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Global shift to a low carbon economy: challenges and opportunities

Climate Change and Trade: Challenges for Southern Africa, a conference organised by South African Institute of International Affairs, 26-27 October 2009

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Decisions in the next 10-15 years will determine whether a climate-safe world is possible

- As global emissions must peak by 2015-20 to keep to the low probability of 2^0C rise in global temperature, investment in new energy and non-energy infrastructure and technology must be consistent with a low carbon/ efficient energy future in all countries.

- Developed countries would not only need to move to a zero-carbon energy system by 2050 but also to a large extent invest in the beginning of global decarbonisation.

- Choices made in developing countries matter, especially in major developing economies. Immediate decisions about infrastructure needs and patterns of consumption will have a decisive impact on global efforts to stabilise GHG emissions, and the feasible rate of reduction to sustainable levels. It is critical to avoid carbon lock-in.

A climate-safer world requires all major emitting countries to begin radical decarbonisation in the next two decades

For developed countries including the US, it implies sharp reductions, moving close to a zero-carbon economy by 2050, and with major developing countries following suit well before the end of the century. According to the IPCC, developed economies should make 25-40% cuts by 2020. This implies average global emissions of around 2 tCO2 per person – less than half the present Chinese level, a fifth of the level in Europe, and a tenth of that in the US.

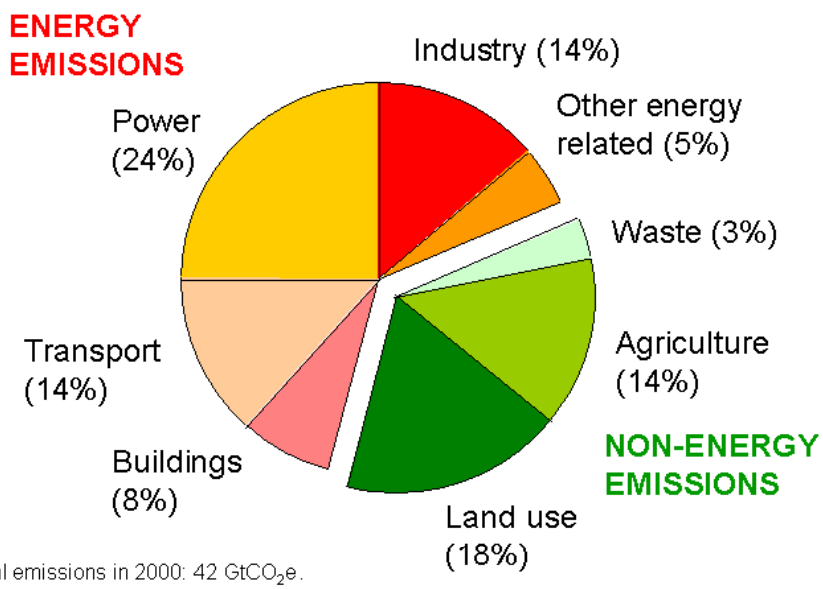
To achieve these reductions, all major emitting countries will need to begin radical decarbonisation in the next 20 years, whatever their level of economic development. The “+5” developing countries (including Brazil, China, India, Mexico and South Africa) at the 2008 G8 summit in Japan refused to accept the global goal without clarification of what the industrialised world is willing to offer towards it.

How to kick-start a new industrial revolution? Still at the early stage of understanding of what is a robust system of incentives and institutions to drive the global low carbon transition

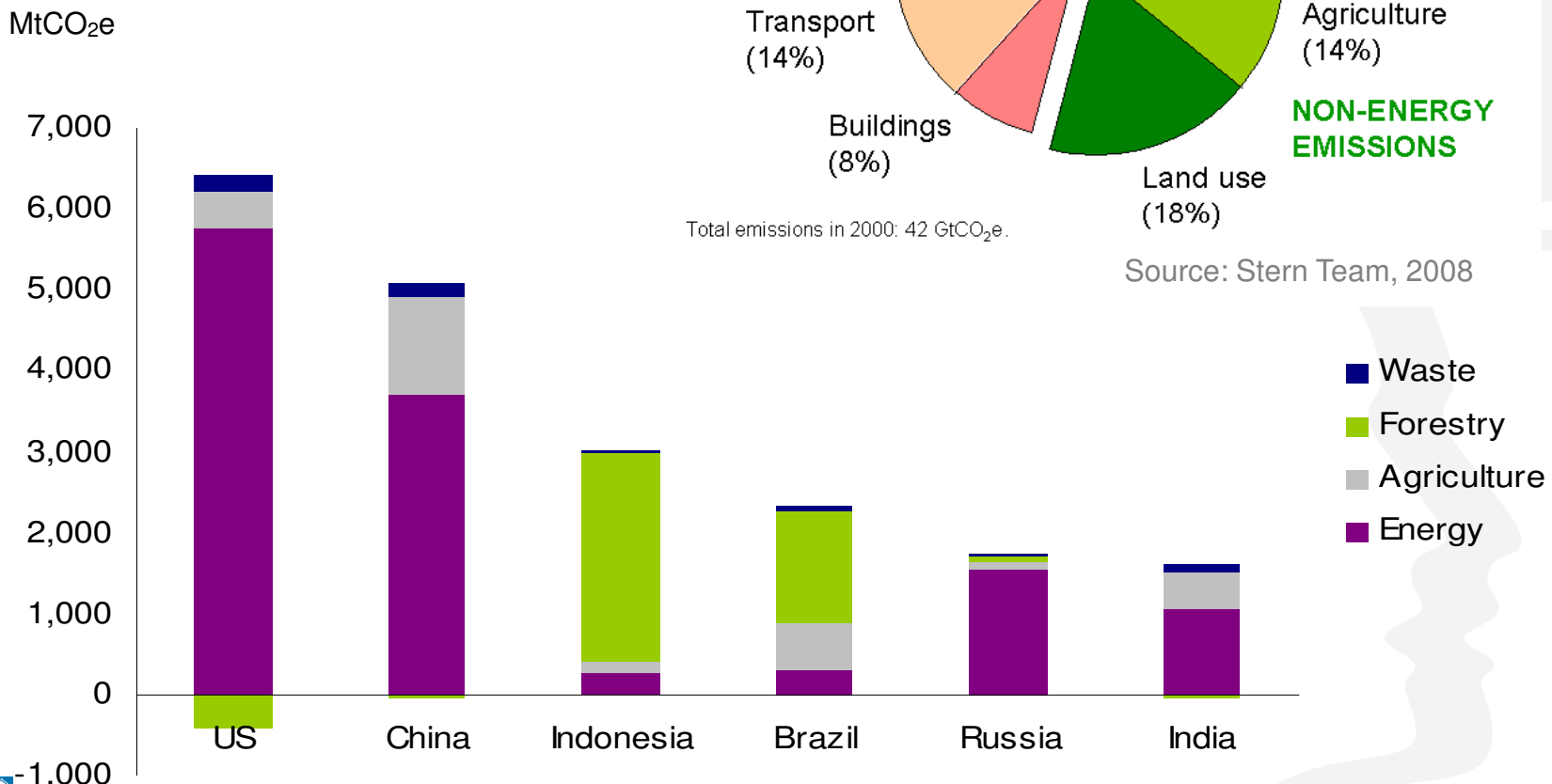
- Rapid global diffusion of existing and near-to-market low carbon technologies: large scale renewables, CCS AND energy efficiency deployment
- New generations of solutions from breakthrough technologies from 2030 onwards (which will help ease increasingly difficult climate politics)
- Equitable international collaboration mechanisms on technological development and transfer: to lower the cost/risk of technology investment and to encourage national action in developing countries
- Equitable incentive systems to deal with forestry and adaptation

Needless to add, countries have very different emissions profile

Global emissions profile

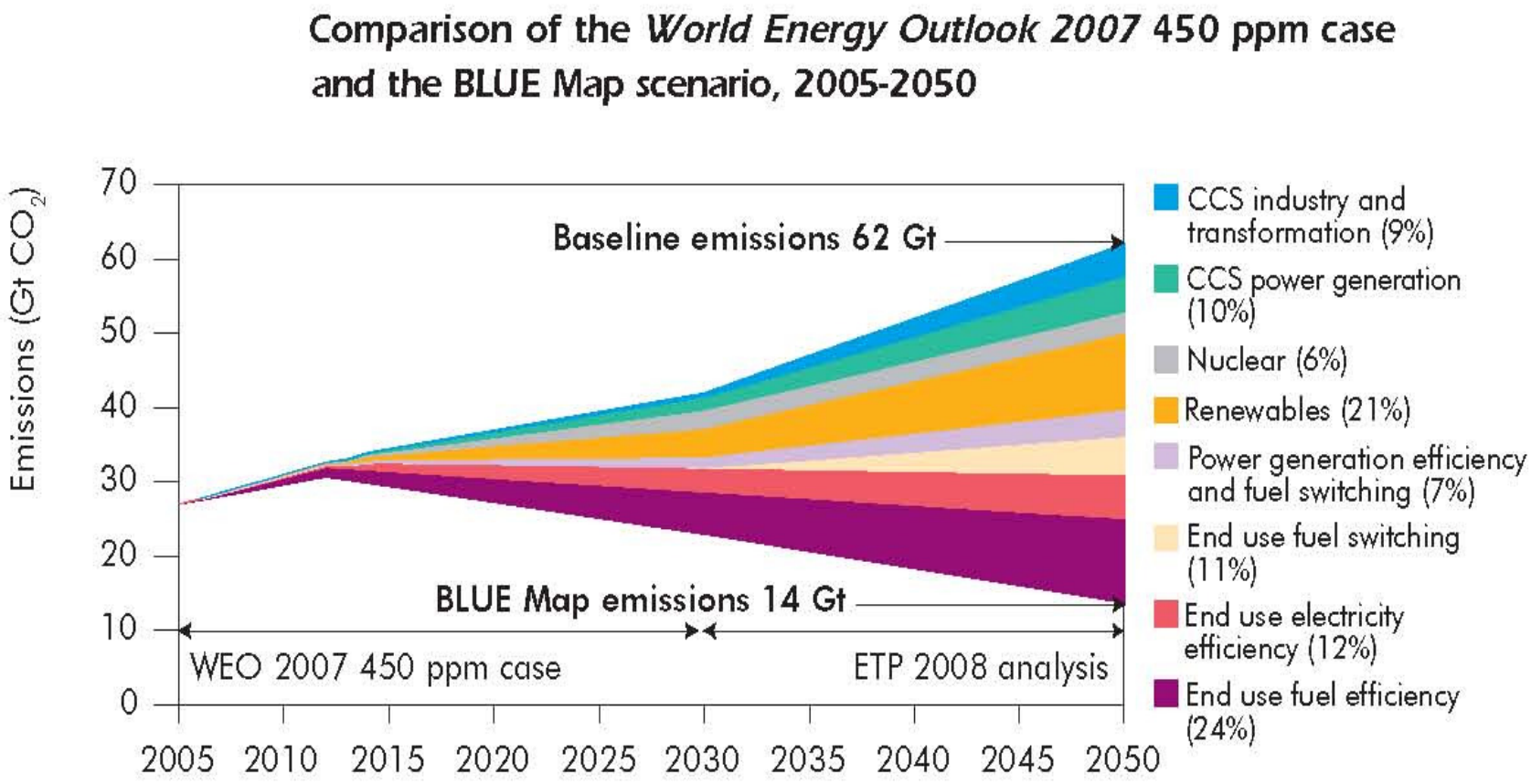


Source: Stern Team, 2008



Source: World Bank/DFID

Energy efficiency and renewable energy are expected to provide three quarters of the global decrease in CO2 emissions



Source: IEA Blue Map Scenario. 2009

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On the road to a global deal?

- National and regional initiatives are much needed, but the world cannot solve the climate problem without an effective multilateral approach. The reality is that they have to be built upon smaller coalitions of powerful actors.

- Many proposals have been made for a core of US leadership, bilateral or trilateral leadership by variants of the US–EU–China/Japan/Asia nexus, the G8, the G8+5, the G20, or the MEM – now know as the MEF.

- Even though these are relevant and necessary, but all such efforts have in the end been driven to recognise the ultimate aim of fostering a multilateral framework under the United Nations. This is for three main reasons - scope, competitiveness, and political legitimacy.

Why All roads lead to Copenhagen?

- **Scope**: Emissions are so widespread geographically that any subset of countries becomes increasingly unable to solve the problem unless others are involved. The dominance of US, EU and Chinese emissions today would be swamped by 2050 if they delivered steep reductions whilst others did not. And none of these are significant contributors to land-use emissions (such as deforestation), which involve a wholly different group of countries.

- **Competitiveness**: A partial solution that encompassed the big emitters would not solve the perceived risks of competitiveness loss in energy-intensive sectors vis-à-vis non participants, which could be as small as Singapore, for example.

- **Political legitimacy**: A deal between the big emitters only is unlikely to secure global legitimacy. In no legal or moral system can a solution be imposed by those inflicting the damage, without at some level engaging those that would most suffer the consequences of inadequate action.

Source: Lee and Grubb et al, 2009

Climate negotiations define ‘what’ and ‘who’ to do ‘what’ ‘when’…. Not necessarily the ‘how’

- Formal negotiations can only be one part of the climate process. how to build trust, confidence and monitoring mechanisms that can withstand and respond to stresses and conflicts of interests?

- The MEF and other processes offer opportunities away from the haggling over specific text to understand each other’s positions, identify areas of common ground and build bridges and explore innovative solutions. Key issues include targets for industrialized countries, the role of developing nations in cutting emissions, financing and technology transfer.

- Beyond setting targets, how to create opportunities for real & concrete economic changes/ opportunities through investments and new markets? The scale of these markets should not be underestimated. According to the International Energy Agency (IEA) meeting a 450 ppm CO_2e concentration limit would require an increase in investment of 18%, averaging an additional $1 trillion per year up to 2050 compared to the Business-as-usual (BAU) requirement.

Country	***Low carbon action across the world***
Australia:	Cap and trade 'Carbon Pollution Reduction Scheme' to be phased in from 1 July 2011 and a commitment to reduce carbon emissions by 25 per cent below 2000 levels by 2020 (pending UNFCCC post-Kyoto agreement).
Brazil:	Implementation of a 'National Policy for Energy Efficiency' that will result in a gradual energy saving up to 106 TWh/year to be reached by 2030, a reduction of emissions of around 30 million tons of carbon in that year.
Costa Rica	Pledged to be carbon neutral by 2021.
France:	Emission reductions of the order of 75 – 80 per cent before 2050 if other countries do the same (a conditional target).
UK:	2008 Climate Change requires legally binding 5 year carbon budgets to be set by an independent expert committee. The Act requires emission reductions through action in the UK and abroad of at least 80% by 2050. The carbon budget for 2020 is set at 34% reduction compared to 1990, increasing to 42% following a global deal on climate change. Pledge to build no new coal-fired power stations without CCS to capture at least 25% of carbon emissions and 100% of emissions by 2025.
Mexico	Planning a domestic cap-and-trade system by 2012 to cut emissions from certain sectors (cement, oil refining etc.). The government has pledged to halve carbon emissions by 2050 on 2002 levels.
Norway:	Aim of being carbon neutral by 2030. Has committed 140 million Euros over 5 years CCS projects in selected EU member states.
South Africa:	A plan to halt its growth of greenhouse gas emissions at the latest by 2020-2025 and to adopt various economic and policy measures so that emissions will eventually stabilise and decline.
Sweden:	In 2000 Sweden discussed a target of reducing own emissions by 50 % from 1990 level before year 2050. The government has said that Sweden should work internationally for stabilising the concentration of greenhouse gases at a level below 550 ppm CO2-equivalents. Swedish per capita emissions should be below 4.5 tonnes CO2-equivalents before 2050. This represents a reduction of just over 40 % compared to today's level. The 2008 budget included 7 billion Krona for climate and energy initiatives between 2009-2011.
United States	The government has suggested a 14-15 % reduction in carbon emissions from 2005 levels by 2020. The Waxman-Markey Bill (recently passed US House of Representatives, now facing the Senate) calls for an absolute cap covering 85% of the US economy, resulting in a 17% reduction by 2020 and over 80% reduction by 2050 compared to 2005 levels. The Bill requires electric utilities to meet 15% of their electricity demand through renewable energy sources and energy efficiency by 2020 and outlines US$90 billion in new investments in clean energy technologies and energy efficiency by 2025.
Japan	Prime Minister Hatoyama has stated that Japan would seek to reduce CO2 emissions by 25% below 1990 levels by 2020. This target would be contingent on a deal involving all major emitters in Copenhagen in December 2009
EU	Committed to cutting carbon emissions by 30% of 1990 levels by 2020 (pending UNFCCC post-Kyoto agreement). The 2007 EU climate and energy package has set 3 additional targets to be met by 2020: a 20% reduction in energy consumption compared with projected trends; an increase to 20% in renewable energies' share of total energy consumption; and an increase to 10% in the share of petrol and diesel consumption from sustainably-produced biofuels.

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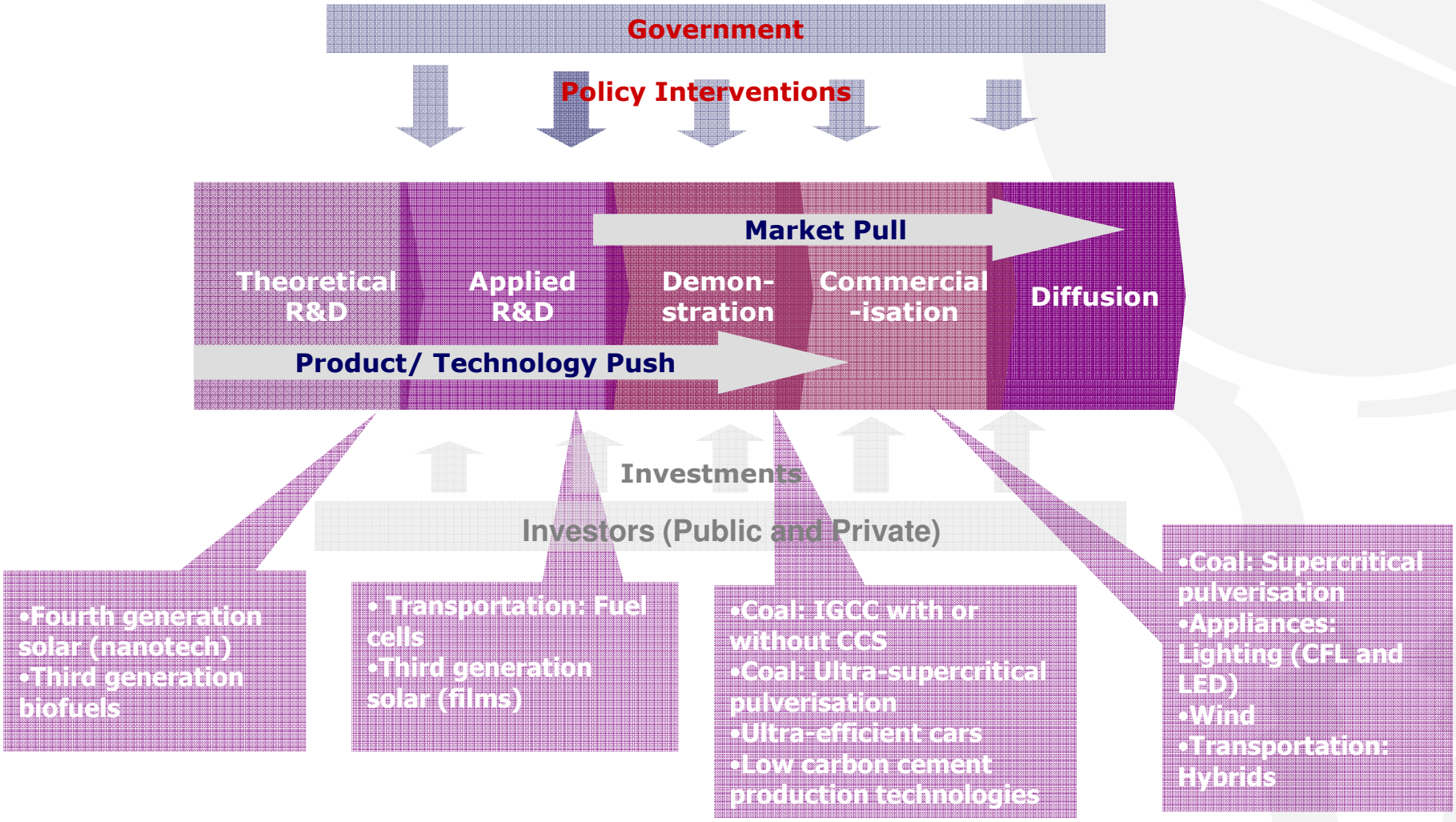
How to drive new technologies down the innovation chain?



This diagram is adapted from the Stern Review (2006) for *Changing Climates* (2007)

How to unlock the barriers to investments?

R&D (Basic and Applied)

- Long term underinvestment
- Challenge of recouping R&D investments with commercial applications
- Multidisciplinary challenges

Demonstration

- Financial, technical and informational challenges to prove that the innovation is viable
- Availability of public funding
- Difficult for private sector to capture benefits
- Technological risks
- High capital costs
- Uncertainty in policy environment

Commercialisation

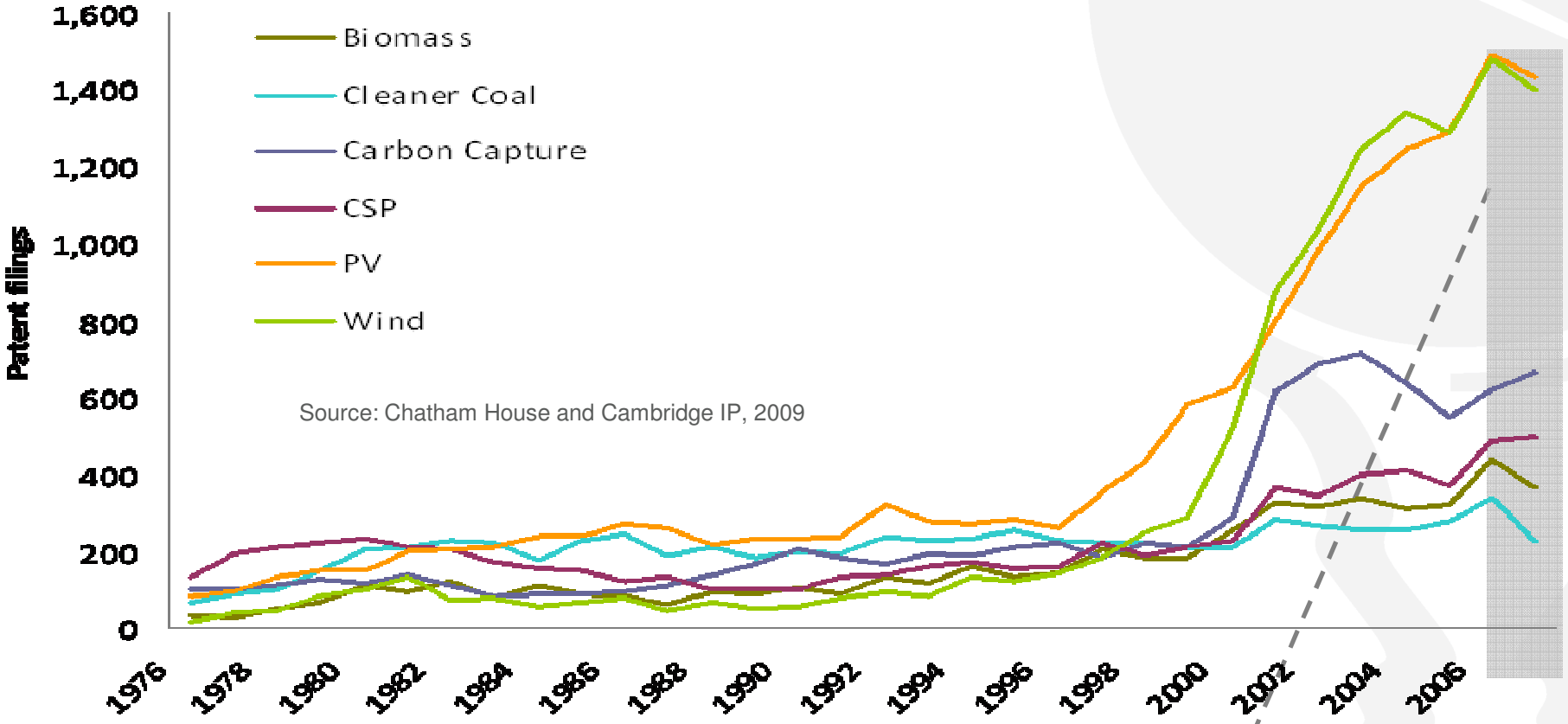
- Financing for incremental cost reduction
- Uncertainties relating to potential for cost reduction and policy environment

Diffusion

- Weaknesses in investment, savings, and legal institutions (including IP enforcement)
- Subsidies to conventional technologies and lack of competition
- Prices for competing technologies exclude externalities
- Weaknesses in retail supply financing and service
- Capacity of countries/markets to use the new innovation

Source: UNDP (2000); OECD (2006); Chatham House and E3G (2007-08)

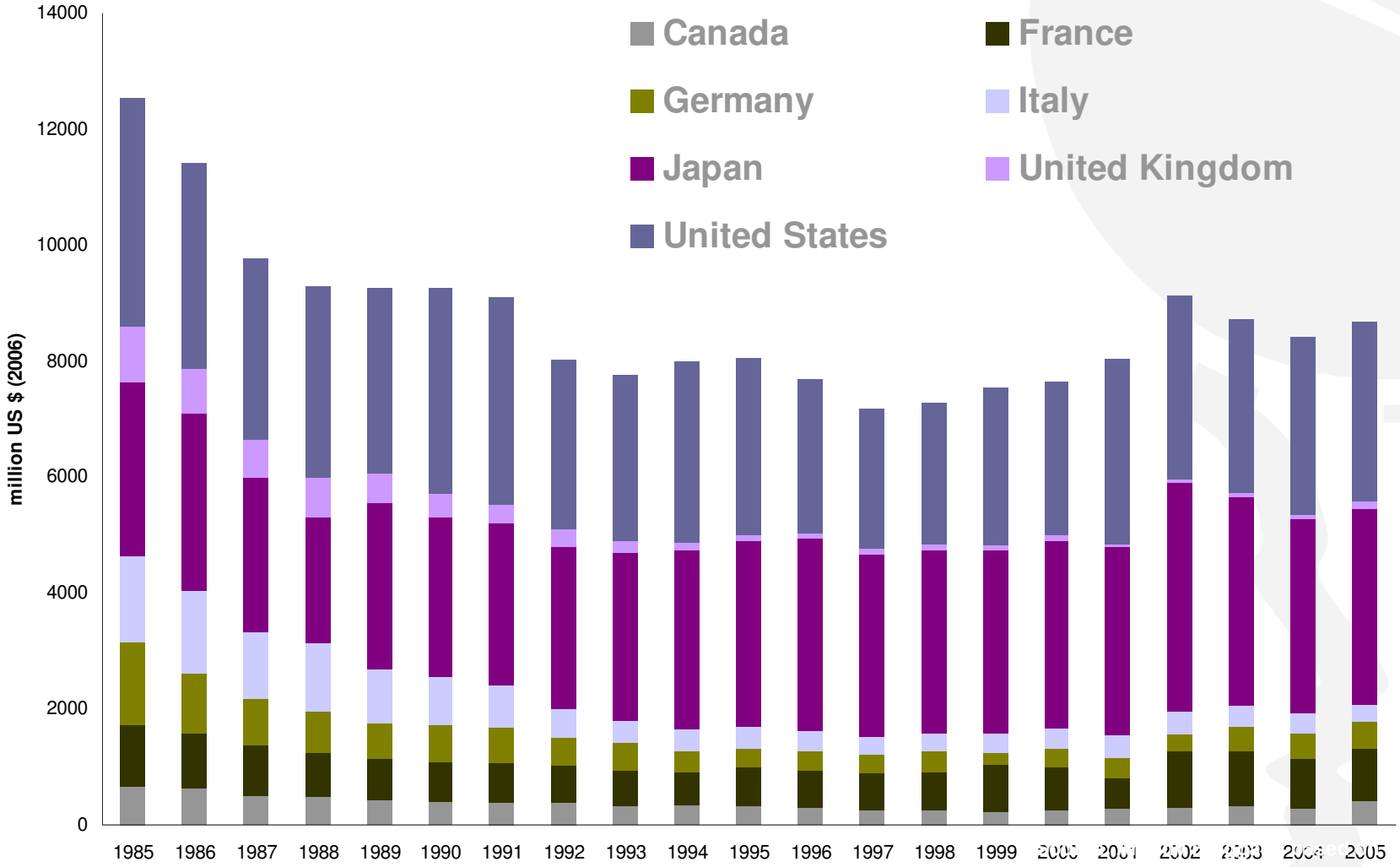
Apart from wind and solar PV, patenting activities growth in other cleaner energy sectors are surprisingly sluggish



Source: Chatham House and Cambridge IP, 2009

Patent applications may be unpublished for 18+ months. Therefore the number of reported patents for the last 2 years may be under-represented.

How to scale up R&D investment?



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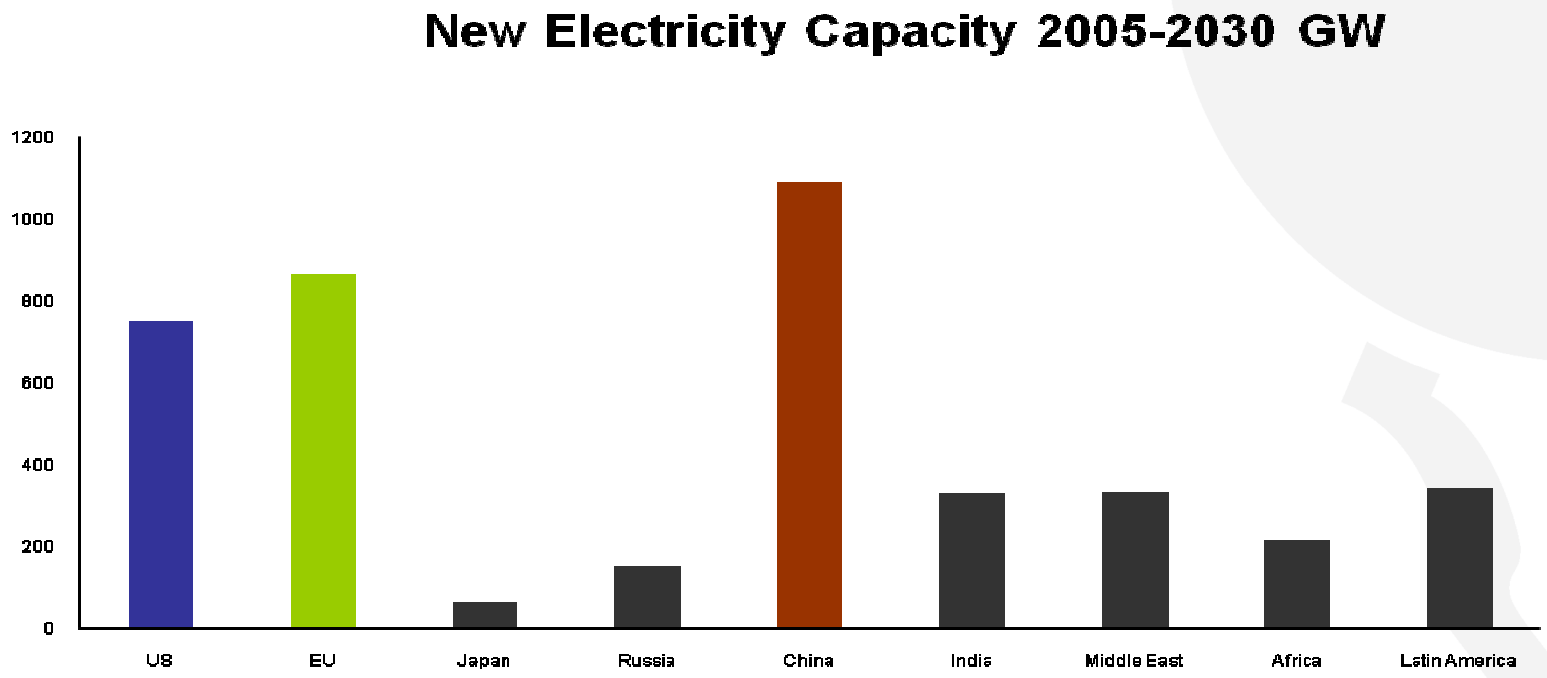
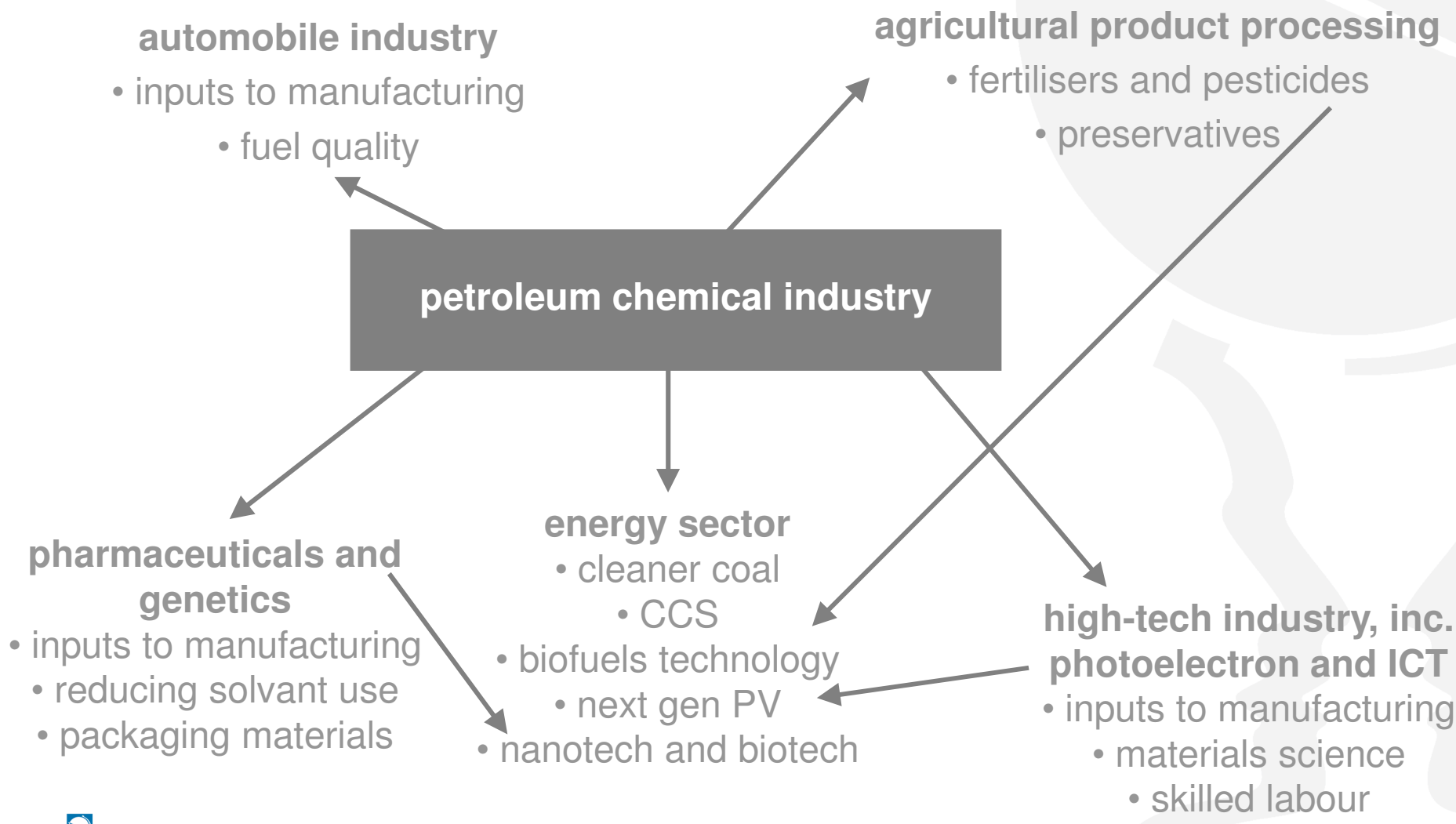
Source: Chatham House with IEA data, 2009

How to avoid locking-in high carbon power sector generation capacity...

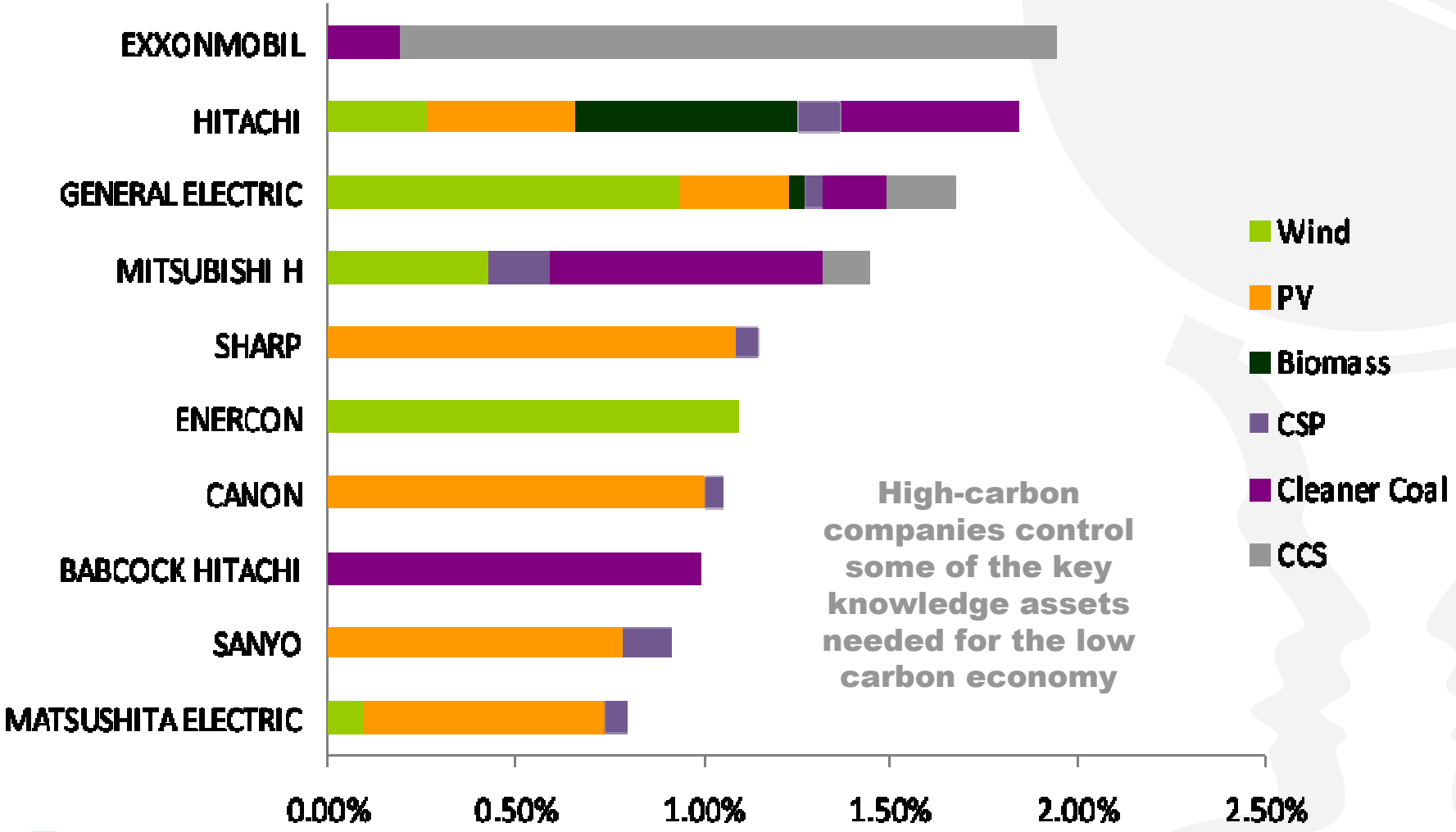


Business as usual investments will either lock us into an unsustainable energy future or into early and large retrofitting / replacement costs

How to use high carbon sectors to drive low carbon transition? (1)



How to use high carbon sectors to drive low carbon transition? (2)



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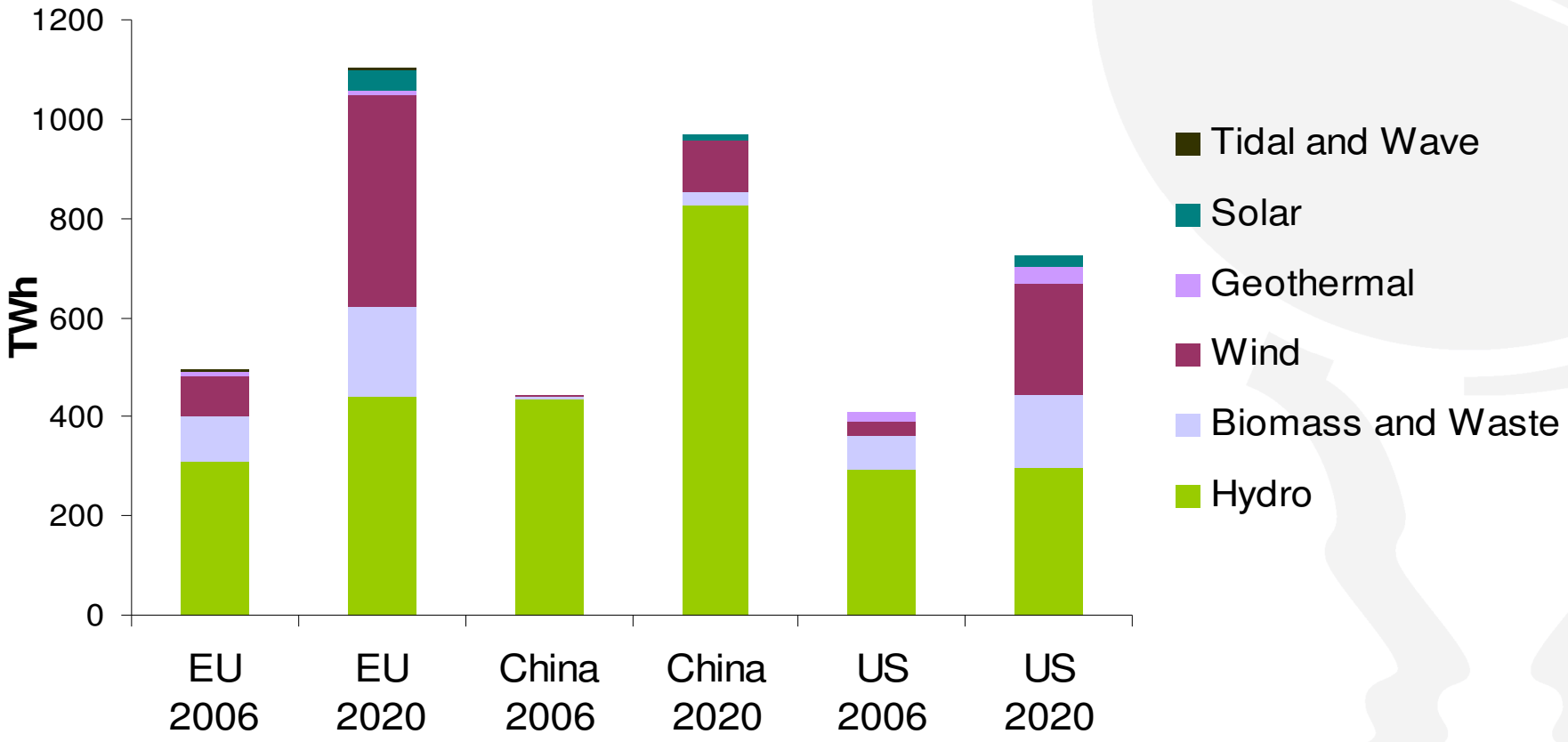
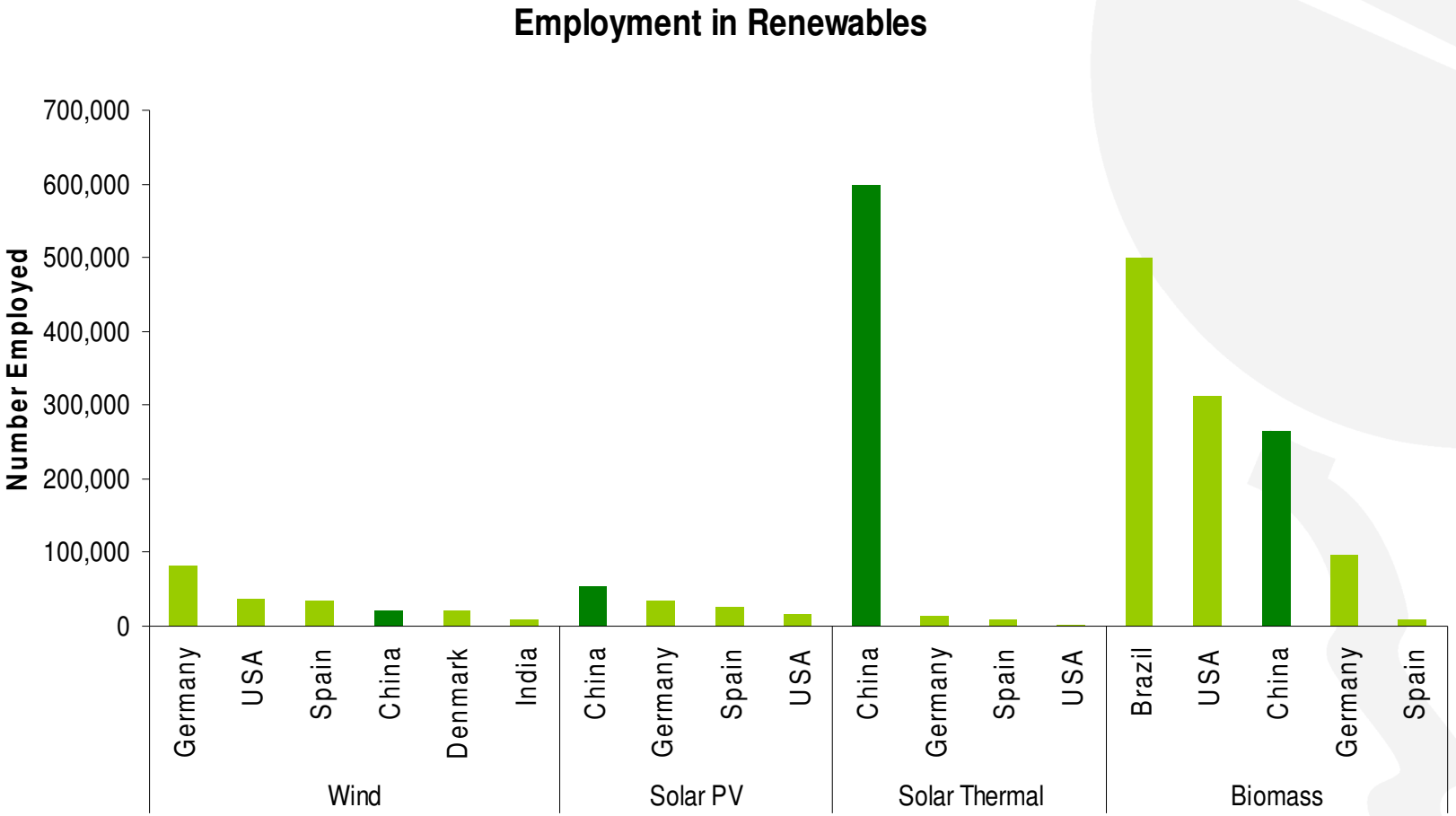
Source: Chatham House and Cambridge IP, 2009

How to capitalise on new markets opportunities and first mover advantages?



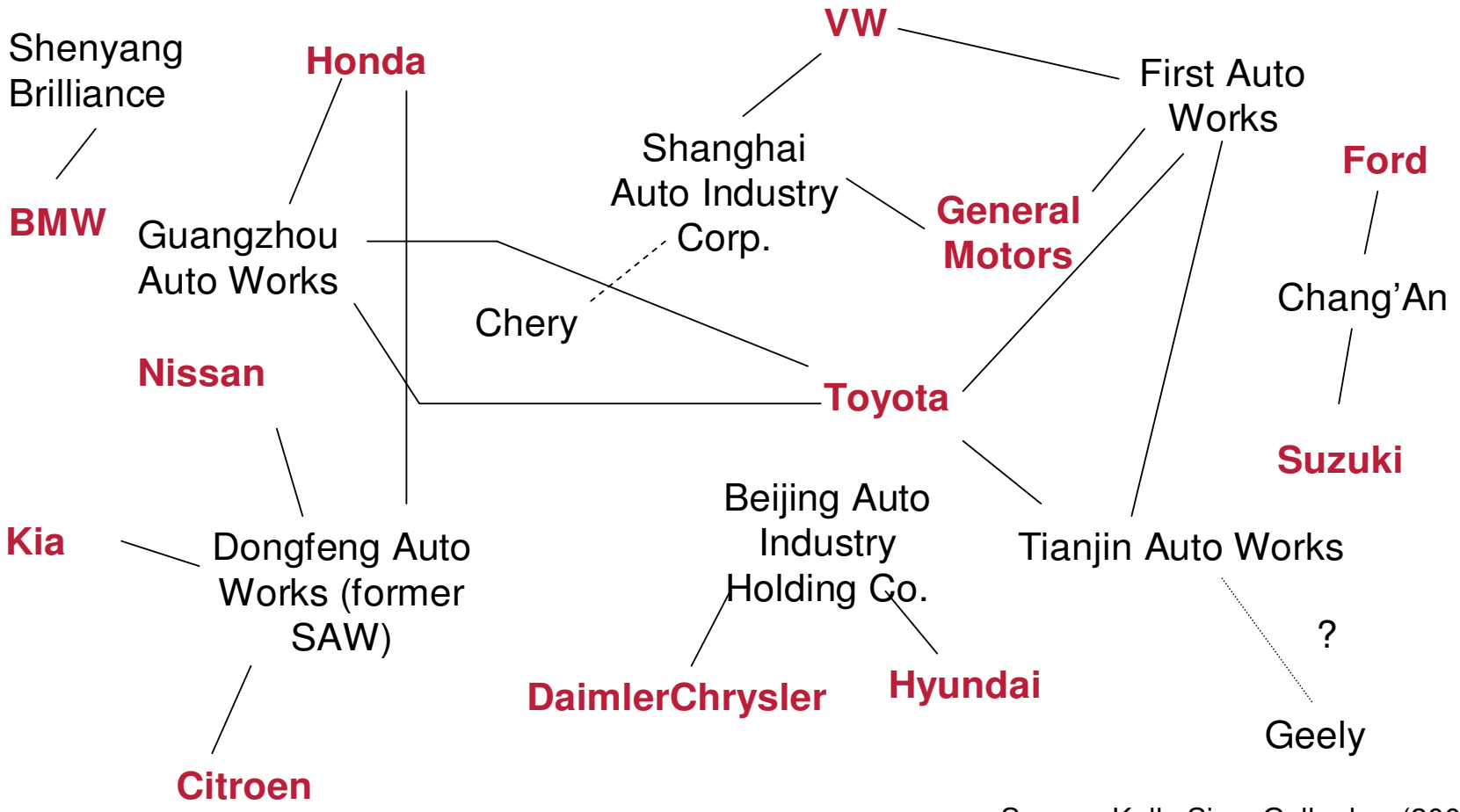
Growth rate for Renewable Energy is expected to be larger than any other supply sector

And to create jobs in return...



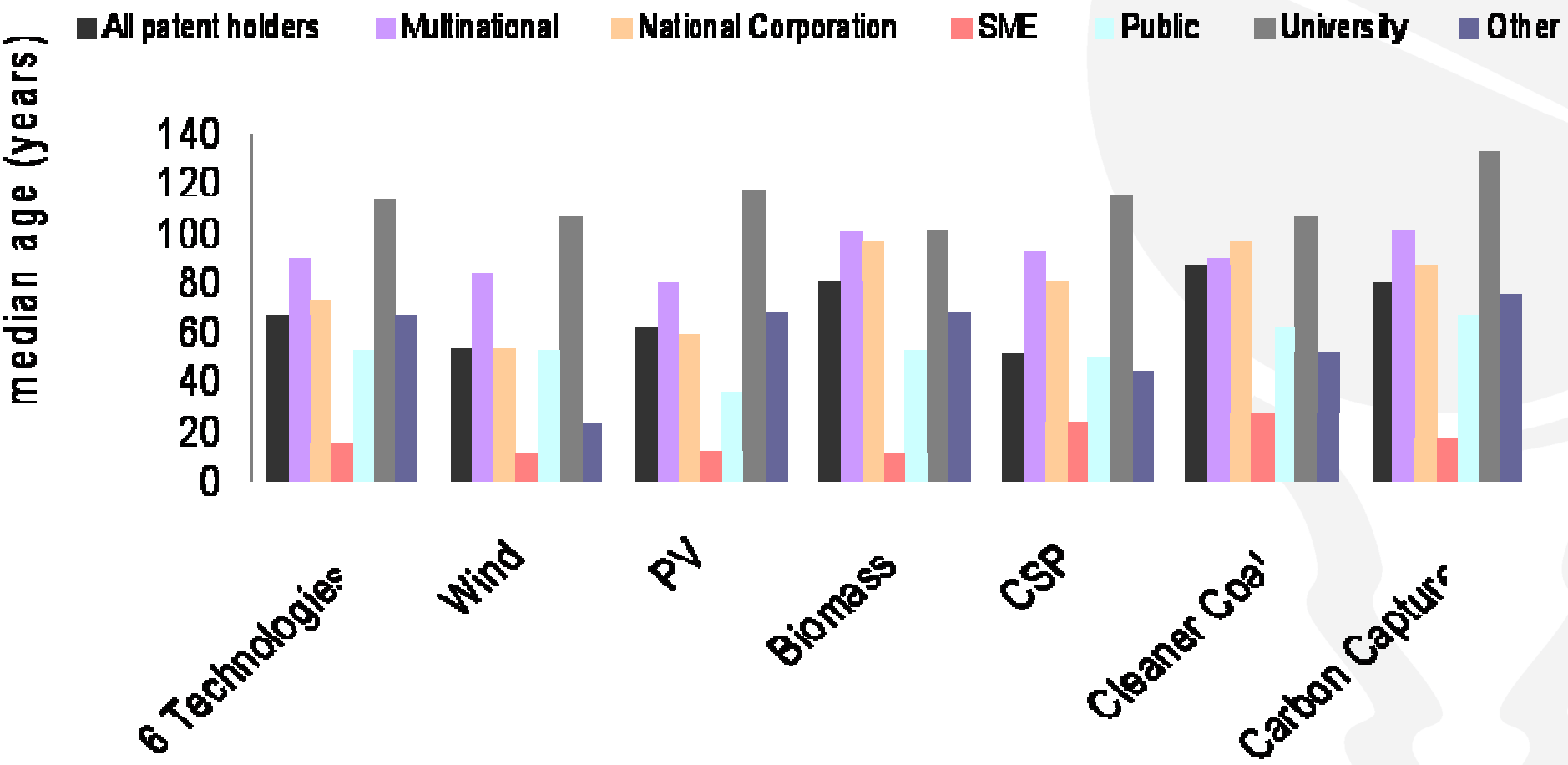
Research in the US found that that renewable energy creates more jobs per megawatt (MW) of power installed, per unit of energy produced, and per dollar of investment, than a fossil fuel energy-based sector.

How to use globalisation, trade, investment and/or the integrated global supply chain to drive technological deployment for the low carbon economy?



Source: Kelly Sims Gallagher (2006)

How to bring in newcomers?

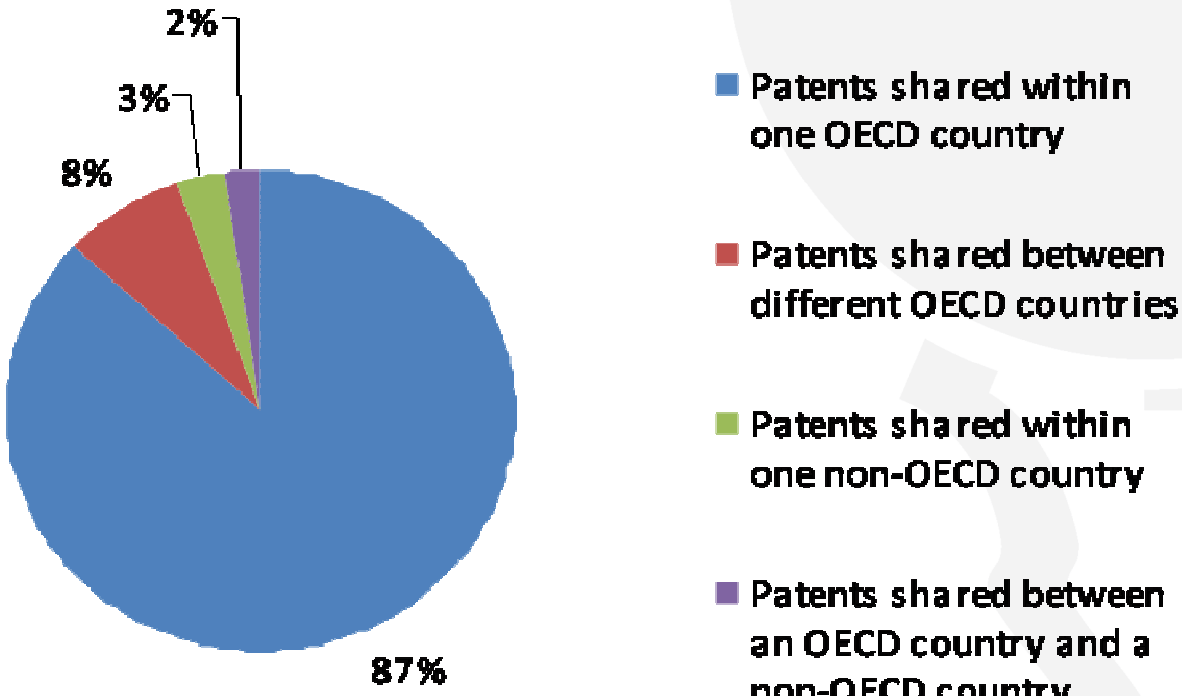


The median age of corporations indicate the advantages of older institutions and companies (based on assignees with more than 4 patents)

Source: Chatham House and Cambridge IP, 2009

How to encourage cross-border technological development?

Cooperation on technology innovation and development is primarily a national activity



Jointly assigned patents: developing-developed economies share

Source: Chatham House, 2009

And last but not least, how to deal with competitiveness concerns

- Difficult to assess the problem of carbon leakage. For the EU, around 2% of all economic activities face significant cost increases relative to their value added (Climate Strategies and Michael Grubb, 2009). A few industries - metals, paper, chemicals, cement etc may be at risk in the US – just over 3% of US output in 2005 and less than 2% of its jobs. (Petersen Institute and WRI, 2008)

- BTAs may be insufficient, especially if US legislators are more interested in tackling competitiveness/China rather than climate change. Very little of China's carbon-intensive production is actually sold in the US: less than 1 percent of its steel, 3 percent of its aluminium and 2 percent of its paper. (Petersen Institute and WRI, 2008)

- A narrow understanding of competitiveness dominates, failing to take into account the dynamic nature of technological change, for example. Persistence of national industrial policy mindset.

- A full trade war is in nobody's interest. Implications for the already fragile multilateral trading system AND Copenhagen negotiations.

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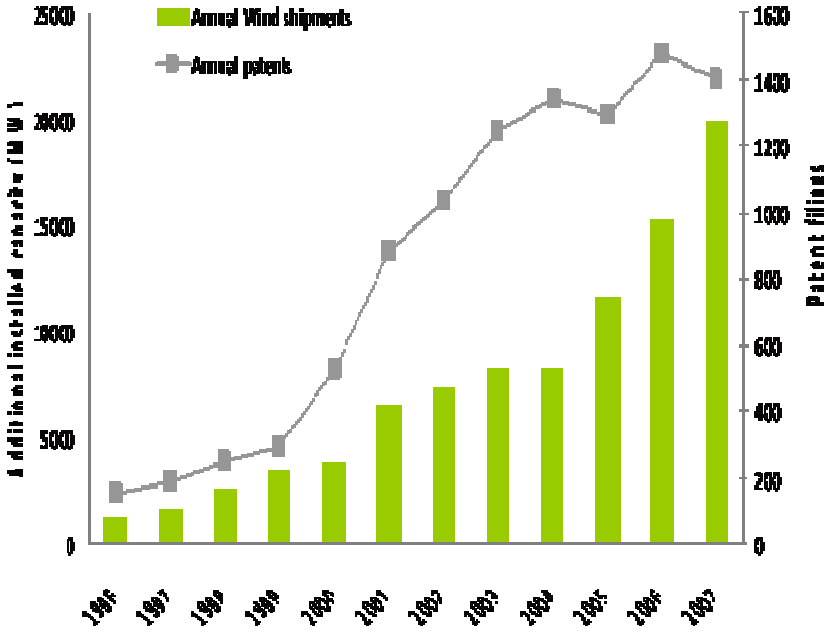
With the new economic realities, the fact base might be shifting

- Revisions of energy/emissions forecasts
- Efficiency investments more lucrative but low carbon technologies particularly affected as higher perceived risks/investments costs
- Higher public sector expenditure can be tied to ‘green products’
- According to HSBC, listed companies in the climate change sector already surpassed the Stern estimates in 2008 – reaching a global turnover of $534bn. It also exceeds the $530bn turnover of the aerospace and defence sector
- Can the crisis be turned into historic opportunities?

Policy works.

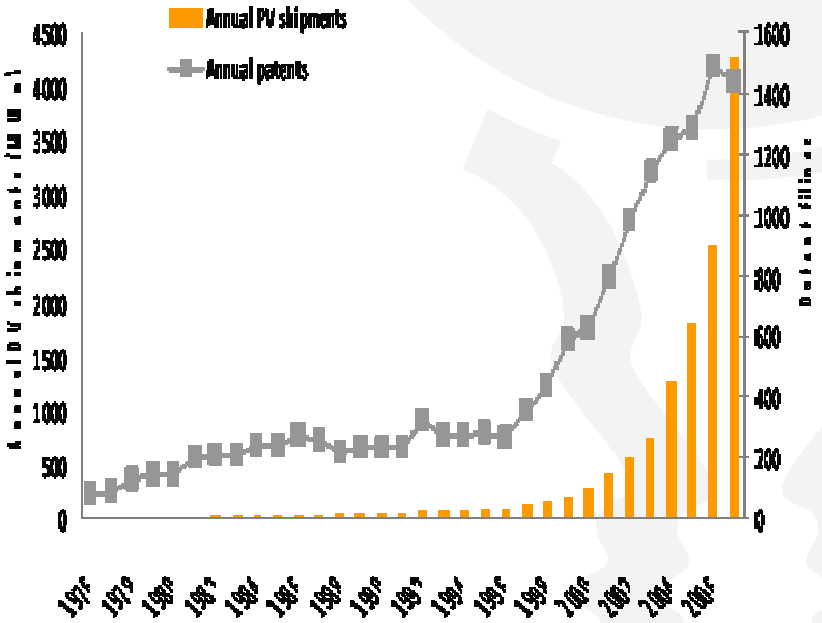
Patenting has generally grown with deployment rate

Wind



Source: Chatham House, 2009

Solar PV



Source: Chatham House, 2009

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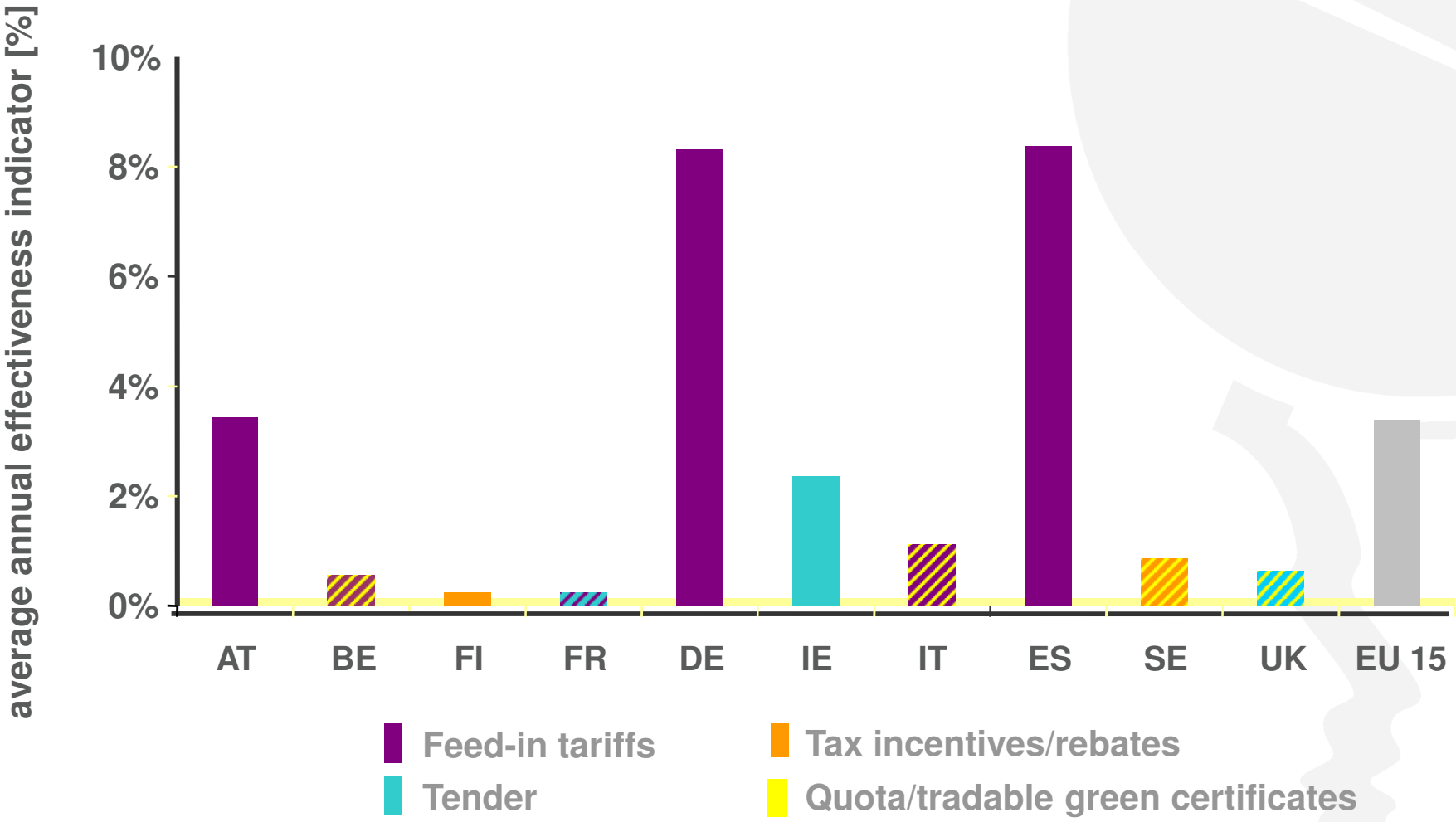
On-shore wind sector (1997-2004) experience varies



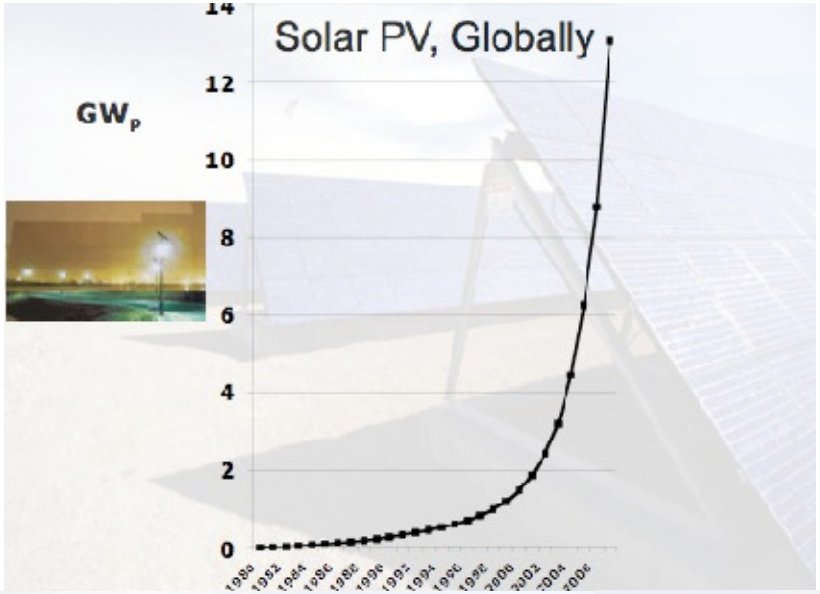
Source: AEA Technology (2008)

Top Runner phase 2: Residential/Commercial Sector

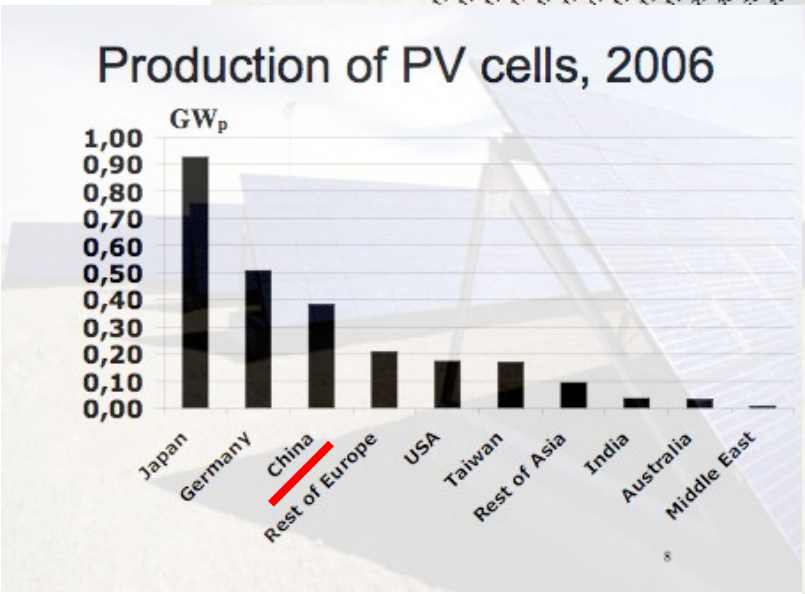
Equipment	*energy use efficiency improvement*
TV sets	25.7% (FY 1997 > FY 2003)
Video-cassette recorders	73.6% (FY 1997 > FY 2003)
Air conditioners *	67.8% (FY 1997 > FY 2004)
Electric refrigerators	55.2% (FY 1998 > FY 2004)
Electric freezers	29.6% (FY 1998 > FY 2004)
Gasoline passenger vehicles *	22.8% (FY 1995 > FY 2005)

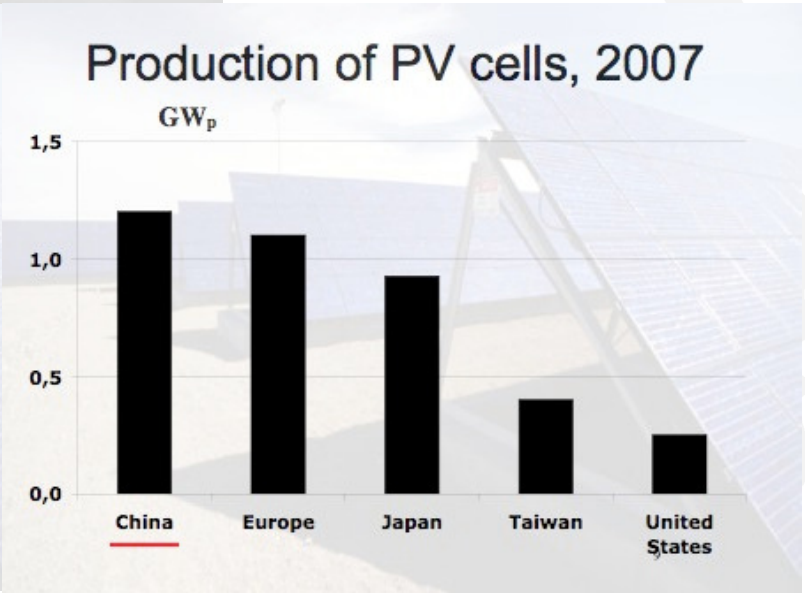
* The effects of reducing energy consumption are indicated as inverse numbers because COP or fuel economy (km/L) is used as an energy consumption efficiency index.

Major economy like China is using its comparative advantage to capitalise on the low carbon opportunities

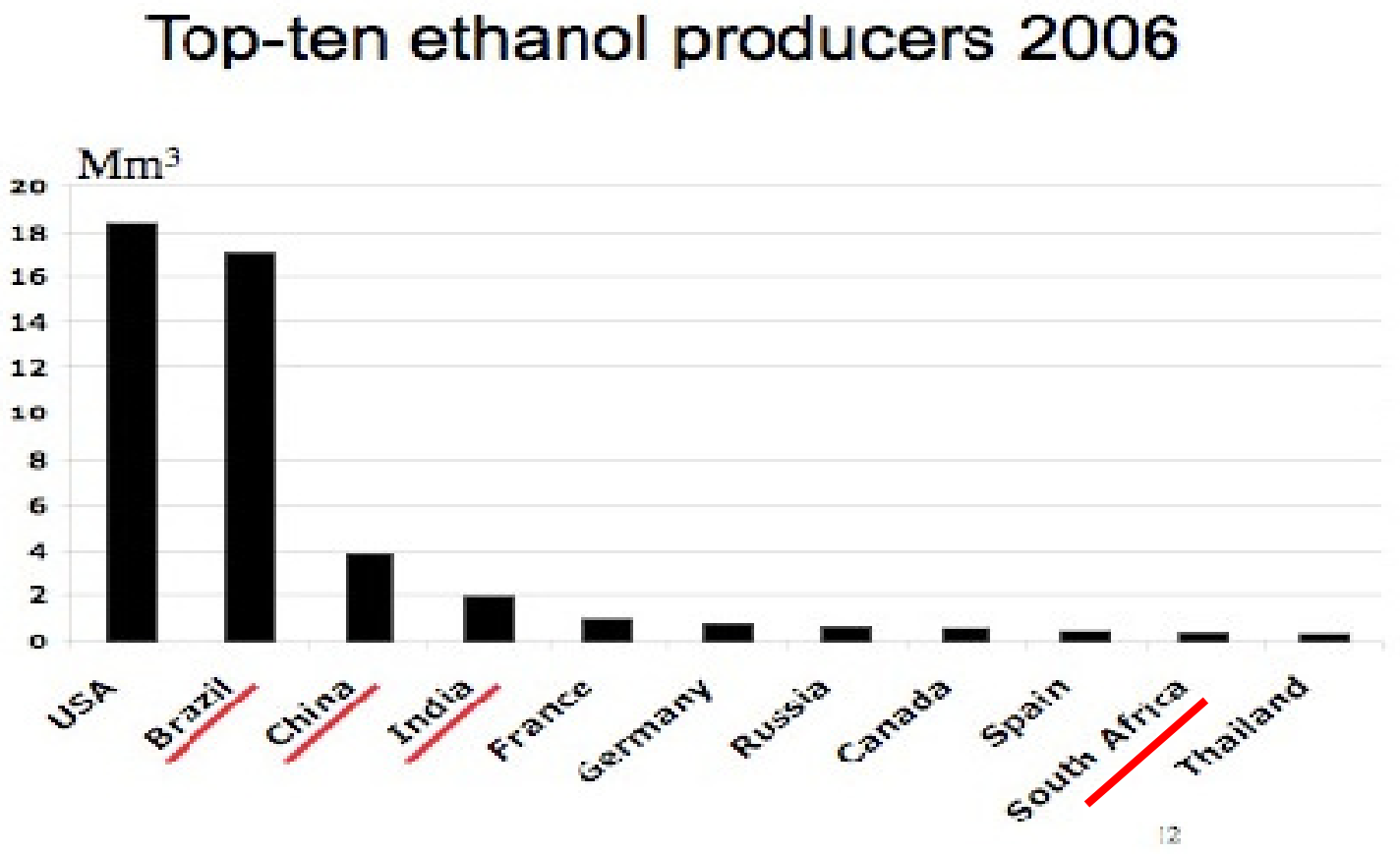


Source: Swedish Energy Agency, 2009



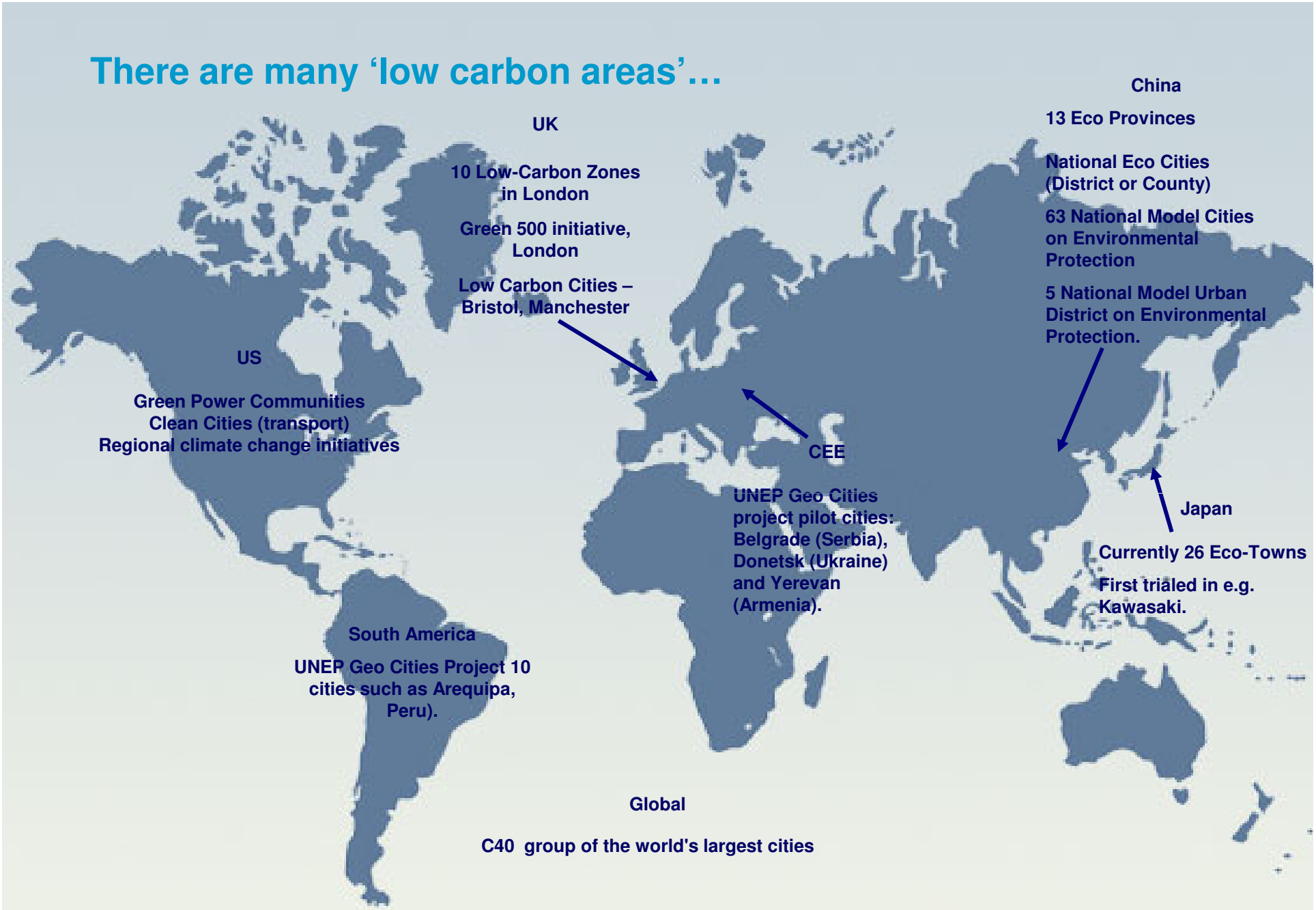


Similar major economies prowess in ethanol production



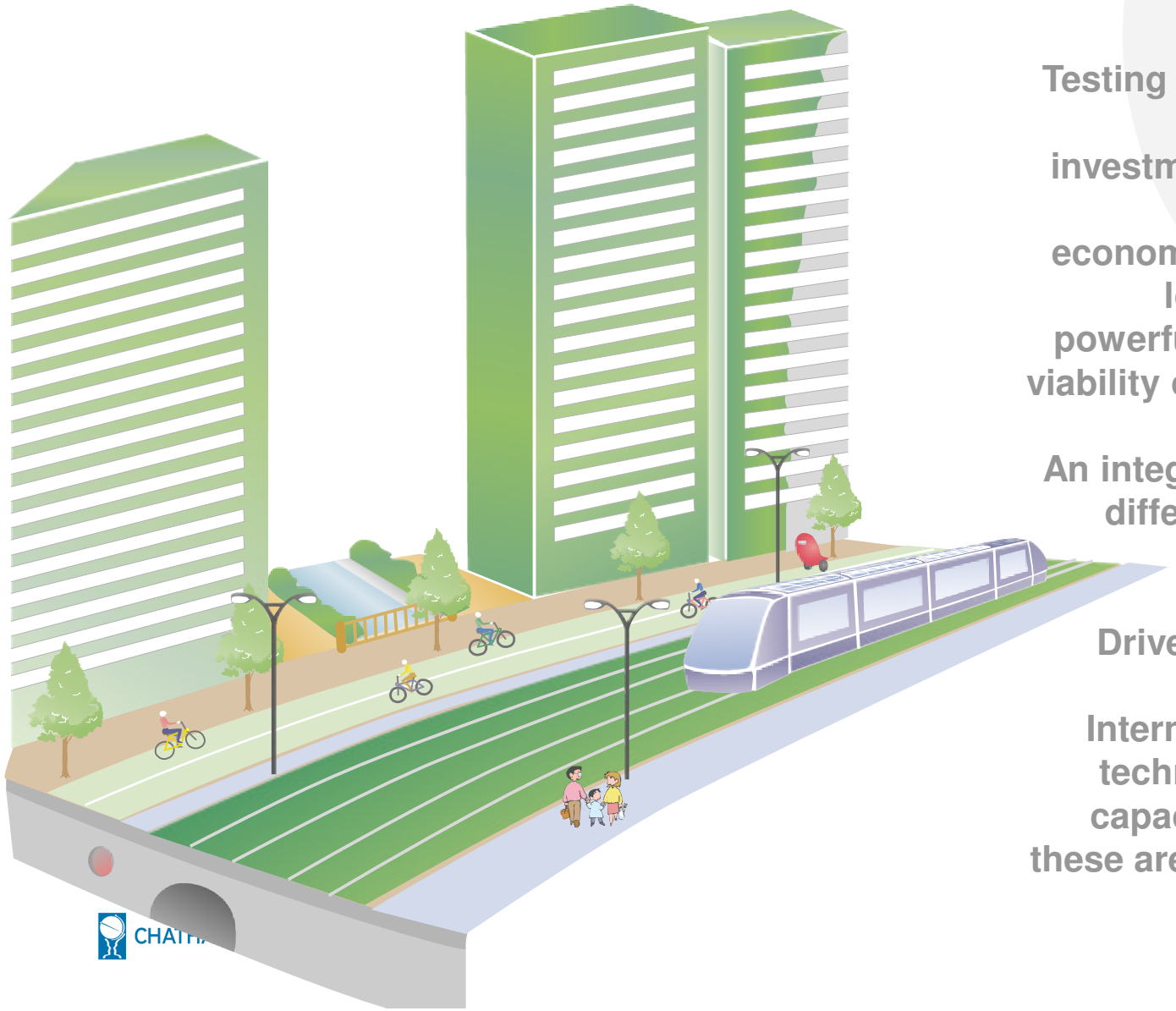
Source: Tomas Kaberger, 2009

There are many ‘low carbon areas’…



Will they drive economy-wide transition?

Piloting low carbon development models in major developing economies?



Large scale regions committed to rapid low carbon transformation

Testing grounds for regulatory, economics, trade and investment policies promoting the necessary scale of economic transformation for a low-carbon future and a powerful demonstration of the viability of low carbon economy

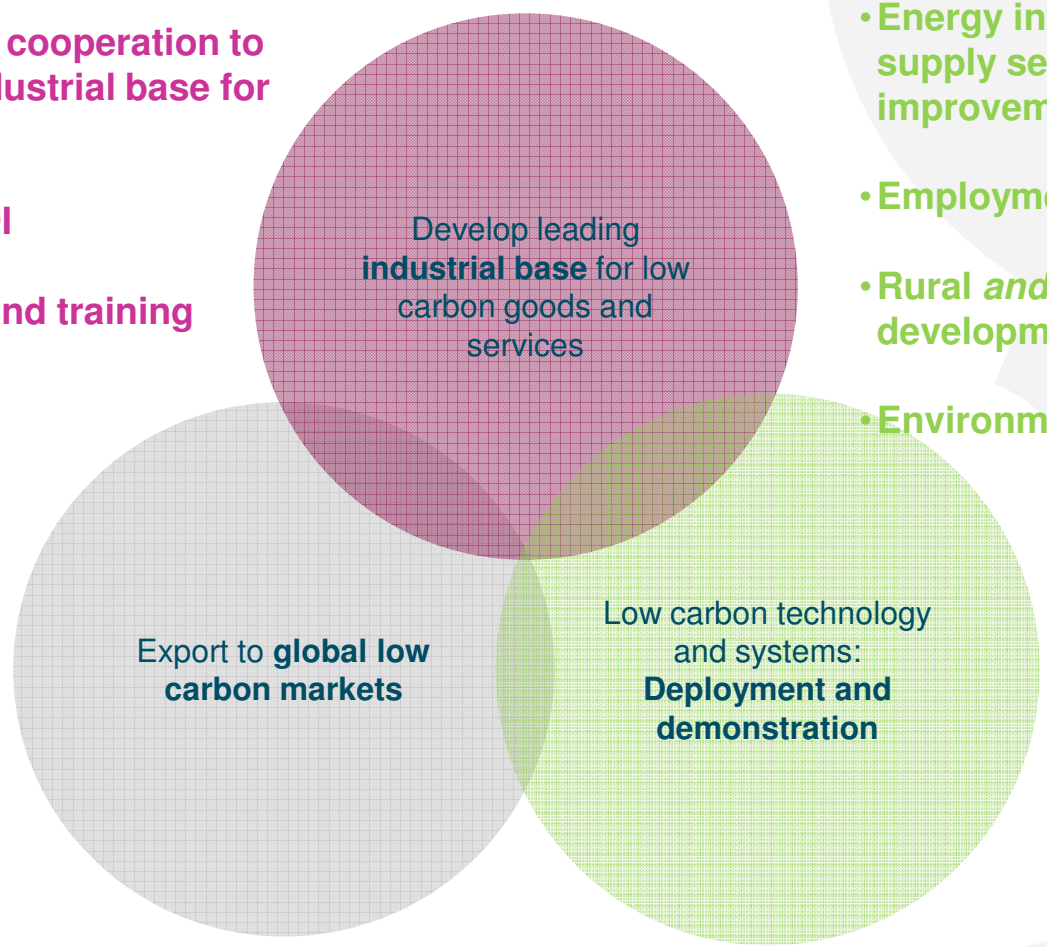
An integrated approach linking different sectors to achieve sustainable dev

Driven by strong leadership

International cooperation on technology, investment and capacity building focuses in these areas to maximise impact

Connecting low carbon transition with industrial development objectives in developing countries

- **Moving up the value chain**
- **Technology cooperation to upgrade industrial base for key sectors**
- **Promote FDI**
- **Education and training**



- **Energy intensity and supply security improvements**
- **Employment**
- **Rural *and* urban development**
- **Environmental quality**

- **Increase growth in selected low carbon exports sector**
- **Attract investors**
- **South-south trade**

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Source: Felix Preston, Chatham House, 2009

Conclusion: There is no Plan B.

- We need an agreement in Copenhagen to send unambiguous signals to the market.
- Demanding energy targets cannot be met by domestic action alone. Enhancing low carbon trade and investment could create virtuous cycles, stimulating further investment opportunities. But global trade politics remains negative.
- How to build trust, confidence and monitoring mechanisms that can withstand and respond to stresses and conflicts of interests?
- Increased finance to help drive low carbon transformation in emerging economies. Public support in developed countries for cooperation with major economies will depend on commitments to act e.g. pricing reforms; governance reforms; meeting efficiency targets. High standards of monitoring and conditionality will be needed to ensure effective use and stop corruption