to blend different sources of public finance e.g. Grants, loans and guarantees



# UK Green Investment Bank



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- Independent public bank with government shareholder
- Limited to investments which meet “green purposes” as defined in statute
- £3 billion in capital but borrowing powers postponed to at least 2015 – estimated leverage of £15bn investment
- Developing range of innovative products for offshore wind, waste, energy efficiency and biomass
- Debate on further role on technology support

**GIB lacks scale but is a focus for finance innovation**

# Key Lessons from Europe



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- Even without the financial crisis Europe would be facing a green investment problem
- Green investment is still seen as too risky and risks of high carbon investment are under-priced.
- Europe has yet to create conditions where available private domestic assets are flowing into long run infrastructure investment.
- Public balance sheets cannot be the solution. Waiting for the private sector is too slow and uncertain.
- Need creative regulation (financial, energy market and infrastructure) and public banks to deliver scale, innovative and clean investment



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“The best way to predict your future is to create it!”

**Abraham Lincoln**

# Managing Political Markets, Pervasive Uncertainty and Business Transformation



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- **Political markets:** perceived uncertainty over forward government carbon/energy support commitments
- **Relative price uncertainty:** interaction of complex fossil and carbon markets; taxation vs trading models; energy security goals.
- **Regulatory incentives:** imperative to drive rapid investment relative to encouraging new entrants, innovation and competition
- **Technology/demand uncertainty:** government role in valuing/supporting technologies and driving energy demand
- **Business model uncertainty:** organisational value of investing given existing business models – hedge by delaying/diversifying

**Private sector often decides not to invest (enough)**

# The New Policy Model?



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- Government as market maker
- Road-mapping to value options under different scenarios; balancing flexibility, resilience, delivery and infrastructure build
- Long-term directed technology development and diffusion
- Reforming/creating markets to (re)-incentivise innovation, maximise consumer value and promote competition
- Direct government intervention to remove financial and political risks and ensure adequate investment.

**Transitional or Permanent?**