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China's "New Normal"

structural change, better growth, and peak emissions

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Munich RE



Global
Green Growth
Institute



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Overview

1. China's "old normal" (~2000–2013)

2. The transition to a "new normal" (2014–2015)

3. The next decade: forecasts, risks, policies



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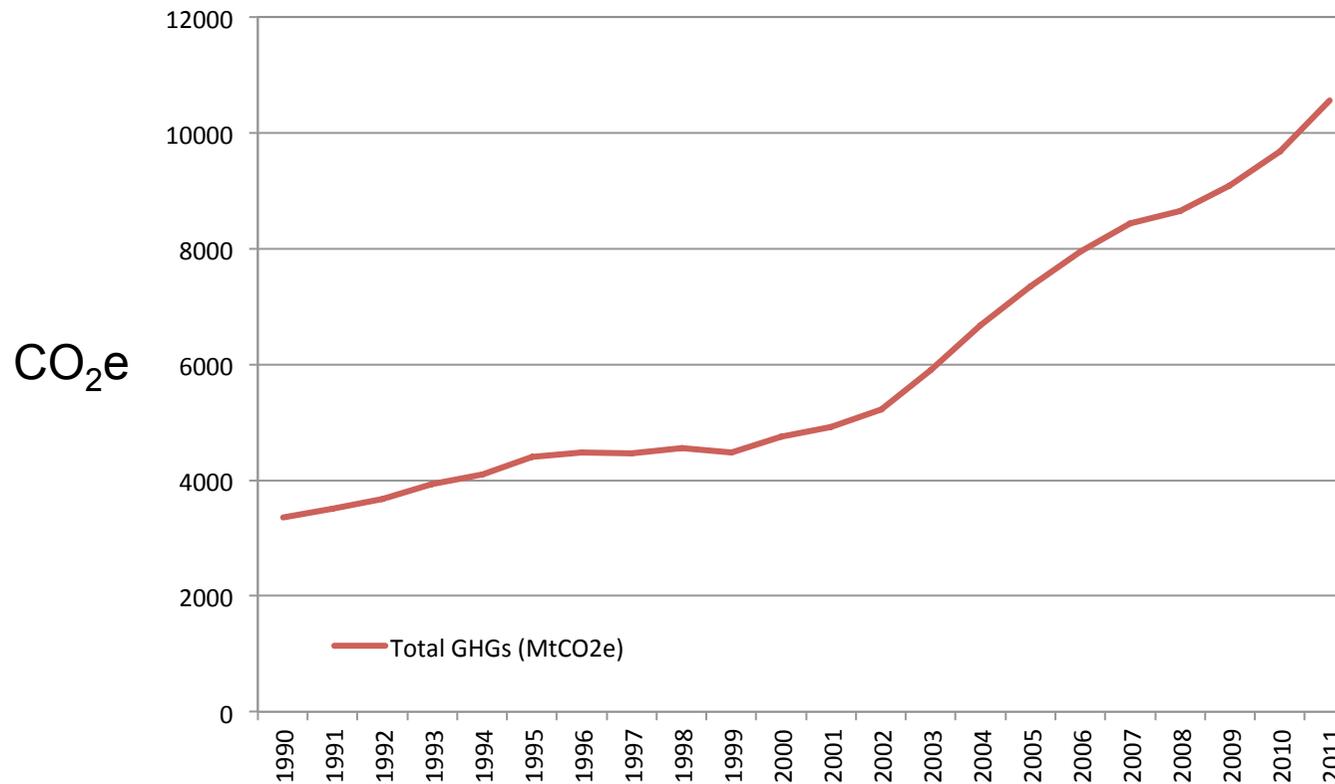


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China's greenhouse gas emissions 1990-2011



Source: World Resources Institute: CAIT Database



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Undesirable local consequences

- **Environmental**
 - Air pollution
 - Water, land, other
- **Social**
 - Public health
 - Inequalities
- **Economic and financial:**
 - Labour market changes eroding low-value manufacturing model
 - Excess industrial capacity
 - Financial risks / bad loans
 - Energy insecurity; resource depletion; environmental damage



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Seeds of change

- **11th 5 Year Plan (2006-10): Energy conservation**
- **12th 5YP (2011-15): Explicit climate goals**
- **New generation of leadership (2013-): central to doctrine & policy**



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*China's current development model is “**unbalanced, uncoordinated and unsustainable**”*

– President Xi Jinping, November 2013

*“We must accelerate the transformation of the growth model, and make China an **innovative** country. We must promote more **efficient, equal and sustainable** economic development”*

– Decision of the 3rd Plenum, 18th Central Committee,
November 2013



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China's new development model (ideal)

- Lower growth rate
- Changing structure of growth
 - C vs I (inequalities)
 - Sector mix (innovation; services)
 - Energy and resource efficiency
 - Low-carbon, low-pollution energy supply
 - “War on pollution”: ↓ coal
 - ↑ Non-coal energy

→ All help reduce CO₂ emissions



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CO₂ (en) emissions in China: Kaya identity

$$\text{CO}_2 = \text{population} \times \text{GDP/pop'n} \times \text{energy/GDP} \times \text{CO}_2/\text{energy}$$

1. Energy Demand / Total Primary Energy Consumption

- **GDP**
- **Energy intensity of GDP**
 - Industrial structure
 - Energy efficiency (within industry)

2. Energy Supply side

- **CO₂ intensity of energy supply**



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Energy demand side

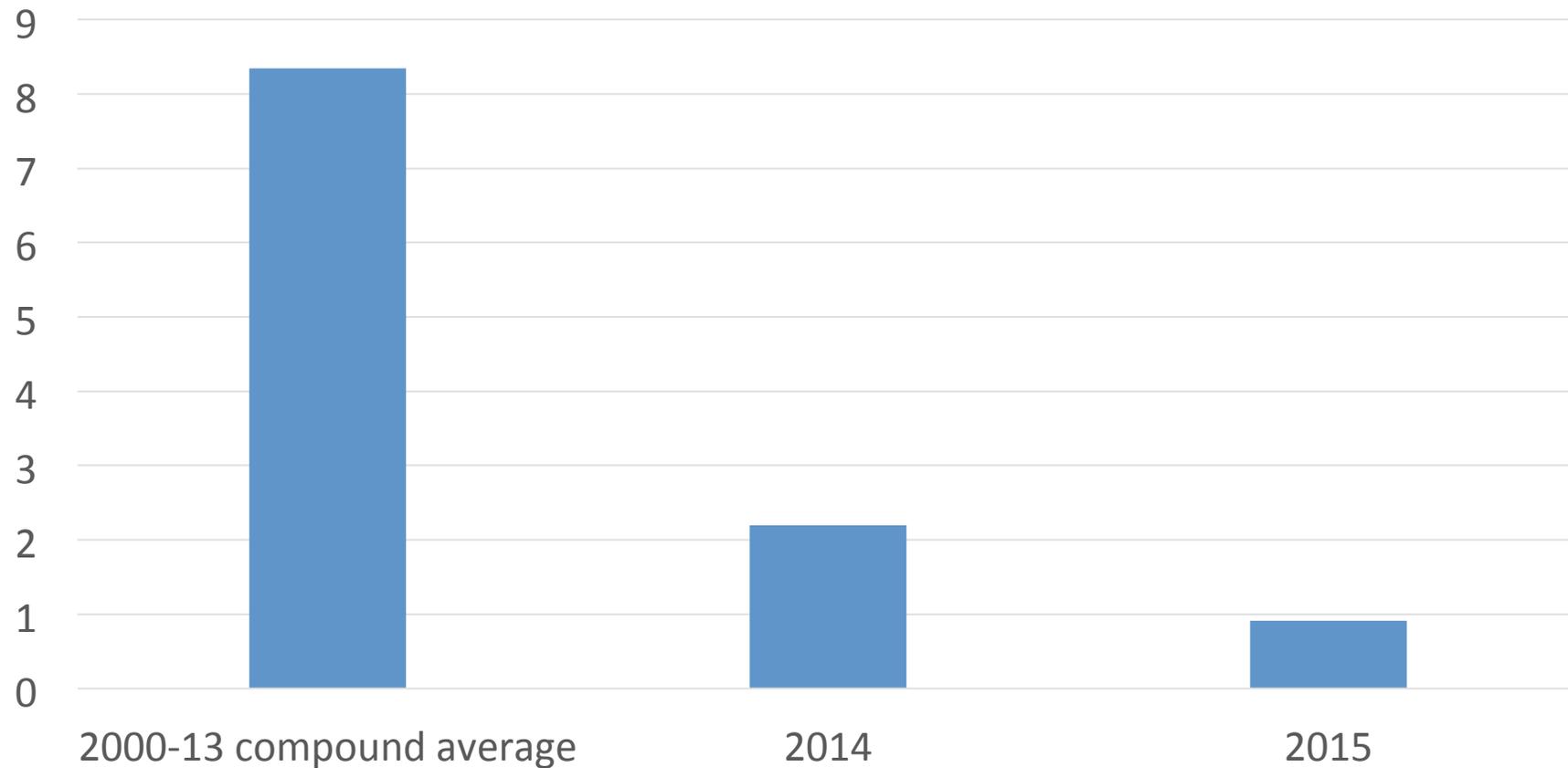


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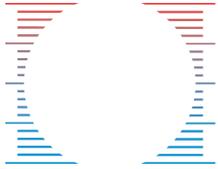


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Primary Energy Consumption (% Growth)



Source: National Bureau of Statistics (China)

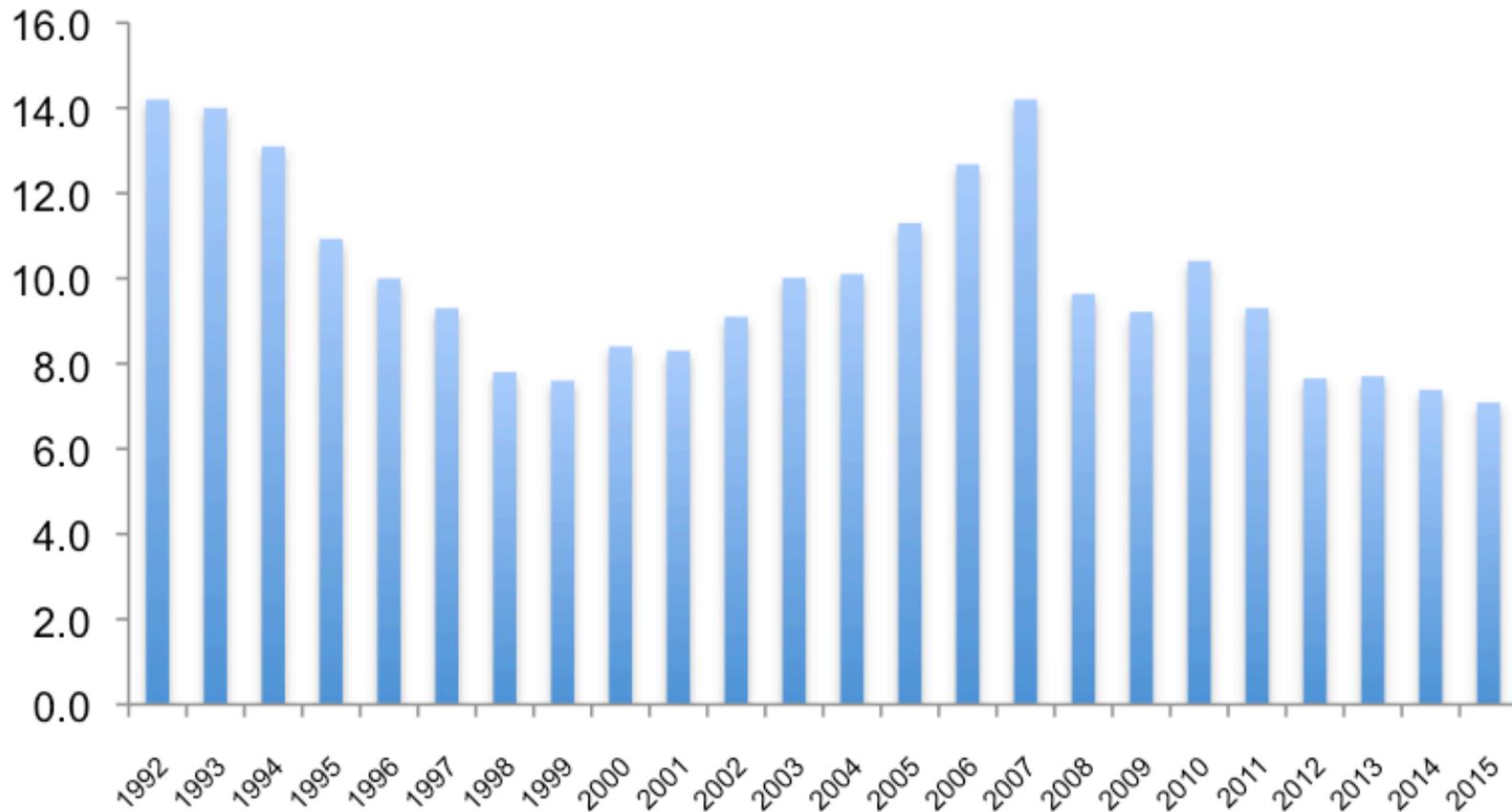


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GDP growth is slowing



Source: *Fortune.com*



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The structure of growth is changing

- **Industry* share of GDP: 44% in 2013 (very high by international standards)**
 - * Basic industrial production (e.g. mining and materials production) and manufacturing industry
- **Heavy industry declining; services growing.**



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Output of key energy-intensive industries (% change on previous year)

Industry	2014	2015
Crude steel production	1.2%	-2.3%
Cement production	2.3%	-4.9%

Source: National Bureau of Statistics (China)



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Energy intensity (structural change + efficiency), reduction on previous year

2013	2014	2015
3.7%	4.8%	5.6%

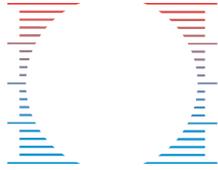


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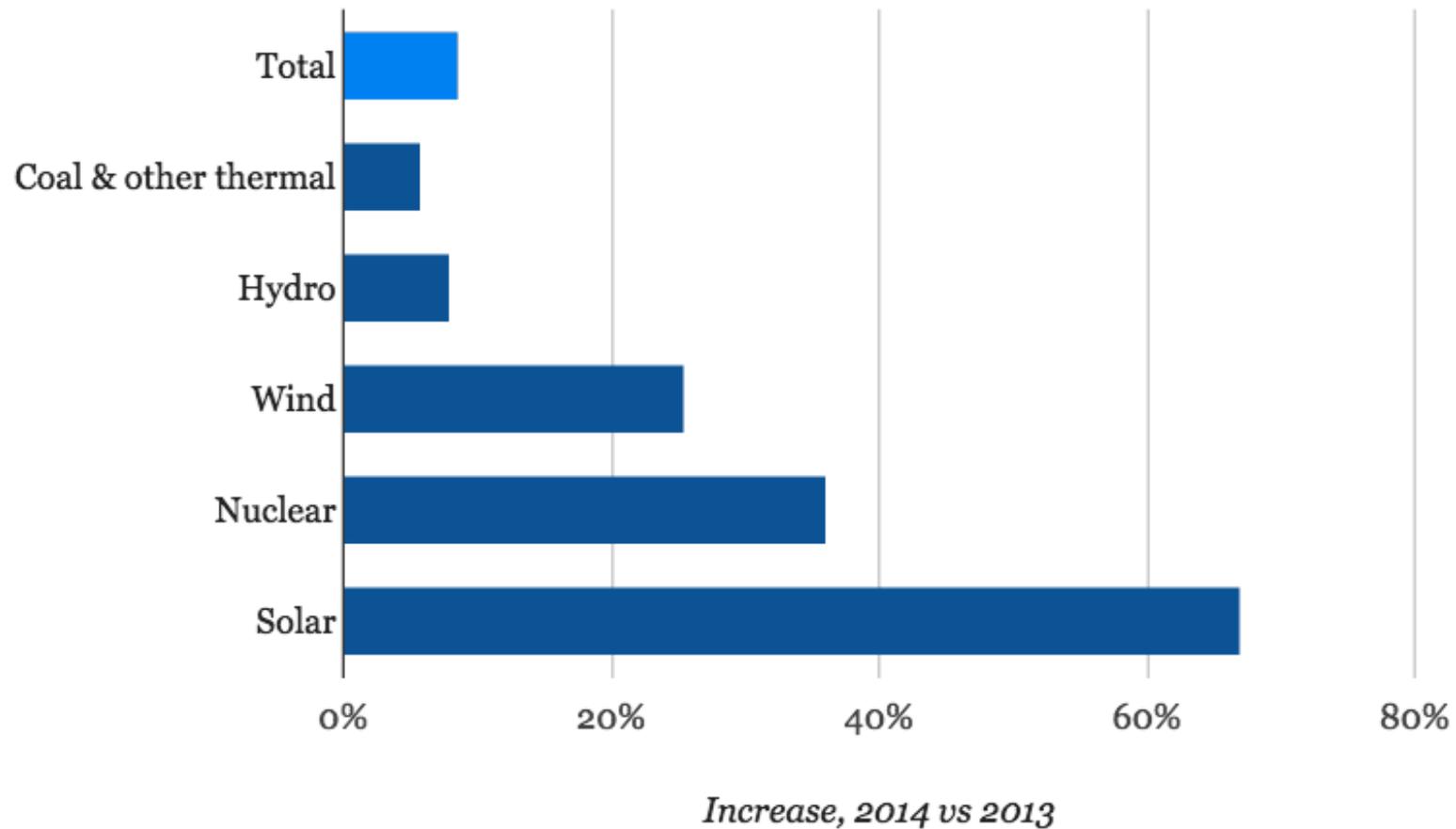


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Energy supply side



Electricity generation capacity expansions (2014)



Source: Evans (2015) based on NBS data



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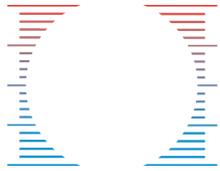


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Coal in China: the 2014-15 turnaround (% change on previous year)

	2014	2015
Production	-2.5%	-3.5%
Imports	-11%	-35%
Consumption calorific value (volume)	0% (2%)	-3% est (-5%)

Source: Energy Information Administration (US) and NBS (China)

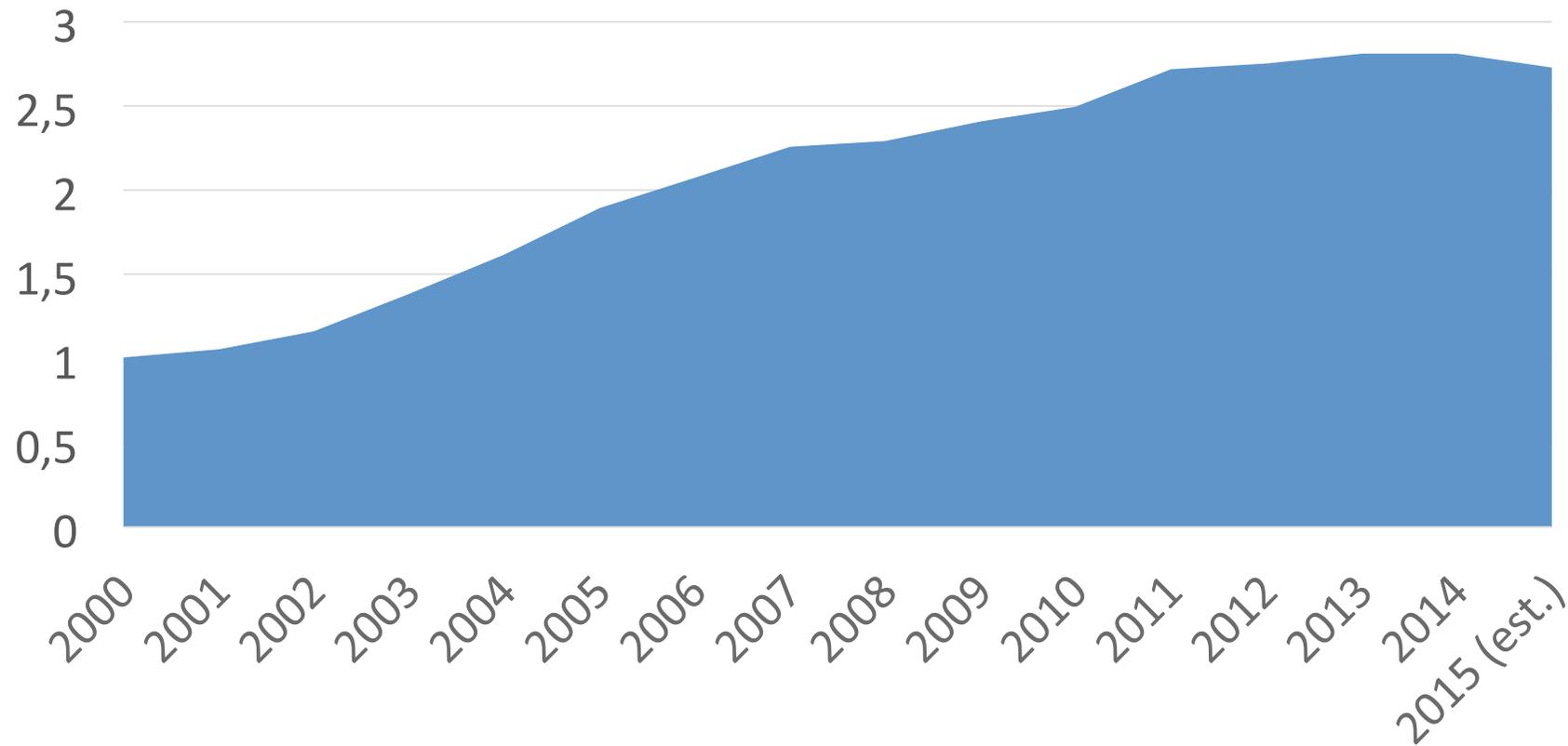


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China Coal consumption (billion tonnes of SCE)



Source: National Bureau of Statistics (China)



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Conclusions re peaking emissions

- **Coal consumption:**
 - Likely peaked in 2014
 - Downward trend over next decade (and beyond)
 - “supply-side reform” / “overcapacity reduction”
 - Slower credit growth and deleveraging
 - “Green” 13FYP
- **Gas and oil growth to 2020/2025**
- **CO₂ emissions: peak year: between 2014 and 2025**
 - CO₂ emissions fell in 2015: Energy Research Institute (fell 3%: Greenpeace)



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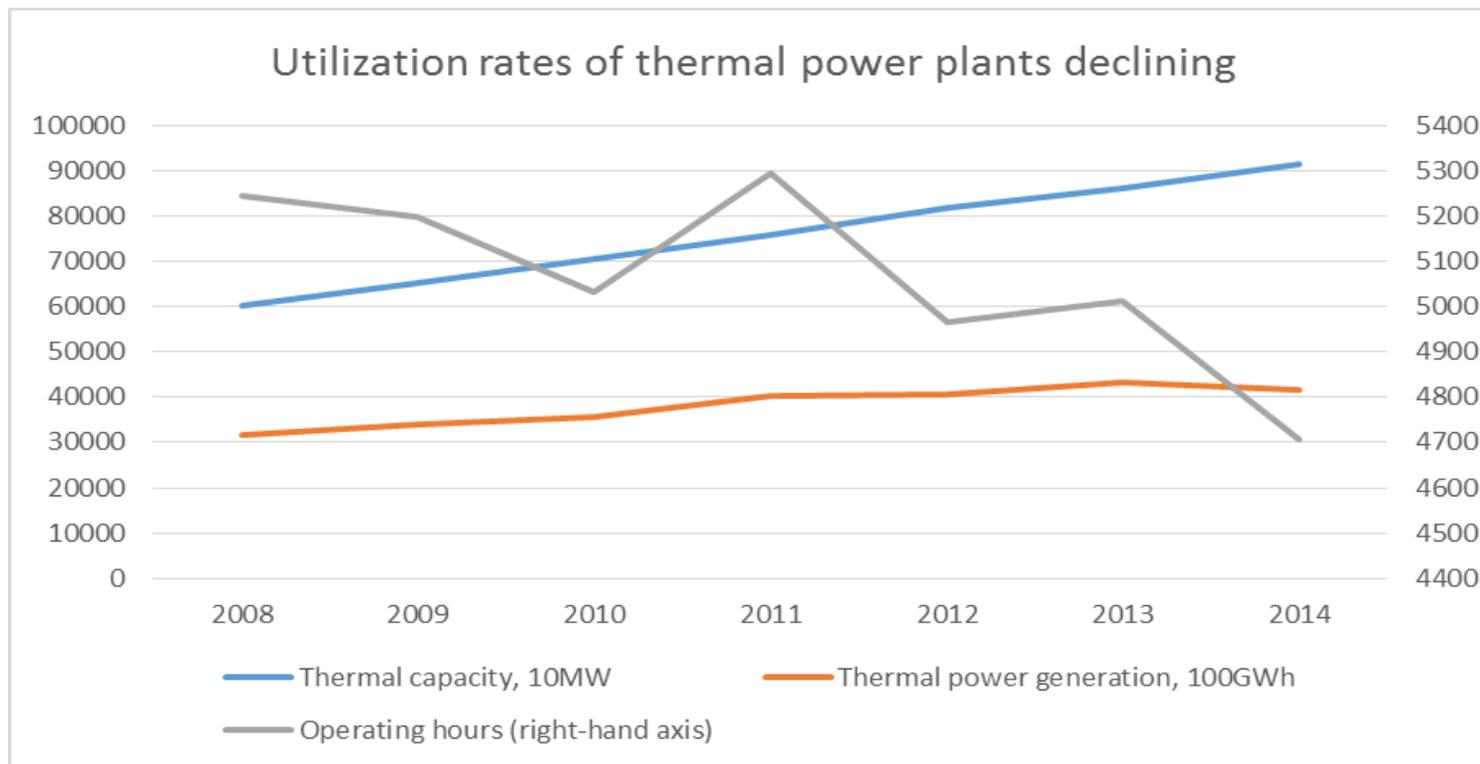
Key risks and responses

- *De facto* return of the ‘old normal’
 - Desperation industrial stimulus
 - Coal-fired power generation expansion
 - Coal-to-gas/chemicals expansion
- Growth sectors: transport, households and commercial buildings and appliances
- The difficulties of transition:
 - Electricity dispatch disputes
 - Local and SOE resistance to reform
 - Stranded assets and stranded workers



Coal capacity expansions: why?

- China added 39GW of new coal-fired generation capacity in 2014
- Yet coal-fired electricity generation fell ~2%



Source: Myllyvirta (2015) based on data from China Electricity Council and National Energy Administration (China)



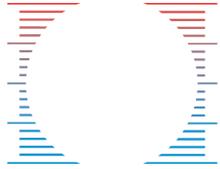
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Key areas of action for strong reductions in emissions in the 2020s

- **Cities**
- **Energy systems**
 - Energy efficiency
 - Energy supply
- **Some key policies and institutions**
 - Support for clean innovation
 - Regulating and taxing coal
 - Low-cost finance for green industries/infrastructure



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References and Contacts details

Fergus Green and Nicholas Stern, “China’s changing economy: implications for its carbon dioxide emissions”, *Climate Policy* (2016, forthcoming)

Fergus Green and Nicholas Stern,
[China’s “New Normal”: Structural Change, Better Growth, and Peak Emissions. Grantham Research Institute. Policy Brief. June 2015.](#)

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Surplus slides

Key areas of action: Cities

ATLANTA, United States



Population: 2.5 million
Urban area: 4,280 km²
Transport CO₂ pp: 7.5 tCO₂e

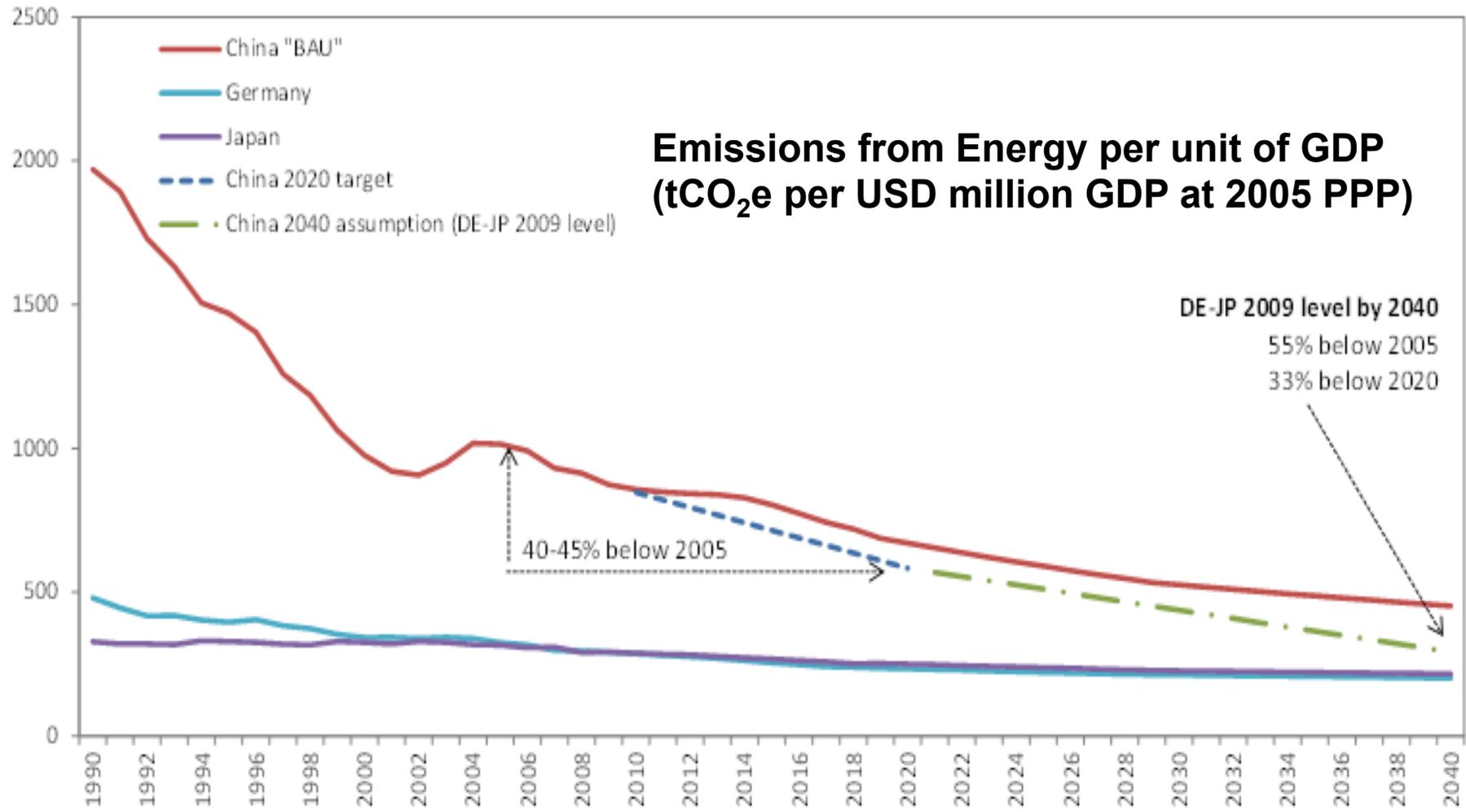
BARCELONA, Spain



Population: 2.8 million
Urban area: 162 km²
Transport CO₂ pp: 0.7

Source: Bertaud, A. and Richardson, A.W (2004), Transit and density: Atlanta, the United States and Western Europe, Figure 17.2 on p.6, available at http://courses.washington.edu/gmforum/Readings/Bertaud_Transit_US_Europe.pdf and Kenworthy (2003), Transport Energy Use and Greenhouse Gases in Urban Passenger Transport Systems: A Study of 84 Global Cities, Third Conference of the Regional Government Network for Sustainable Development, Notre Dame University, Fremantle, Western Australia, September 17-19, 2003, Figure 1 on p.18 cited in Lefevre, B. (2009), Urban Transport Energy Consumption: Determinants and Strategies for its Reduction, S.A.P.I.EN.S 2(3): 1–32, Figure 6, available at <http://sapiens.revues.org/914>. The reference year is 1995, with the exception of the population data which is from 1990.

Key areas of action: Energy Efficiency



Sources: WRI, WB, calculations



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Key areas of action: Energy Supply

- Tightly limiting new coal developments
 - New plants; coal-to-gas/chemicals industry
 - Scaling up non-coal sources:
 - (Hydro); (Gas); wind, solar and other renewables; nuclear
 - Managing existing coal assets:
 - Energy storage, network infrastructure and grid management
 - Electrification of transport and parts of industry
- Multiple benefits: air pollution/public health; energy security; water security; greenhouse gas emissions



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Key areas of action: clean innovation

- Global under-investment in clean innovation → key role and opportunity for China
- Policy mix to support innovation:
 - Correct the externalities (coal tax)
 - Support across the innovation chain, from R&D → deployment
- China aiming to move “up” the innovation chain
- Advantages of scale, manufacturing capabilities, and finance
- Challenges: managing higher-risk innovation and its financing; a more conducive “enabling environment” (eg. institutions)



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Key areas of action: fiscal reform

- Removing perverse subsidies (fossil fuels; heavy industry)
- Coal tax (other fossil fuel taxes)
 - Facilitates restructuring toward green industries
 - Brings government revenue for green investment and structural adjustment
- Correcting “vertical fiscal imbalance” (local government revenues needed for service provision and infrastructure)
- Other tax reform: property tax; congestion charging etc.



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Key areas of action: financial reform

- People's Bank of China: need to direct finance away from coal/heavy industry toward green industries
- PBC/UNEP report, *Establishing China's Green Financial System*:
 - Annual green investment needed for sustainable development model each year to 2020: 2 trillion yuan (3% of GDP)
 - Specialised green investment bank and green funds
 - Green financial products and instruments
 - Green financial and legal infrastructure



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Thank You!

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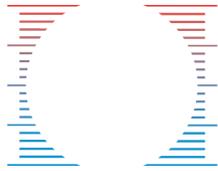
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Transport emissions / oil consumption

- Transport is ~10% of China's overall GHG emissions
- Strong growth in heavy industrial development phase of:
 - Private vehicles / road transport
 - Oil demand
 - Transport CO₂ emissions
- Likely to be largest source of growth in China's emissions
- Some signs of moderation in last two years
- But trajectory uncertain
 - Many factors affecting demand and supply: urban planning model; social norms; costs; technologies; policies
- Strong policy focus due to energy security, pollution, congestion and climate concerns – will need continued concerted efforts
- Emissions growth unlikely to offset decline in electricity and industry emissions, so emissions peak around 2020 still likely



- Structural change needs governance reform and expenditure
- Taxes are needed to provide **incentives + revenue** for sustainable restructuring
- Political economy → opportunity for “package” reforms; ↑ equity and accountability

Extra revenue from new taxes for sustainable economic transformation

Type of tax	Object of tax	Revenue estimate (%GDP)	Jurisdiction	Possible expenditure of revenue
Property	Land value	1-1.5	Local	Public service provision; basis for bond market for green infrastructure
Externality/ corrective	Urban externalities (e.g. congestion)	<0.5	Local	
	GHG emissions	4-5	Central	
	Environmental/pollution	3-4	Central	Low-carbon innovation; structural adjustment; reducing other taxes
Total		8-11%		



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Major reform challenges

- **Fiscal reform**
 - Removing perverse subsidies for industrial investment; FFs
 - Fossil fuel / carbon taxation
 - Other tax reform: property tax; congestion charging etc.
 - Correcting vertical fiscal imbalance (local service provision and infrastructure); east-west imbalance
- **Market reform**
 - Liberalisation of energy prices and management of dispatch
 - Reduced role of SOEs; increased role of private sector
- **Financial sector reform**
 - Access to private finance = no.1 barrier to doing business in China: World Bank investment climate surveys
 - Liberalisation
 - Capacity for market lending (due diligence and risk mgmt)



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Major reform challenges

- **Governance reform:**
 - Reallocating expenditure responsibilities & revenue powers
 - Administration of increasingly complex policies → capacity, incentives and accountability for officials at all levels
 - Overcoming corruption
 - Rule of law → administration and enforcement of environmental laws, efficiency standards, taxation etc.
 - Transparency and accuracy of data and statistics
- **Political and social and challenges**
 - Power of vested interests (energy SOEs; local officials)
 - State-Party relationship
 - State-Party-Corporate relationship (SOEs)
 - State-society relationship (political controls/freedoms, civil society, the media, NGOs, academics and think tanks)
 - Centre-local disconnect



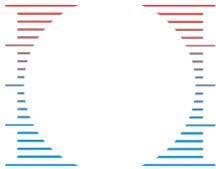
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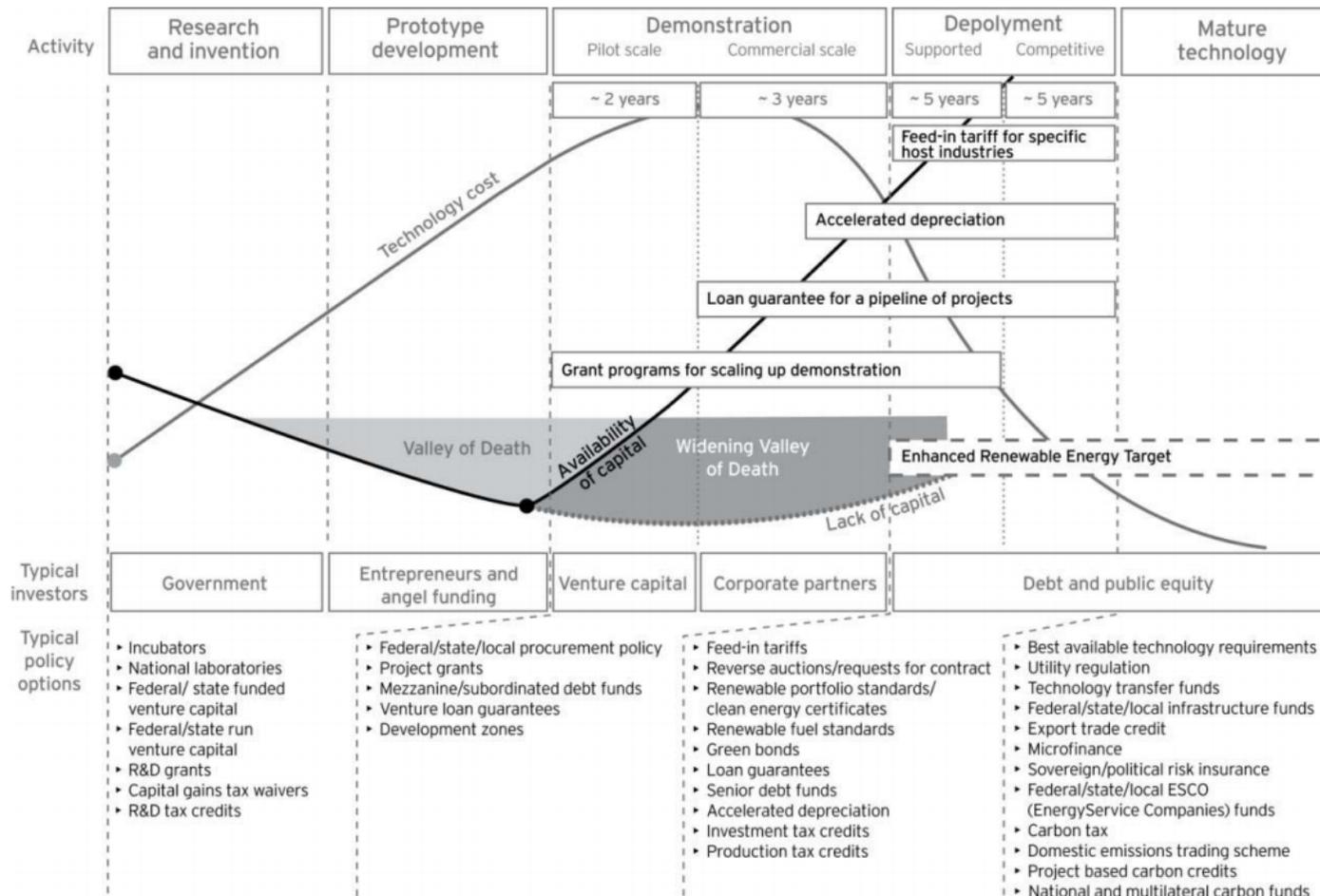
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Examples of challenges: pricing carbon

- Emissions trading
 - Cap setting
 - Permit allocation
 - MRV
 - Administration and enforcement
 - Cost pass through in a highly regulated electricity market
 - Trading
 - Firm capacity, incentives and behaviourSupporters: EU, World Bank, OECD, Shell; NDRC (China)
- Better approach: fossil fuels tax reform, esp. coal:
 - Income + rent + local damages + global carbon
 - Clear signal; informational and enforcement benefitsIMF; Summers; Ahmad; CCICED/ERI; Ministry of Finance (China)



Examples of challenges: supporting innovation



Source: Ernst & Young (2010)



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Factors affecting low-carbon development

- Capacity to implement increasingly complex reforms
- Managing green urbanisation
 - Incentives for internal movement to new cities
 - City/local govt authorities incentives for revenues – land sales v property tax
- Pricing liberalisation
- Market-based carbon policy
 - ETS: policy complexity; cheating/corruption; vested interests
 - FF taxes: vested interests
- Centre→local disconnect in policy (eg. building regulations)
- Innovation and productivity (connected to rule of law)
- Financial sector capacity and quality; access to private finance
- Quality of governance and administration