

Renewable Energy Investment Trends

Jacob Dencik, IBM - Plant Location International

Seoul, May 2015



Objectives and Structure

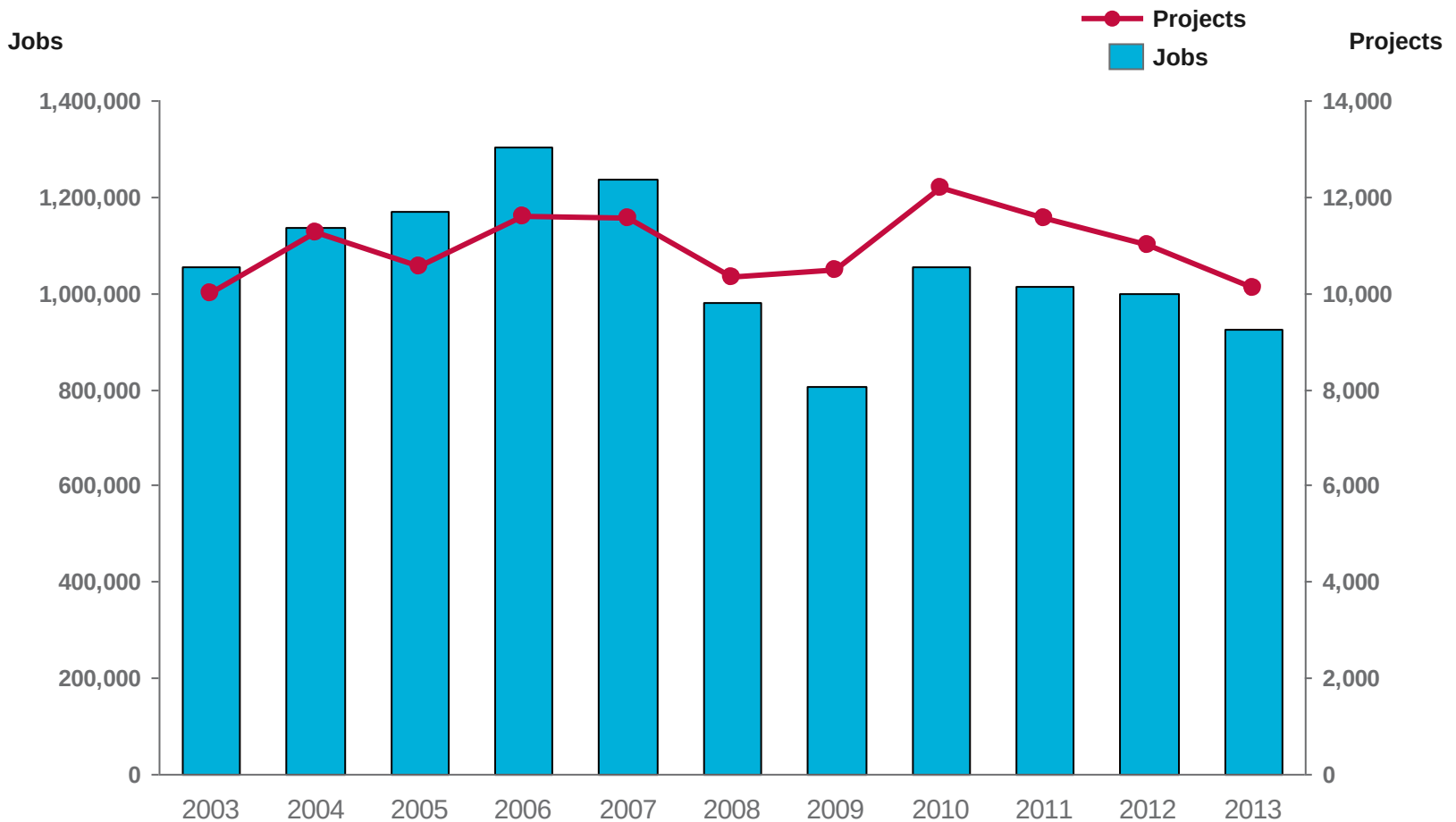
- Foreign direct investment in the renewable energy cluster
- Trends by sub-cluster
- Trends in Asia

Investment trends based on GILD

- IBM-PLI created a Global Investment Locations Database (GILD) in 2002 to produce reliable data on global trends in location decisions
- GILD monitors location decisions globally for new investment projects
 - Currently over 150,000 projects registered in 2003-2013
 - Focus on new 'greenfield' projects (where location choice was made)
 - Focus on announcement (decision moment)
 - Focus on new job creation



The initial post-crisis recovery in global foreign investment experienced in 2010 has not been sustained during 2011-2013.



Key trends

Manufacturing footprint reconfiguration

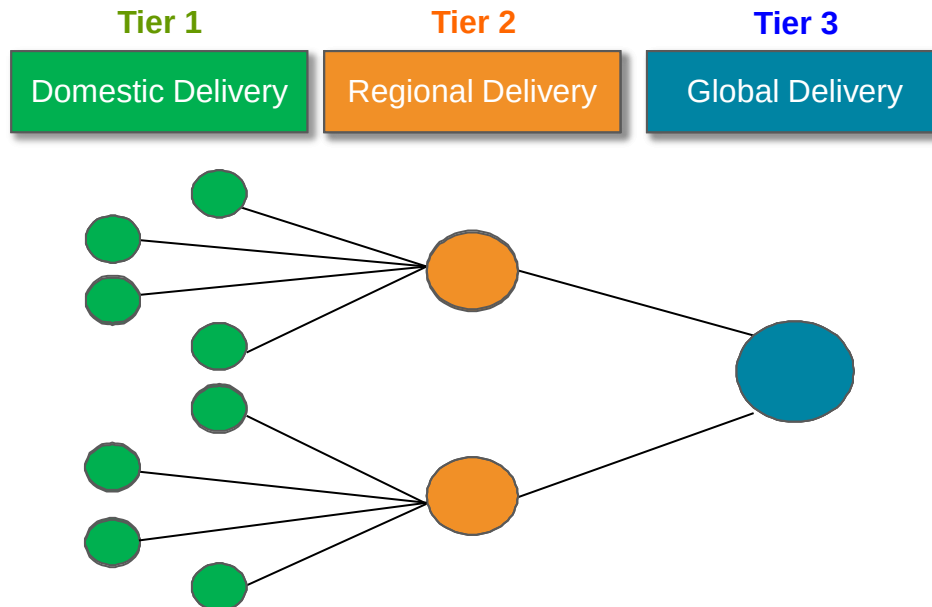
- Global manufacturing footprints are changing, as value propositions of manufacturing hotspots change (particularly China)
- Different strategic responses by companies:
 - Labor-intensive, cost sensitive operations: look to other export platforms (Thailand, Vietnam, Indonesia, ...)
 - Companies sensitive to transportation costs: look at near shore solutions
 - Companies with strategic interest in China: maintain production, but look at expansions inland or aim at productivity improvements
- Result: more complex global value chains
- Looking forward, new technologies (3D-printing, enhanced robotics, Internet of Things) enable more optimized supply chains and tailored cost-effective production closer to end-customers.



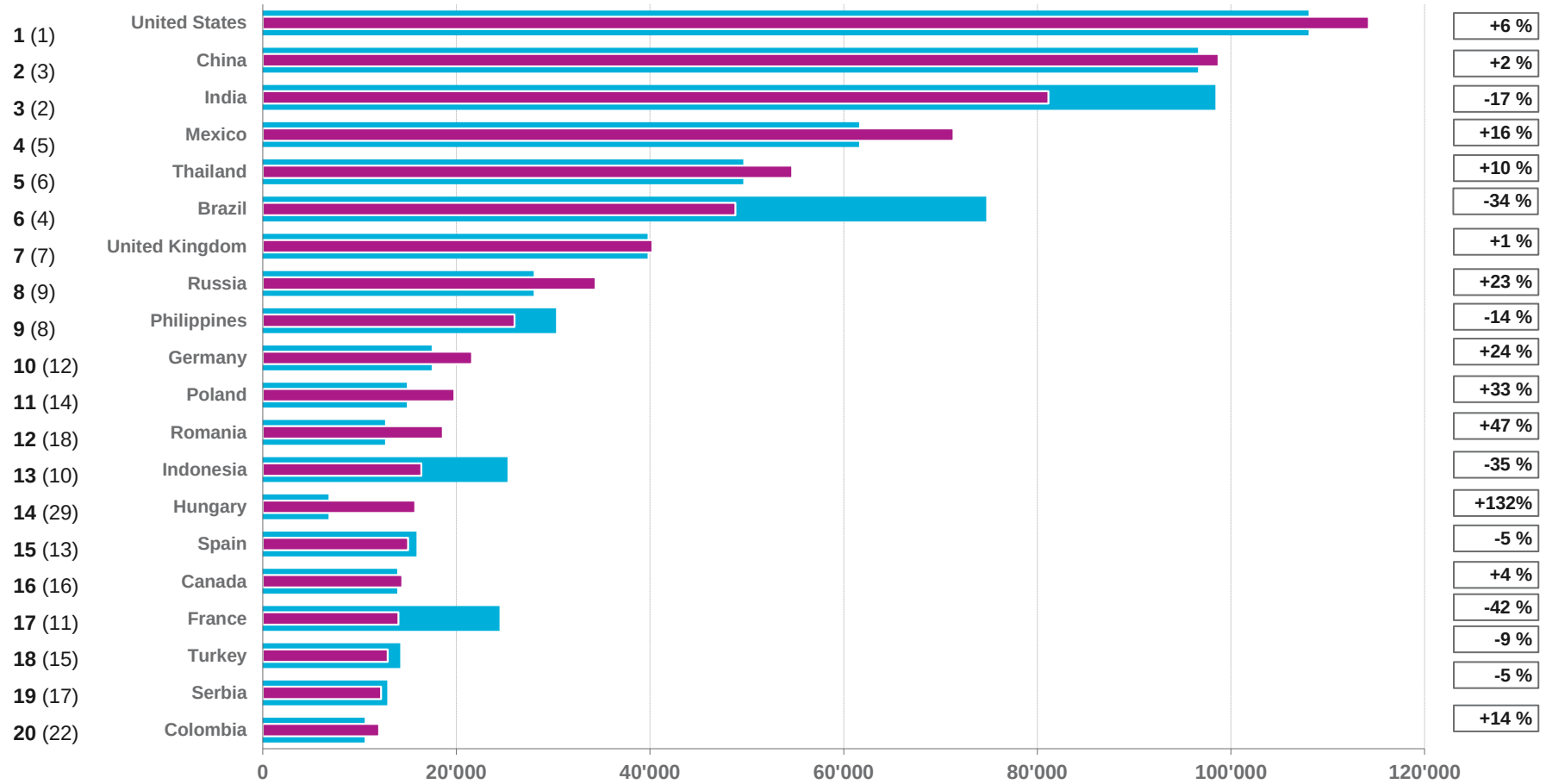
Key trends

Services delivery transformation

- A new approach to structuring services delivery capabilities (e.g. SSCs, BPOs):
 - Large IT and business services organisations are moving away from a pre-dominant focus on large global delivery centres in low-cost locations.
 - Companies are looking for a more geographically balanced delivery capability
 - Rise in regional and domestic delivery centres closer to customers in key markets
 - Fewer investments in large delivery centres, more smaller scale centres



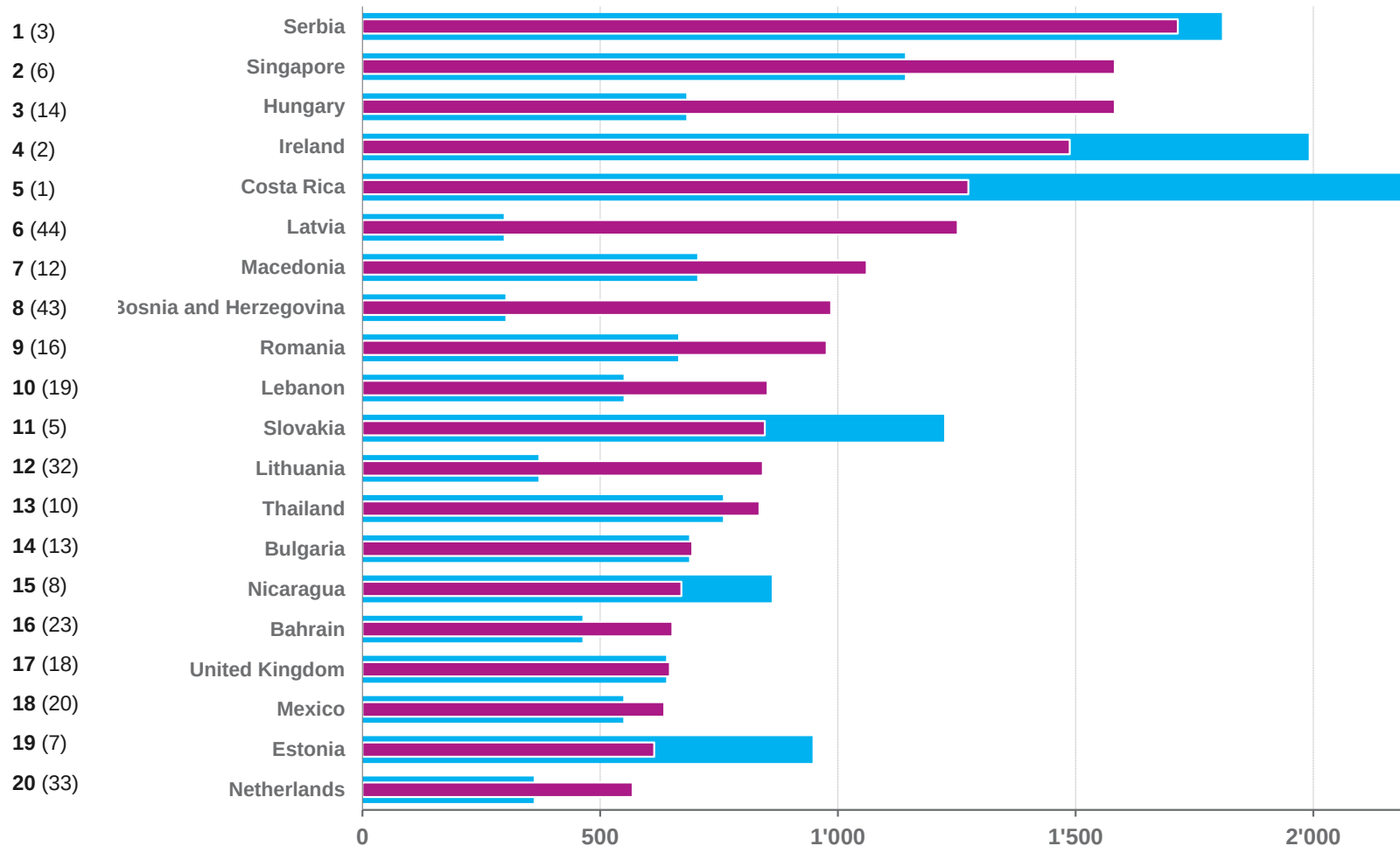
US is now top destination country. While India and China have been top destination countries for several years, both have experienced declines more recently, with other emerging and mature economies gaining ground.



Source: IBM- Global Location Trends report 2014



Different picture emerges when looking at jobs relative to population size. Serbia, Singapore and Hungary are top performers. Strong economic development efforts generate success.



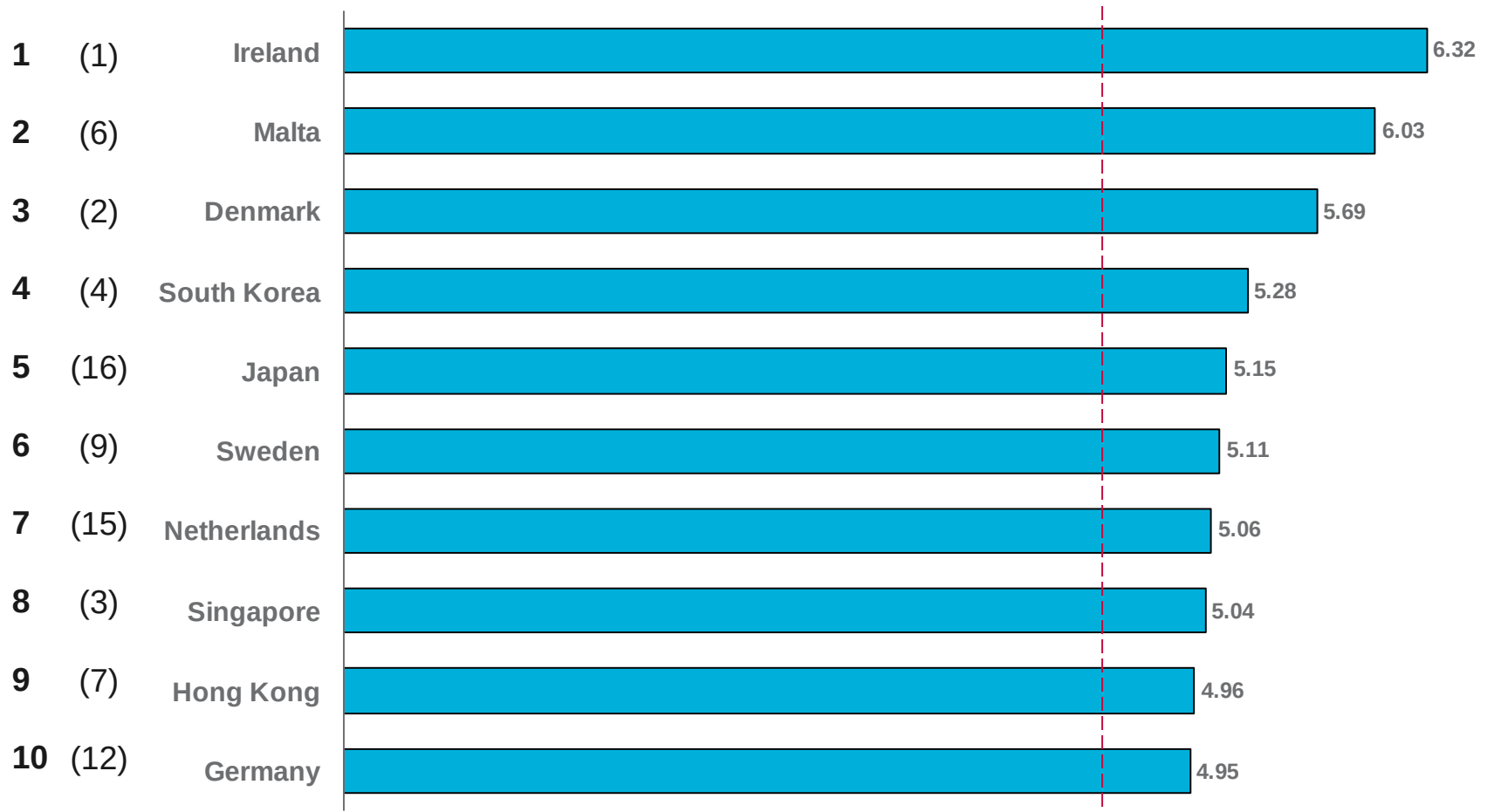
Note: Countries with less than 1 million population were excluded from the analysis

Source: IBM- Global Location Trends report 2014

■ 2012 ■ 2013



Ireland is the top destination country measured by average value of projects. Top 10 dominated by mature economies. South Korea is top destination country in Asia-Pacific, followed by Japan and Singapore.



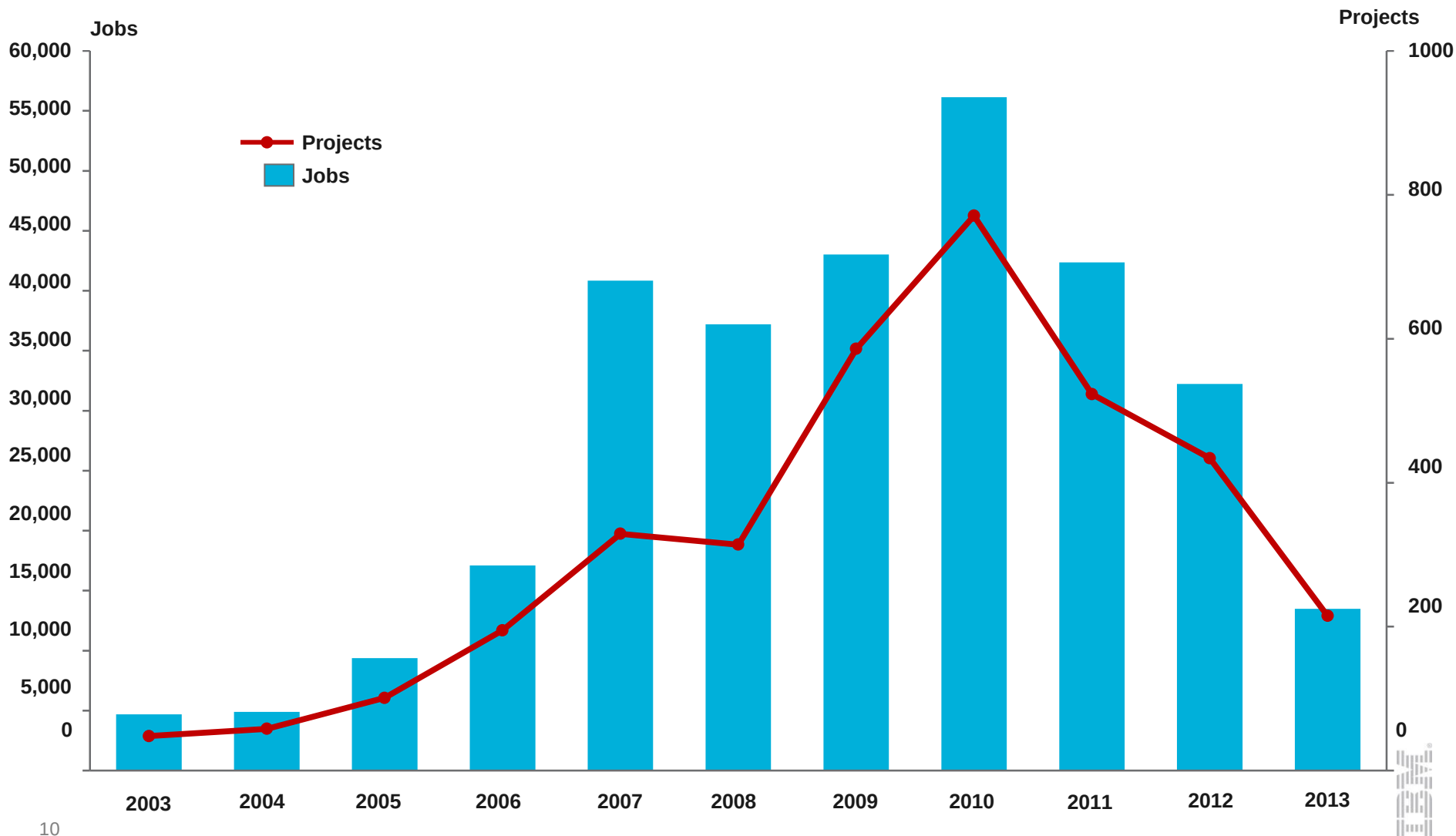
Note: Countries with less than 40 projects were not assessed because of sample size

Source: IBM- Global Location Trends report 2014

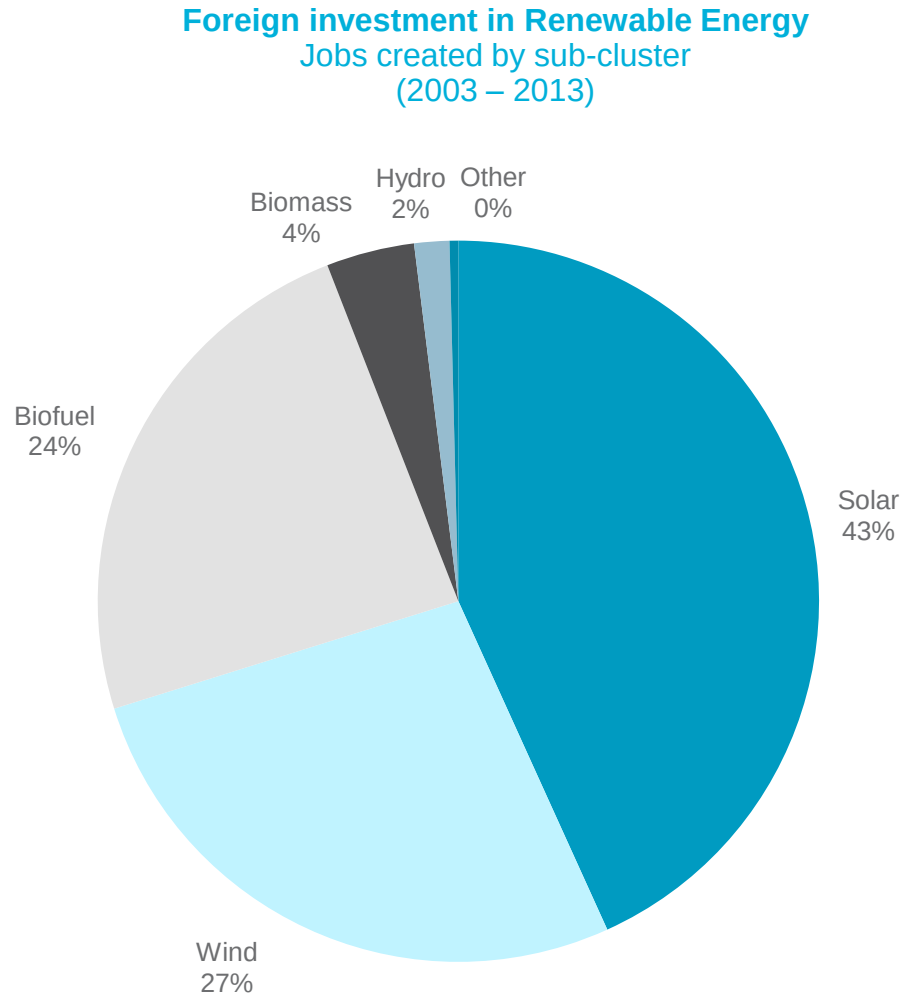
▲ World average
4.58



Foreign direct investment in renewable energy has seen a dramatic decline in the last couple of years after several years of strong growth, with particularly large falls in solar and wind energy investment.

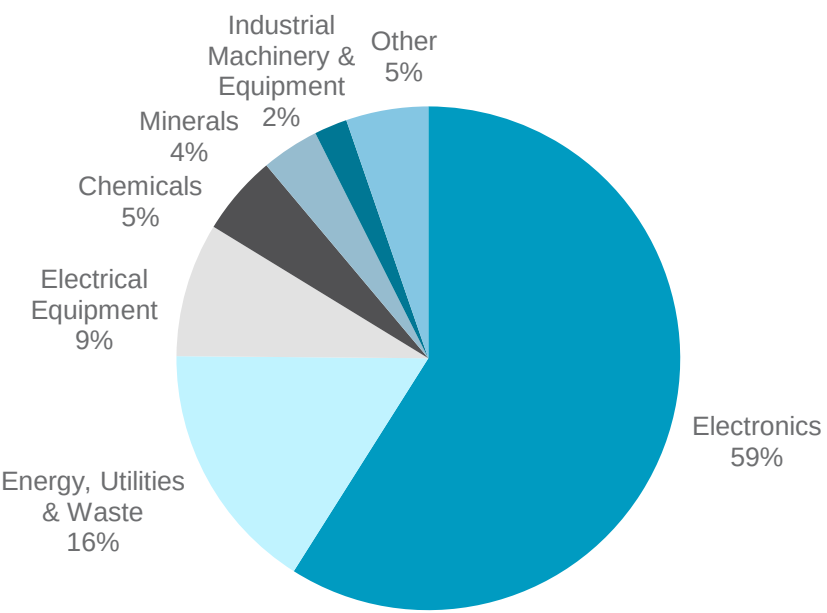


Solar is the most significant sub-cluster for foreign investment, followed by Wind and Biofuel. Other sub-sectors are still negligible sources of foreign investment.

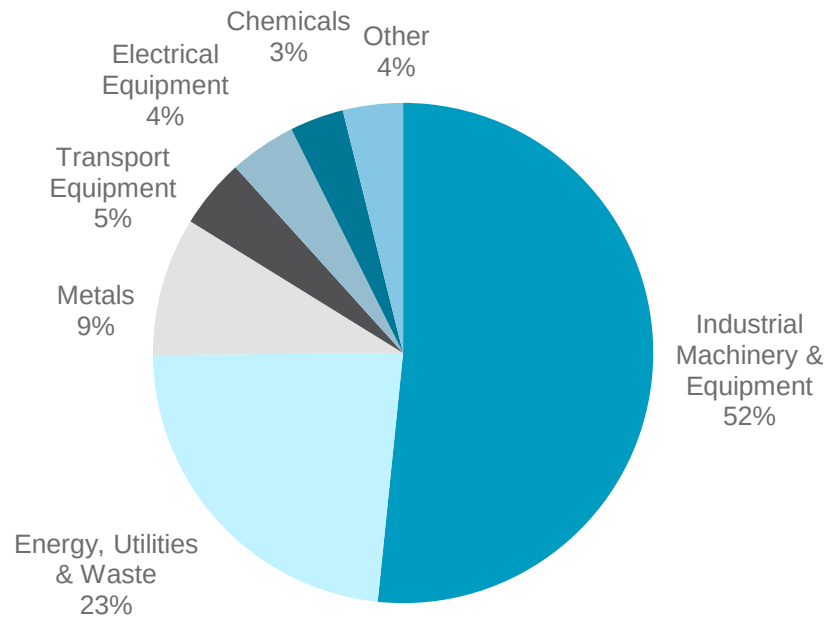


Foreign investment in Solar and Wind cuts across several sectors. Production activities dominate across all sub-clusters.

Foreign investment in Solar
Jobs created by sector
(2003 – 2013)

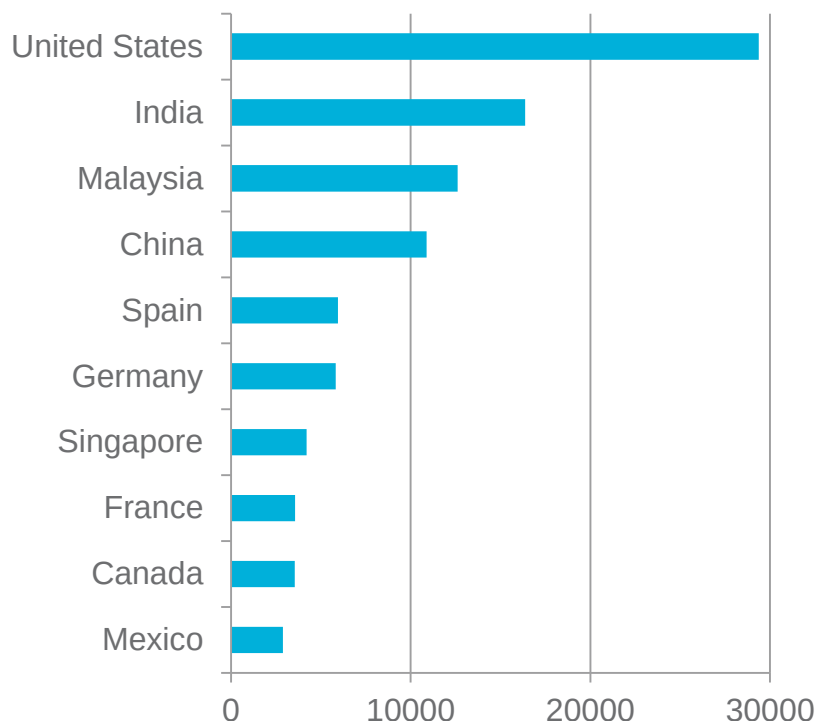


Foreign investment in wind
Jobs created by sector
(2003 – 2013)

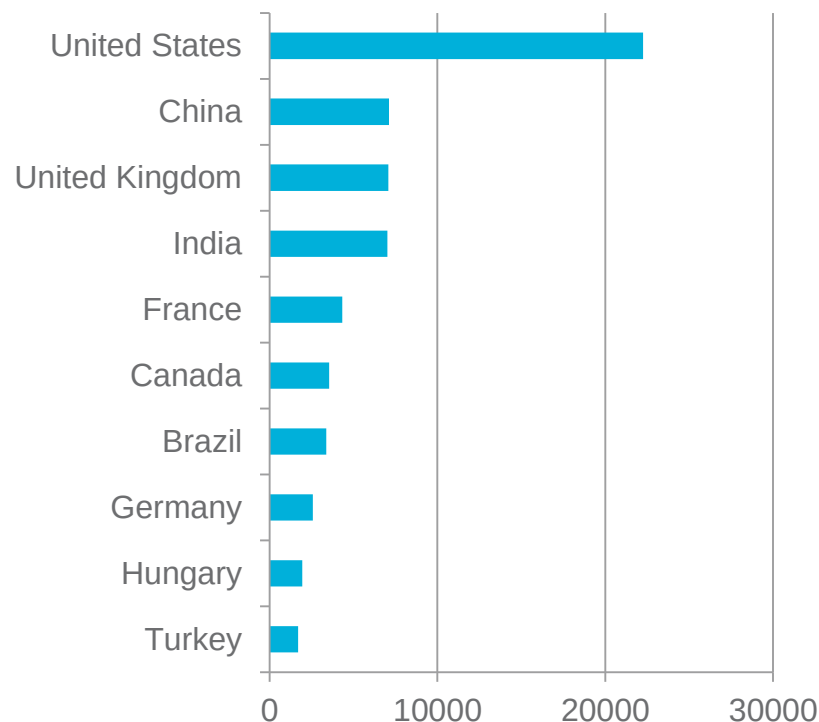


FDI in Solar and Wind go to key markets and is strongly influenced by government support. India and China are strongly positioned in both Solar and Wind, while Malaysia is among the top locations for Solar.

Top destination countries in Solar
Jobs created (2003 – 2013)



Top destination countries in Wind
Jobs created (2003 – 2013)



Changing dynamics in renewable energy

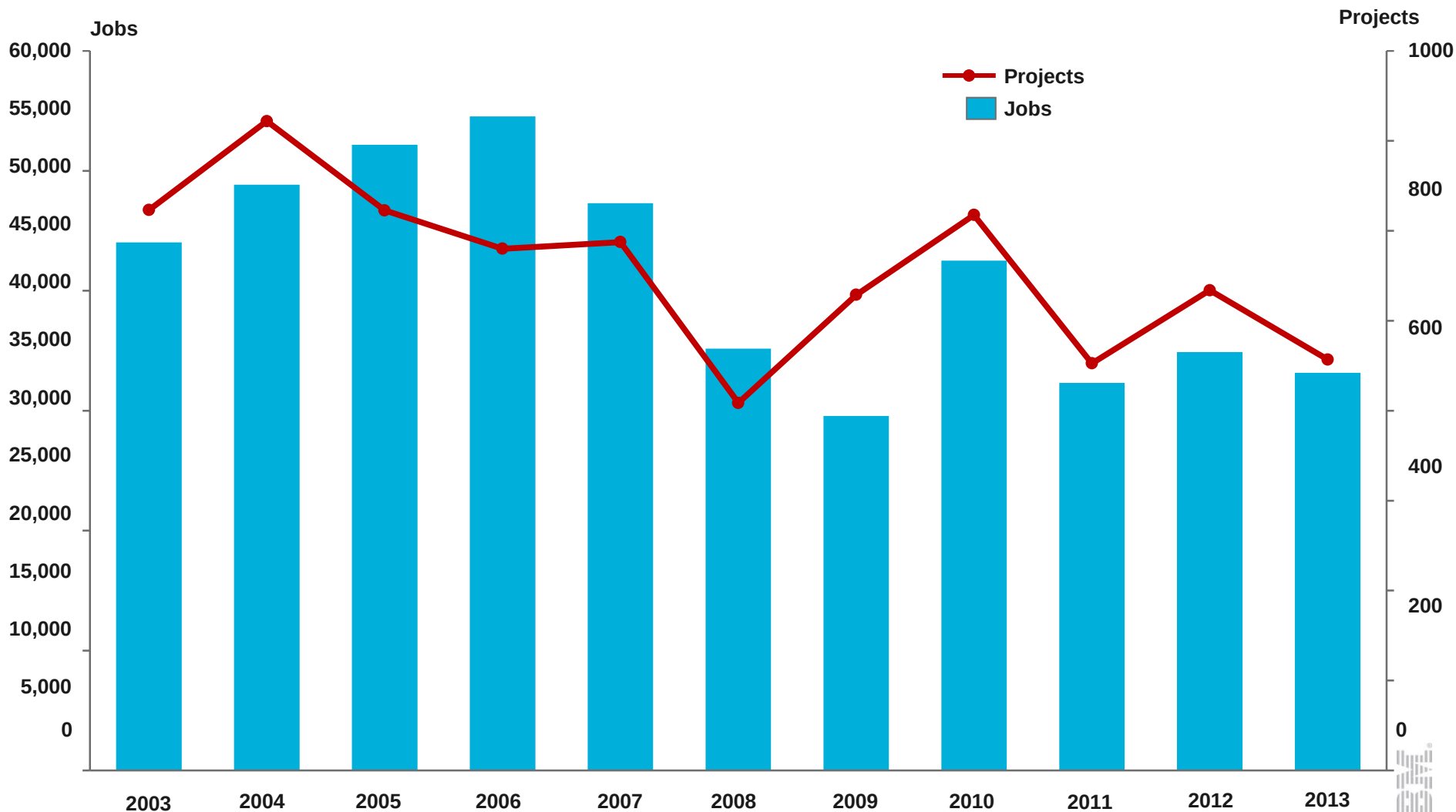
- Renewable energy investment is affected by many factors and uncertainties
 - Global economic growth and associated energy demand
 - Availability and cost of fossil fuels (e.g. low oil price and shale gas)
 - Environmental concerns and associated policy environment supporting renewable energy
 - Technological development and cost of renewable energy

- Solar
 - After years of strong growth, there is significant consolidation taking place in the sector
 - Earlier growth had been largely driven by government incentives and subsidies, which are now being reduced in major markets
 - The solar energy sub-cluster is currently struggling with overcapacity

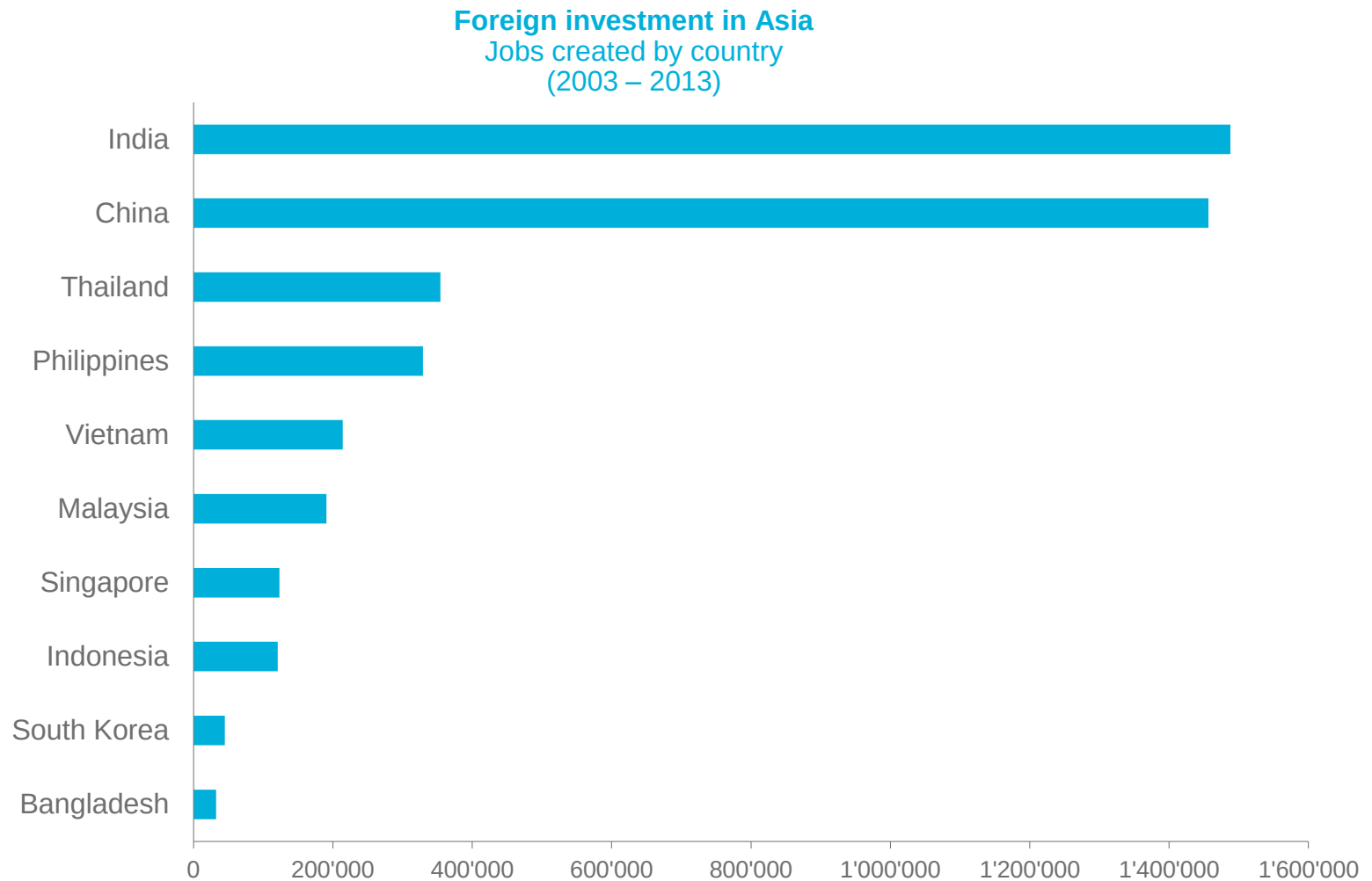
- Wind
 - Growth of investment in sector has been largely market driven, in part created by government policies (EU, US and China)
 - Uncertainty about economic outlook and policy support mechanisms in key markets has reduced investment



Foreign direct investment in Asia has been volatile, with investment levels remaining below pre-crisis levels.



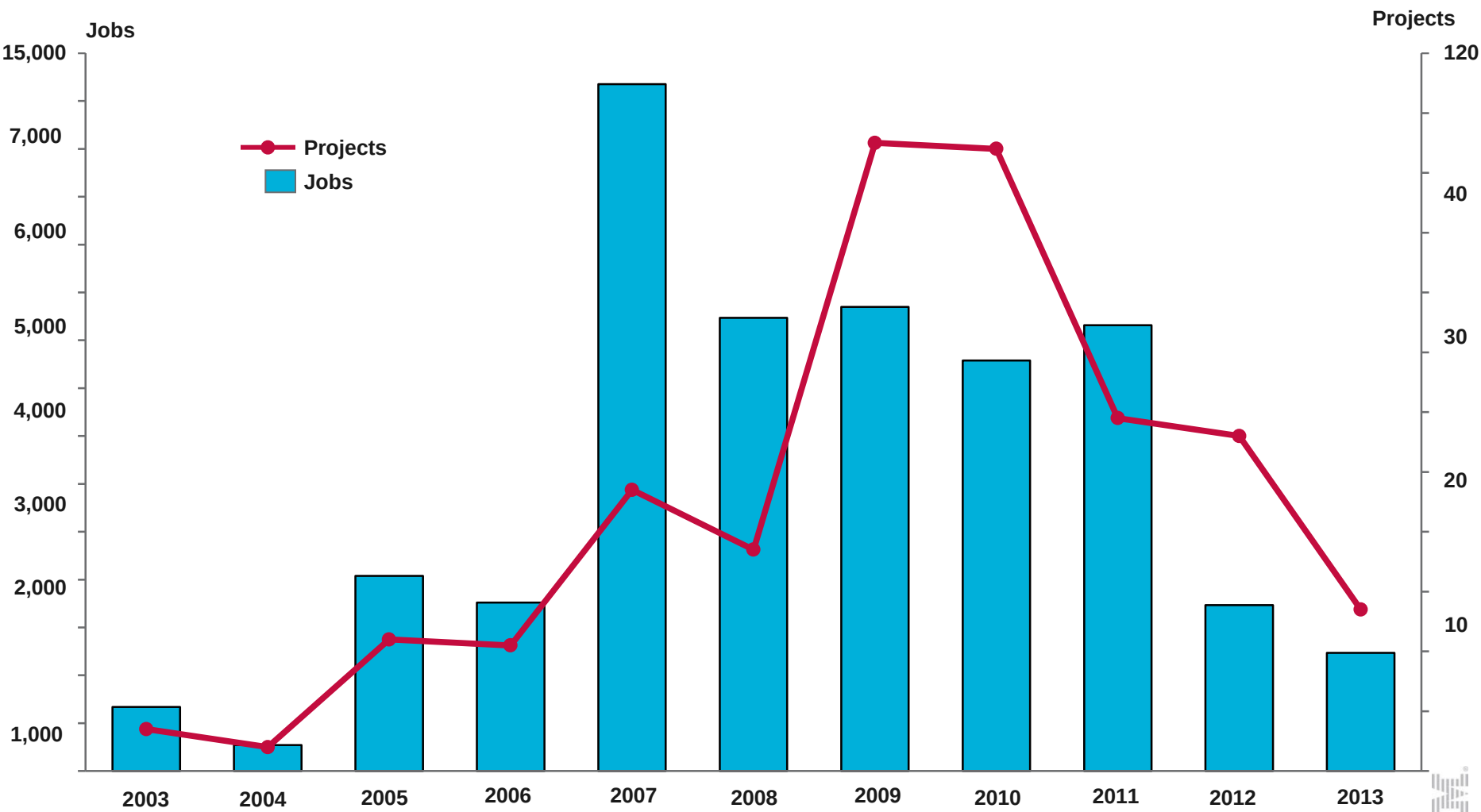
India and China are the top destination countries in Asia. Thailand, Philippines and Vietnam have received substantial investment in recent years. Relative to population size, Singapore is top performer.



Source: IBM-PLI GILD, 2013

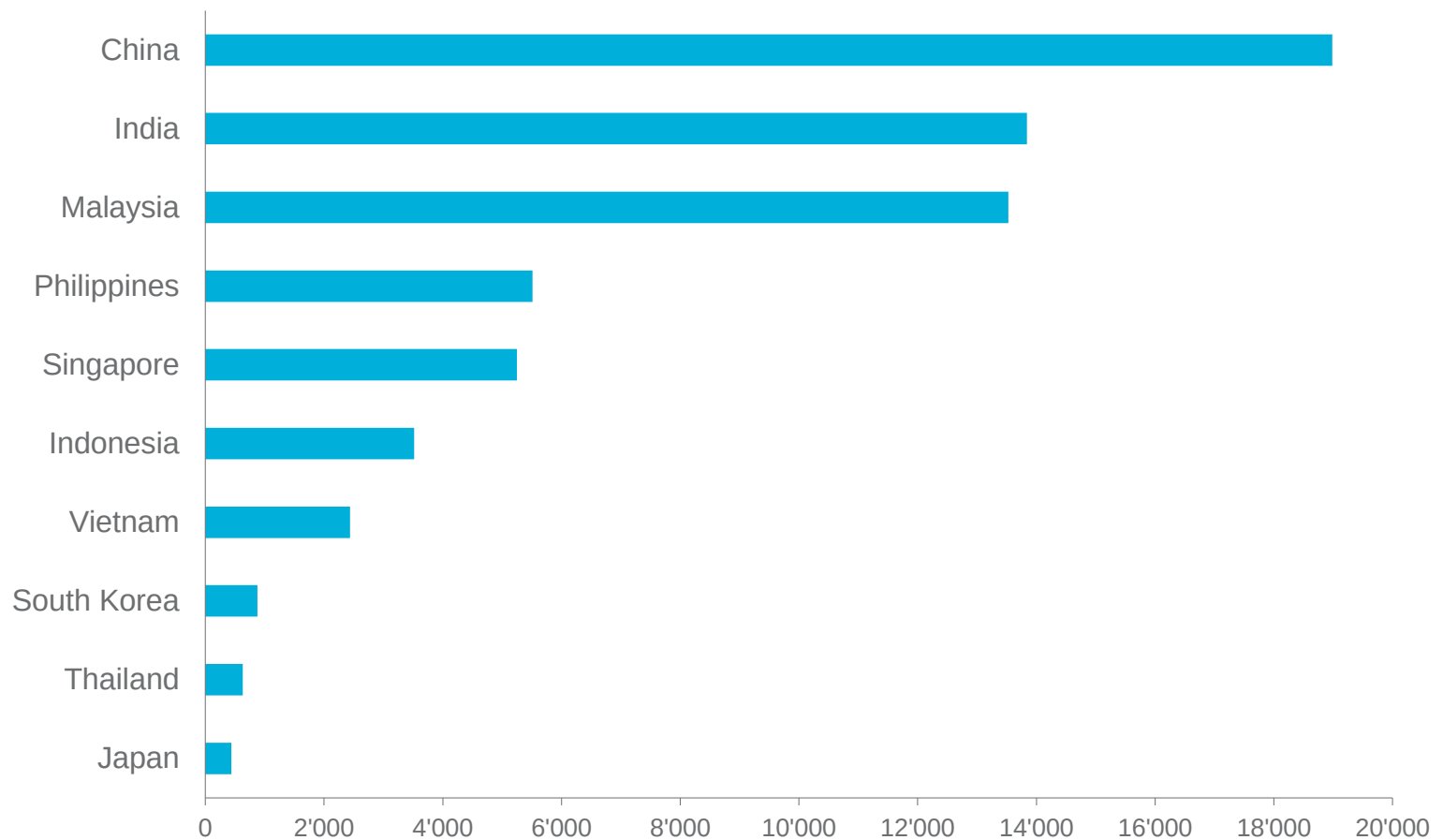


Foreign investment in Renewable Energy in Asia has been volatile and seen a dramatic decline in recent years.



Renewable energy investment in Asia is going to major markets (India and China), followed by Malaysia and the Philippines. Singapore is top performer relative to size. Note the low investment to Japan and South Korea.

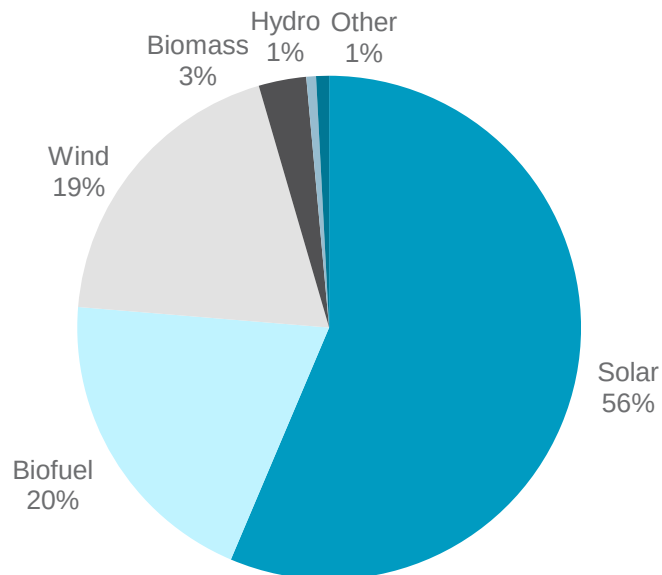
Top ranking destination countries in Asia by estimated jobs
2003-2013



In Asia, Solar is the leading renewable energy sub-cluster for foreign investment, with a sector focus on Electronics and Chemicals.

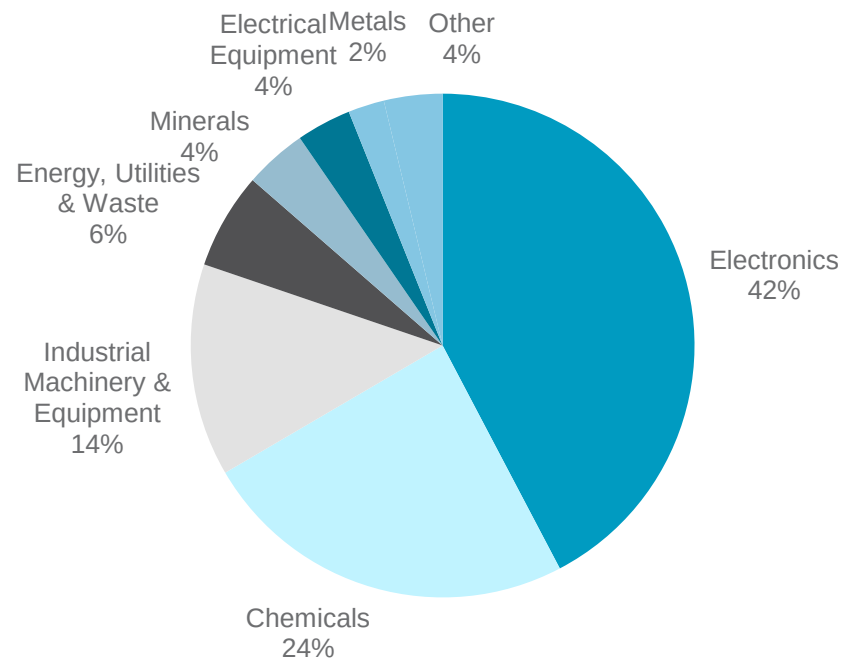
Renewable Energy FDI in Asia

Jobs created by sub-cluster
(2003 – 2013)



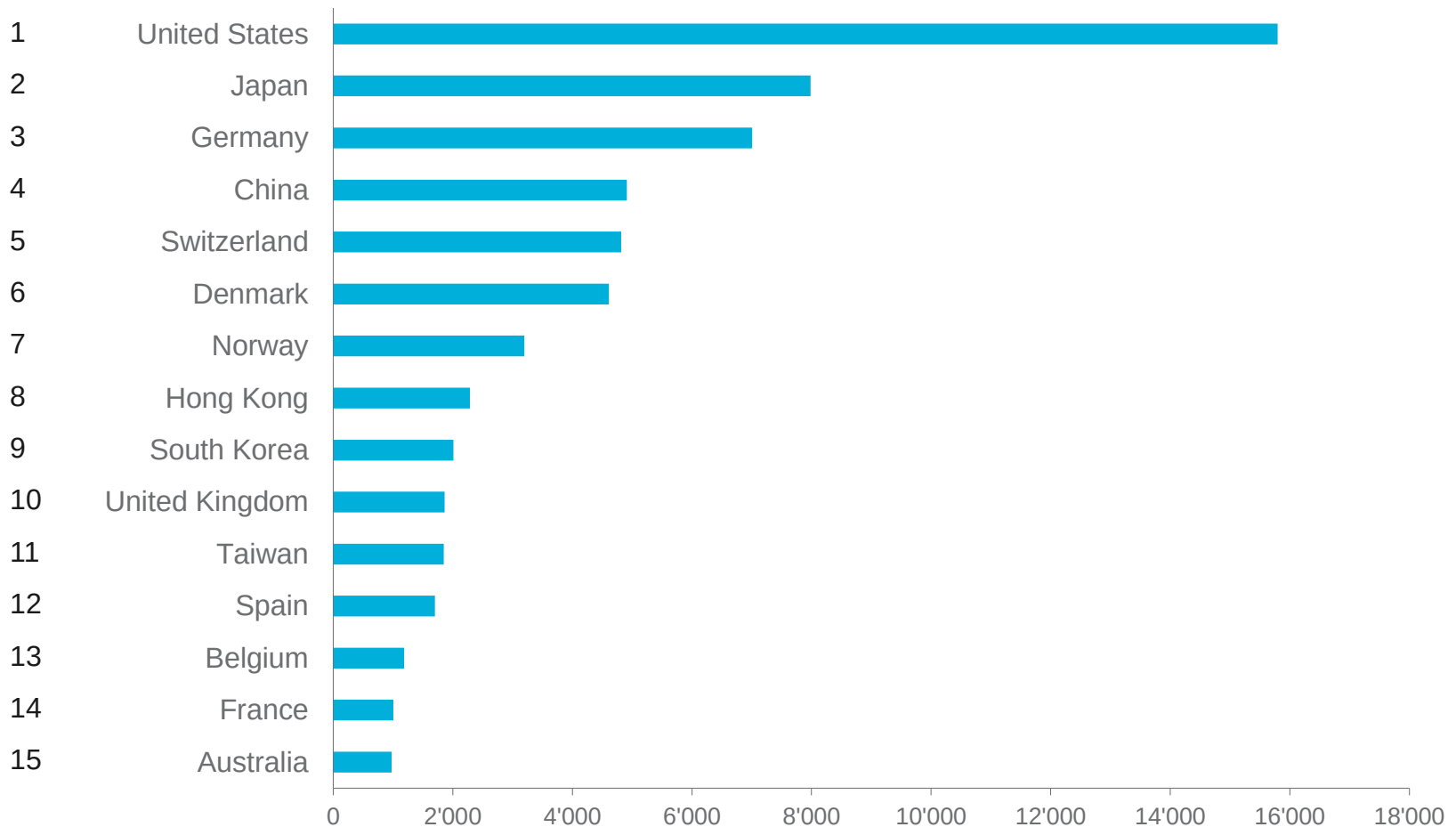
Renewable Energy FDI in Latin America

Jobs created by sector
(2003 – 2013)



The US is most dominant source of foreign renewable energy investment. Intra-regional investment also important. Note that domestic investment in countries like India and China is very substantial.

Top ranking origin countries in Asia by estimated jobs
2003-2013



Creating the right conditions for renewable energy investment – the case of Malaysia



Malaysia has a large potential for renewable energy, and is increasingly tapping into this for foreign investment:

- Large natural potential for renewables, notably biofuel and solar.
- Moving towards the right policy environment, with e.g. ambitious green house gas emission reduction target of 40% by 2020 (compared to 2005 levels) and introduction of Feed-in-Tariff to encourage take up of solar.
- Establishment of the Sustainable Energy Development Authority, with a mandate to promote the national policy objectives for renewable energy, promote investment in the sector and advising the Government on sustainable energy.
- Attractive business environment for foreign investors, with strong value propositions in key segments.
- Has received substantial investment in solar, notably from US, Japan, Germany and China.



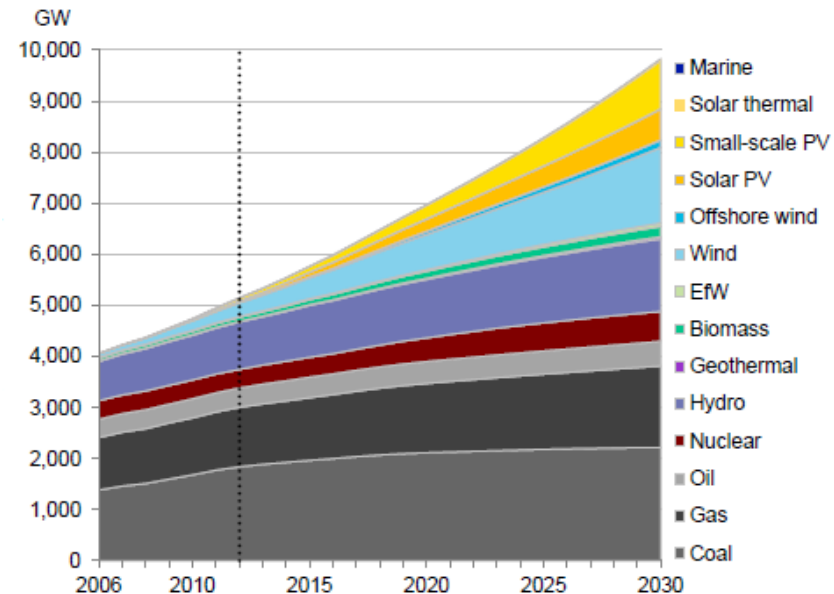
Renewable energy: summary of FDI potential

- 2 % of total foreign investment worldwide, and focused on three dominant clusters:
 - Solar component manufacturing
 - Wind component manufacturing
 - Bio-fuel production

- FDI potential:
 - Short term: uncertain short-term outlook for all sectors. Solar struggling with overcapacity, wind and bio-fuel affected by political commitment.
 - Long term: high for all (particularly solar + wind); both sectors expected to see considerable long-term growth.

- Key drivers for investment and location selection:
 - Cost effectiveness
 - Governmental regulations,
 - Access to markets,
 - Access to raw materials

- Investment in Renewable Energy is more contestable than traditional energy sectors



“By 2030 renewables will account for 50% of installed power generating capacity”, Bloomberg New Energy Finance, 2013

Beyond Renewable energy: New Opportunities

- A number of new/growing sub-sectors and niche areas linked to renewable energy are emerging, offering opportunities for foreign investment:
- **Smart Grids** – R&D, IT and manufacturing projects for utility networks, with companies such as ABB, Siemens, IBM
- **Energy efficiency and management (Smarter Buildings)** – R&D and manufacturing facilities focusing on energy efficiency technologies, devices and material to be applied in energy management systems and/or energy efficiency solutions. Companies include GE, Siemens, ABB, IBM, Honeywell, Saint Gobain, Johnson Controls.
- **Carbon Capture and Clean Coal** – R&D and manufacturing operations focusing on the development, demonstration and implementation of clean coal and carbon capture & storage technologies. Companies include Bechtel, Calera, Babcock, GE, Dow Chemical, BASF and Linde
- **Clean mobility** – R&D and manufacturing projects linked to the development and production of low carbon vehicles, e.g. hybrid/electric cars and fuel cell technologies. Companies include Toyota, Tata, Nissan, Renault and Ford.
- **Environmental/Engineering Consulting and Services** – business services supporting transition to green economy and low carbon energy, with companies such as Veolia, Bechtel, Atkins etc.



Beyond Renewable energy: New Opportunities

- FDI levels in these sub-sectors are currently more limited than in renewable energy, but are expected to grow substantially in the future.
- Each of these niche areas have different location requirements than renewable energy and offer substantial opportunities for a wide variety of locations. For example,
 - Clean mobility is linked to the transport equipment sector and advanced manufacturing, and investment goes to key transport equipment locations in e.g. UK, Germany, Belgium, China and India.
 - Environmental/Engineering consulting services is highly market driven and linked to the wider business/professional services industry and investment tends to go large urban locations, such as London, Singapore, Shanghai and New York.





Plant Location International (PLI)

Global Location Strategies

A service of IBM Global Business Services

Web-site: www.ibm.com/gbs/pli

Jacob DENCİK

Senior Manager

+32 473 23 09 23

Jacob.Dencik@be.ibm.com