BLOOMBERG NEW ENERGY FINANCE SUMMIT

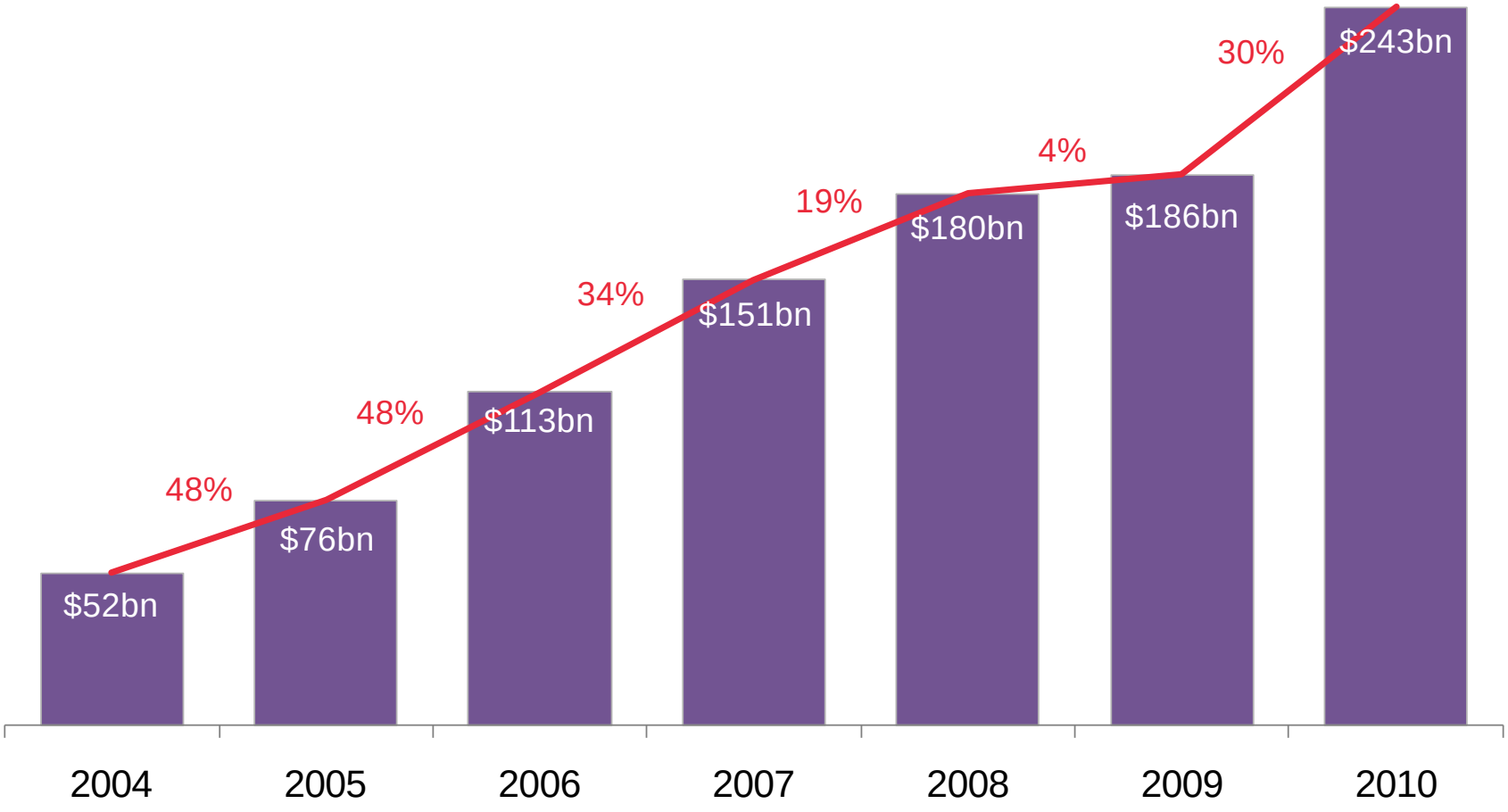
DAY 2 – KEYNOTE

Michael Liebreich, Chief Executive
Twitter: MLiebreich

5TH APRIL 2011

Bloomberg
NEW ENERGY FINANCE

GLOBAL TOTAL NEW INVESTMENT IN CLEAN ENERGY 2004–10 ($BN)



Note: Includes corporate and government R&D, and small distributed capacity. Adjusted for re-invested equity. Does not include proceeds from acquisition transactions

Source: Bloomberg New Energy Finance

THE WALL STREET JOURNAL.

DOWJONES A News Corporation Company

THURSDAY, MAY 29, 2015 - VOL. CCLITH NO. 125

★★★★ $1.50

DJIA 12594.03 ▲45.68 0.4% NASDAQ 2486.70 ▲0.2% NIKKEI 13709.44 ▼1.3% DJ STOXX 50 3169.69 ▲0.7% 10-YR TREAS ▼23/32, yield 4.009% OIL $131.03 ▲$2.18 GOLD $900.50 ▼$7.20 EURO $1.5645 YEN 104.73

Bloomberg Summit 2015. Liebreich forecasts clean energy investments to exceed $300bn this year.

Time to commit. Endesa signs 20-year PPA with Desertec

LONDON—Major banks are contributing to the erratic behavior of a crucial global lending benchmark, a Wall Street Journal analysis shows.

The Journal analysis indicates that Citigroup Inc., WestLB, HBOS PLC, J.P. Morgan Chase & Co. and UBS AG are among the banks that have been rowing rates to avoid looking desperate for cash, the British Bankers' Association, which oversees Libor, is expected to report Friday on possible adjustments to the system. That report isn't expected to recommend any major changes, according to people familiar with the association's deliberations.

AgroChina opens world's largest cellulosic plant in Kenya

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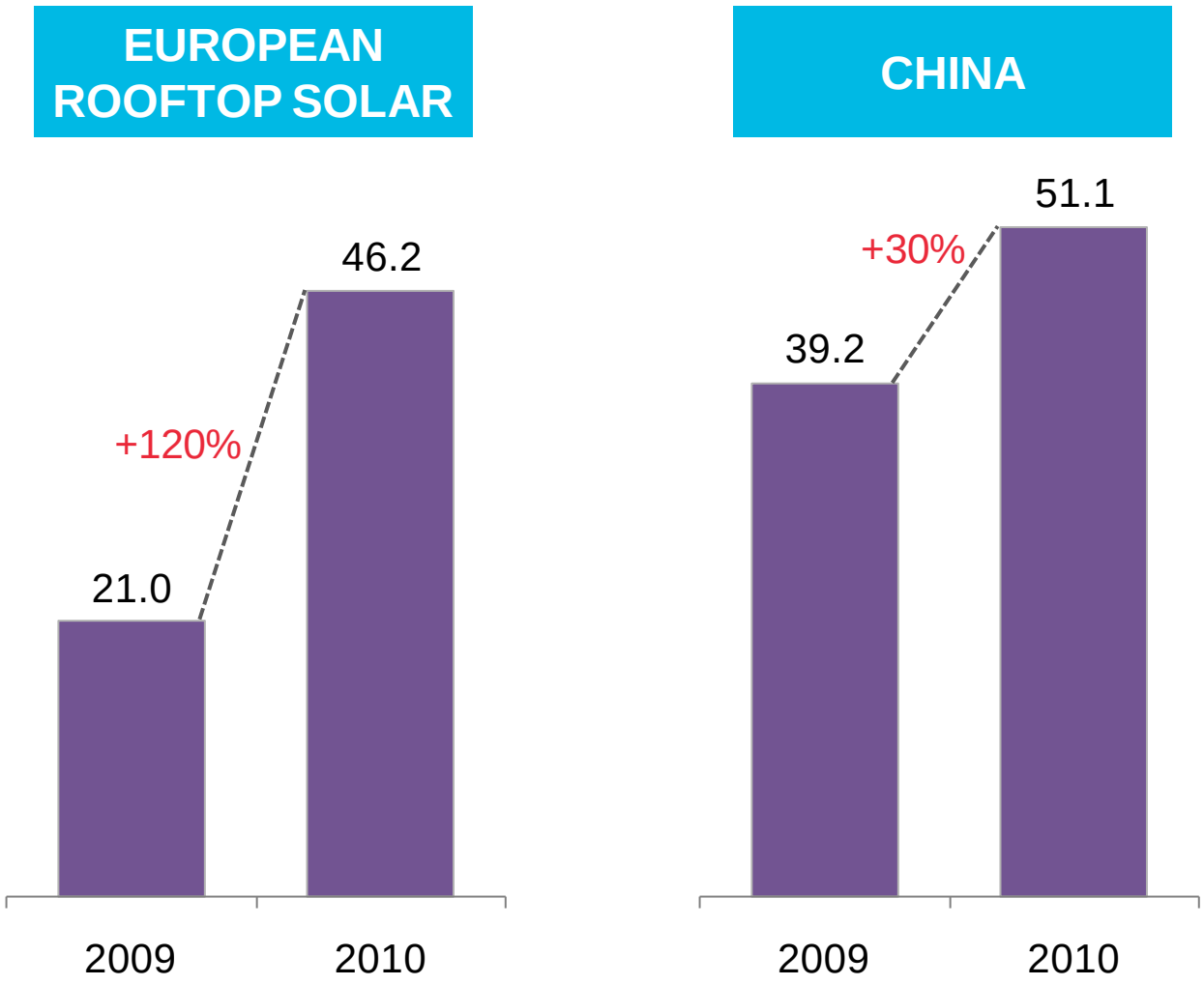
Fast and fossil free

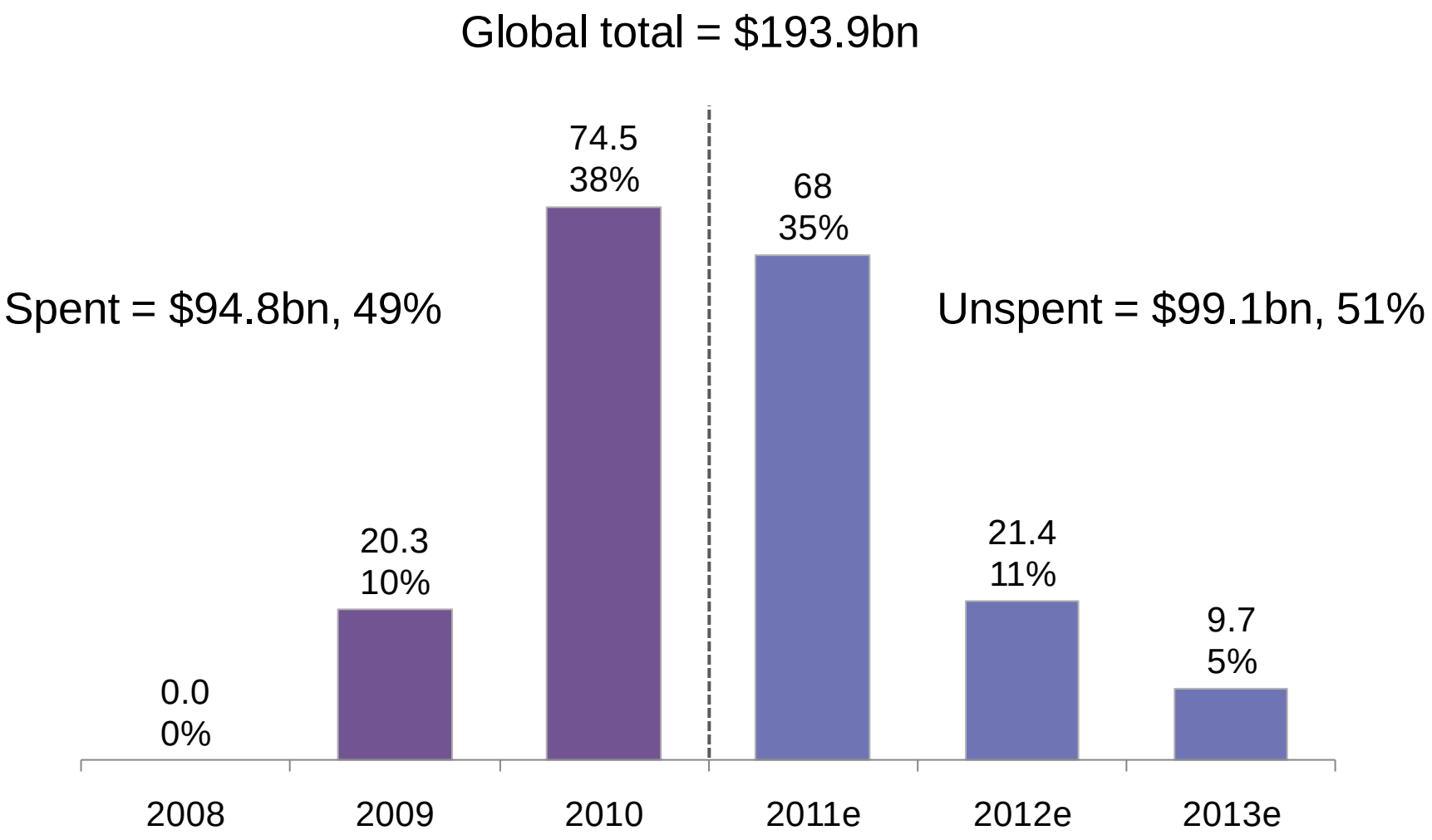
Aston Martin reveals electric car for new James Bond movie

DRIVERS OF INVESTMENT GROWTH, 2009–10 ($BN)



Source: Bloomberg New Energy Finance

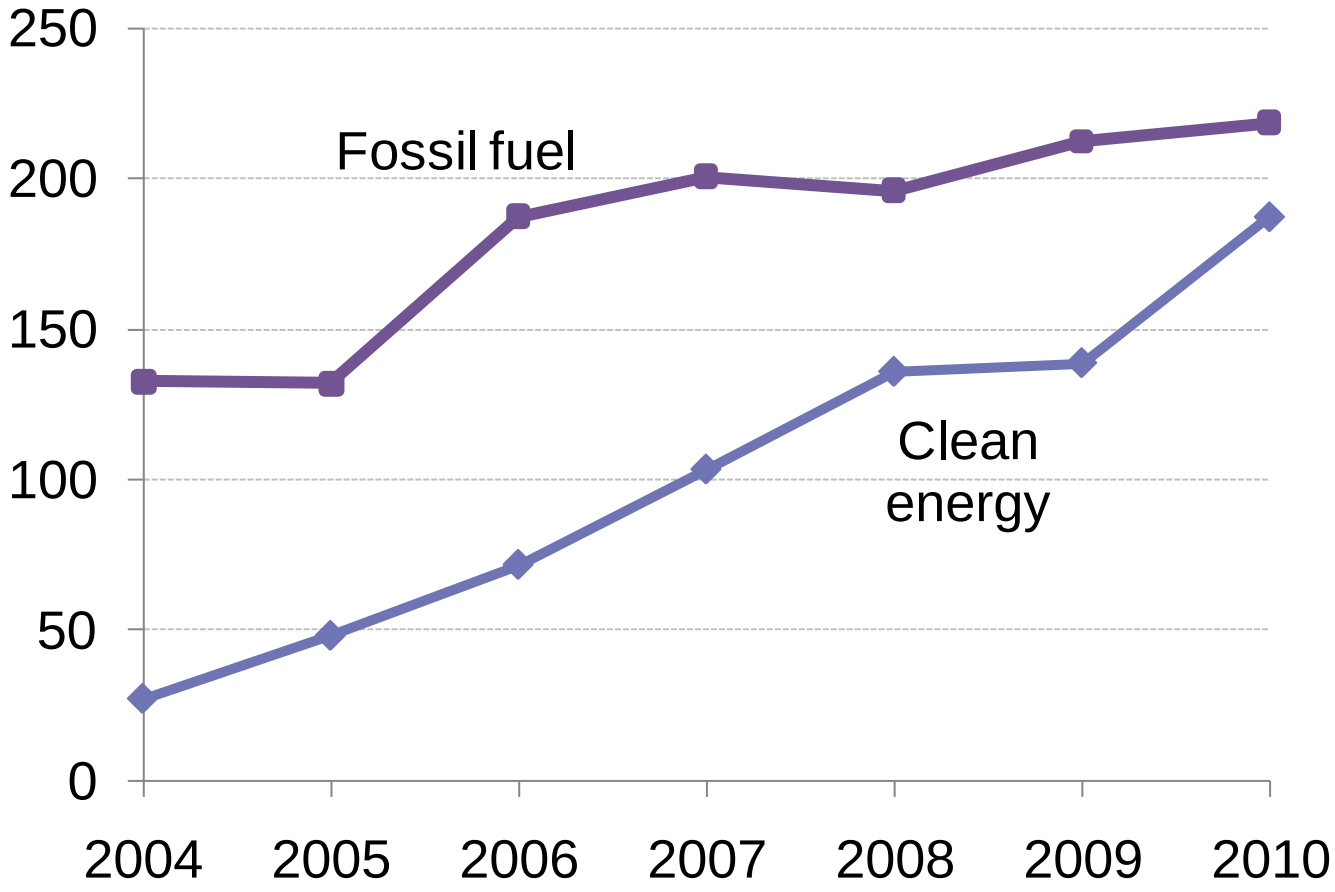
GLOBAL CLEAN ENERGY STIMULUS SPENDING BY YEAR, 2011–13 ($BN)



Note: 2011–13 according to Bloomberg New Energy Finance expectations

Source: Bloomberg New Energy Finance

CLEAN VS FOSSIL-BASED GENERATING CAPACITY INVESTMENT, 2004–10 ($BN)



Note: Investment for new build – fossil fuel calculated from EIA & IEA numbers, clean energy taken from Bloomberg New Energy Finance totals. Clean energy capacity includes small distributed capacity.

Source: IEA, EIA, Bloomberg New Energy Finance

INDUSTRY SIZE COMPARISON ($BN)

• Clean energy investment	$243bn
• Clean energy generation capacity investment	$187bn
• Fossil-based generation capacity investment	$219bn
• Total energy sector investment	$1,200bn
• Earnings of Mexican drug cartels (spending)	$40bn
• Video games (spending)	$46bn
• Adventure travel (spending)	$89bn
• Global luxury goods market (spending)	$234bn
• Global advertising (spending)	$640bn
• Oil (spending)	$3,200bn
• Of which OECD oil imports (spending)	$880bn

Source: IEA, EIA, Bloomberg New Energy Finance, Facebook, Bain & Co, PWC, George Washington Business School

POLICY BALANCE SHEET, 2010–11

NEGATIVES	POSITIVES
• Regulatory pushback over smart grid programs in US • No US climate or energy bill • US midterms • Retrospective changes to tariff regimes in Czech Republic & Spain • Tariff reductions in other EU countries	• Brazilian wind tenders • Italy tariffs remain in place • Unexpected success of Cancun • Indian Solar Mission programme • CA victory over Proposition 23 • EU/UK funding progress on CCS

THREE CURRENT ISSUES

1. Cost-competitive clean energy

2. Black swans

3. Regional rivalry

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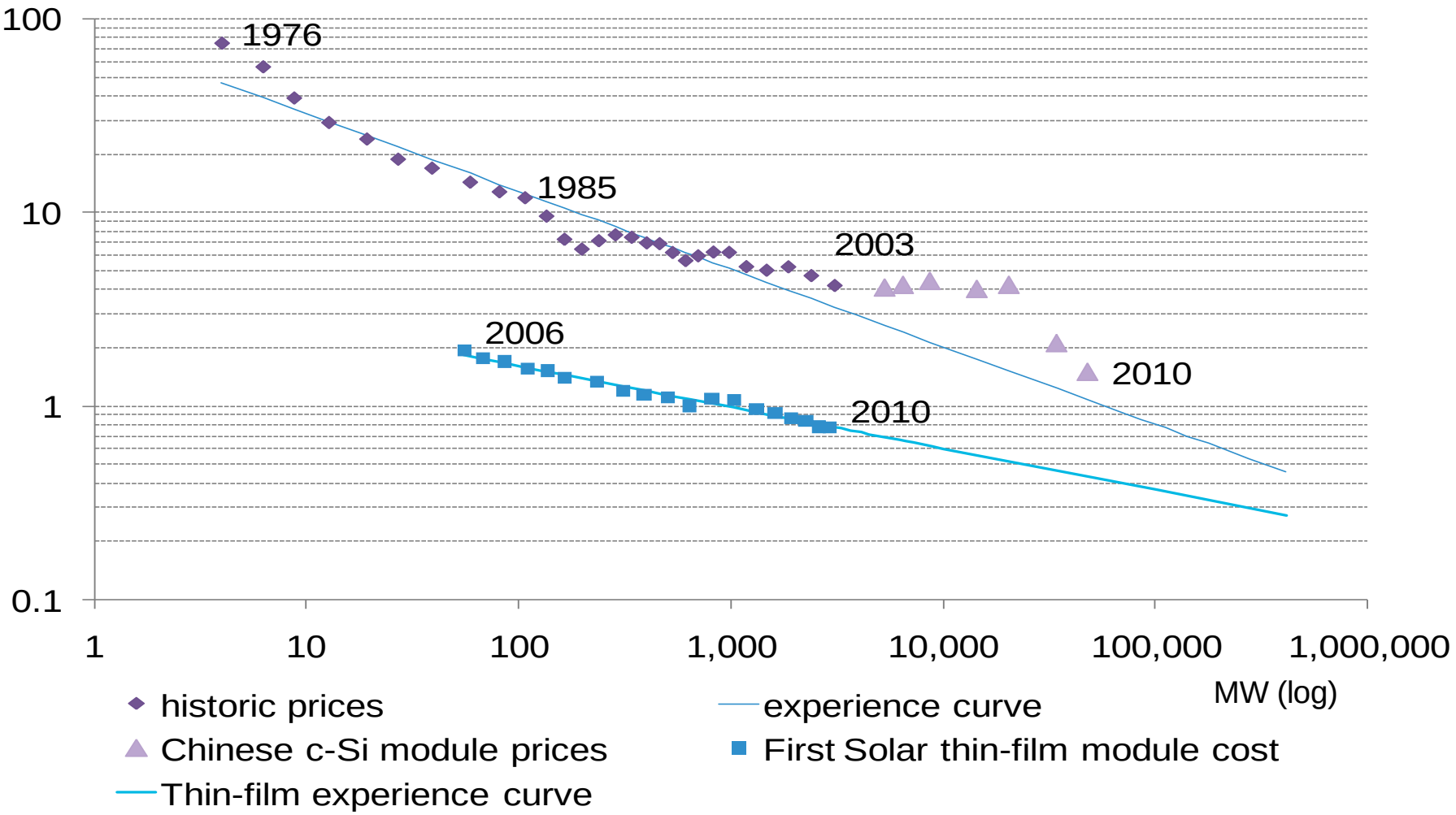
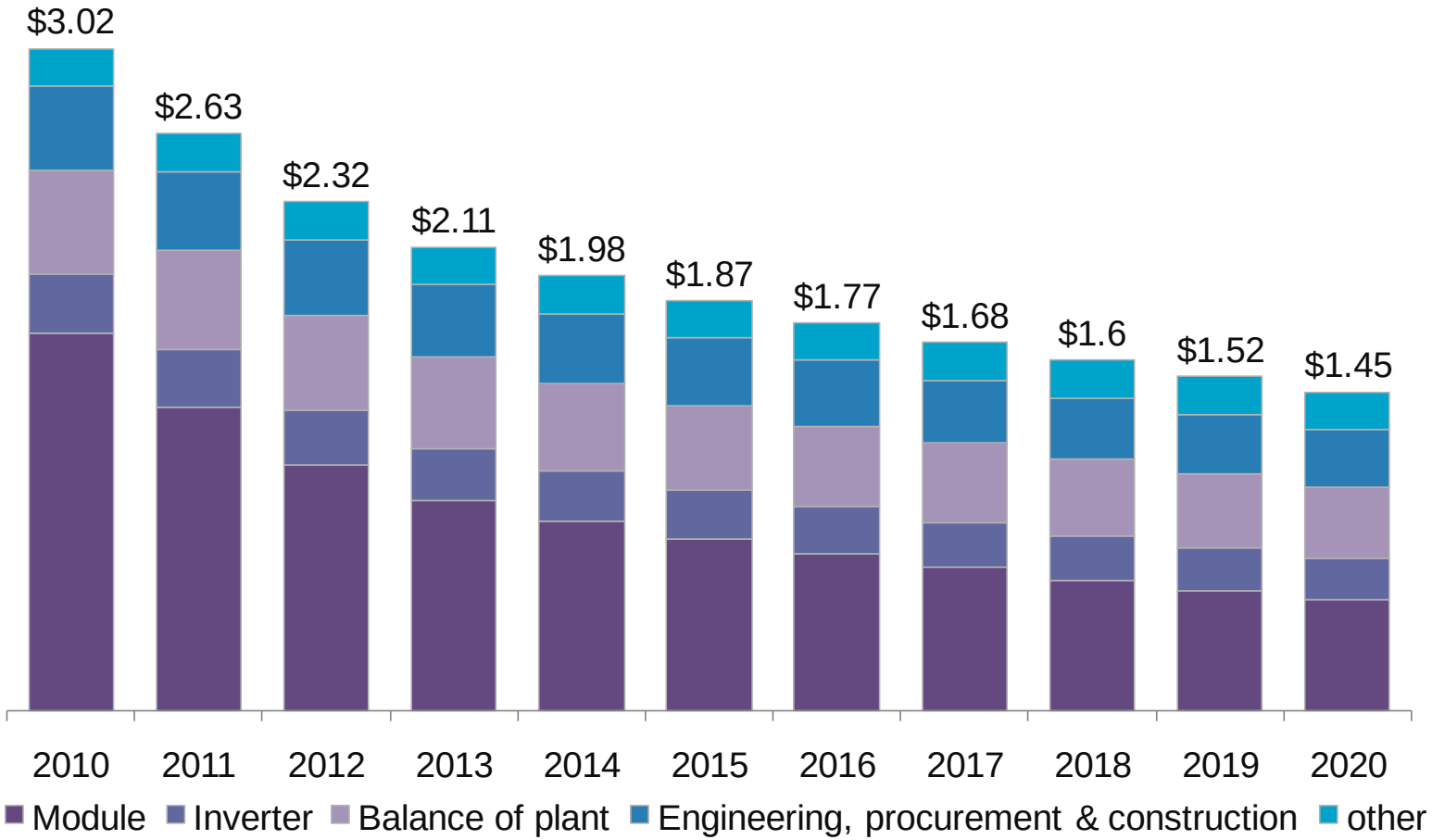
THE PV MODULE EXPERIENCE CURVE, 1976–2010 ($/W)



Notes: Inflation adjustment using US PPI, R2 of c-Si regression = 0.94, R2 of FSLR regression = 0.98

Source: Bloomberg New Energy Finance, FSLR filings

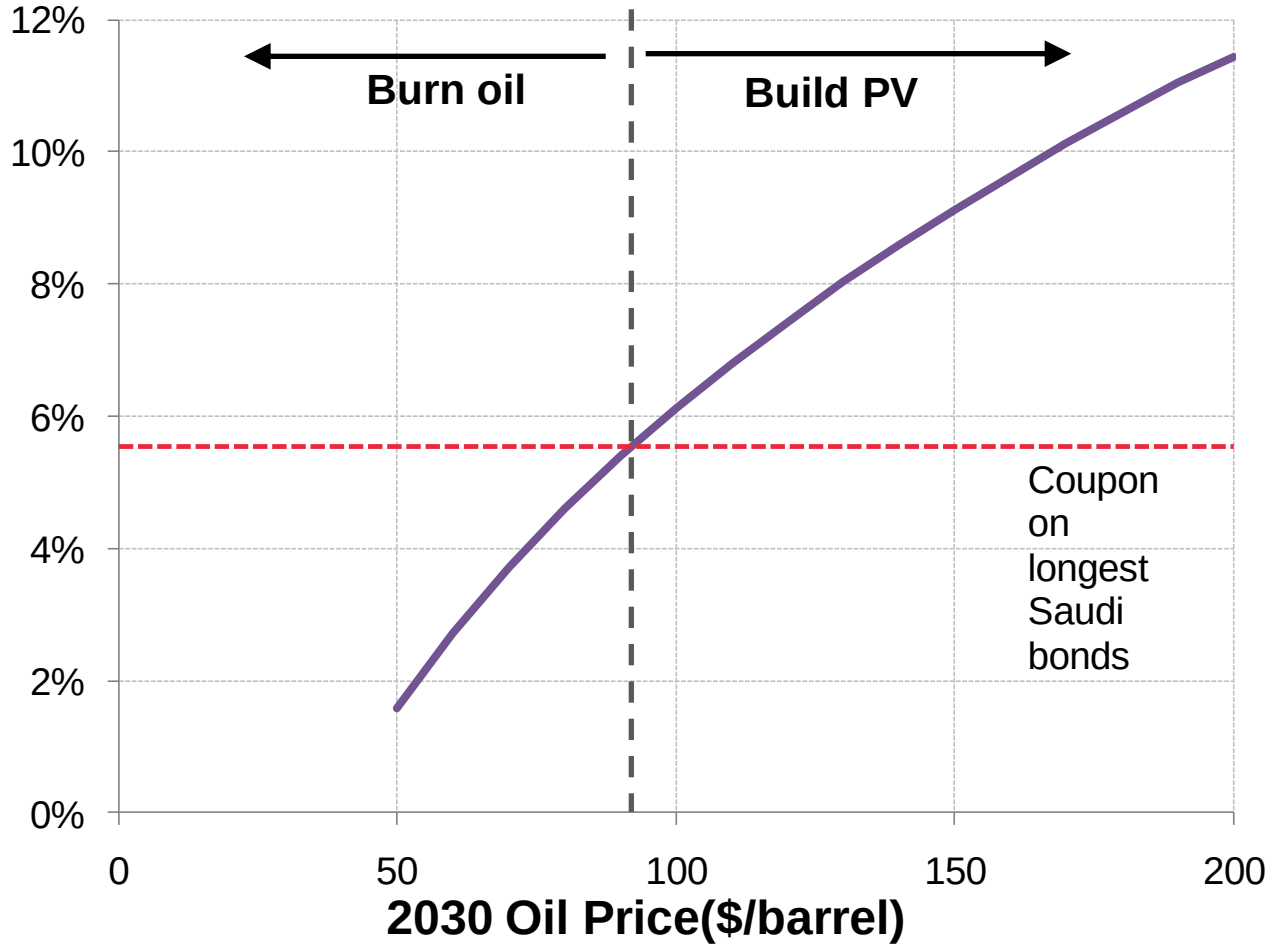
FORECAST LARGE PV PROJECT CAPITAL COST, 2010–20 ($/W)



Note: Based on historical experience curves for crystalline silicon modules and other components, and the prices in the mature German market. 2010 dollars. Assumes Bloomberg New Energy Finance short-term build forecasts to 2013, 20% new build growth after that.

Source: Bloomberg New Energy Finance

IRR OF GULF PV PROJECTS VS OIL PRICE (%)



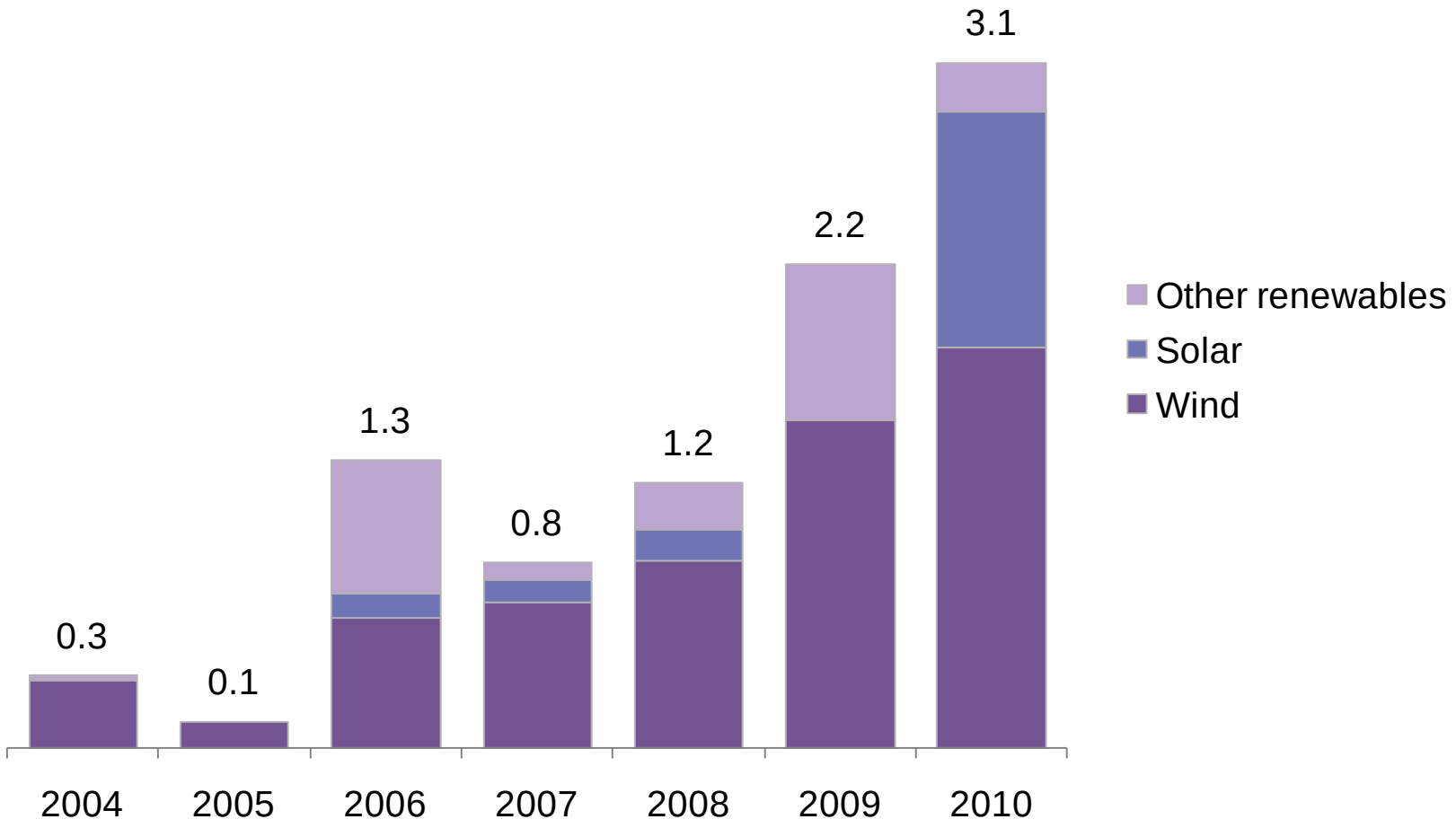
Saudi Arabia generates 57% of electricity from oil

Replacing 5% of this per year would be a 3.3GW PV market

Note: Assumes PV project can be built for $3.14/W, capacity factor 20%, 1% capex/year O&M and 0.7%/year degradation , all oil replaced would have been burned in a plant with a heat rate of 10.85Btu/kWh. Instead it is sold at market price which changes linearly to 2030

Source: Bloomberg New Energy Finance

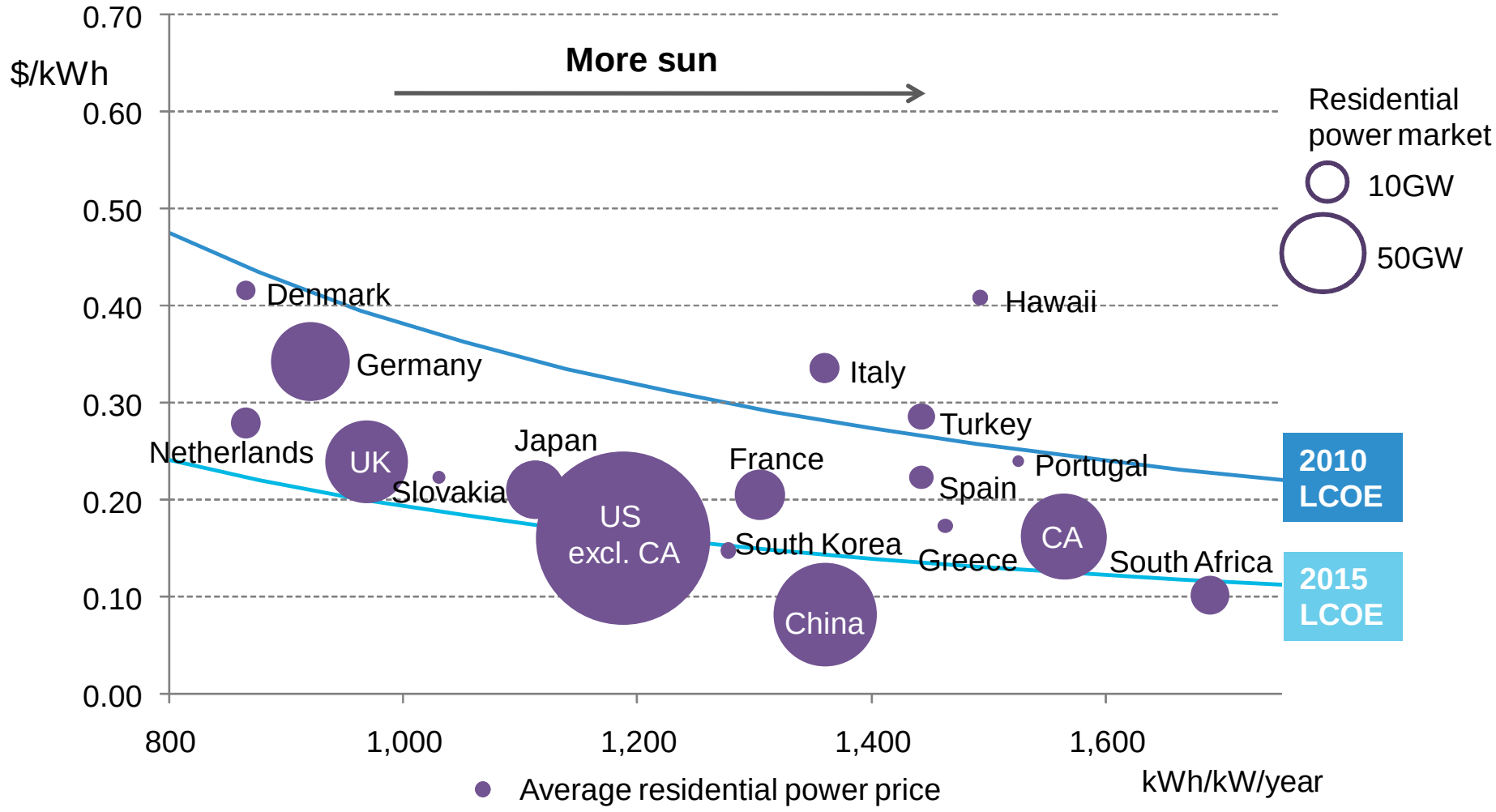
ASSET FINANCING FOR NEW BUILD CLEAN ENERGY ASSETS IN THE MIDDLE EAST, 2004–10 ($BN)



Note: Includes estimates for undisclosed deals. Includes North Africa.

Source: Bloomberg New Energy Finance

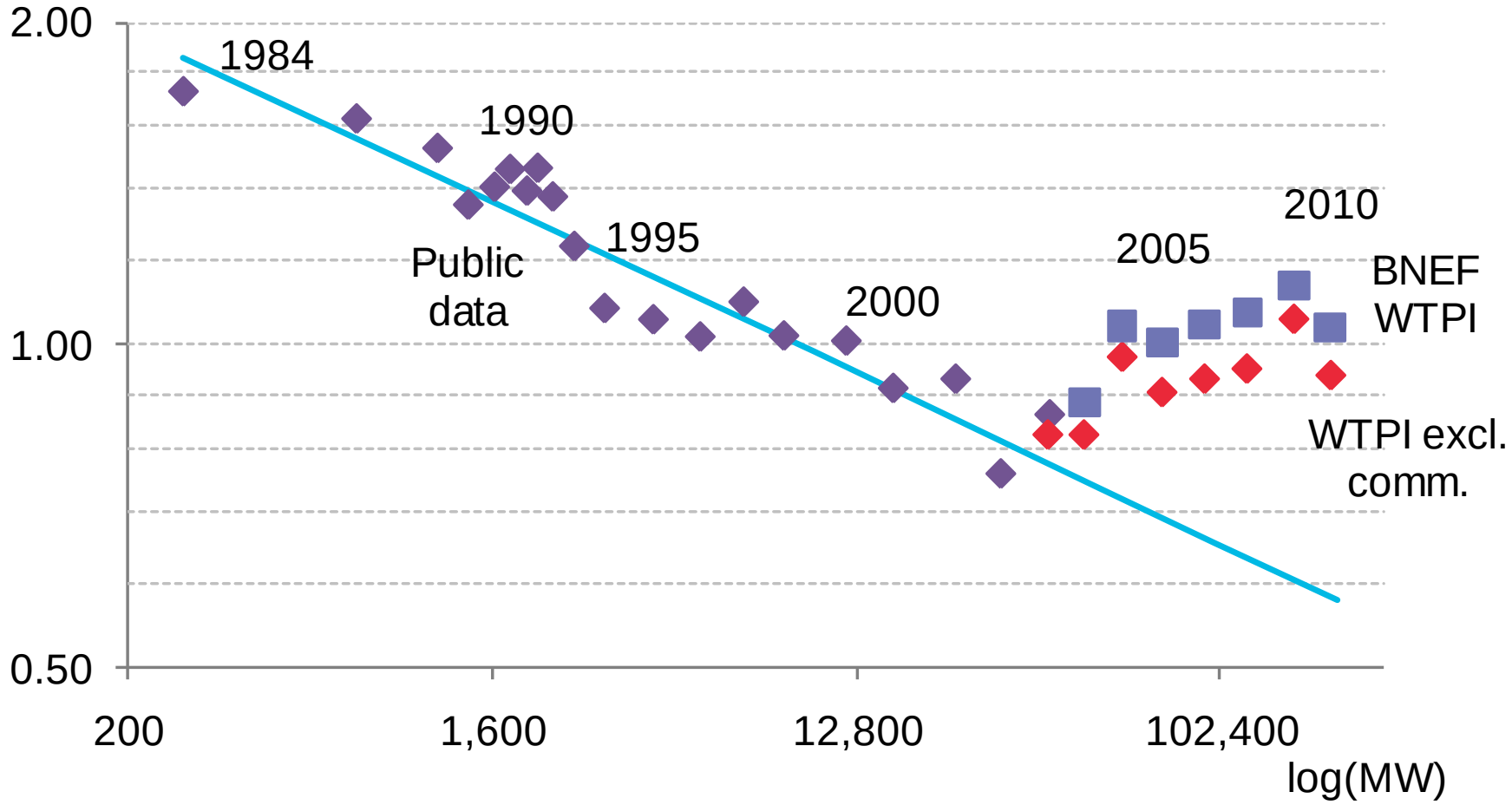
RESIDENTIAL PV PRICE PARITY



Note: LCOE based on 6% weighted average cost of capital, 0.7%/year module degradation, 1% capex as O&M annually. CA is California.

Source: Bloomberg New Energy Finance

WIND TURBINE PRICE INDEX, 1984–2010 (EUR M/MW)

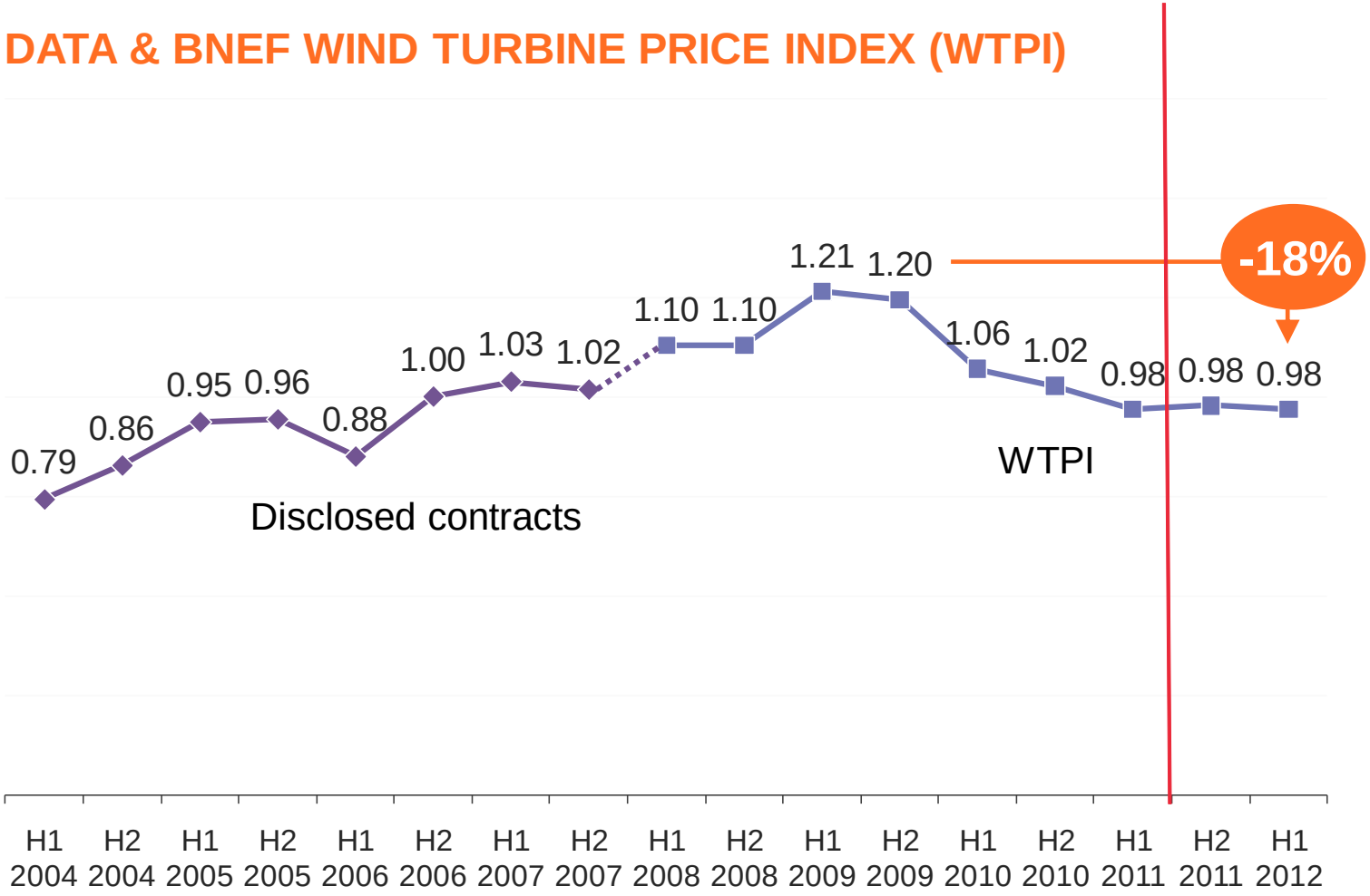


Note: WTPI is wind turbine price index, WTPI excl. comm. is adjusted for commodity prices 2002–10.

Source: Bloomberg New Energy Finance, Extool, Lawrence Berkeley Laboratory

TURBINE PRICES BY DELIVERY DATE, 2004–10 (EUR m/MW)

PUBLIC DATA & BNEF WIND TURBINE PRICE INDEX (WTPI)

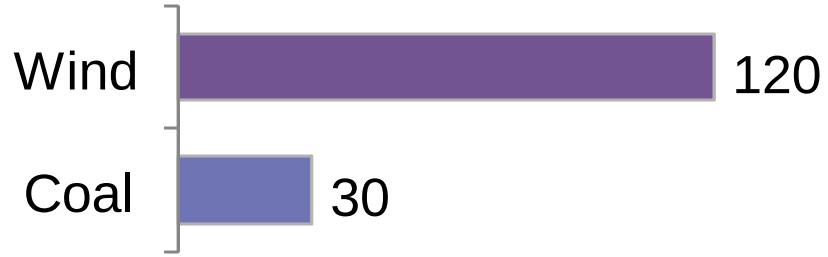


Note: Prices include towers & transport, exclude civil engineering. Extract from H1 2011 Bloomberg New Energy Finance WTPI participant report covering 150 contracts over the period.

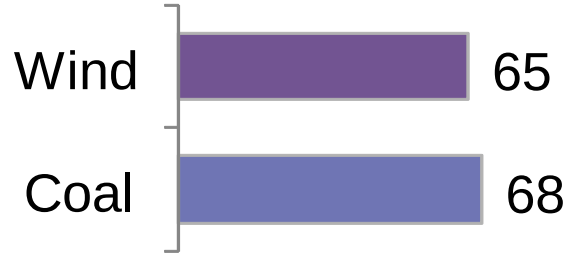
Source: Bloomberg New Energy Finance

LEVELIZED COSTS: BEST NEW WIND VS NEW COAL ($/MWh)

Perception:



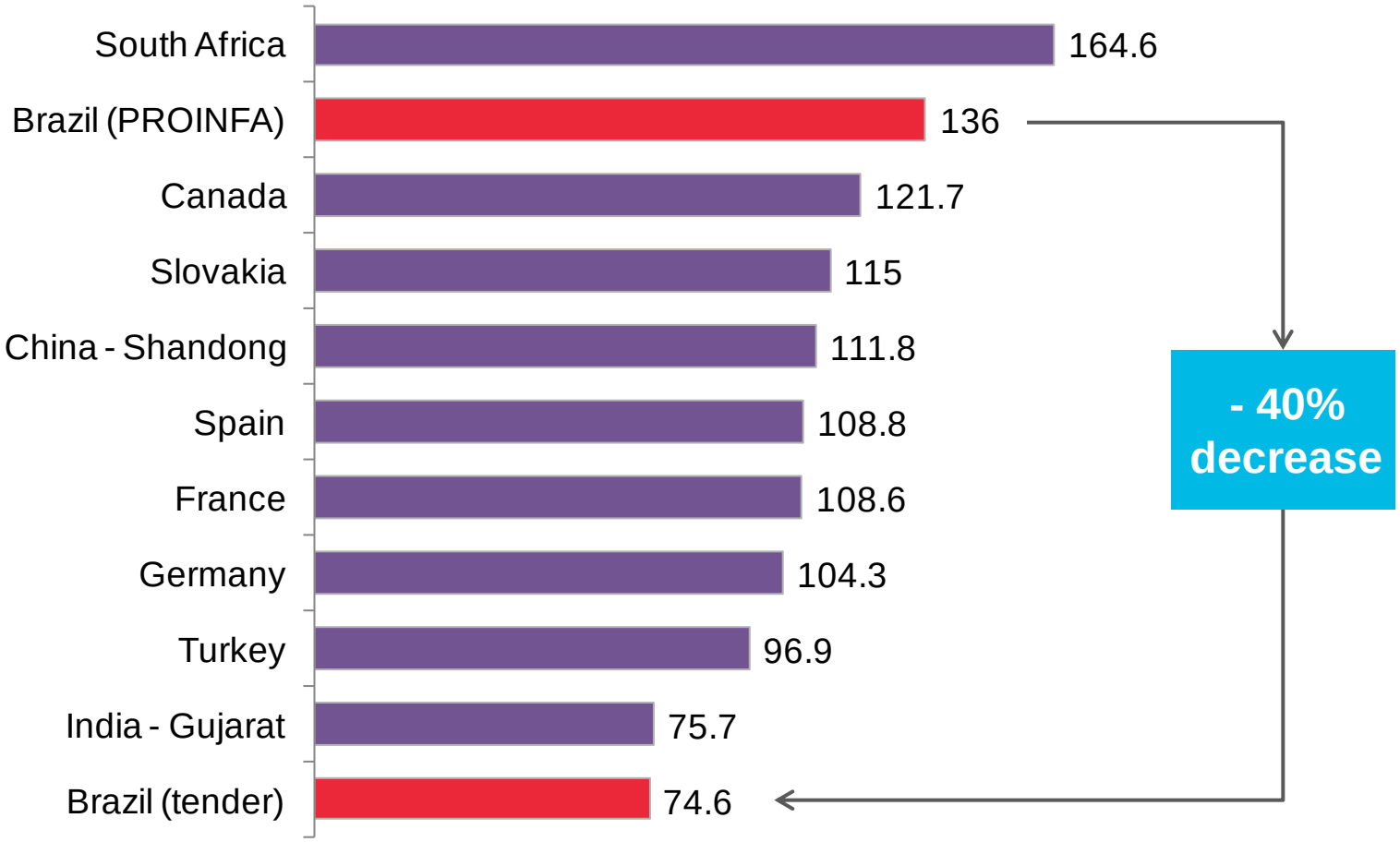
Reality:



- New coal must cover cost of capital
- New coal requires advanced pollution control
- Wind turbines back to 2005 prices, but now perform much better
- Wind bankability has driven down cost of capital
- Coal suffers from carbon price risk

Source: Bloomberg New Energy Finance

WIND TARIFFS UNDER THE TENDER OPTION IN BRAZIL AND SELECTED FEED-IN TARIFF MARKETS ($/MWh)



Source: Bloomberg New Energy Finance

THREE CURRENT ISSUES

1. Cost-competitive clean energy

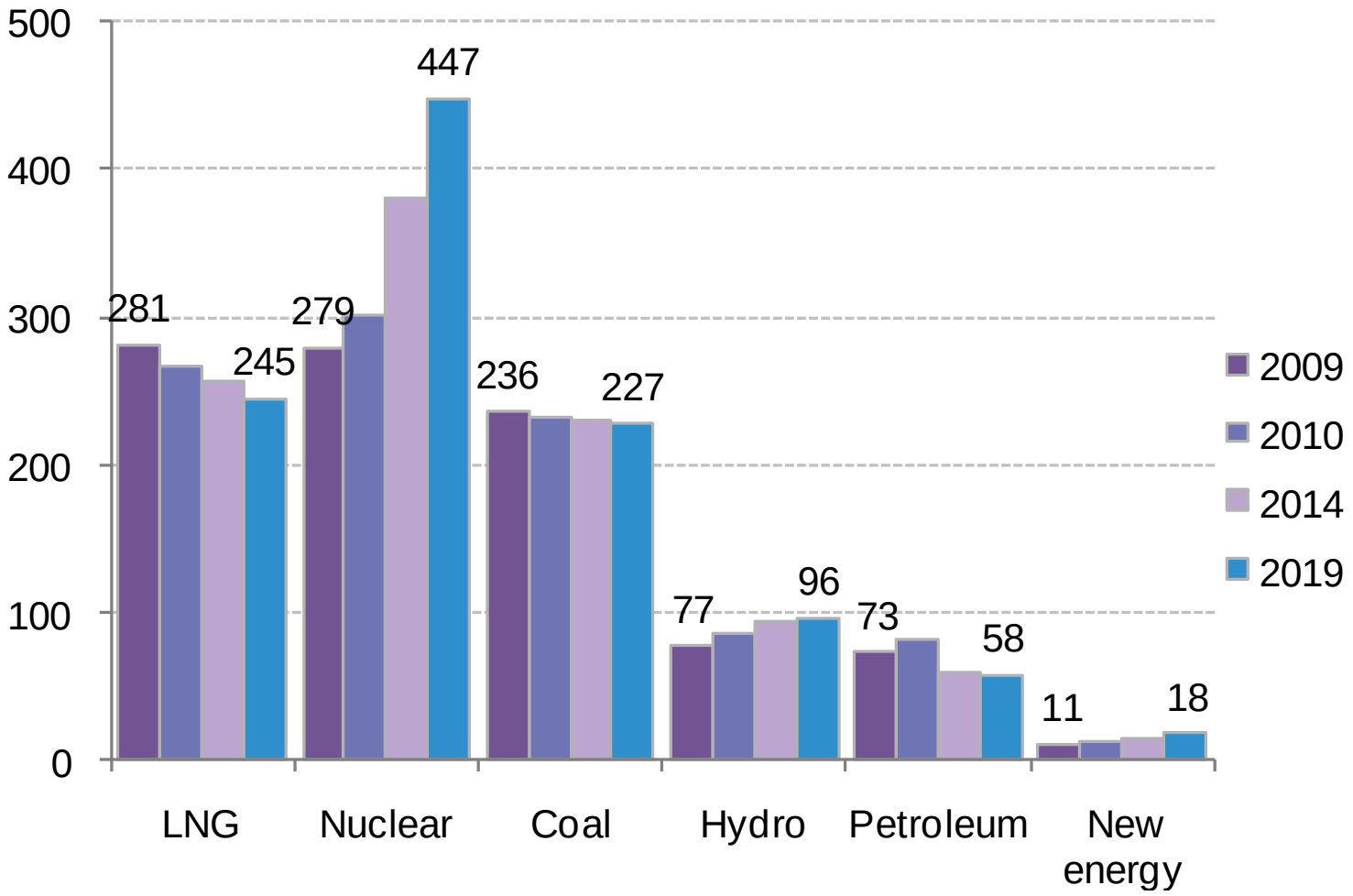
2. Black swans

3. Regional rivalry

BLACK SWANS

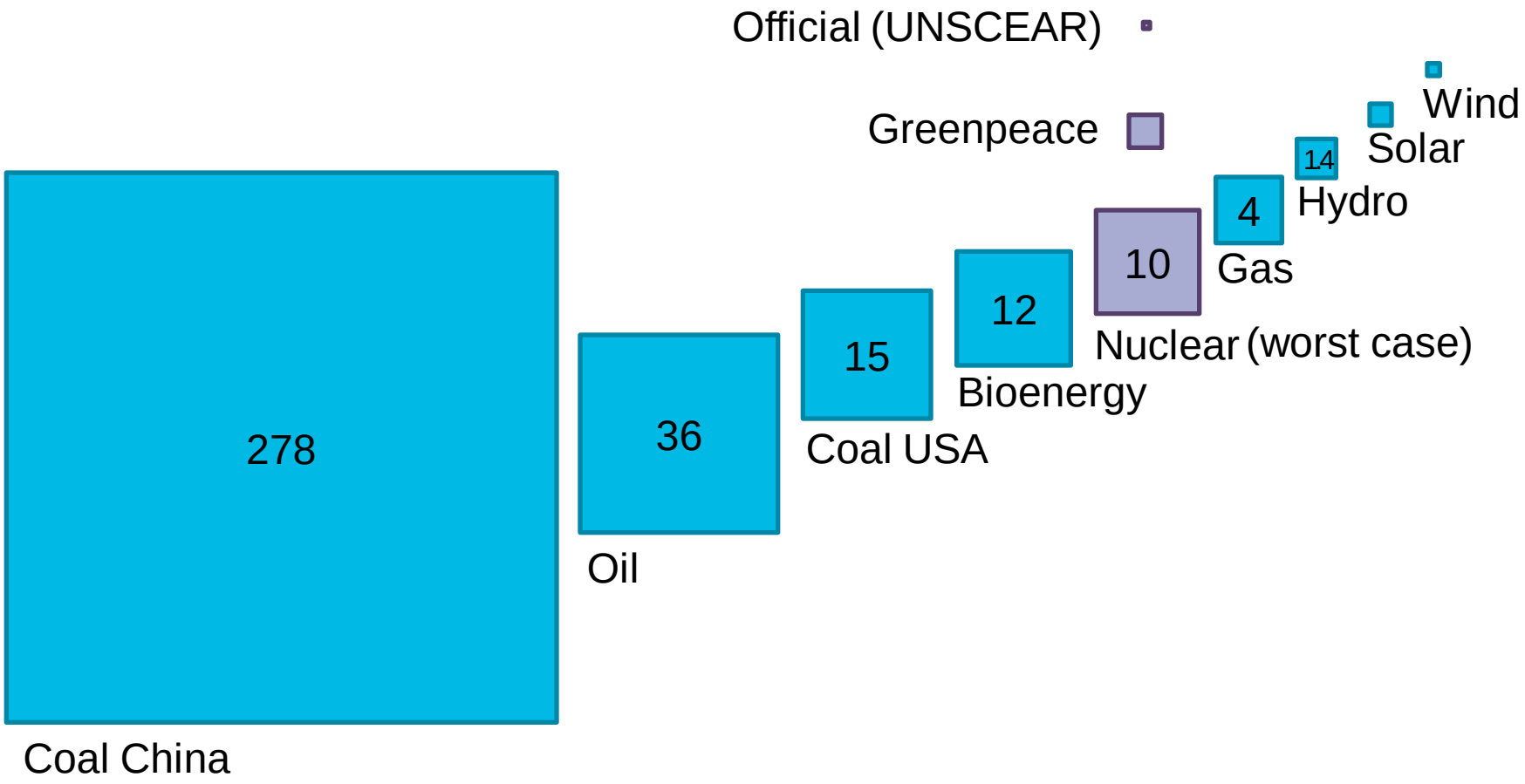
- Japan earthquake & Fukushima
- Deepwater Horizon
- North Africa

PRE-EARTHQUAKE PLANNED TOTAL ELECTRICITY SUPPLY BY SOURCE, JAPAN, 2009–19 (TWh)



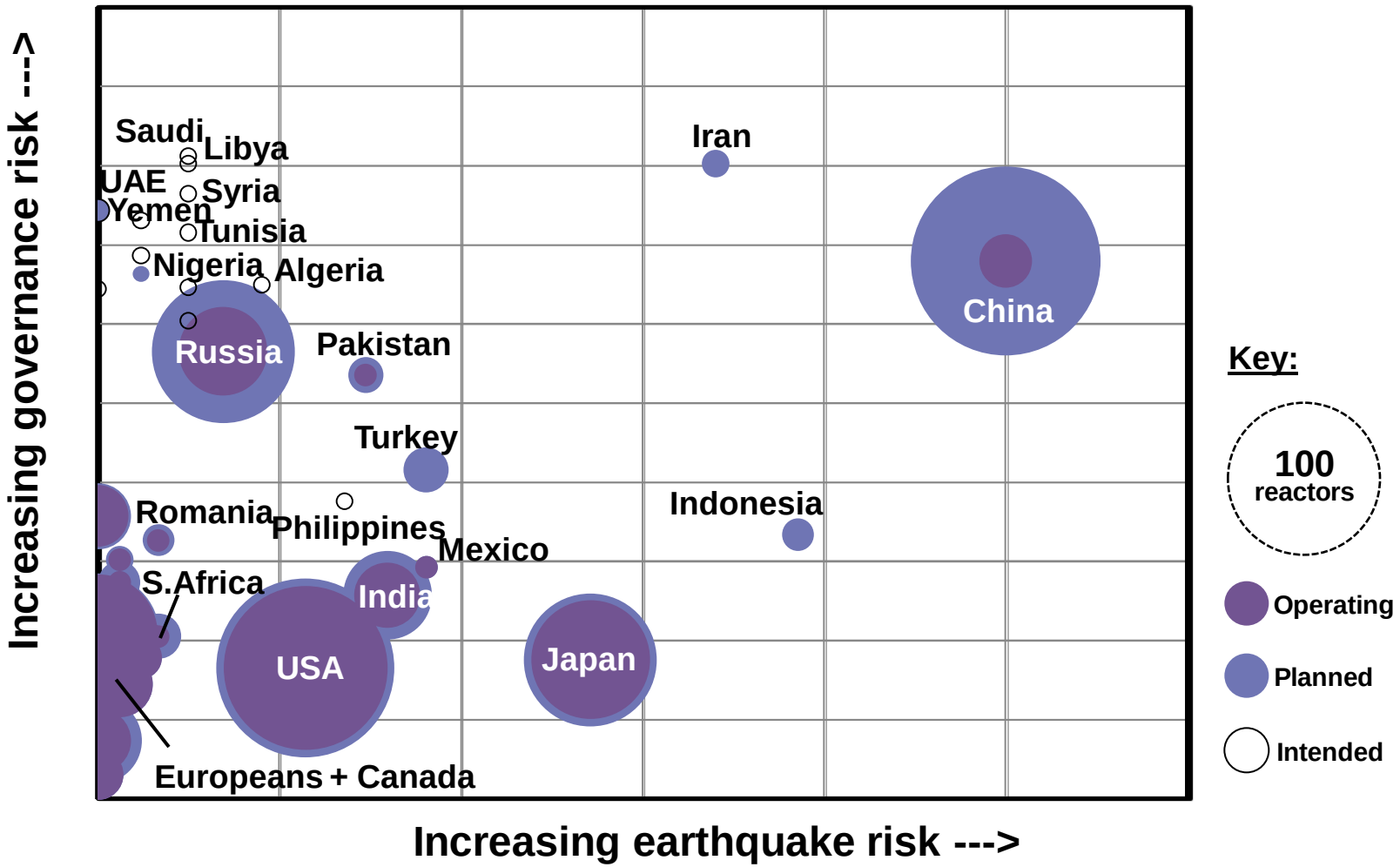
Source: Ministry of Economy, Trade and Industry, *Electricity Supply Plan of 2010*, 31 March 2010

DEATHS PER TWh, 1980–2010



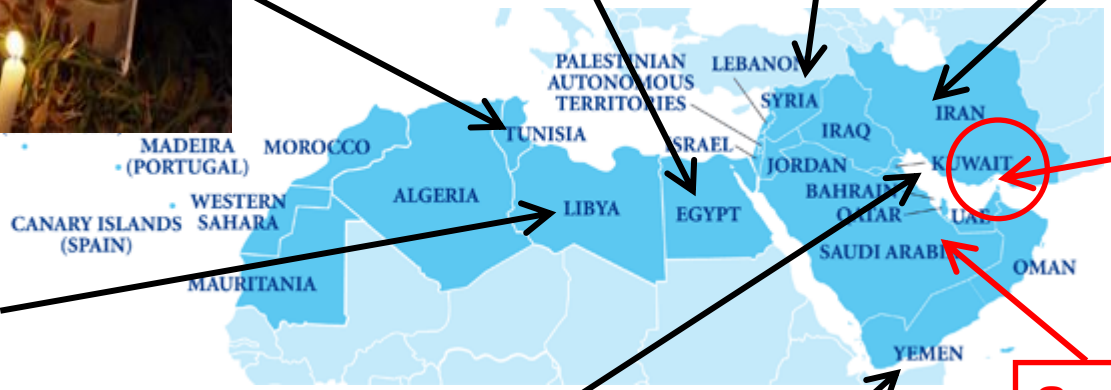
Source: Lifeboat Foundation/Nextbigfuture.com; UNSCEAR; Greenpeace

NUCLEAR POWER: EARTHQUAKE & GOVERNANCE RISK



Source: Economist Intelligence Unit, OFDA/CRED International Disaster Database

NORTH AFRICA



Egypt

Syria

Iran

Libya

Kuwait

Yemen

Straits of Hormuz
17mbpd - 17% of world oil transport

Saudi Arabia
20% of world oil reserves

Source: EIA; Picture credits, AFP, Getty, various

THREE CURRENT ISSUES

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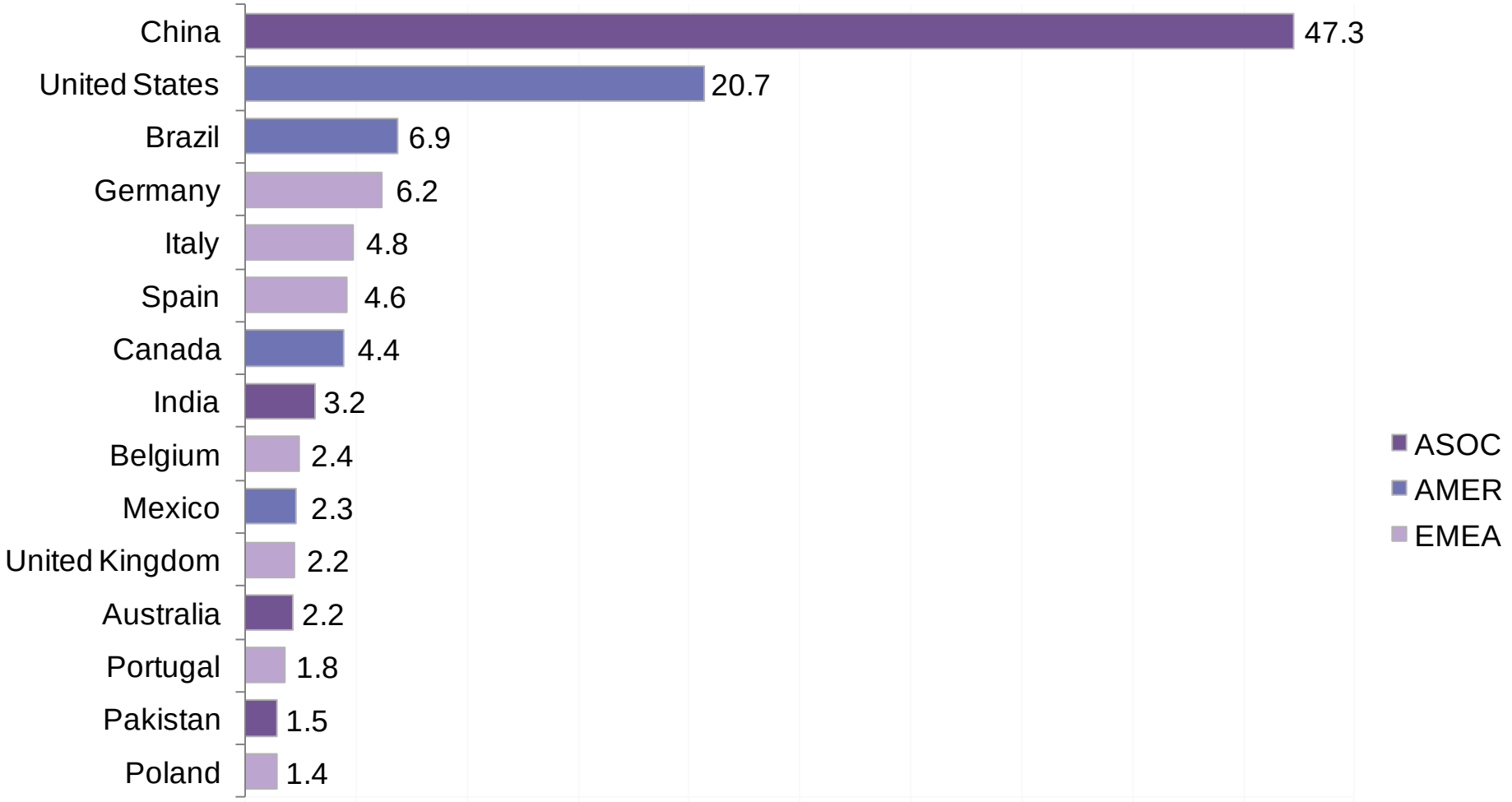
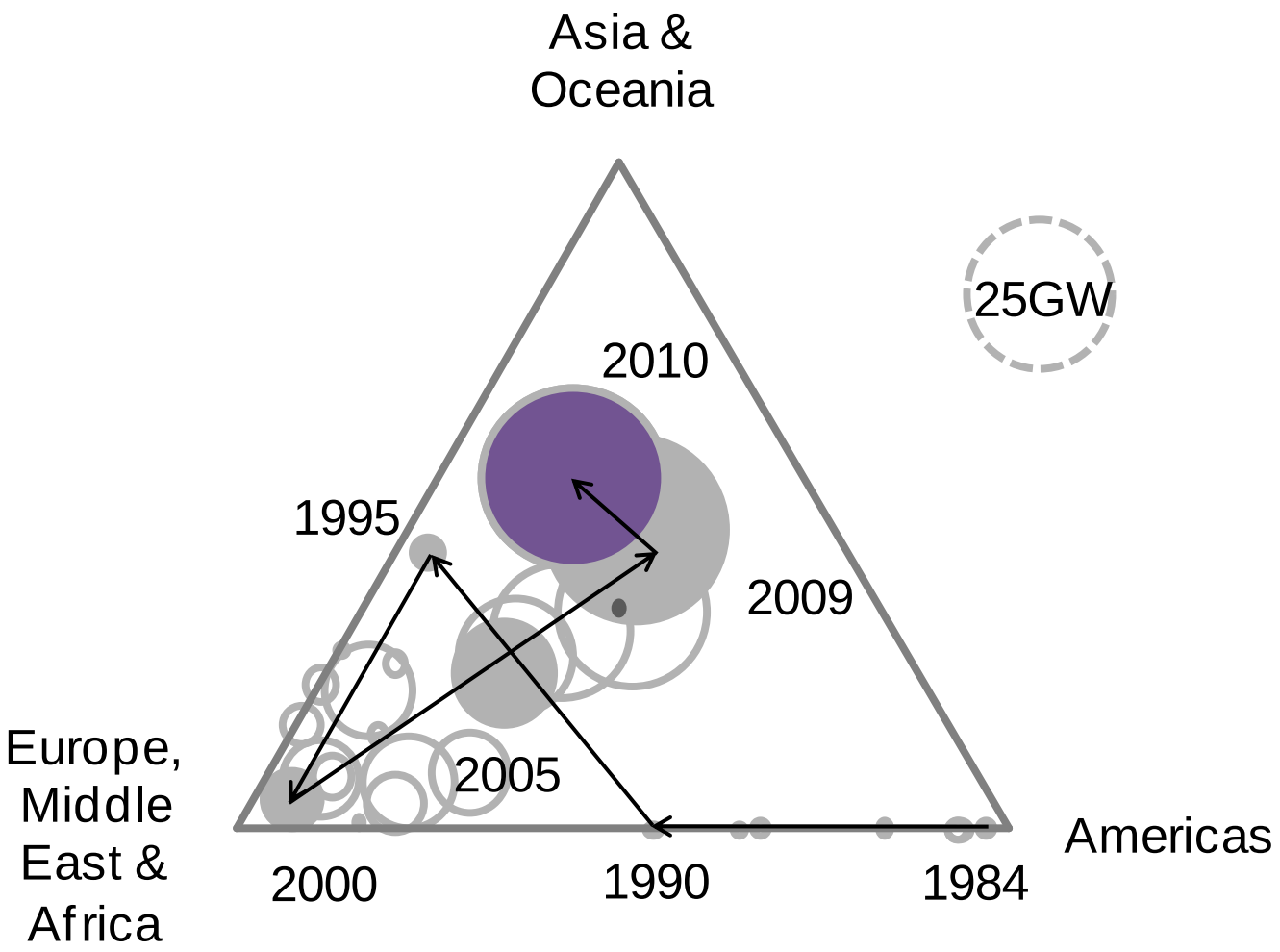
ASSET FINANCE FOR NEW BUILD CLEAN ENERGY – TOP 15 COUNTRIES, 2010 ($BN)



Note: Total values include estimates for undisclosed deals

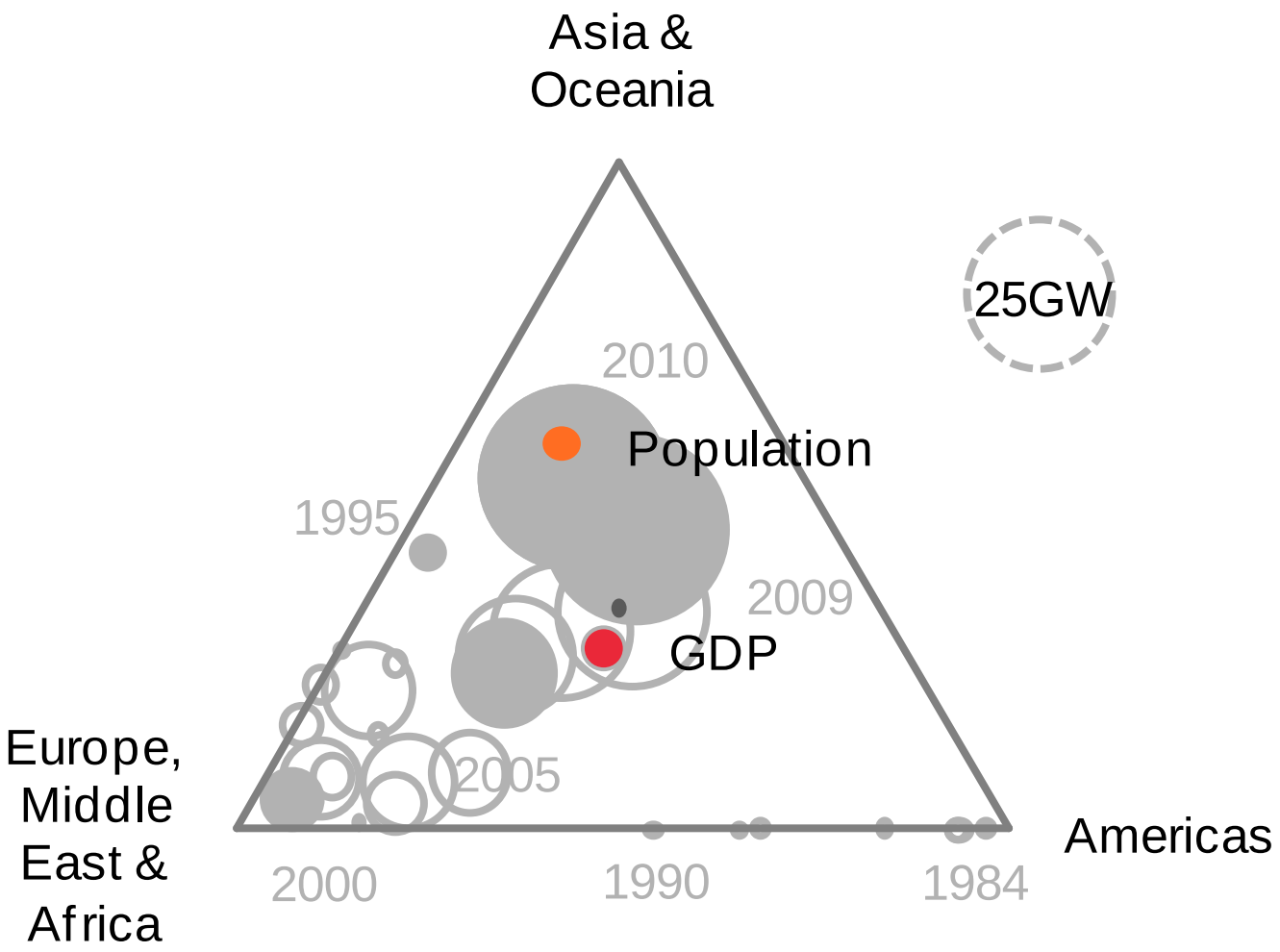
Source: Bloomberg New Energy Finance

WIND-GENERATING CAPACITY NET ADDITIONS, 1984–2010 (GW)



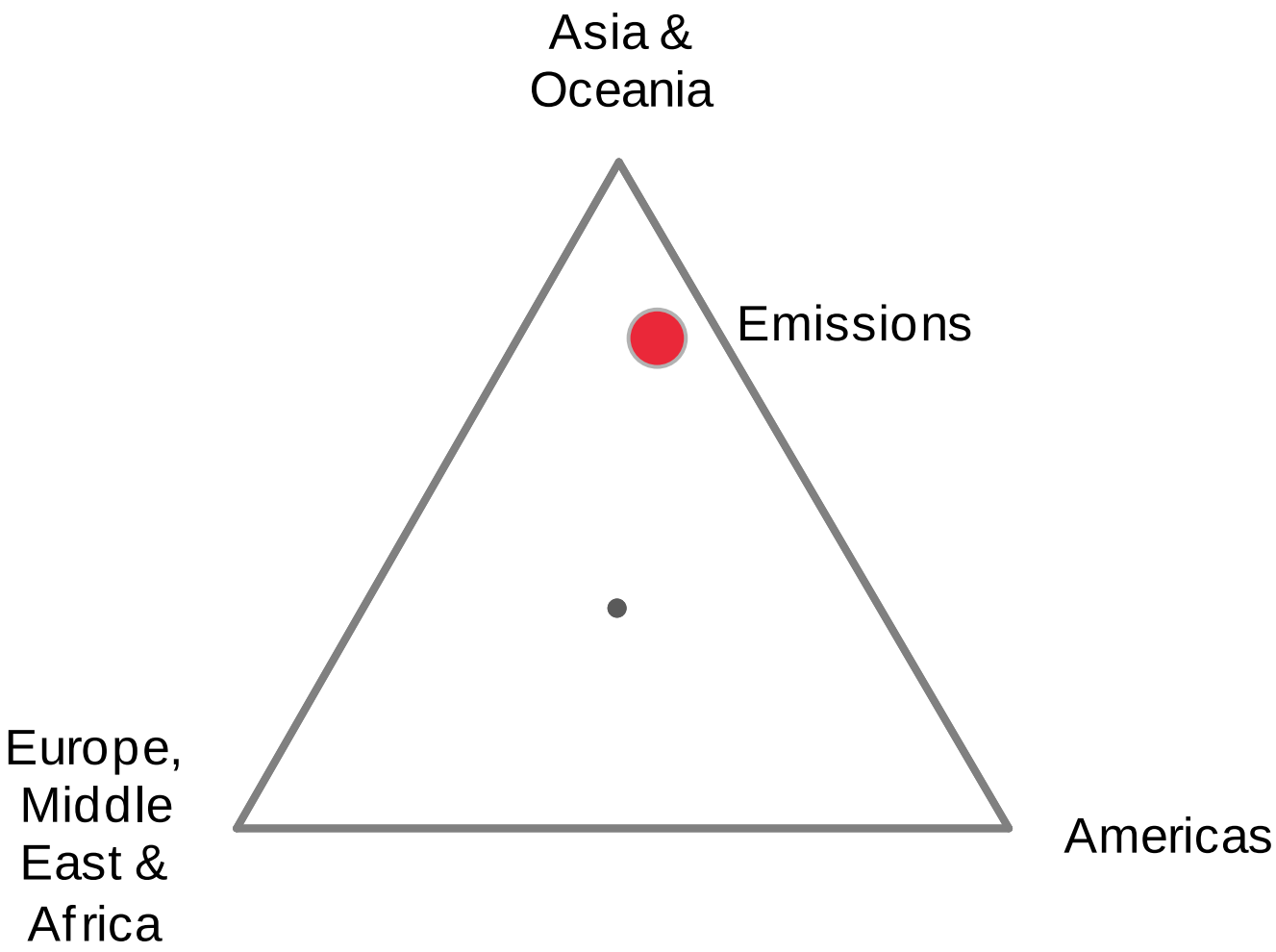
Source: Bloomberg New Energy Finance

WIND-GENERATING CAPACITY NET ADDITIONS, 1984–2010 (GW)



Source: Bloomberg New Energy Finance, World Bank

REGIONAL RIVALRY – INCREMENTAL EMISSIONS, 2010–50



Source: Bloomberg New Energy Finance

TOP 10 GLOBAL WIND MANUFACTURERS 2005, 2010 (RANK ORDER BY PRODUCTION)

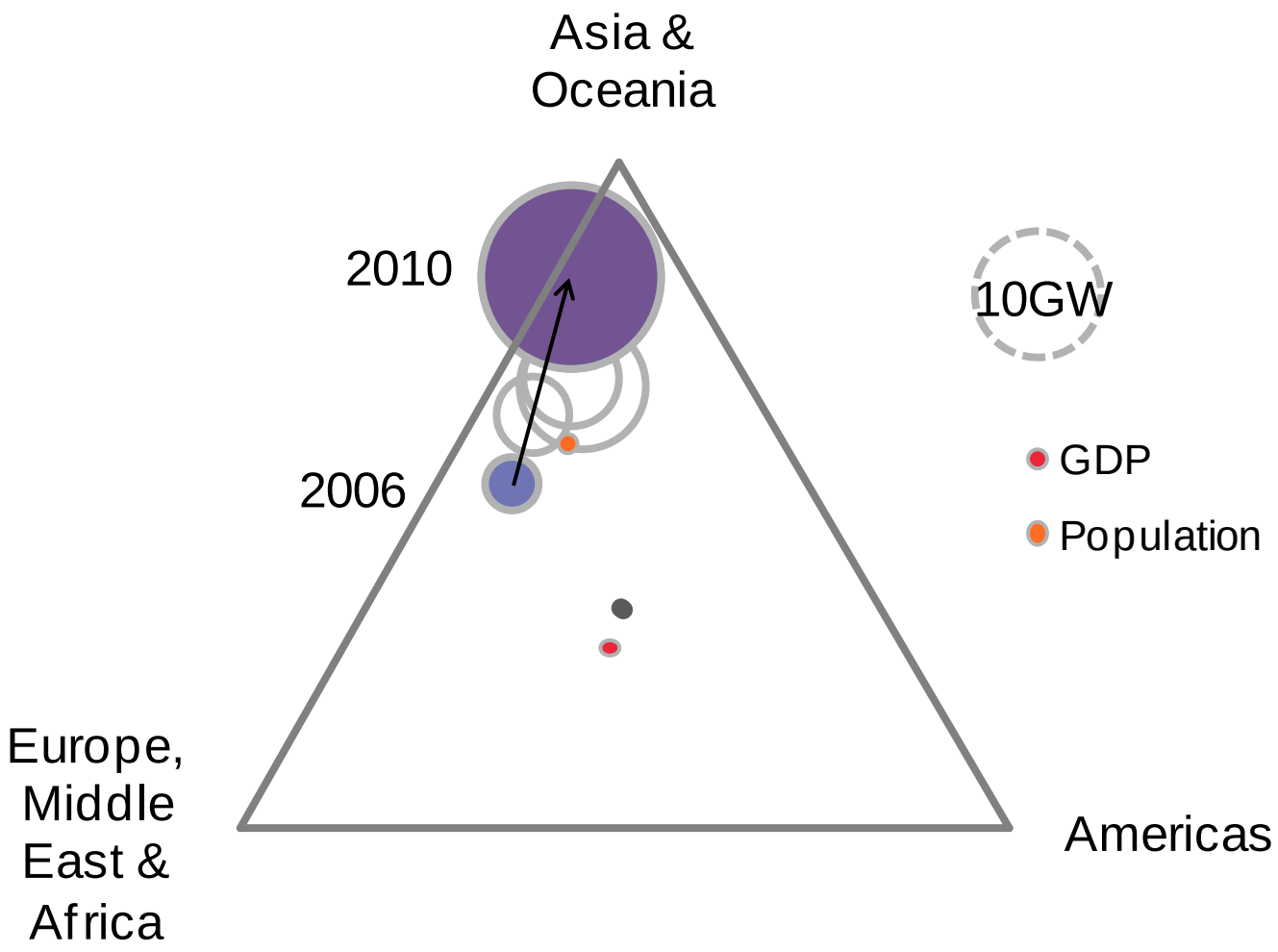
+25% per year

2005			2010		
Company	**Country**	**Production (GW)**	**Company**	**Country**	**Production (GW)**
1. Vestas	Denmark	3.2	1. Vestas	Denmark	6.3
2. Enercon	Germany	2.7	2. GE Wind	US	6.0
3. Gamesa	Spain	1.9	3. Sinovel	China	5.3
4. GE Wind	US	1.3	4. Gamesa	Spain	4.4
5. Siemens	Denmark	1.1	5. Goldwind	China	3.6
6. Suzlon	India	0.9	6. Suzlon	India	3.5
7. Repower	Germany	0.9	7. Enercon	Germany	3.4
8. Goldwind	China	0.7	8. Dongfang	China	3.0
9. Nordex	Germany	0.5	9. Repower	Germany	2.9
10. Ecotecnica	Spain	0.3	9. Siemens	Denmark	2.9

Europe **US** **China** **Other Asia**

Source: Bloomberg New Energy Finance

SOLAR MANUFACTURING CAPACITY ADDITIONS, 2006–10 (GW)



Source: Bloomberg New Energy Finance

TOP 10 GLOBAL PV CELL MANUFACTURERS 2006, 2010 (RANK ORDER BY CAPACITY)

+46% per year

2006

Company	Country	Capacity (MW)
1. Sharp	Japan	500
2. Q-Cells	Germany	420
3. Suntech	China	270
4. Motech	Taiwan	240
5. Solarworld	Germany	200
6. China Sunergy	China	180
7. Kyocera	Japan	180
8. Isofoton	Spain	130
9. Schott	Germany	121
10. Sanyo Electric	Japan	115

2010

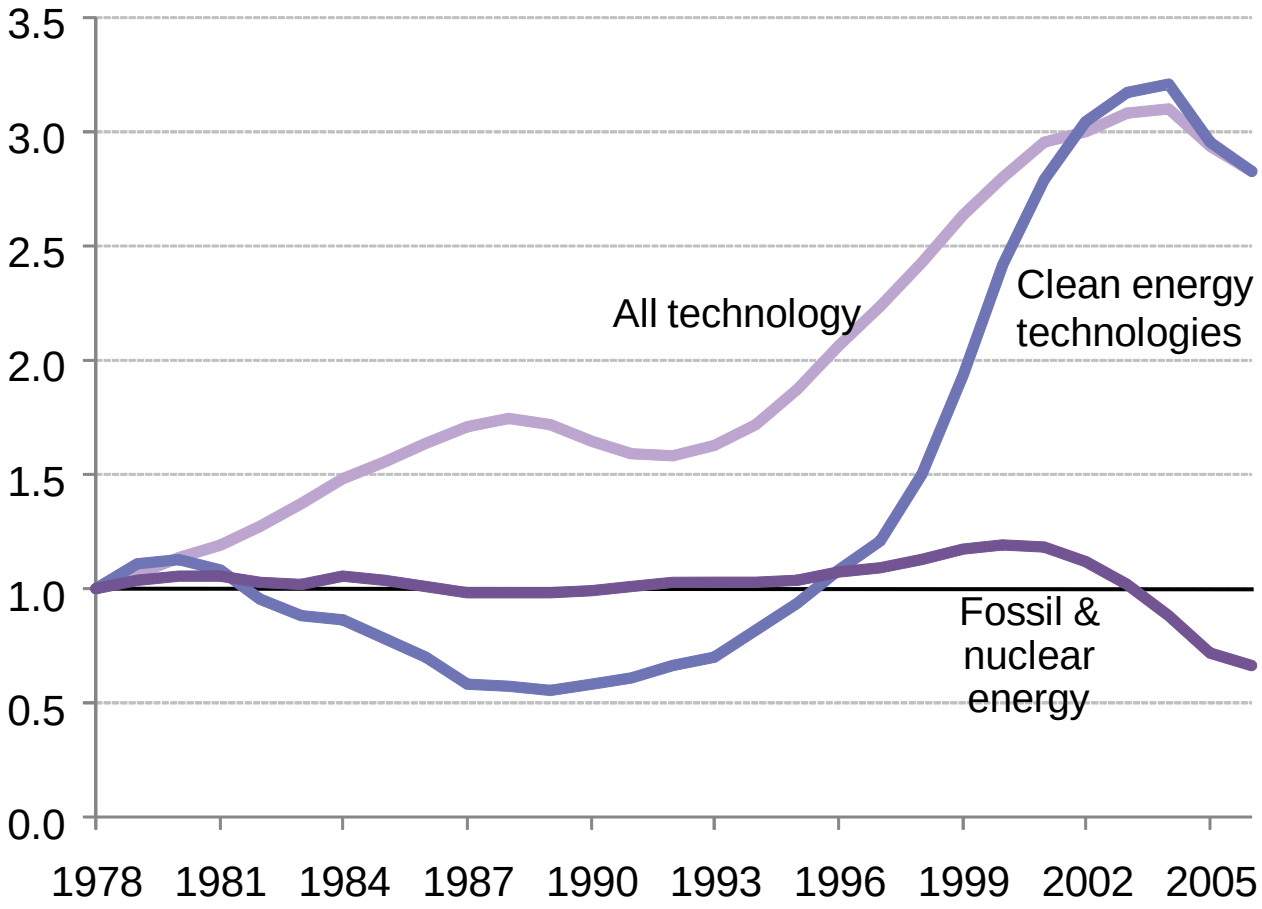
Company	Country	Capacity (MW)
1. JA Solar	China	1,900
2. Suntech	China	1,620
3. First Solar (TF)	US	1,502
4. Yingli	China	1,100
5. Trina Solar	China	1,000
6. Q-Cells	Germany	1,000
7. Canadian Solar	China	800
8. Motech	Taiwan	600
9. Gintech	Taiwan	600
10. JinkoSolar	China	600

Europe **US** **China** **Other Asia**

Note: 'Capacity' counted as either crystalline silicon cell or thin film module. TF is thin film

Source: Bloomberg New Energy Finance, company announcements

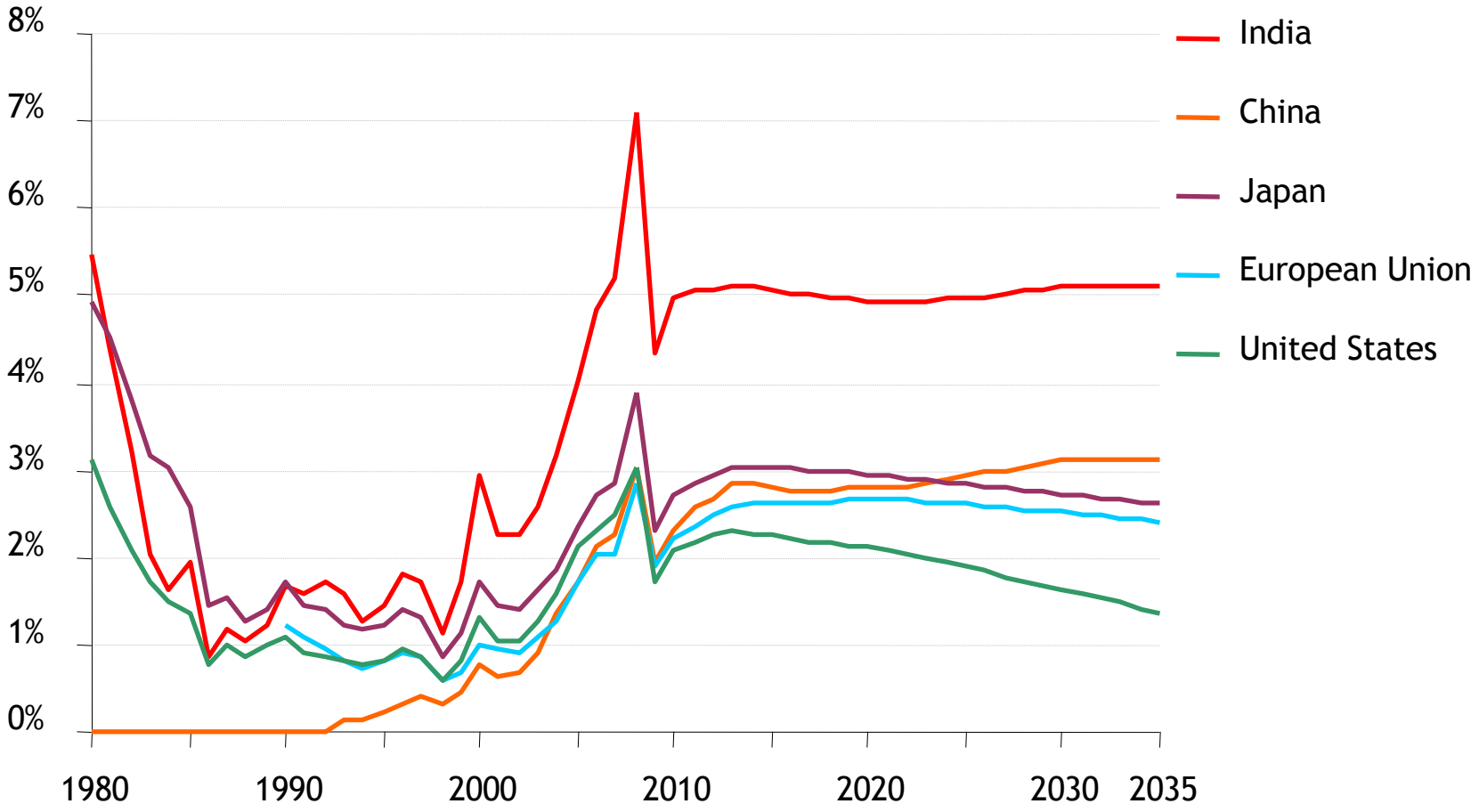
INTERNATIONAL PATENTS WORLDWIDE, 1978–2006 (NUMBER OF PATENTS, INDEXED)



Source: UNEP-EPO-ICTSD Report, Bloomberg New Energy Finance

Note: Three-year moving average, normalised to 1.0 in 1978

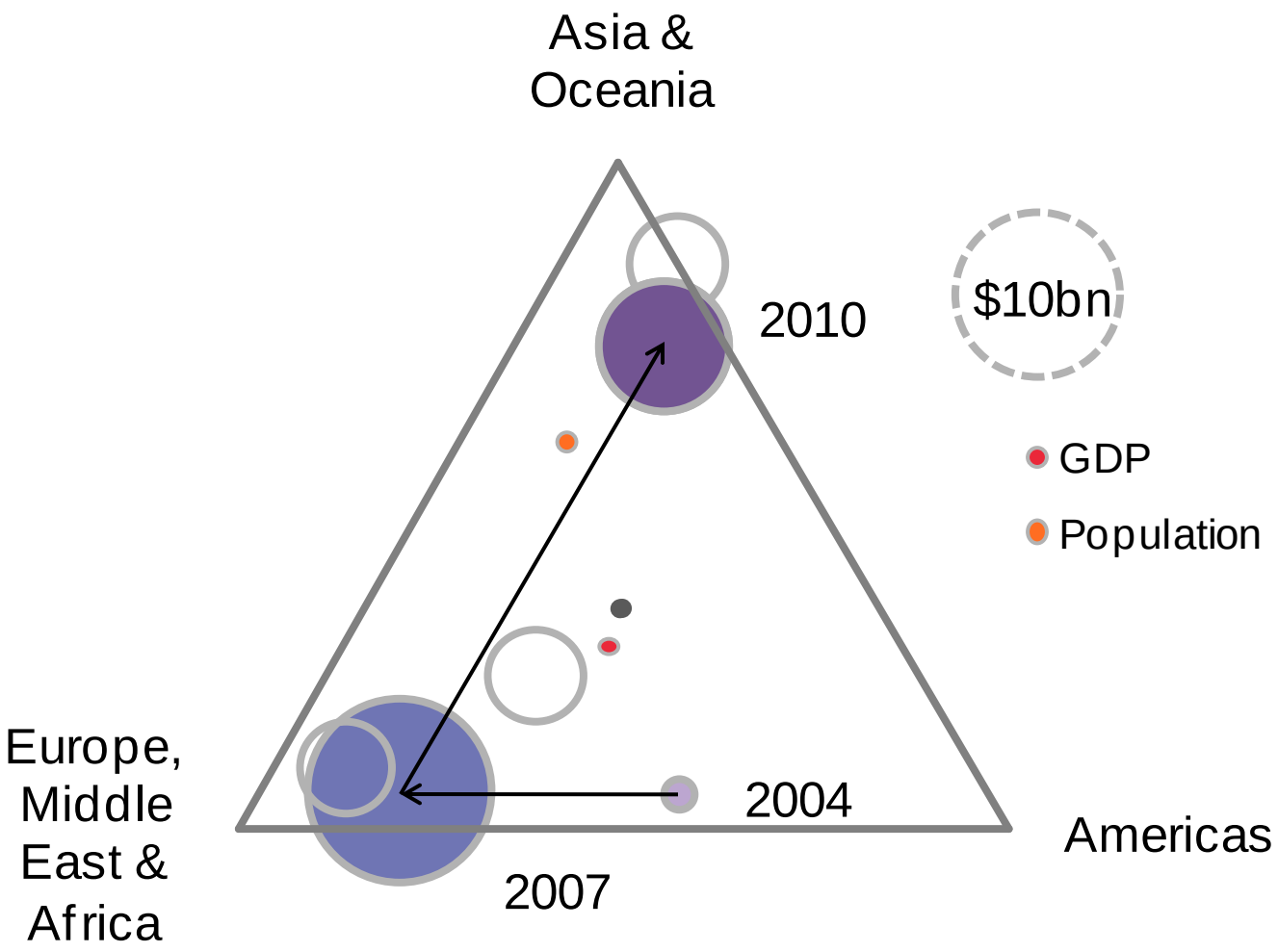
SPENDING ON NET IMPORTS OF OIL & GAS (% OF GDP, IEA WEO 2010 CENTRAL SCENARIO)



Note: Based on oil price rising to $120 ($2009) by 2030

Source: IEA WEO 2010

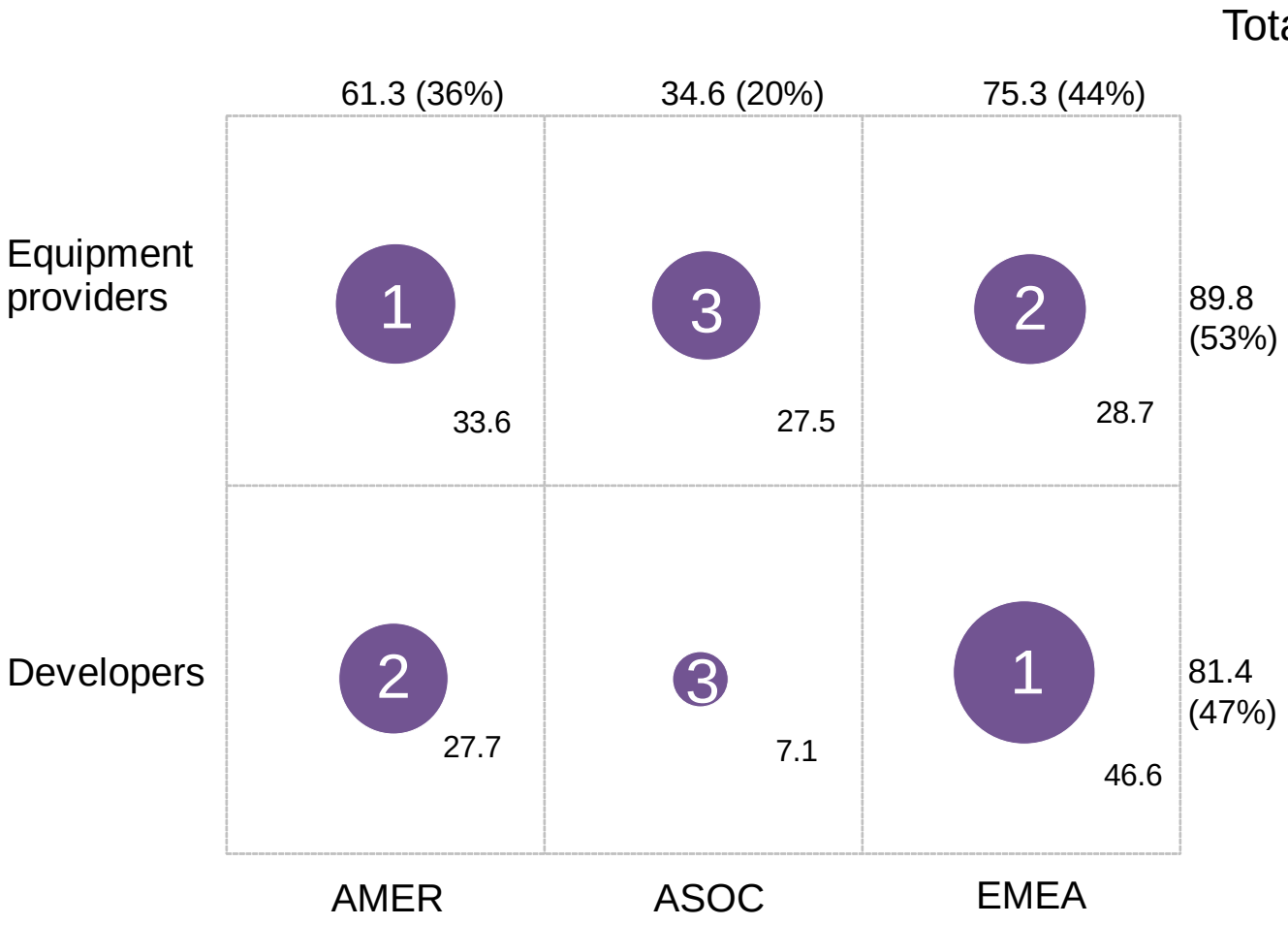
INITIAL PUBLIC OFFERINGS, 2004–10 ($BN)



Note: Includes new equity raised only

Source: Bloomberg New Energy Finance

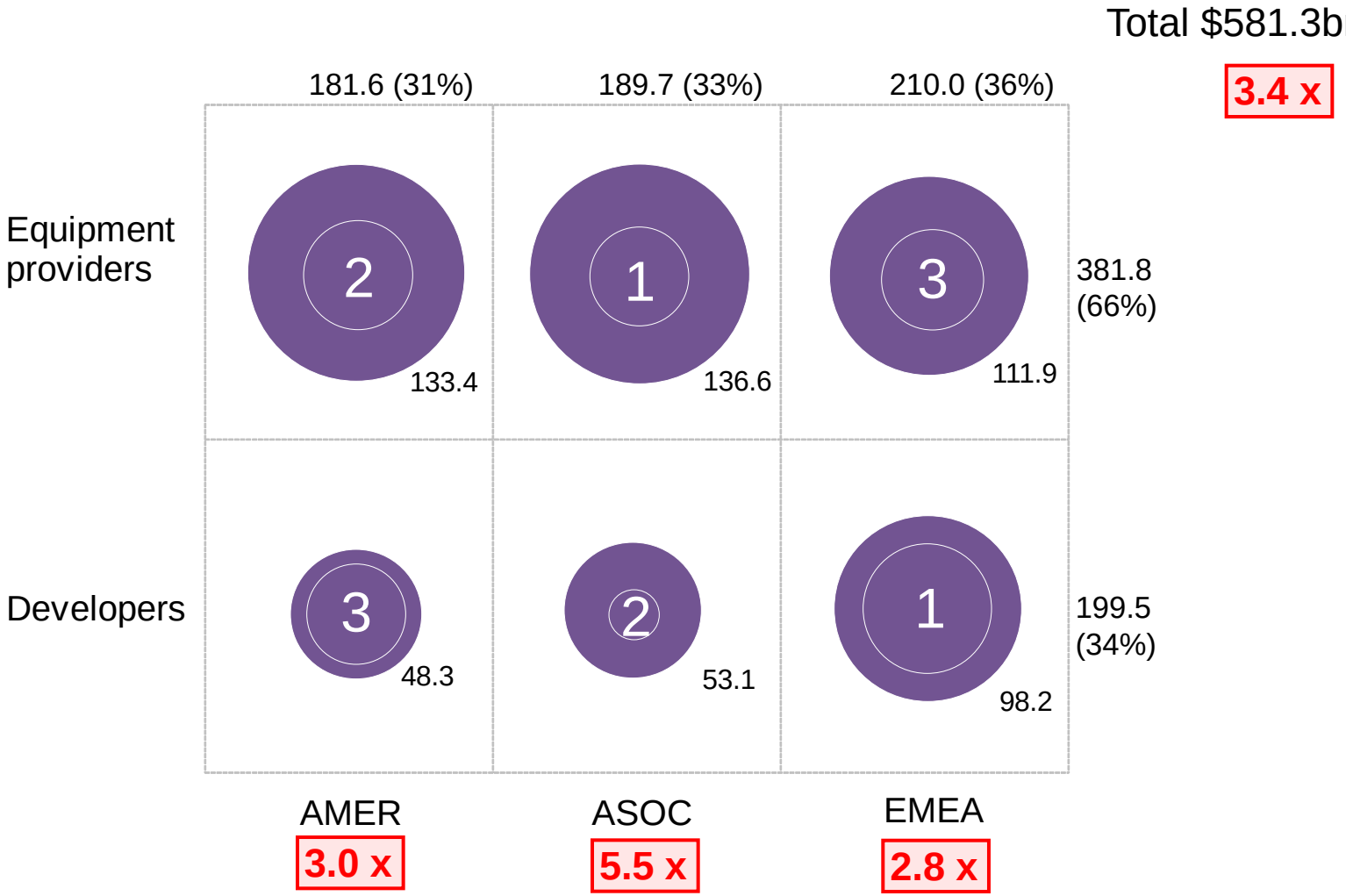
WEIGHTED MARKET CAPITALISATION BY REGION & TYPE, 2006 ($BN)



Note: As at H2 2006. Based on estimated proportion of clean energy contribution to market capitalisations.

Source: Bloomberg New Energy Finance

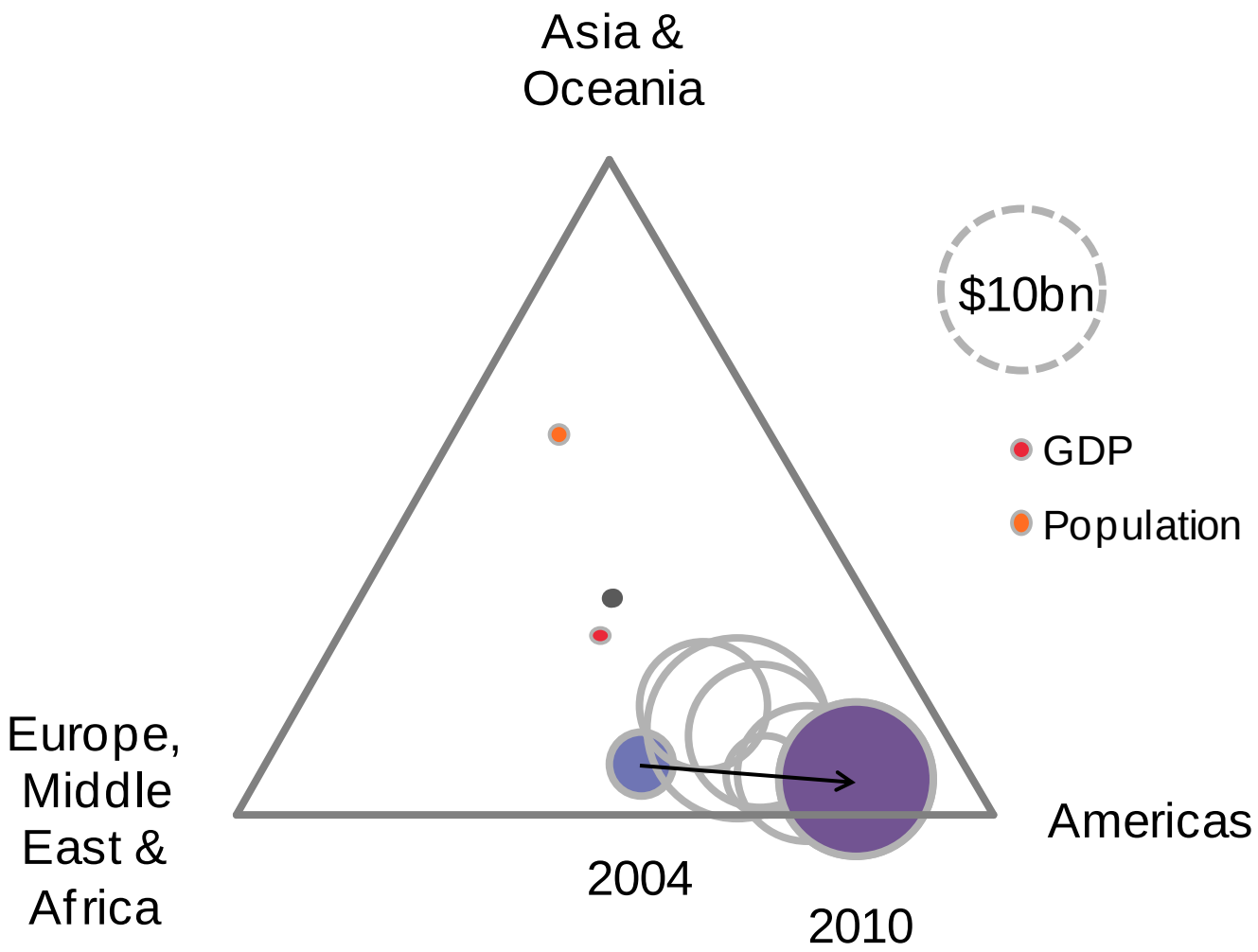
WEIGHTED MARKET CAPITALISATION BY REGION & TYPE, 2011 ($BN)



Note: As at Q1 2011. Based on estimated proportion of clean energy contribution to market capitalisations.

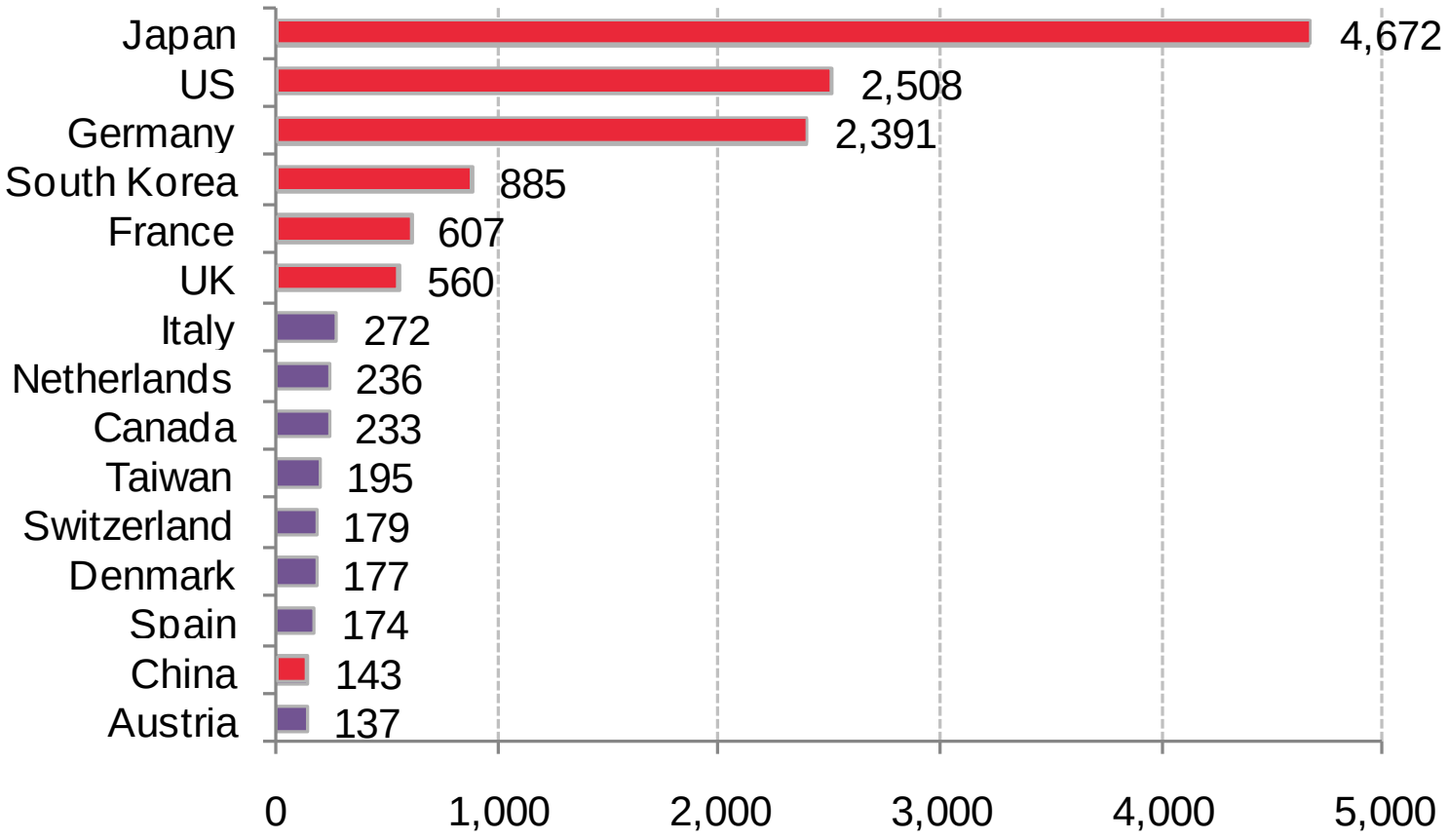
Source: Bloomberg New Energy Finance

VENTURE CAPITAL & PRIVATE EQUITY, 2004–10 ($BN)



Source: Bloomberg New Energy Finance

INTERNATIONAL CLEAN ENERGY PATENTS, 1978–2006
TOP 15 COUNTRIES BY NO. PATENTS



Source: UNEP-EPO-ICTSD Report, Bloomberg New Energy Finance

Note: Patents ordered by country of invention

Innovate
Generate
Integrate

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KEYNOTE – DAY 2

Michael Liebreich

Twitter: MLiebreich

MARKETS

Renewable Energy
Carbon Markets
Energy Smart Technologies
Renewable Energy Certificates
Carbon Capture & Storage
Power
Water
Nuclear

SERVICES

Insight: research, analysis & forecasting
Industry Intelligence: data & analytics
News & Briefing: daily, weekly & monthly
Applied Research: custom research & data mining
Knowledge Services: Summit, Leadership Forums, Executive Briefings & workshops

Subscription-based news, data and analysis to support your decisions in clean energy, power and water and the carbon markets

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