

Financing Energy Infrastructure Projects

Engineers Ireland

28 October 2015



Building a better
working world

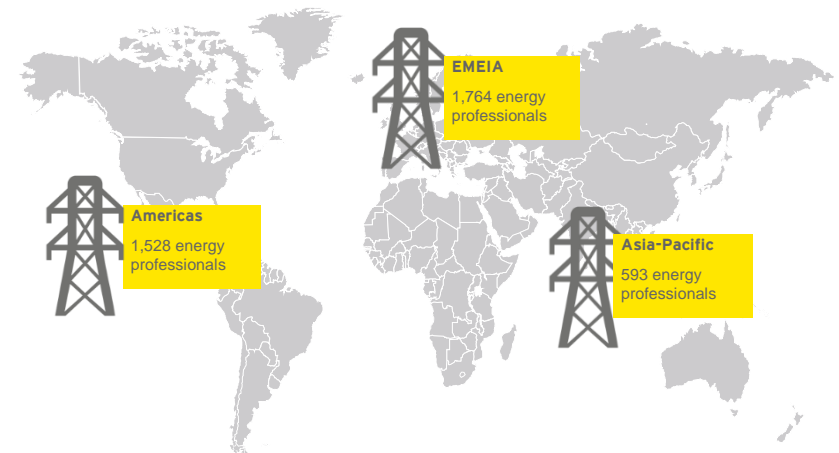
EY: global corporate finance advisory services to the Power & Utilities sector

- ▶ Dedicated global Power & Utilities corporate finance team, with over 60 sector specialists dedicated to providing international corporate development, transaction management, transaction execution and corporate finance services to the energy, waste and water sectors.
- ▶ This team is one of the largest dedicated corporate finance advisory teams in the Power & Utilities sector in the world, having helped close more than 27 debt and equity transactions worth over US\$11Bn in the last two years alone.
- ▶ EY is able to leverage its network of over 3,500 energy specialists in more than 60 countries around the world, seamlessly integrating transaction services and capabilities if and when necessary – corporate finance, due diligence, tax, valuations, accounting, modelling, forensics, integration, regulatory affairs
- ▶ Our integrated transaction, advisory, tax and accounting services span the entire energy lifecycle, including development, generation, transmission and asset management
- ▶ We have a long-track record in the renewable energy sector, being one of the leading advisors in the sector and having led numerous onshore and offshore wind, solar and bioenergy transactions across the world over the past decade.

Cradle-to-grave transaction capabilities

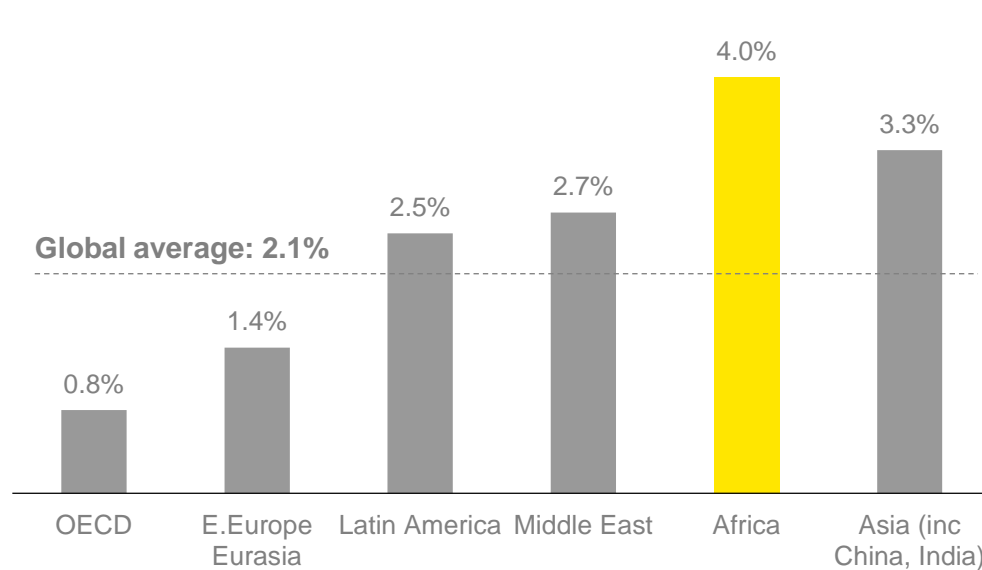
Our corporate finance services include:

- ▶ Corporate strategy support and execution
- ▶ M&A origination, execution and transaction support
- ▶ Primary and secondary financing (asset and corporate)
- ▶ Government advisory and infrastructure procurement programs
- ▶ Market reform and unbundling
- ▶ Integration and operations
- ▶ Financial, commercial and operational due diligence
- ▶ Tax due diligence and structuring
- ▶ Ratings and debt advisory
- ▶ Valuations and business modelling
- ▶ Performance improvement and risk management
- ▶ Climate change and sustainability services
- ▶ Accounting compliance and reporting



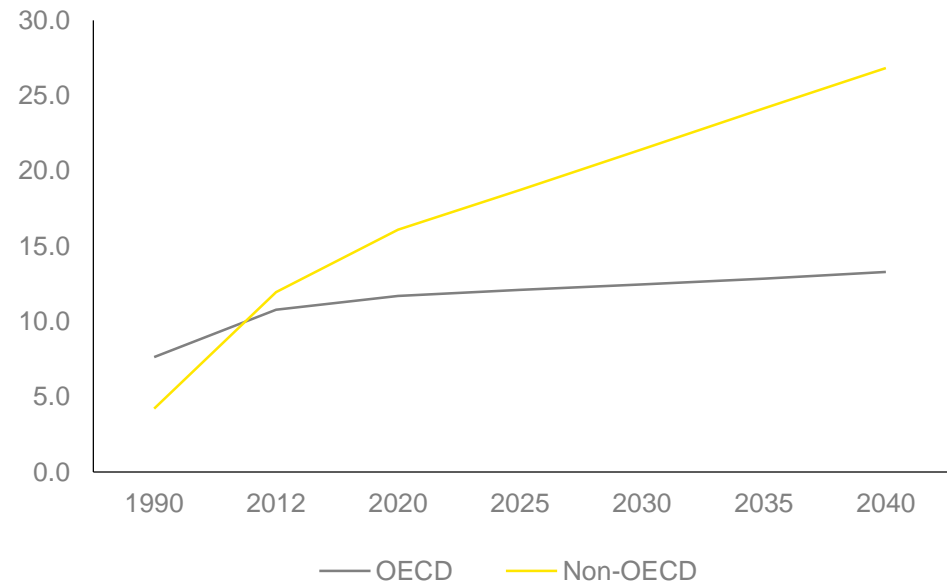
Global demand for electricity is expected to increase at 2.1% CAGR through 2040 with most growth coming from emerging markets

Growth in electricity demand by region, 2012–40 (CAGR)



Source: World Energy Outlook (WEO) 2014

Electricity generation in OECD and non-OECD countries



Source: WEO 2014

- ▶ World electricity demand is expected to increase by more than 75% over the period 2012–40, growing at an average rate of 2.1% per year.
- ▶ The most dramatic growth in demand will come from Africa (4% CAGR).
- ▶ Asia, led by China and India, is also expected to experience dramatic growth in electricity demand of 3.3% CAGR through 2040.

Meeting this demand will require enormous infrastructure investment of more than US\$23t in power and gas alone

Investment in supply infrastructure, 2014–40 (2013 US\$b)

| | Total power plant | Total power T&D | Total gas T&D* | Total |
|-------------------|-------------------|-----------------|----------------|---------------|
| Europe | 2,109 | 970 | 303 | 3,382 |
| E.Europe/Eurasia | 835 | 526 | 417 | 1,778 |
| Middle East | 479 | 273 | 241 | 993 |
| India | 1,227 | 788 | 70 | 2,085 |
| Africa | 776 | 848 | 241 | 1,865 |
| Asia-Pacific | 4,180 | 3,536 | 588 | 8,304 |
| OECD Americas | 1,952 | 1,215 | 586 | 3,753 |
| Non-OECD Americas | 593 | 530 | 93 | 1,216 |
| World | 12,151 | 8,686 | 2,539 | 23,375 |

* Gas T&D values are for the period 2014-35 in 2012 US\$b
Sources: IEA, WEO 2014; World Energy Investment Outlook 2014

Drivers of capex

Replacement cycle

- ▶ Aging power stations
- ▶ High expenditure on asset replacement

Environmental targets

- ▶ Government-imposed environmental targets imply massive spend

Demand growth

- ▶ Power demand to grow especially in emerging markets

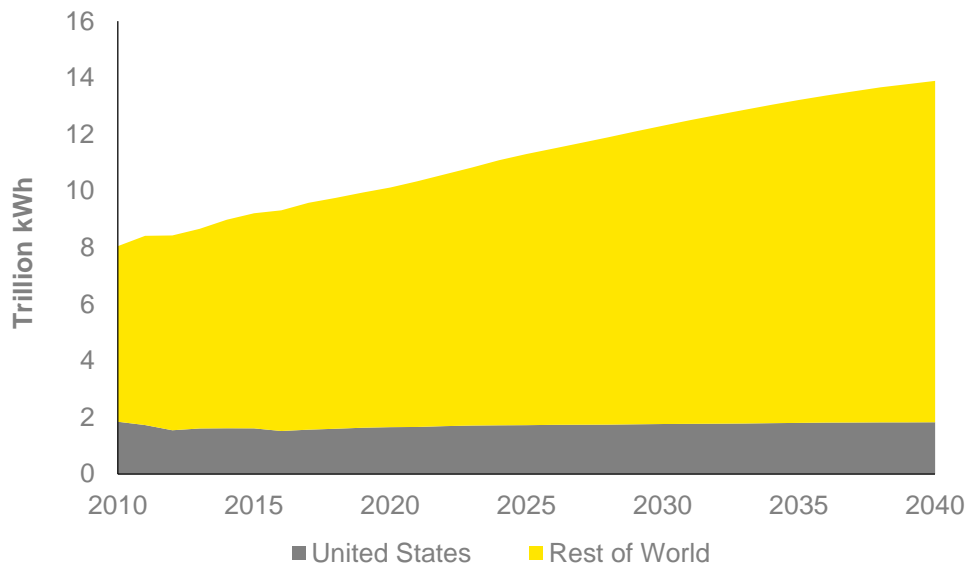
More than US\$23.3t globally in power and gas

In addition, the OECD estimates that **more than US\$1t per annum** needs to be invested globally just to replace and maintain water infrastructure.

Coal-fired generation is expected to continue to account for a significant share of global electricity supply

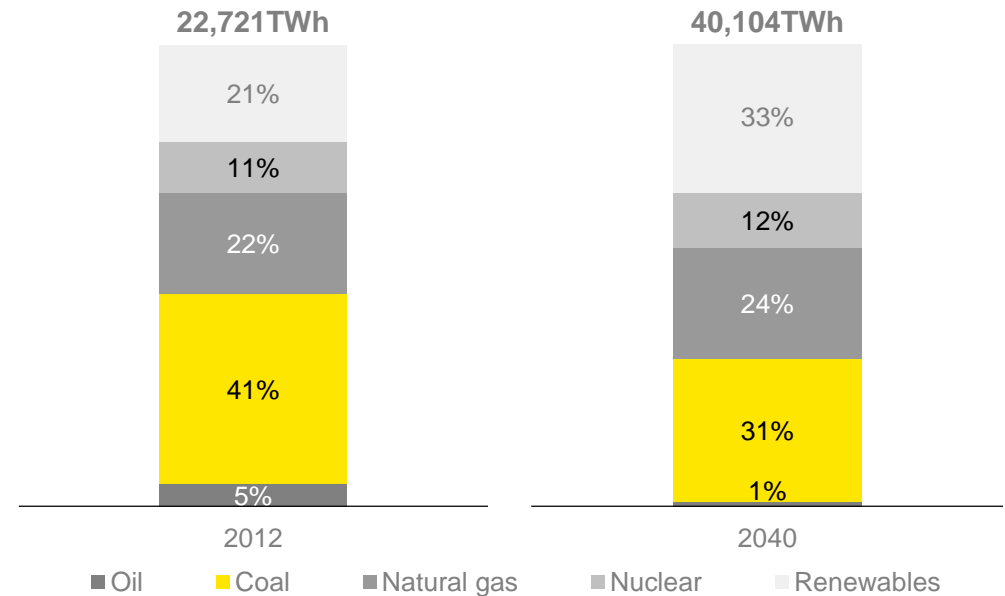
Global coal-fired electricity generation is expected to grow from 9.2TWh in 2012 to 12.2TWh in 2040, representing a CAGR of 1.02%.

Coal-fired electricity generation



Source: US Energy Information Administration International Energy Outlook 2013 Reference

Global electricity generation by source



Source: IEA WEO 2014

- ▶ Coal will still be a dominant fuel source for power generation in 2040, accounting for more than 31% of global generation, but there will be a massive decline from its 40%-plus share today.
- ▶ Natural gas-fired generation is expected to maintain its 22%-24% share of global generation, which will still imply a huge expansion in natural gas absolute volumes.
- ▶ The real global growth story of course is renewables, which are expected to overtake coal as the primary source of power generation by 2040.

The carbon bubble: implications for energy companies, investors, consumers and entire economies?

The Carbon Brief

Globally



52% of natural gas reserves

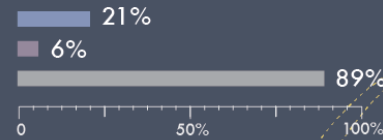


35% of oil reserves

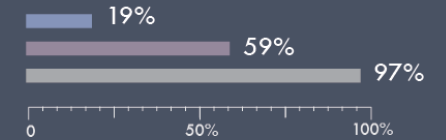


88% of coal reserves

Europe

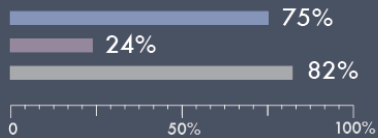


Former Soviet Union countries

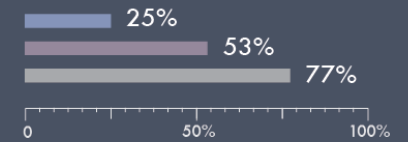


How much oil, gas and coal will we have to leave in the ground to stay under 2 degrees of warming?

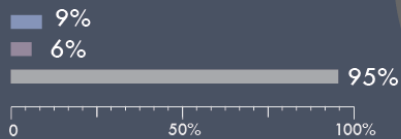
Canada



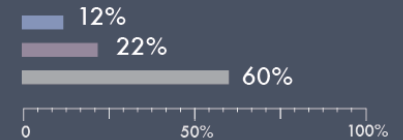
China and India



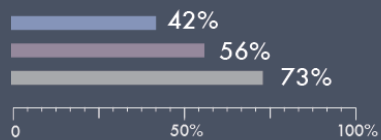
US



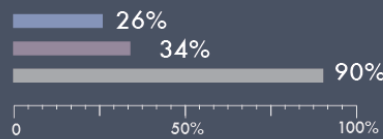
Other developing Asian countries



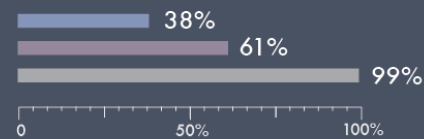
Central and South America



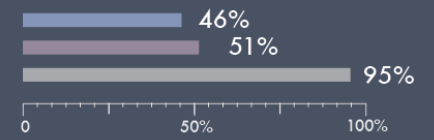
Africa



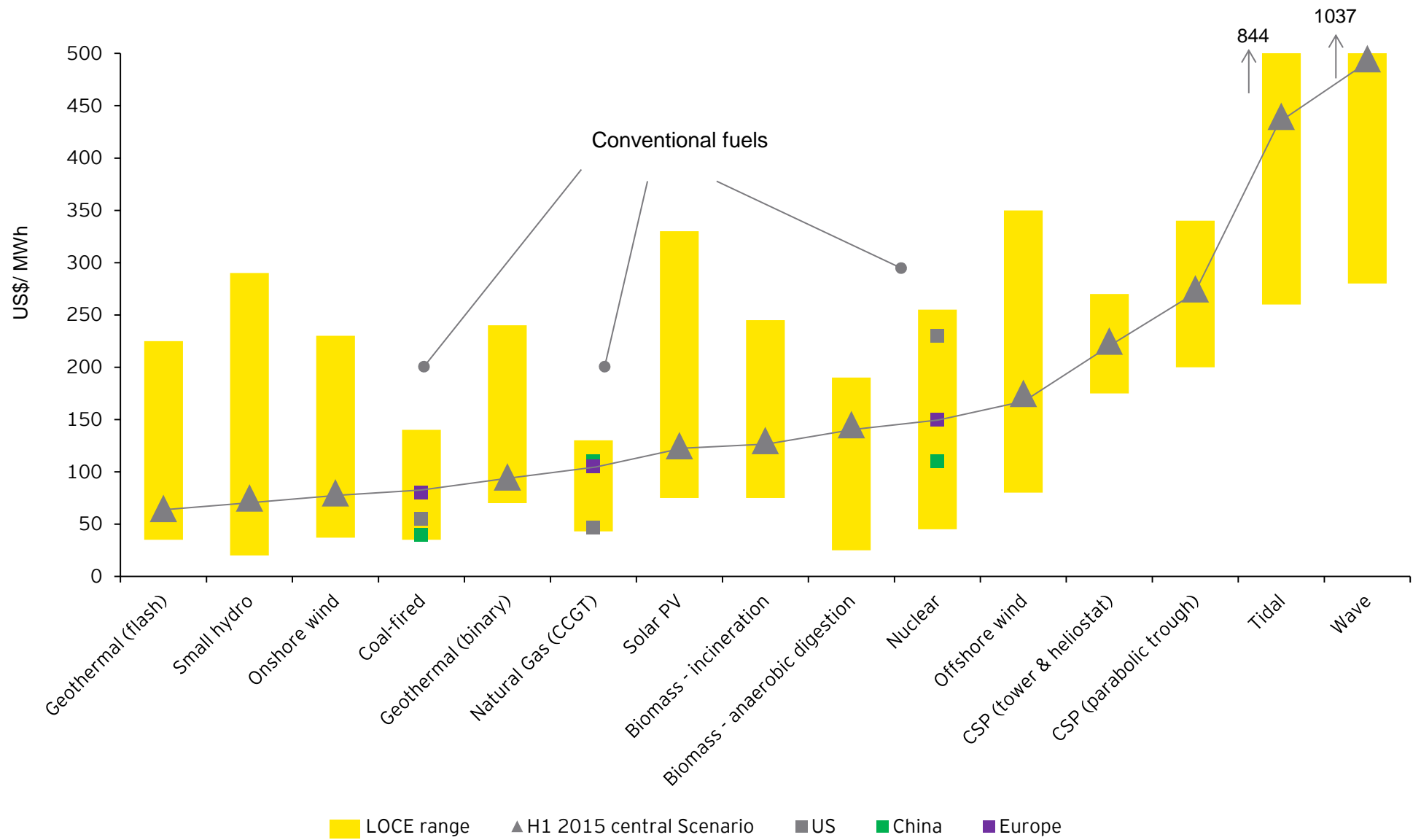
Middle East



OECD Pacific

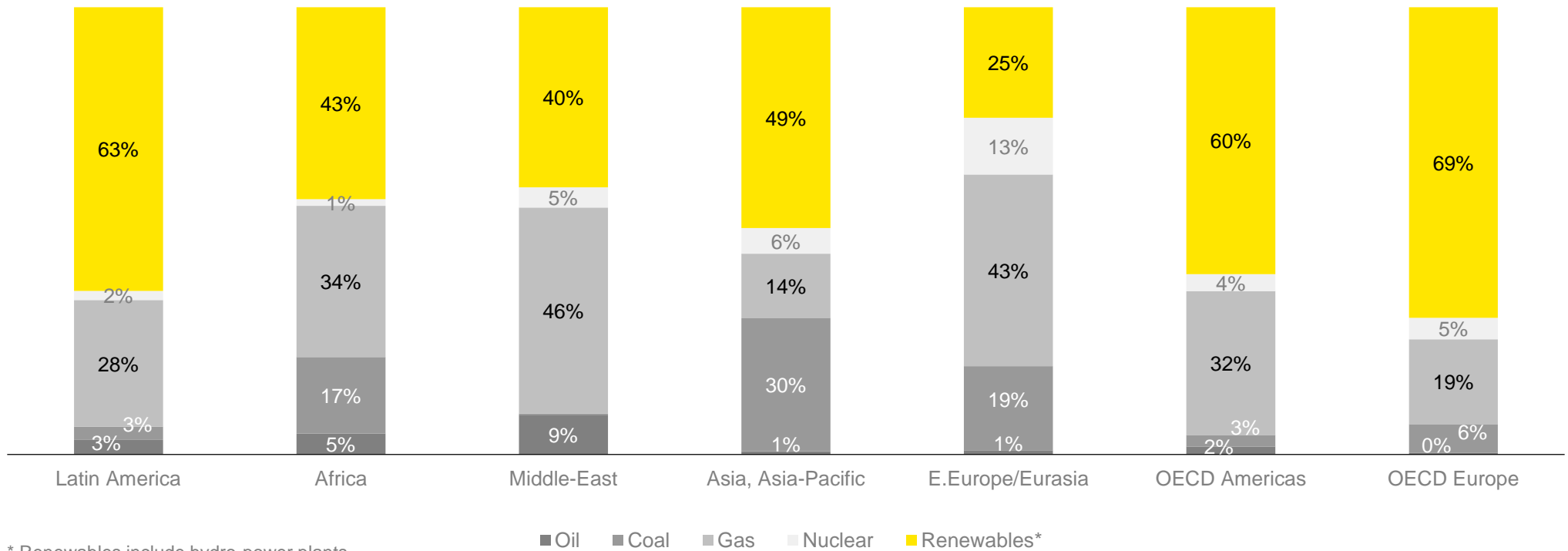


Technology is forcing rapid change in how electricity should be generated: the market is responding



Fossil fuels holding fast but renewables are gaining ground ...

New capacity additions by region, 2014–40



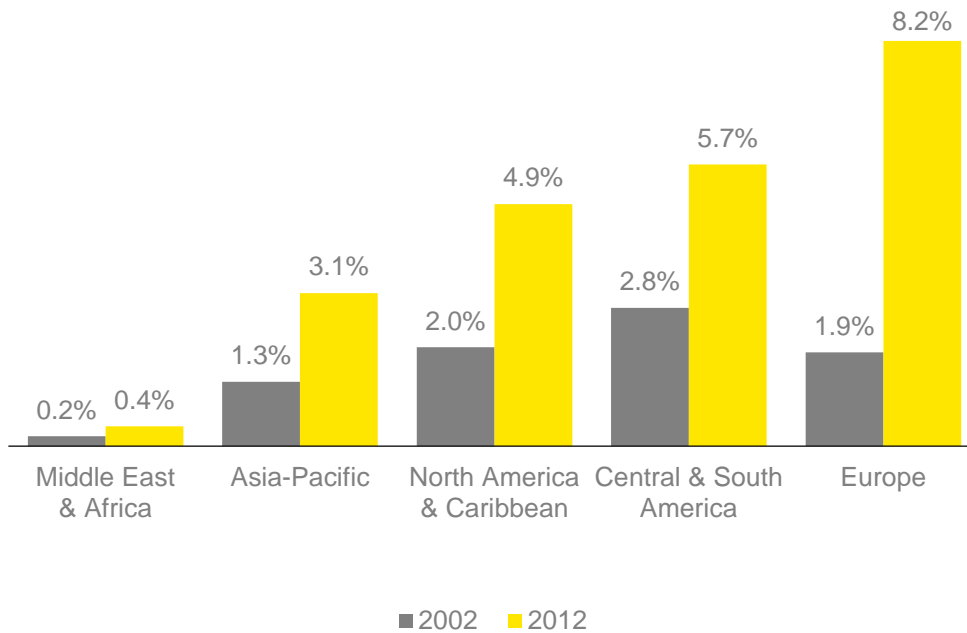
* Renewables include hydro-power plants.

Source: IEA WEO 2014

► Renewables will represent the lion's share of new capacity installed over the next couple of decades in every region.

... and growth in renewable energy investment is shifting to emerging markets

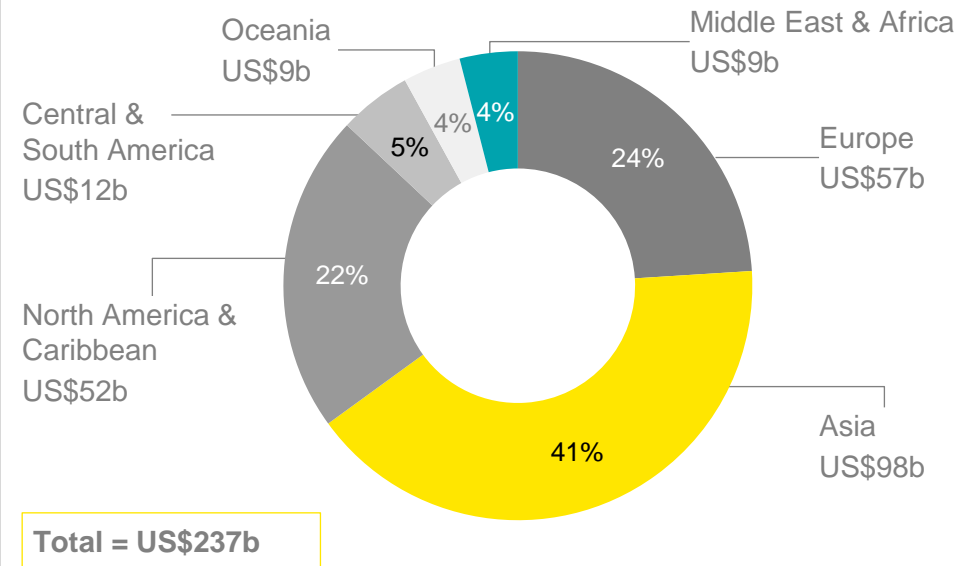
Non-hydro renewables share of power generation by region



Source: BP Statistical Review of World Energy, 2013

- ▶ For most regions, the share of non-hydro renewables in the generation mix at least doubled between 2002 and 2012.
- ▶ In Europe, driven by subsidies and government incentives, the share of non-hydro renewables in total generation quadrupled from 2% in 2002 to just over 8% in 2012.

Investment in renewables by region, 2013



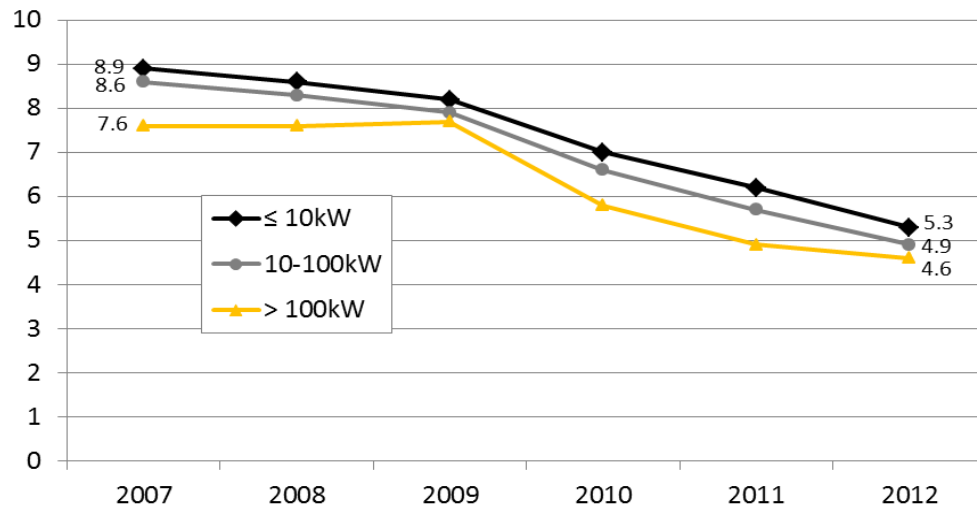
Solar PV has attracted the highest annual investment for the past three years (US\$112b in 2013).

Source: EY analysis of BNEF data

- ▶ Investment in renewable energy sources across Europe and North America peaked in 2011 at \$108b and \$62b, respectively.
- ▶ Investment is shifting to emerging markets, led by China as they pursue clean power sources and reduce dependence on fossil fuel generation.

Traditional utility business models have been disrupted by the growth in distributed generation such as solar PV ...

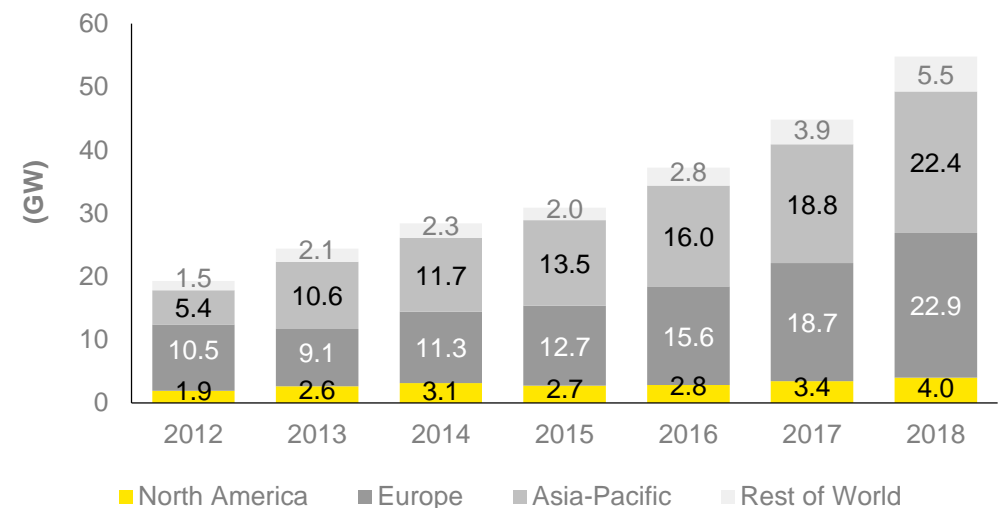
US solar PV installation prices (US\$/W)



Source: Tracking the Sun VI, SunShot, U.S. Department of Energy

- ▶ In 2012, 19.2GW of distributed solar PV systems were installed globally, representing **US\$65.7b** in revenue.
- ▶ PV module prices also decreased 77% between 2008 and 2012 from **US\$3.80/W** to **US\$0.86/W**.
- ▶ Lower prices open new markets while also helping reach grid parity quickly in high-cost retail electricity markets.
- ▶ Between 2013 and 2018, 220GW of distributed solar PV is expected to be installed worldwide, representing US\$540.3b in revenue.

Annual installed distributed solar PV capacity by region, 2012–18

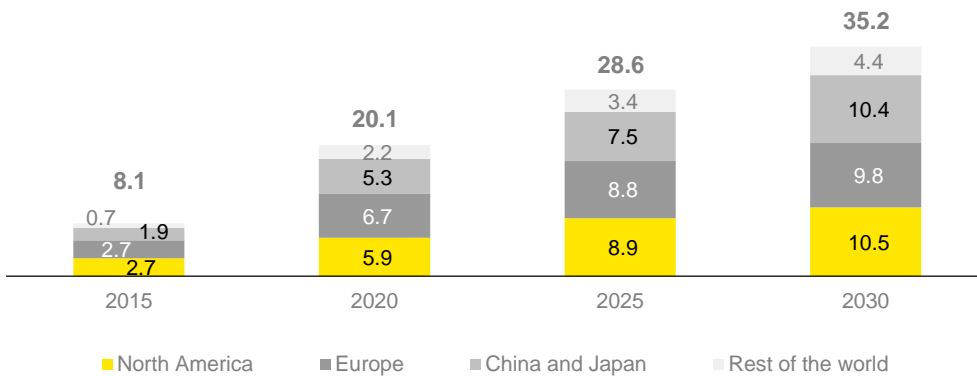


Source: Navigant Research

- ▶ Europe is expected to remain the market leader in distributed solar PV with an expected 23GW of annual installed capacity by 2018, followed closely by Asia-Pacific with 22GW of annual installed capacity.
- ▶ North America is also expected to witness robust growth in distributed solar PV with annual installed capacity increasing by more than 50% between 2013 and 2018 from 2.6GW to 4.0GW.

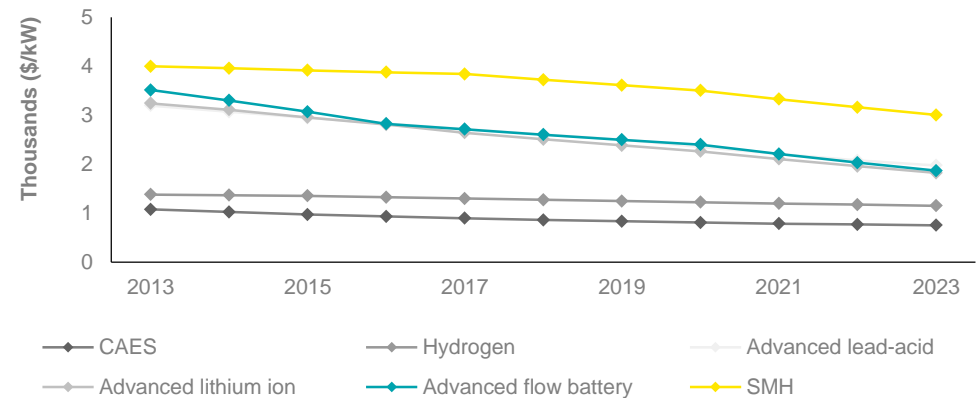
... and improving economics for battery storage may also address the intermittency challenges of renewable resources

Projected annual sales of storage technologies (US\$b)



Source: BCG perspective

Installed energy storage cost for renewable integration, by technology



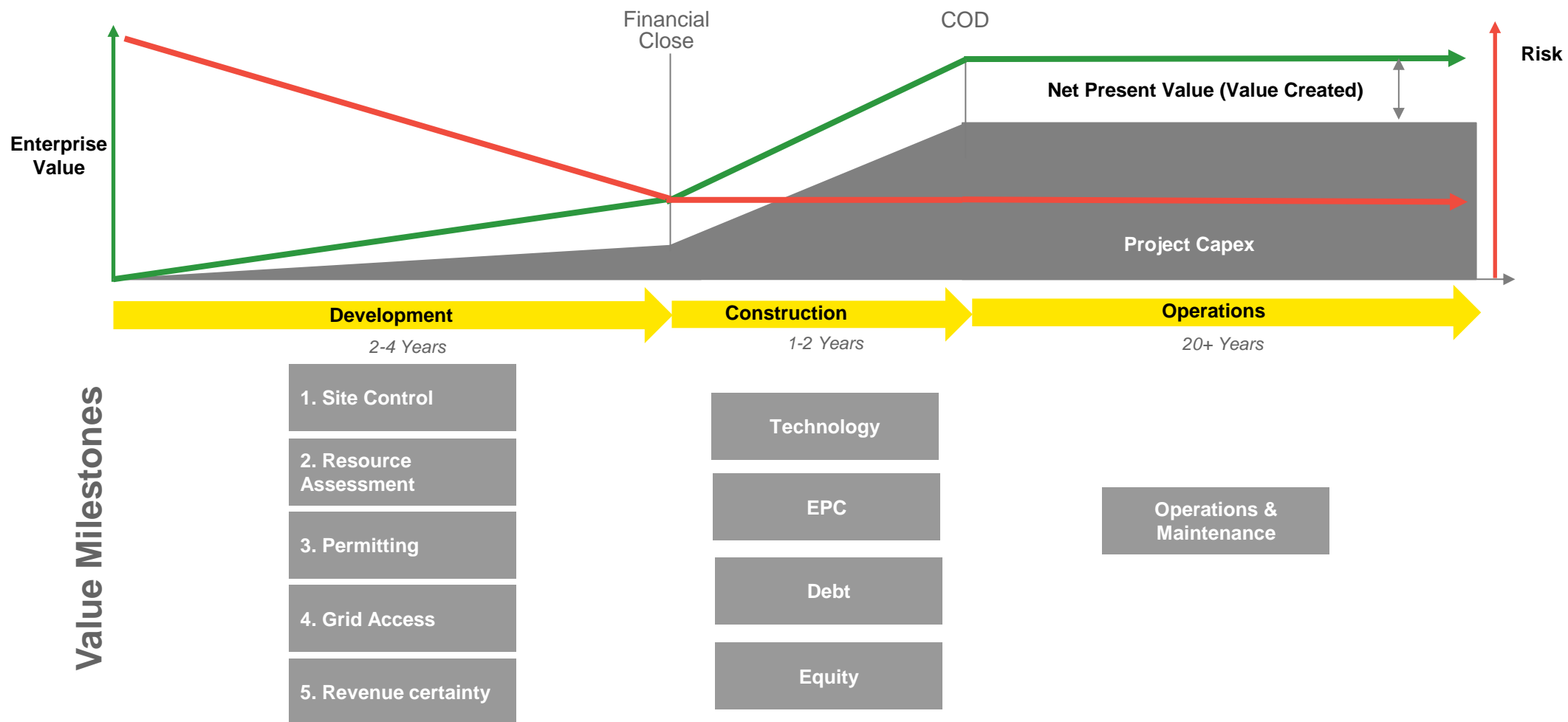
Source: Navigant Research

Key drivers

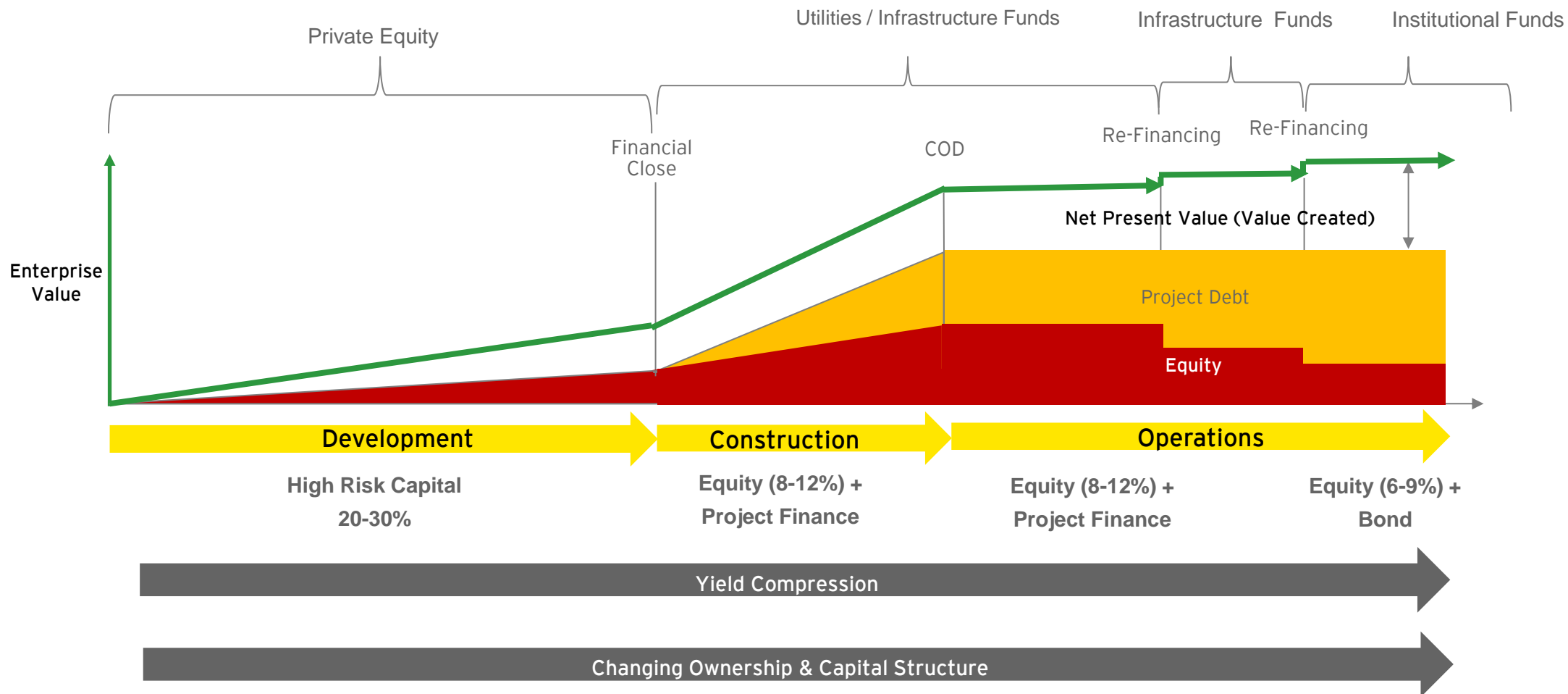
| | |
|---|---|
| Falling system prices | <ul style="list-style-type: none"> ▶ North America, Europe and East Asia are expected to be the leading regions for storage technologies, with distributed solar PV combined with battery chargers becoming more competitive with electricity from the grid. |
| High retail prices | <ul style="list-style-type: none"> ▶ European countries such as Germany, Italy and Spain have high retail electricity prices, largely from taxes and the subsidies on renewable power, making distributed solar/storage solutions a compelling investment opportunity. |
| Low compensation for surplus electricity fed into the grid | <ul style="list-style-type: none"> ▶ Compensation via wholesale prices for power sold back to the grid is generally low following numerous governments deciding to abolish feed-in-tariffs. ▶ In the US, factors such as pricing and tariff schemes designed to moderate power consumption strengthen the prospects for energy storage in California. |
| Direct government and regulatory support | <ul style="list-style-type: none"> ▶ In Japan's case, a push to deregulate the country's electricity by 2016 has accelerated the adoption of distributed energy technologies in its own market. ▶ Some European countries (e.g., Germany) have introduced a 30% investment subsidy for small-scale solar PV storage. ▶ In the US, California regulators introduced an energy storage mandate on the three utilities, SCE, SDG&E and PG&E with a capacity target of 1.3GW in total by 2020. |

Energy infrastructure assets: value creation

Energy assets are valued based on their long-term contracted operating cashflows, discounted back accordingly for the related risks. The value of these plants are maximized once development and construction risks have been minimized and the contracted cashflows are as certain as possible and with a creditworthy counterparty.



Energy infrastructure assets: always on the move



Evolving business models: EY examples

| IPPs / Transmission | Smart Meters | ESCos | Street Lights | Distributed Generation |
|---|---|---|--|--|
| <ul style="list-style-type: none">• National procurement programmes• Private sector led• Turn-key IPP bids• Highly competitive• Offtake bankability• Cost of capital and supply chain access key• Regulatory stability is key | <ul style="list-style-type: none">• Emerging markets focus• Targeting utilities with significant debt challenges• Prepaid smart-metering to ensure revenue collection• Fully funded, owned, operated by the private sector• Remunerated through savings | <ul style="list-style-type: none">• Buildings consume c. 40% of energy• Building retrofit pay for themselves• Long-term capital to fund upfront capex• Remunerated via energy savings• Energy performance contracts• Counterparty risk | <ul style="list-style-type: none">• Self-financing street lighting• Long-term capital can fund upfront capex• Remunerated through capex, opex, energy savings and new revenues• Little upfront cost to cities and towns• Opens up revenues for wifi, CCTV, signage, 5G | <ul style="list-style-type: none">• Business model evolving• Solar PV: solar leases/solar PPAs• Long-term financing - debt and equity• Scale and counterparty risk• Reducing government dependencies |

Questions

EY | Assurance | Tax | Transactions | Advisory

About EY

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About EY's Global Power & Utilities Center

In a world of uncertainty, changing regulatory frameworks and environmental challenges, utility companies need to maintain a secure and reliable supply, while anticipating change and reacting to it quickly. EY's Global Power & Utilities Center brings together a worldwide team of professionals to help you succeed — a team with deep technical experience providing assurance, tax, transaction and advisory services. The center works to anticipate market trends, identify the implications and develop points of view on relevant sector issues. Ultimately, it enables us to help you meet your goals and compete more effectively.

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ED None

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