

# Trends in Clean Energy Investment

**Madrid**

**31<sup>st</sup> January 2012**

**Guy Turner**

**Director, Bloomberg New Energy Finance**

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1. Global annual clean energy investment overview

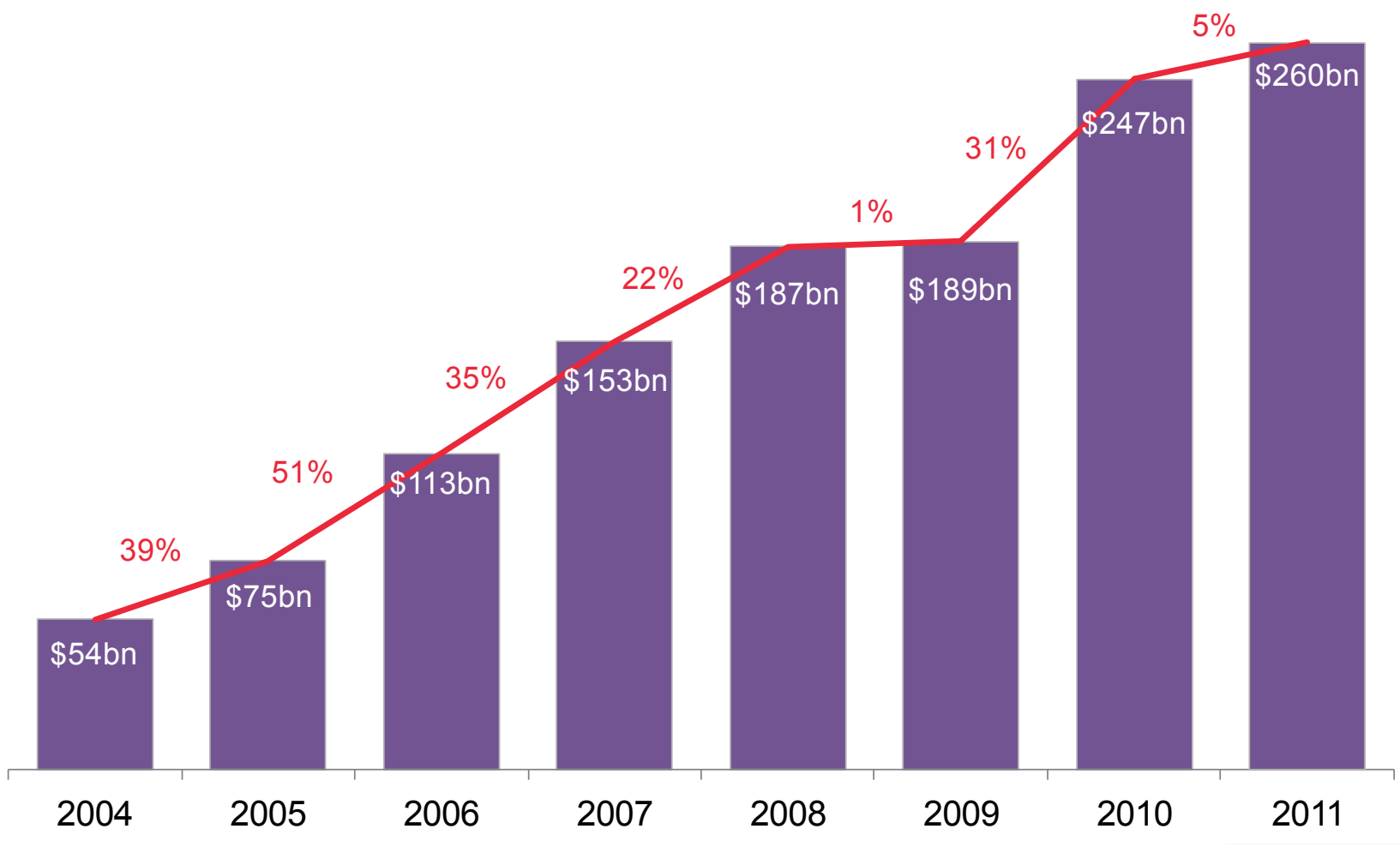
2. Drivers

3. Threats

4. Projections

# GLOBAL TOTAL NEW INVESTMENT IN CLEAN ENERGY

2004–11 (\$BN)

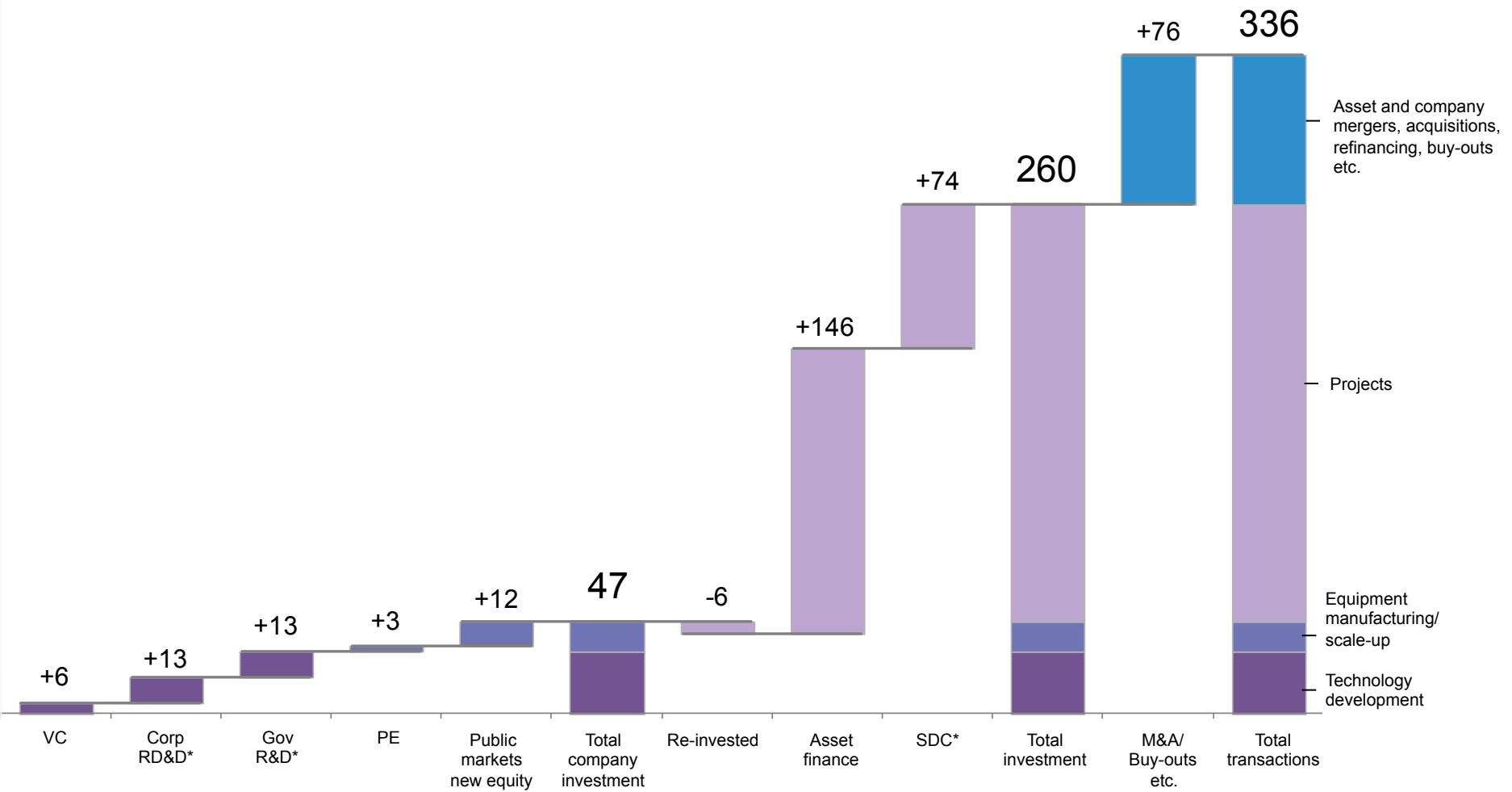


Note: Includes corporate and government R&D, and small distributed capacity. Adjusted for re-invested equity. Does not include proceeds from acquisition transactions

Source: Bloomberg New Energy Finance

# CLEAN ENERGY INVESTMENT TYPES & FLOWS

2011 (\$BN)

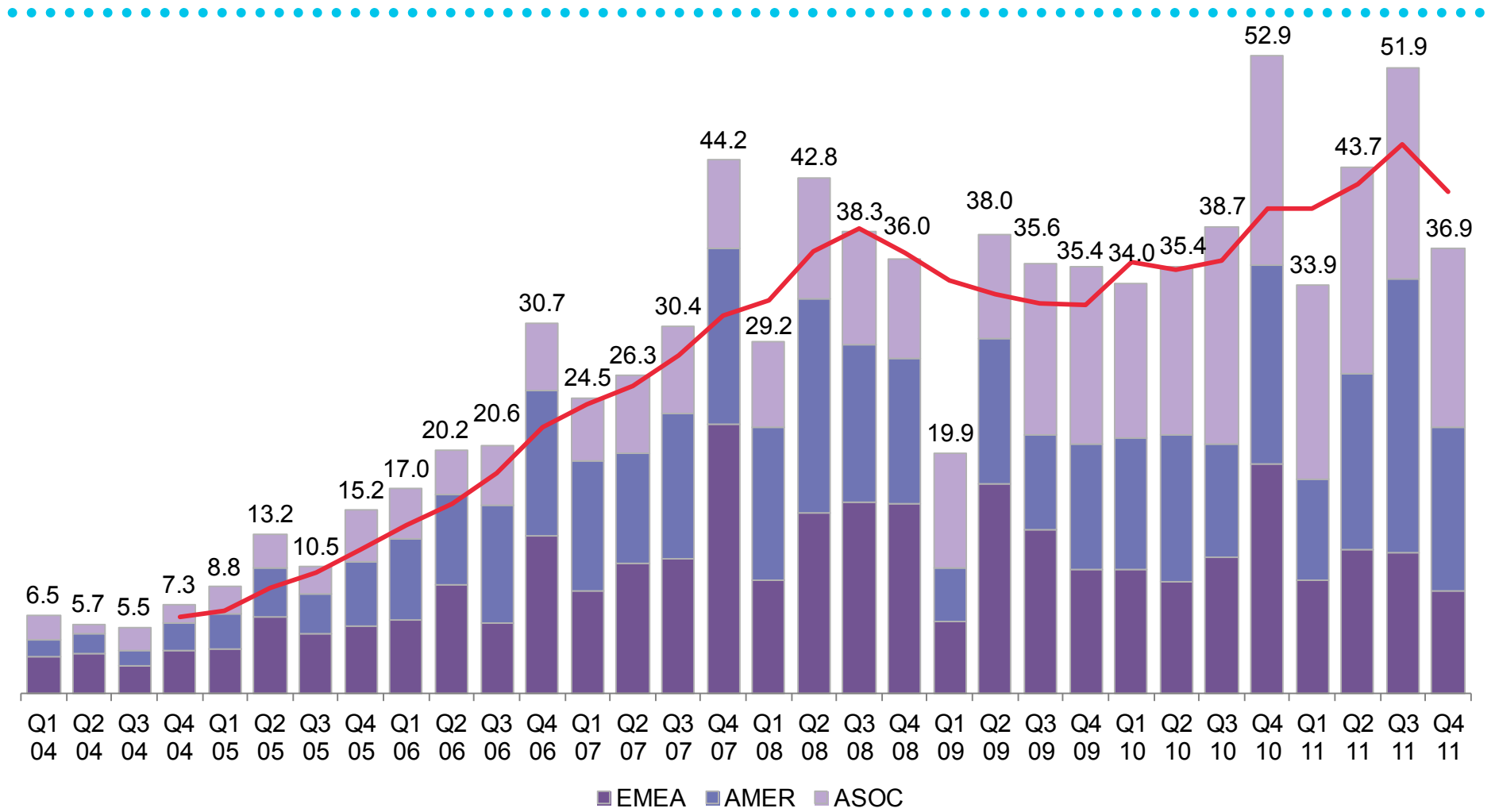


Note: Includes corporate and government R&D, and small distributed capacity. Adjusted for re-invested equity.

Source: Bloomberg New Energy Finance

# NEW FINANCIAL INVESTMENT IN CLEAN ENERGY BY REGION

Q1 2004–Q4 2011 (\$BN)

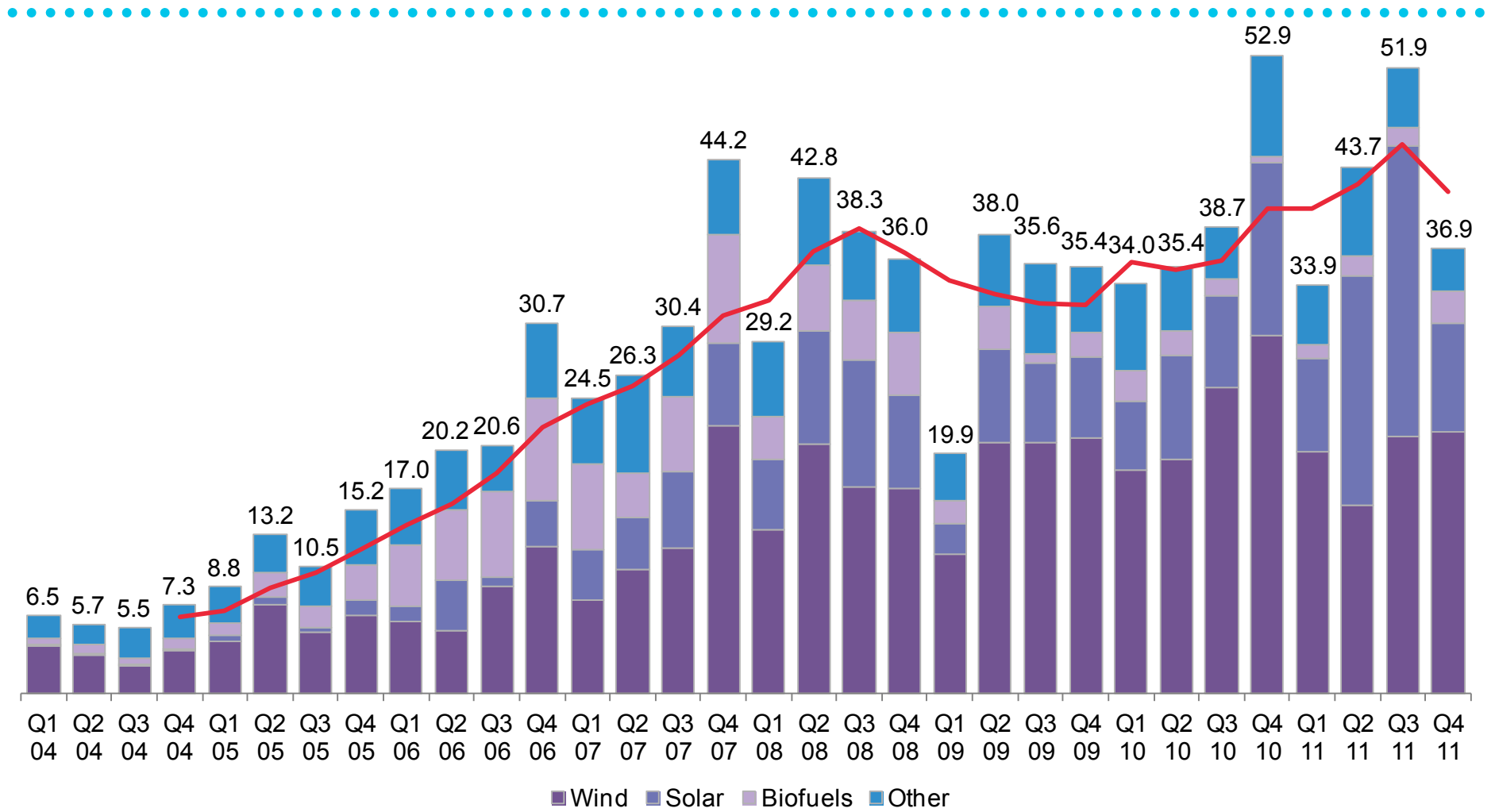


Note: Excludes corporate and government R&D, and small distributed capacity. Not adjusted for re-invested equity

Source: Bloomberg New Energy Finance

# NEW FINANCIAL INVESTMENT IN CLEAN ENERGY BY SECTOR

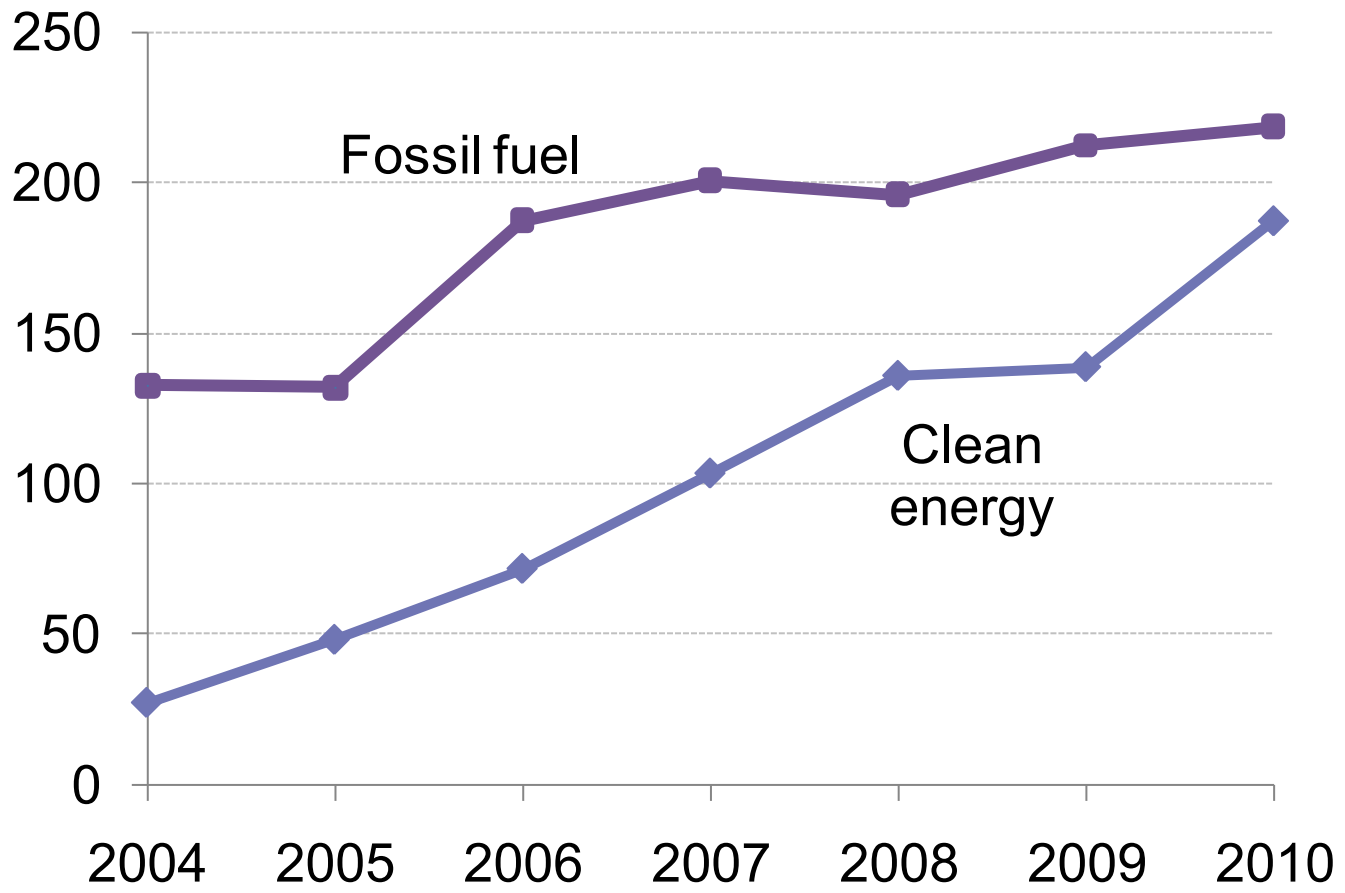
## Q1 2004–Q4 2011 (\$BN)



Note: Excludes corporate and government R&D, and small distributed capacity. Not adjusted for re-invested equity

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

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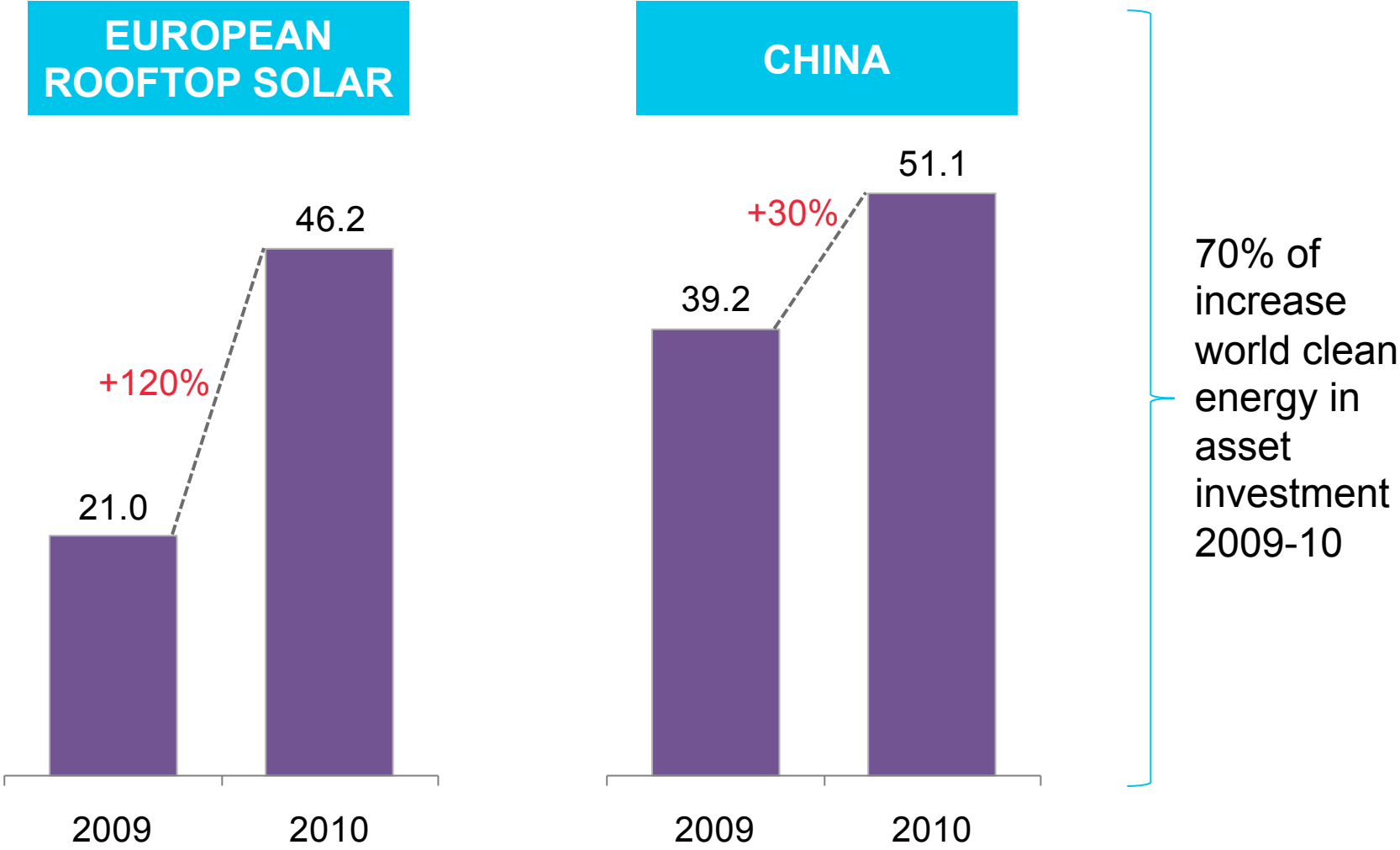
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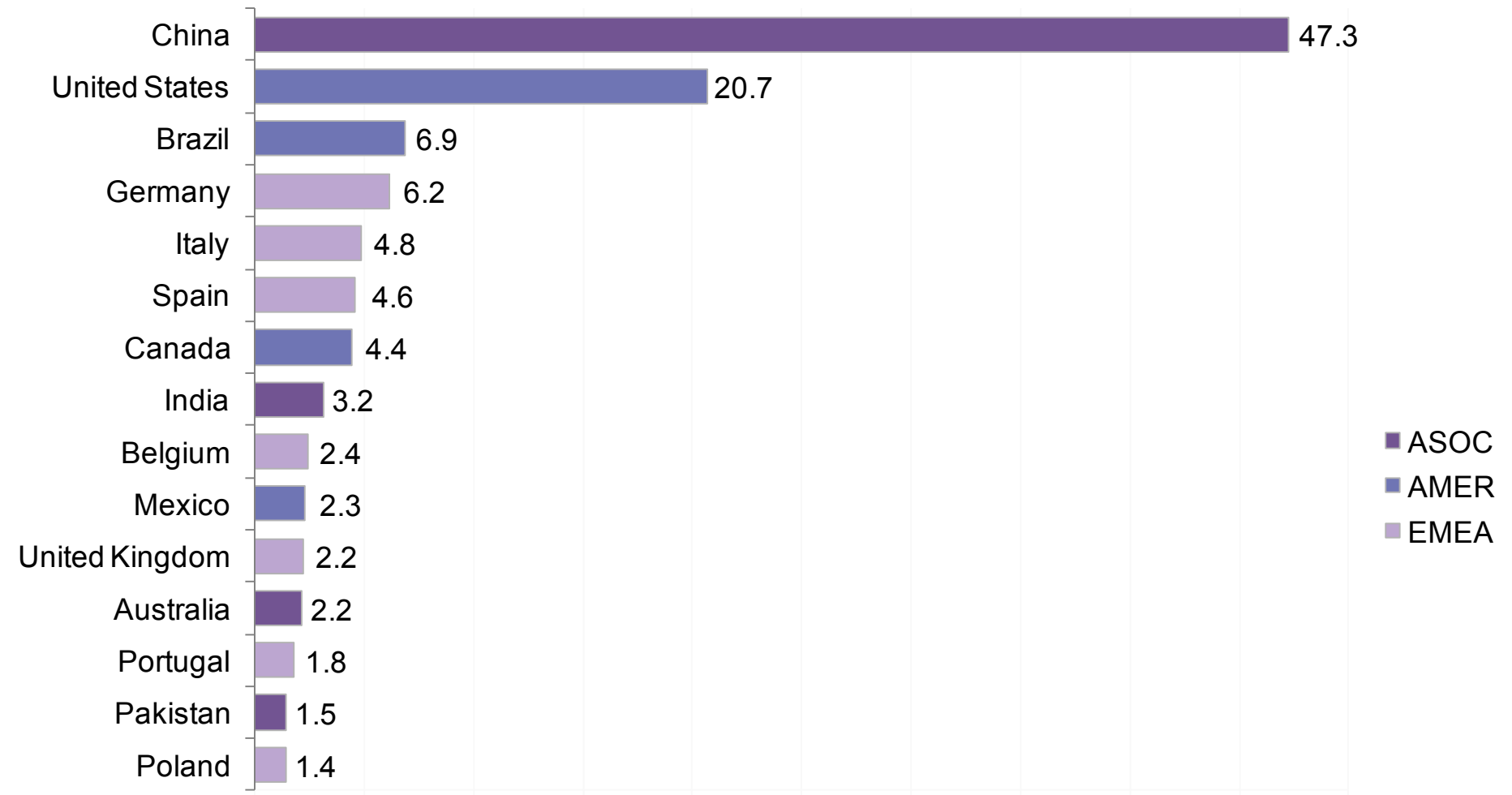


# DRIVERS OF INVESTMENT GROWTH, 2009–10 (\$BN)



Source: Bloomberg New Energy Finance

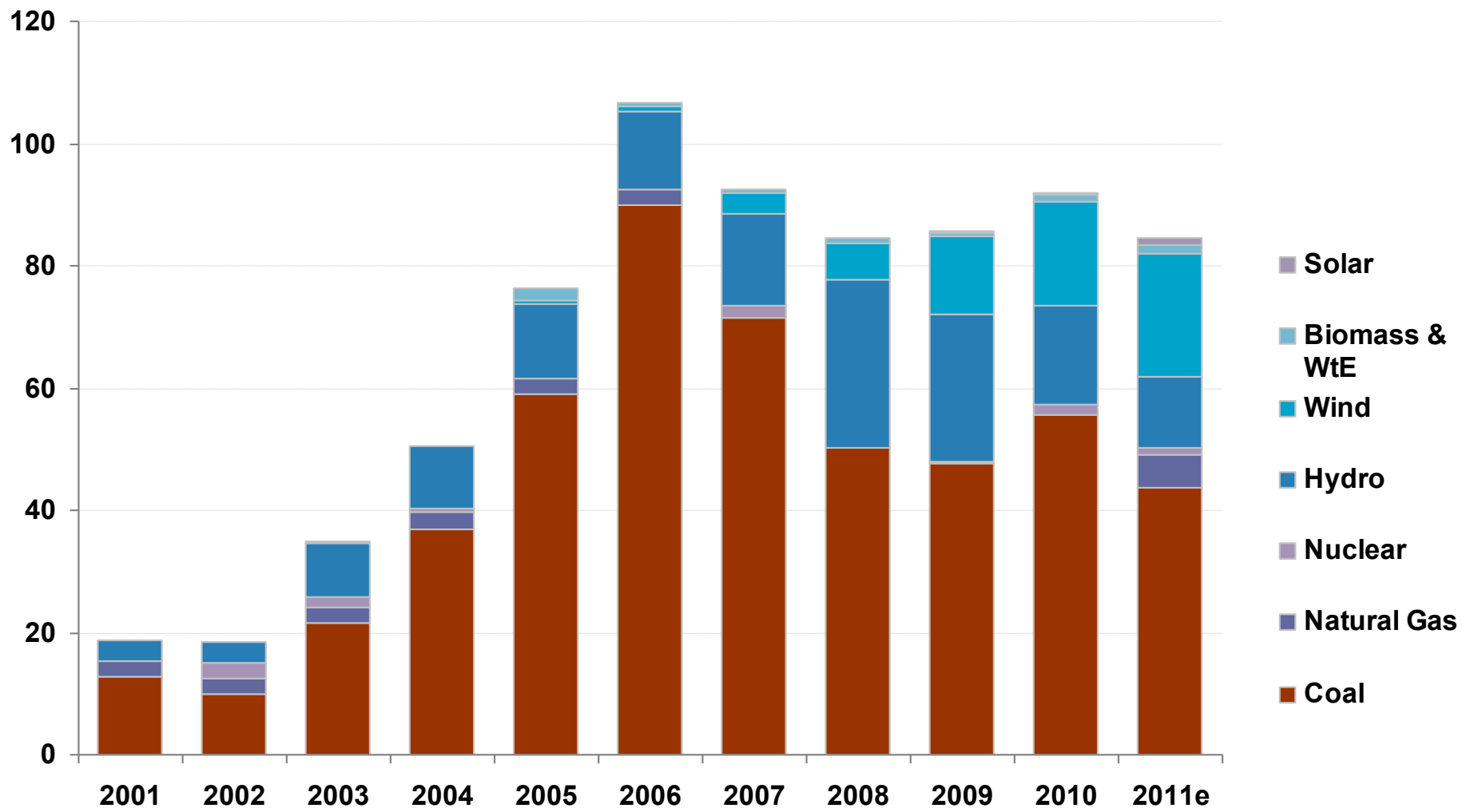
# ASSET FINANCE FOR NEW BUILD CLEAN ENERGY – TOP 15 COUNTRIES, 2010 (\$BN)



Note: Total values include estimates for undisclosed deals

Source: Bloomberg New Energy Finance

# CHINA POWER CAPACITY ADDITIONS BY TECHNOLOGY, 2001-11E (GW)



Source: China Electricity Council, Bloomberg New Energy Finance

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

20%

2006

+46% per year

2010

65%

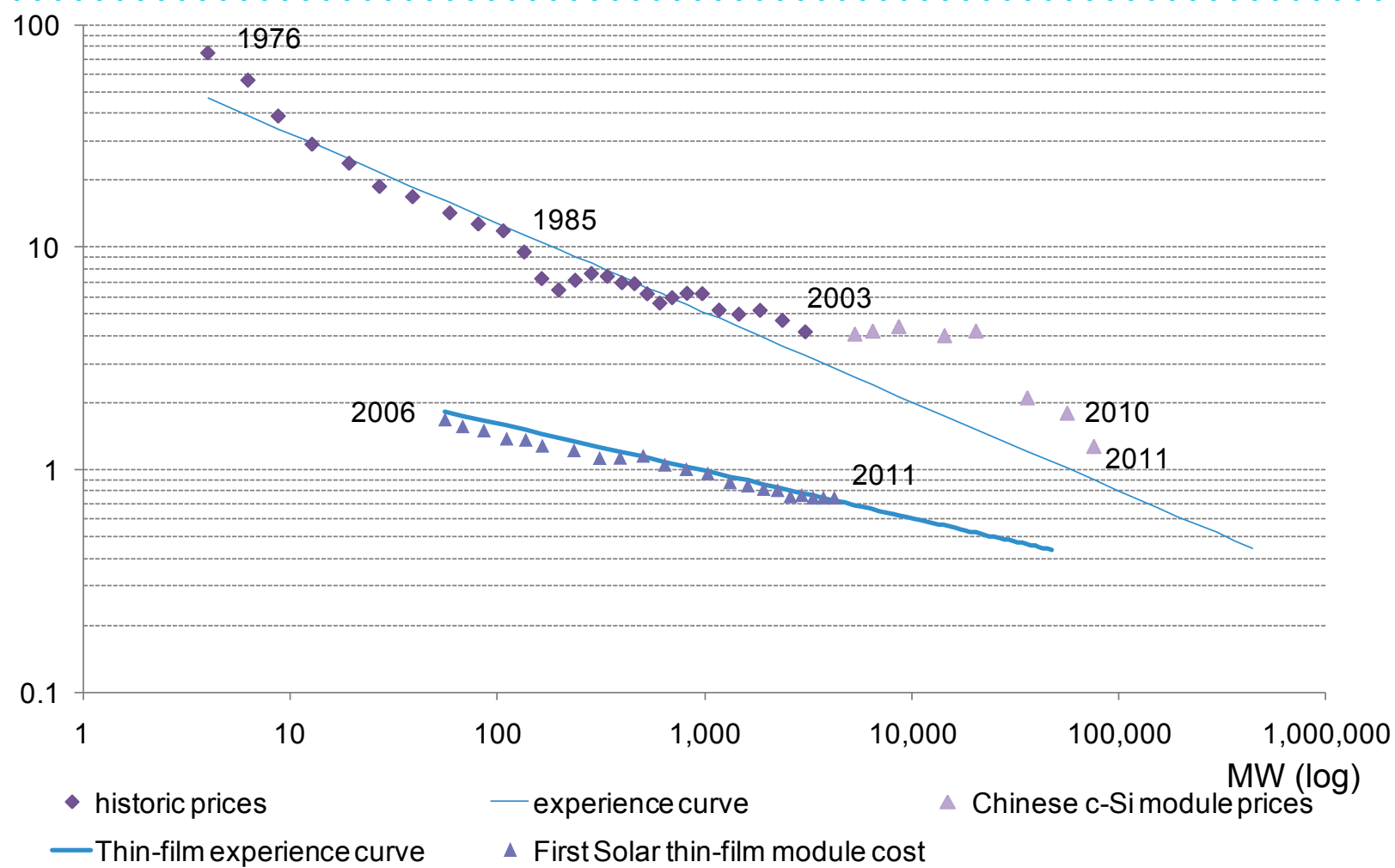
Company	Country	Capacity (MW)	Company	Country	Capacity (MW)
Sharp	Japan	500	JA Solar	China	1,900
Q-Cells	Germany	420	Suntech	China	1,620
Suntech	China	270	First Solar (TF)	US	1,502
Motech	Taiwan	240	Yingli	China	1,100
Solarworld	Germany	200	Trina Solar	China	1,000
China Sunergy	China	180	Q-Cells	Germany	1,000
Kyocera	Japan	180	Canadian Solar	China	800
Isofoton	Spain	130	Motech	Taiwan	600
Schott	Germany	121	Gintech	Taiwan	600
Sanyo Electric	Japan	115	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

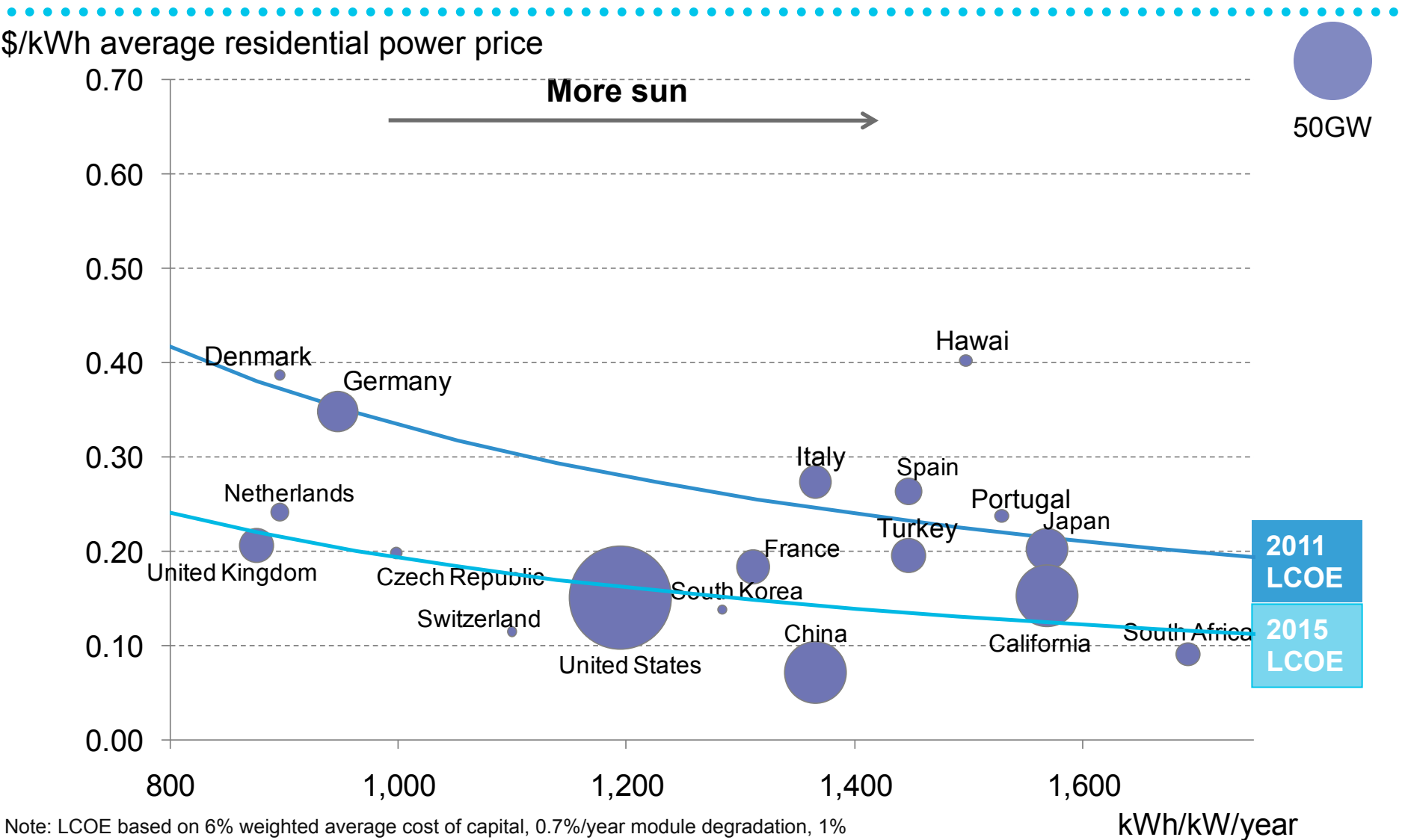
# THE PV MODULE EXPERIENCE CURVE, 1976–2011 (\$/W)



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

Source: Paul Maycock, Bloomberg New Energy Finance, FSLR filings

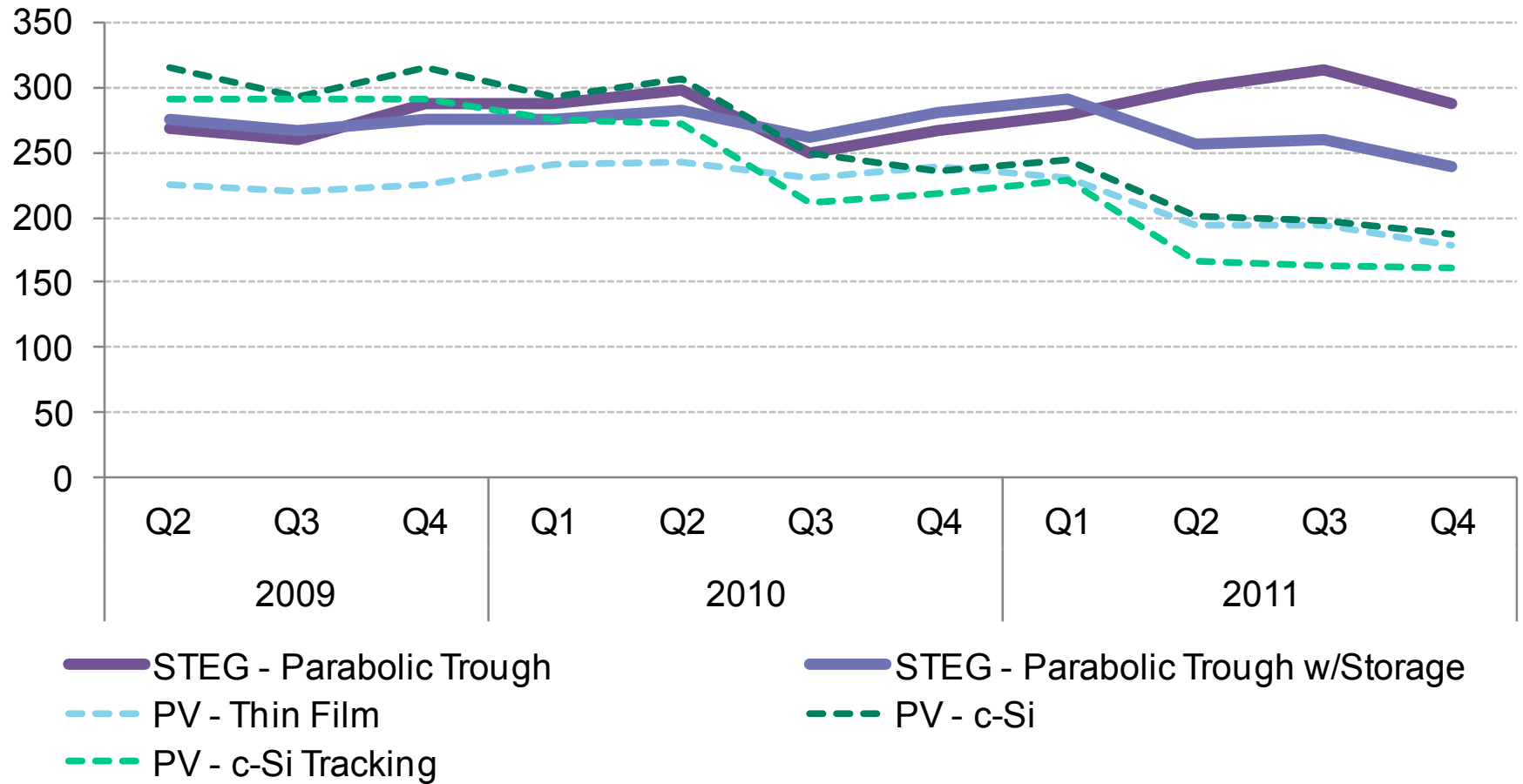
# RESIDENTIAL PV PRICE PARITY



Note: LCOE based on 6% weighted average cost of capital, 0.7%/year module degradation, 1% capex as O&M annually. \$3.5/W capex assumed for 2011, \$2/W for 2015.

Source: Bloomberg New Energy Finance

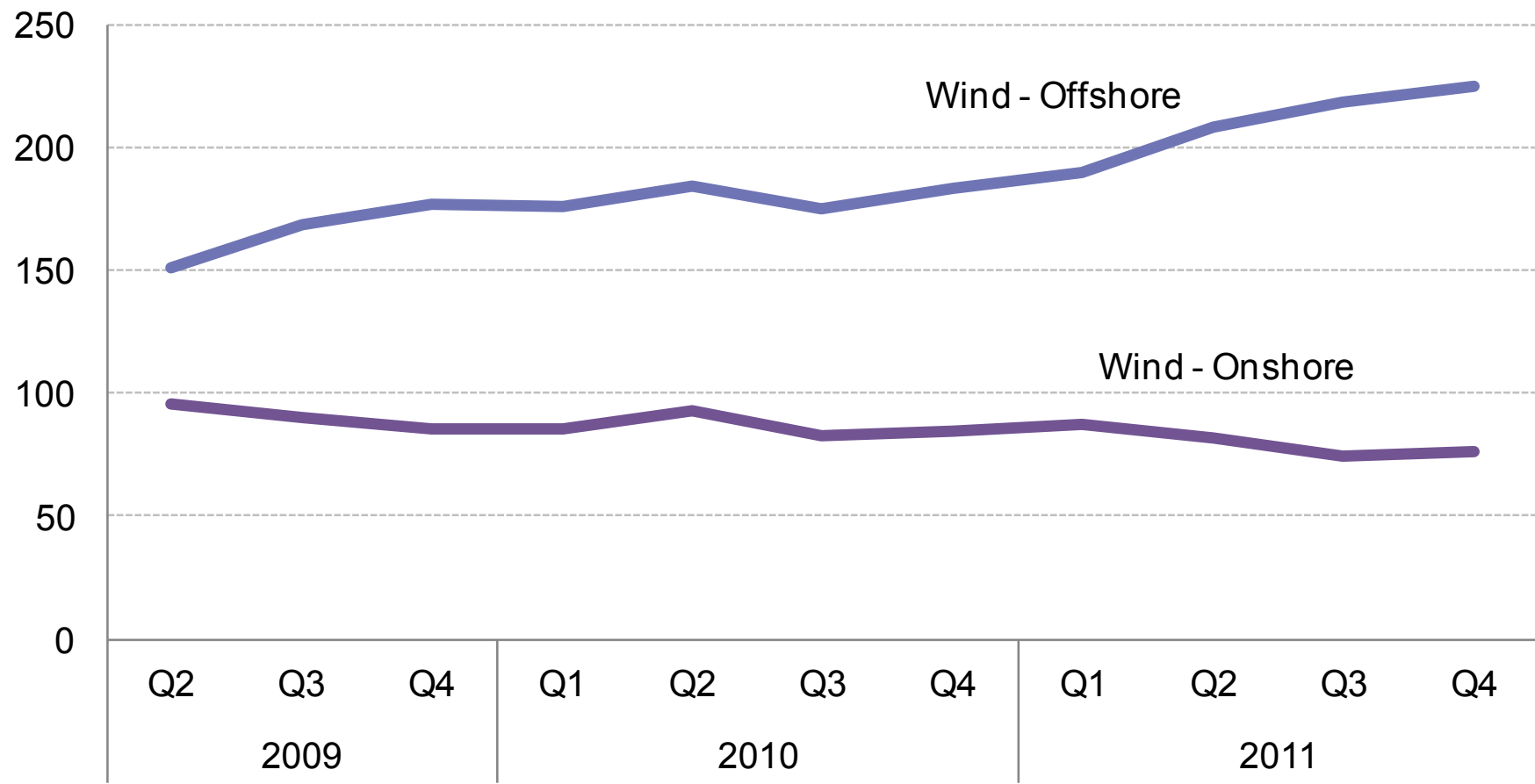
# SOLAR TECHNOLOGY LCOES (\$/MWH)



Prices are in nominal dollars

Source: Bloomberg New Energy Finance

# WIND TECHNOLOGY LCOES (\$/MWH)

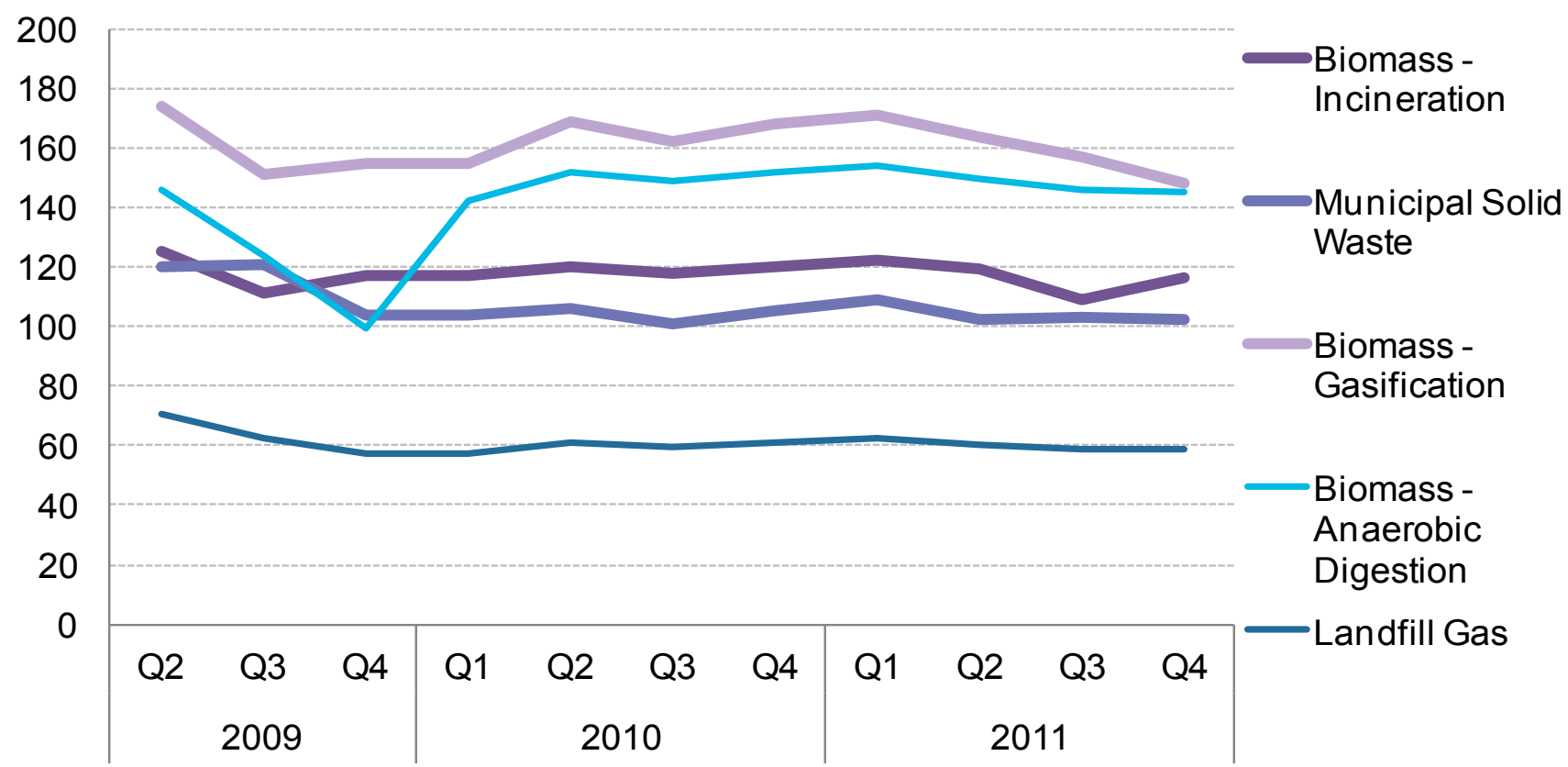


Prices are in nominal dollars

Source: Bloomberg New Energy Finance



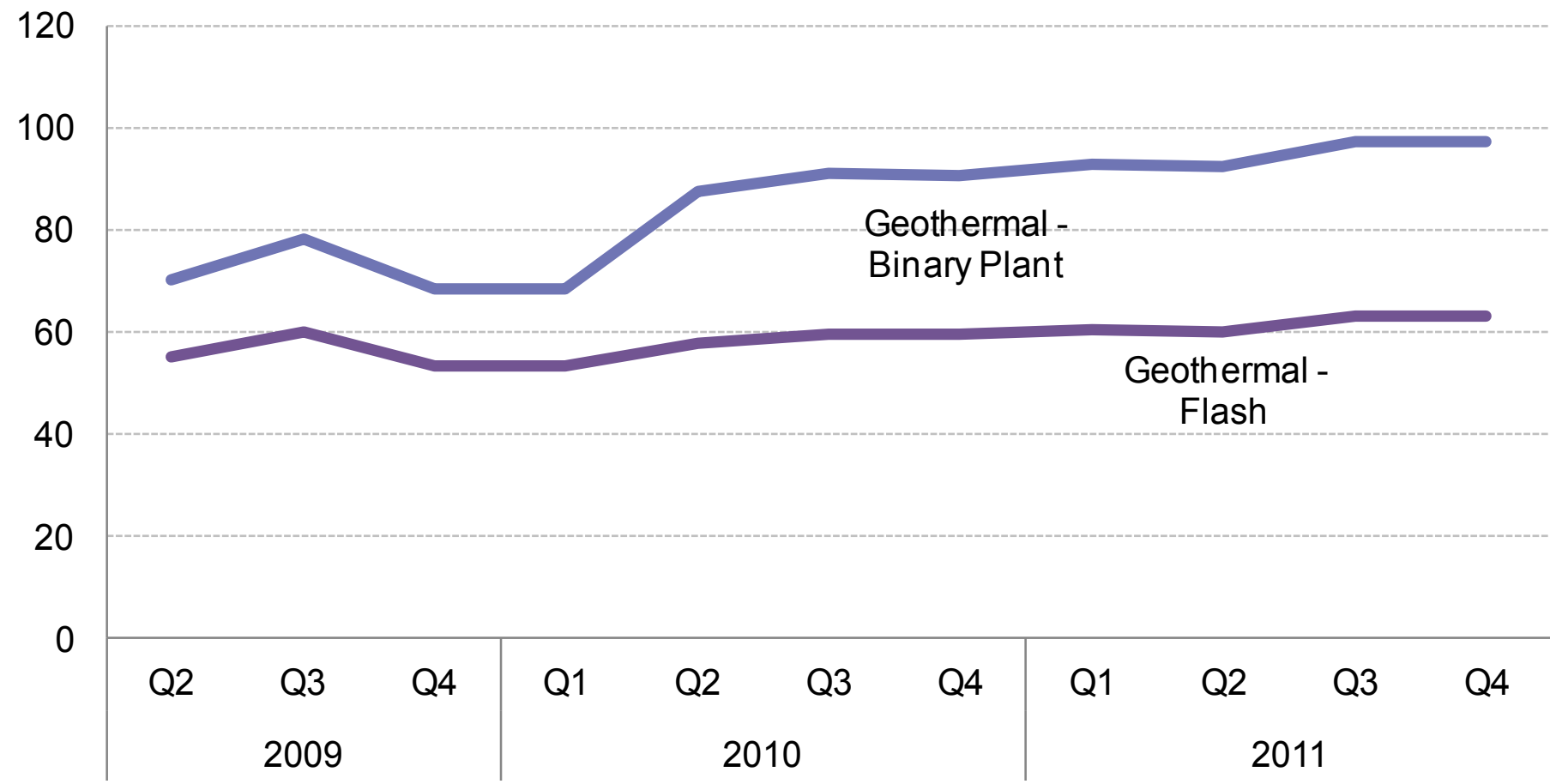
# BIOMASS TECHNOLOGY LCOES (\$/MWH)



Prices are in nominal dollars

Source: Bloomberg New Energy Finance

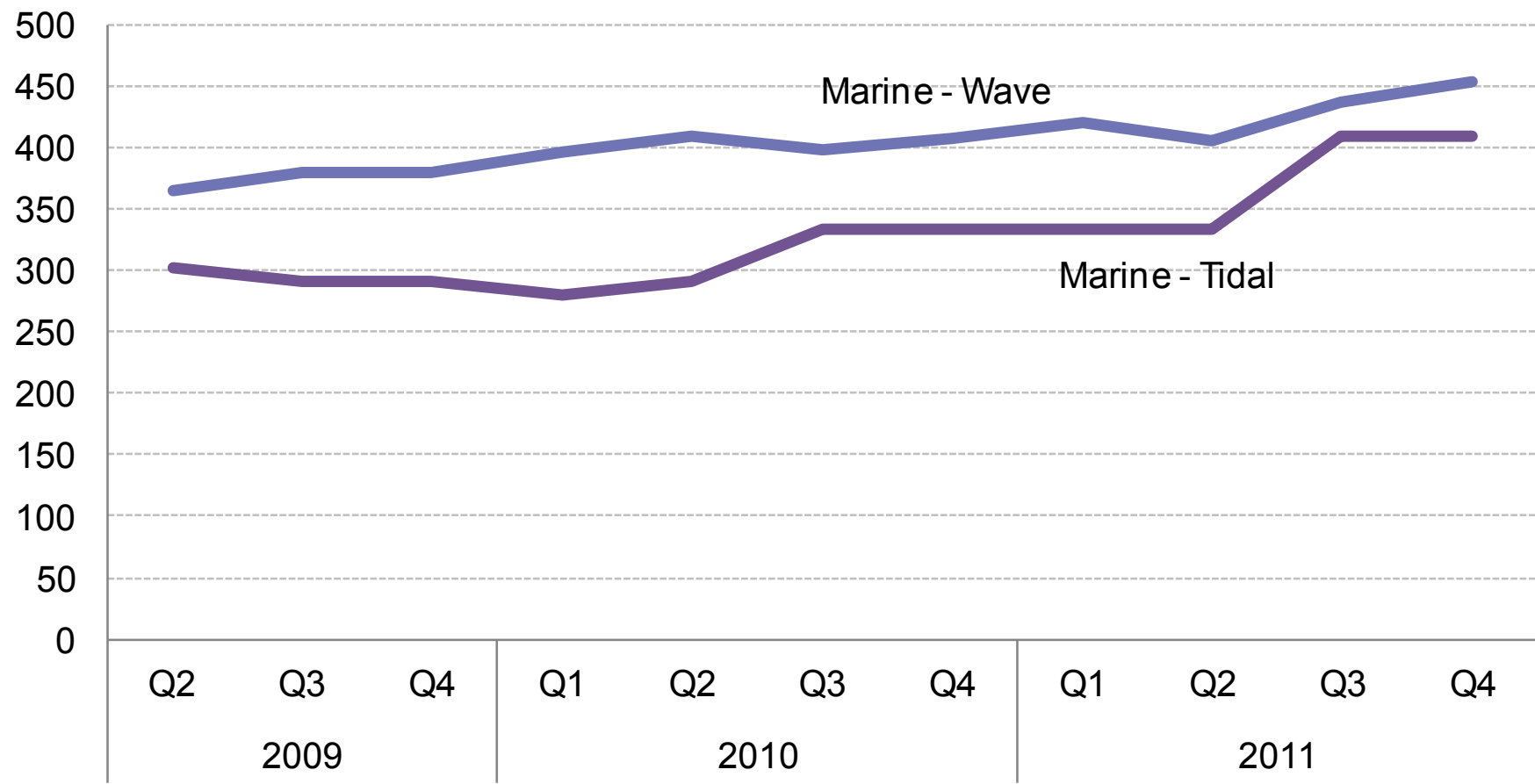
# GEOHERMAL TECHNOLOGY LCOES (\$/MWH)



Prices are in nominal dollars

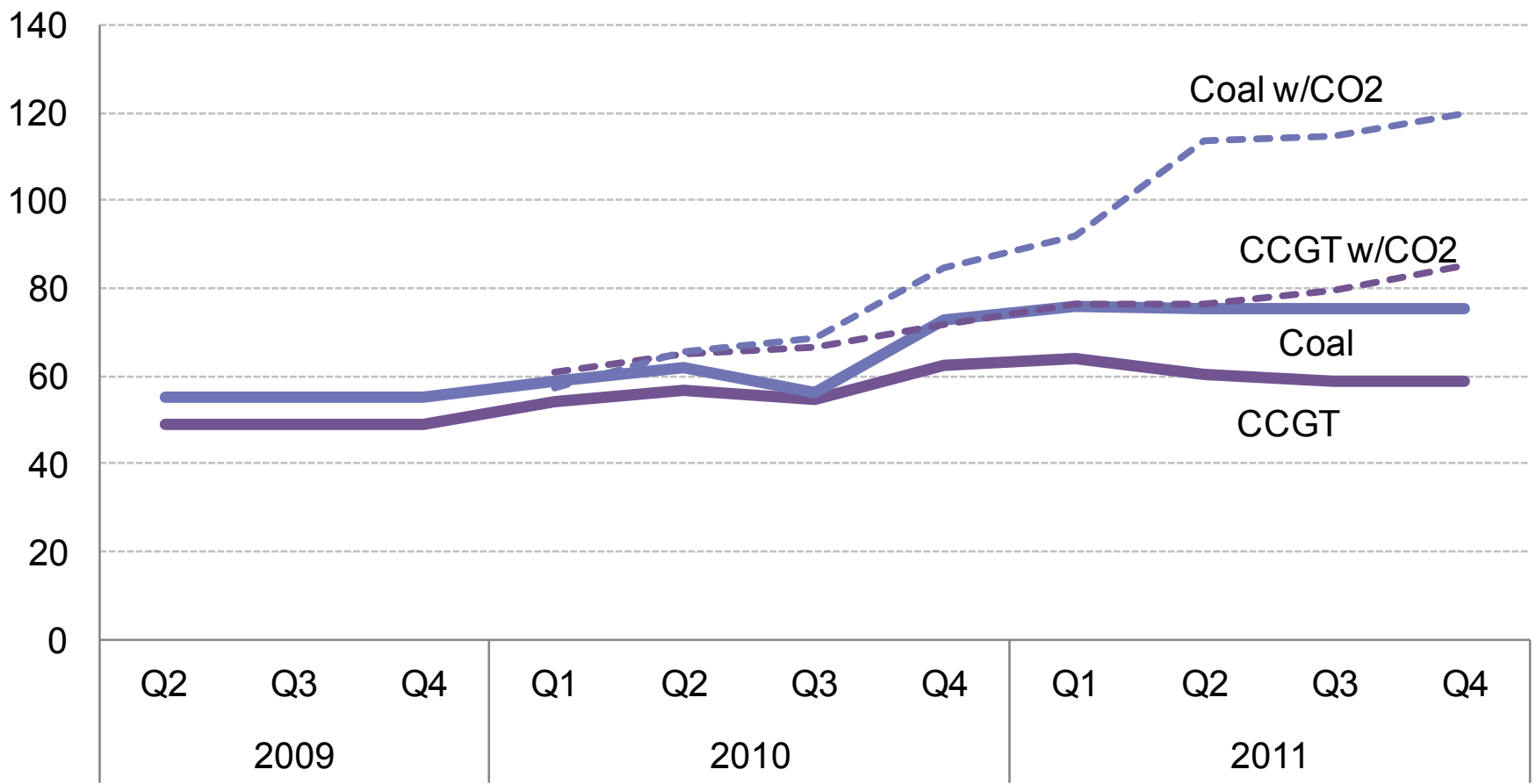
Source: Bloomberg New Energy Finance

# MARINE TECHNOLOGY LCOES (\$/MWH)



Prices are in nominal dollars Source: Bloomberg New Energy Finance

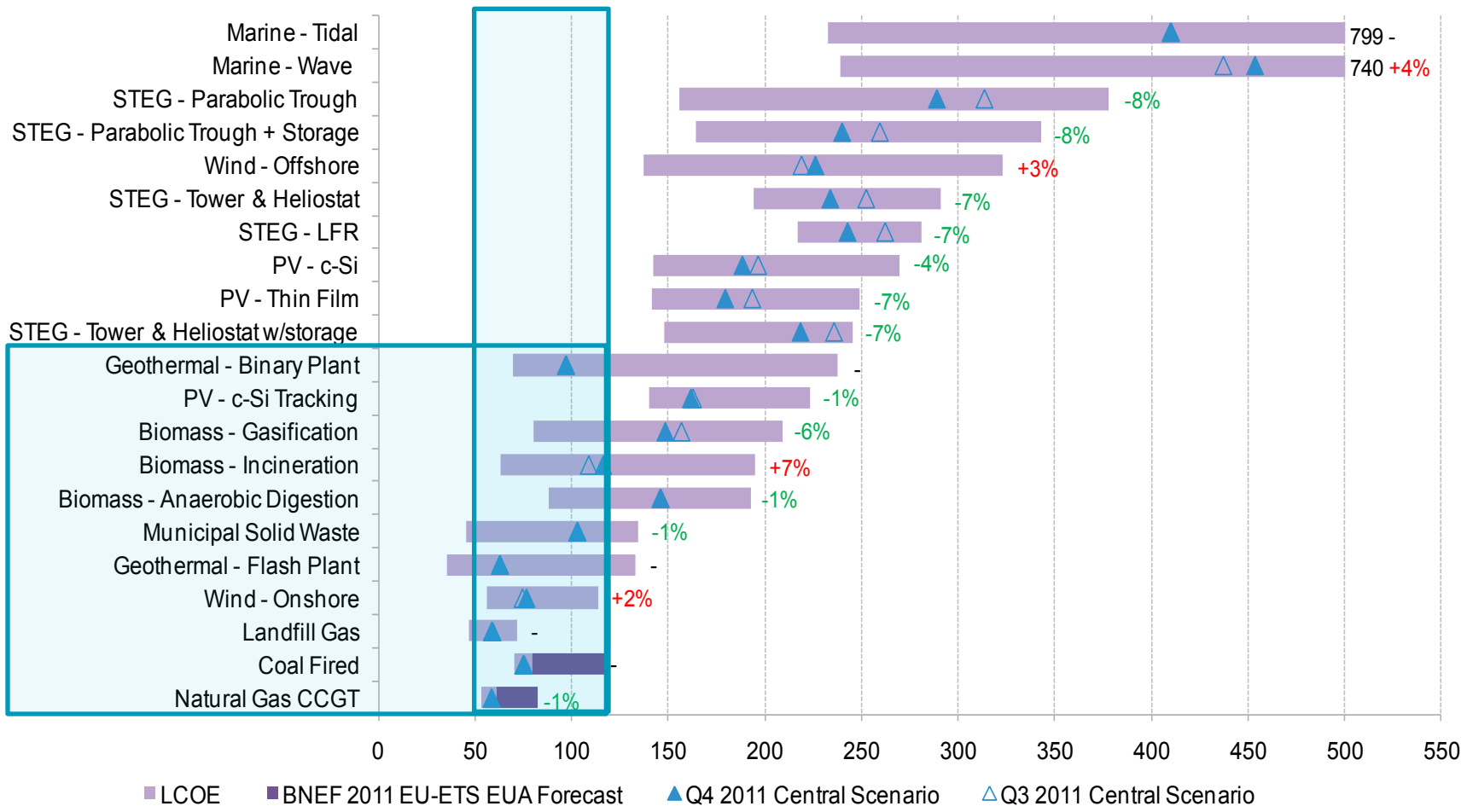
# FOSSIL TECHNOLOGY LCOES (\$/MWH)



Prices are in nominal dollars

Source: Bloomberg New Energy Finance

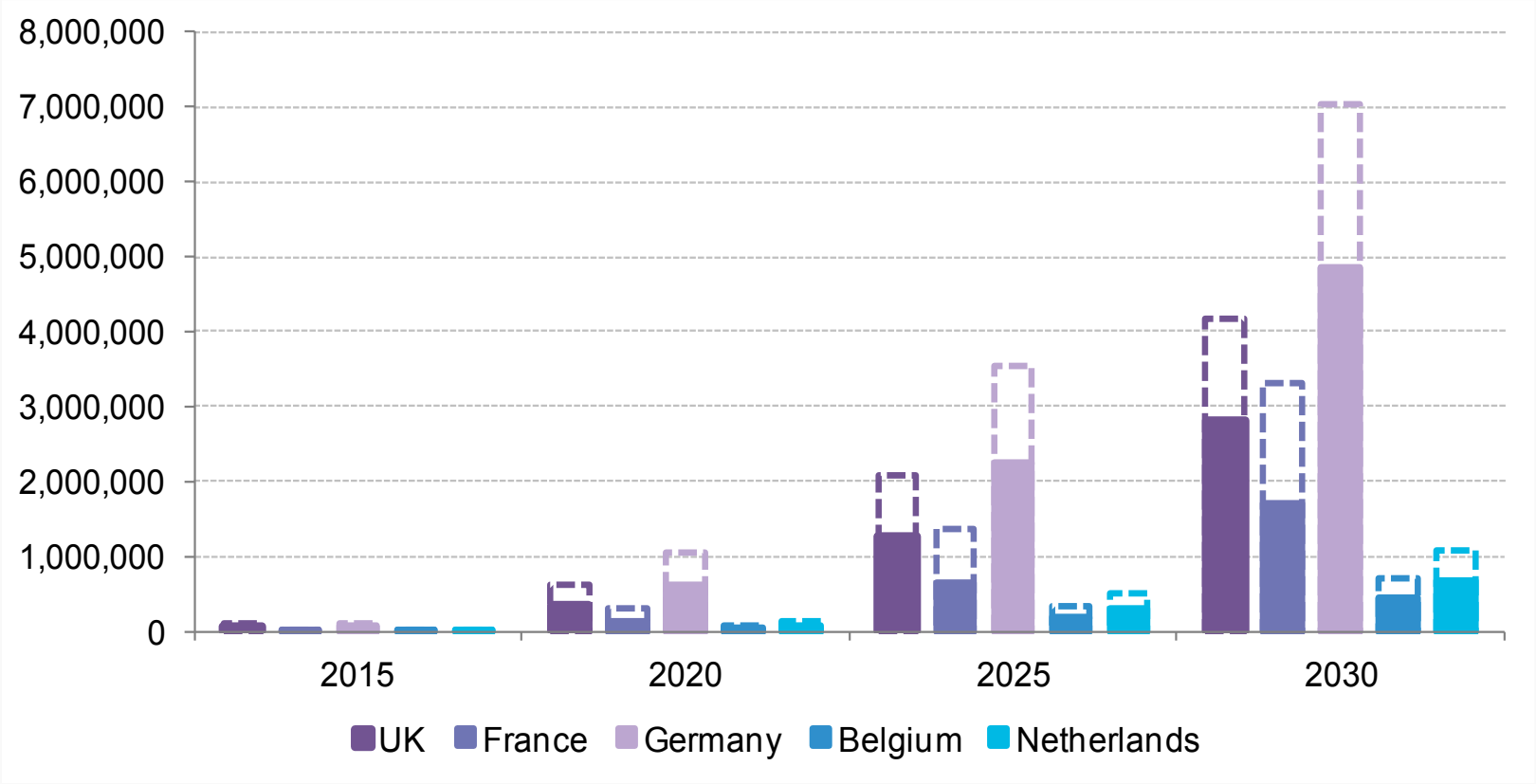
# LEVELISED COST OF ENERGY Q1 2012 (\$/MWH)



Carbon forecasts from the BNEF European Carbon Model with a 2020 horizon \$89/tCO<sub>2</sub>.  
Coal and nat gas prices from the US Department of Energy EIA Annual Energy Outlook 2011. % change represents change in mid from Q3 2011.

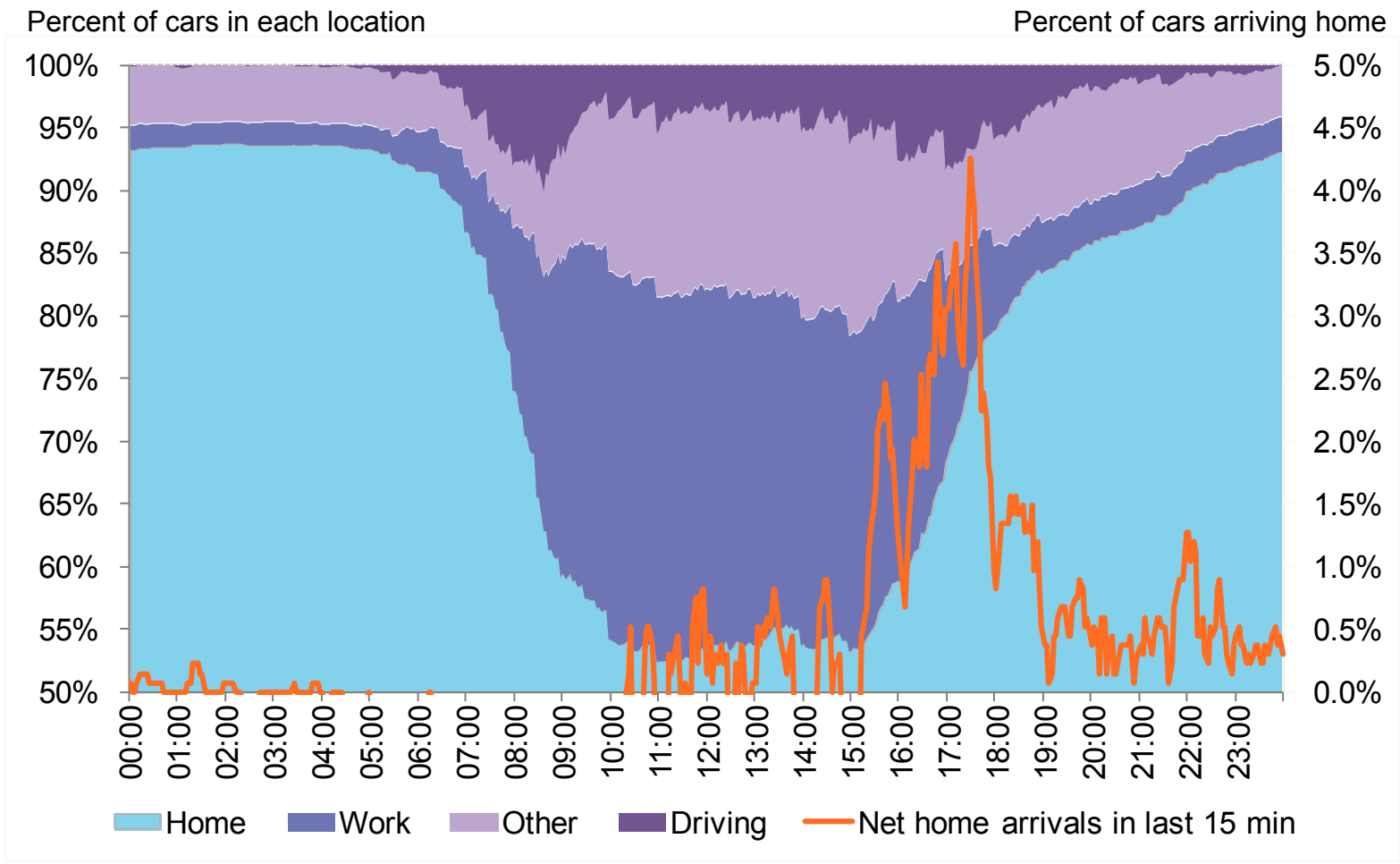
Source: Bloomberg New Energy Finance

# ELECTRIC VEHICLE FLEET FORECASTS



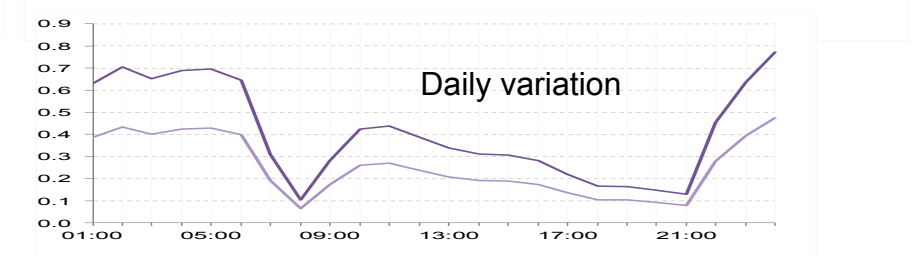
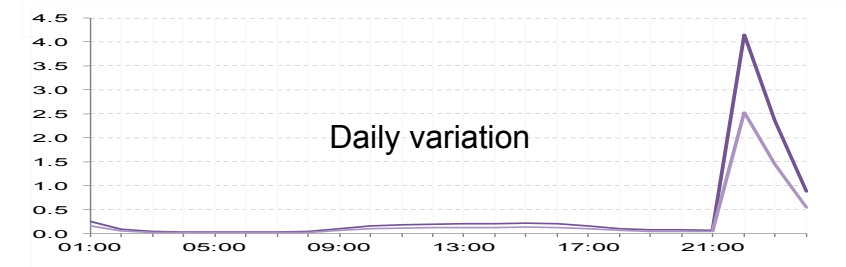
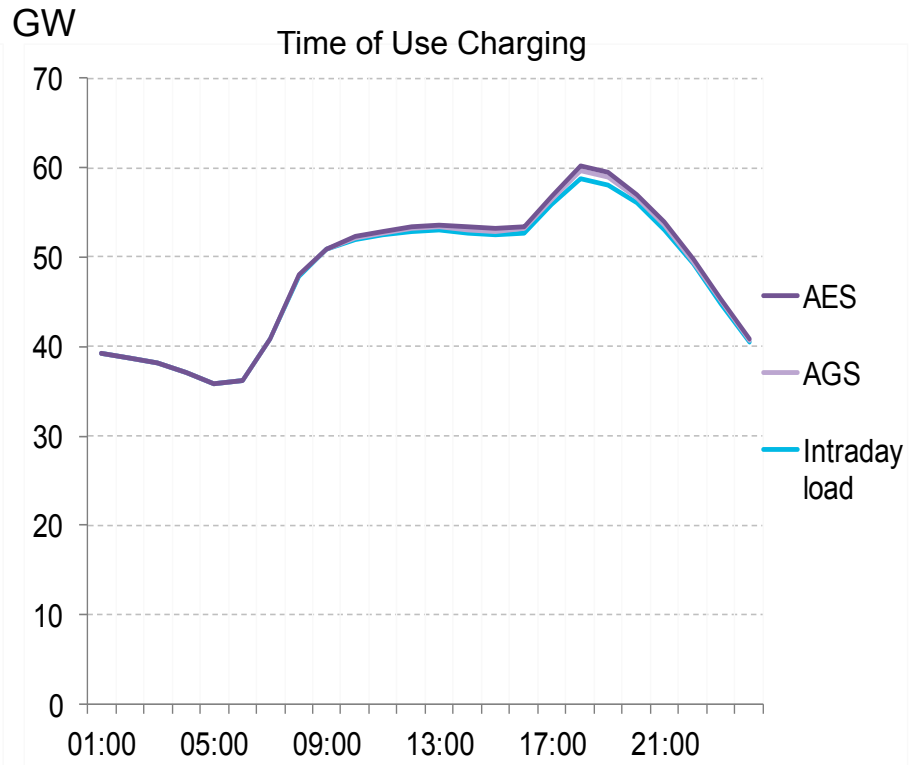
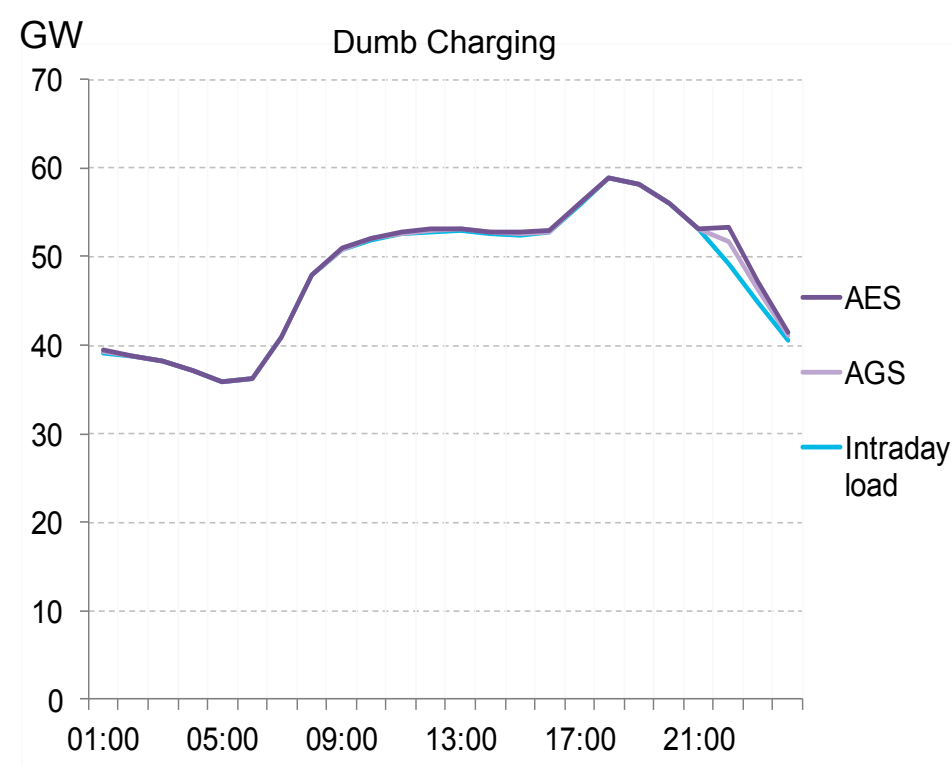
Source: Bloomberg New Energy Finance

# UK EXAMPLE - LOCATION PATTERNS JANUARY (WED)



Source: Derived from 2002-08 National Travel Survey data

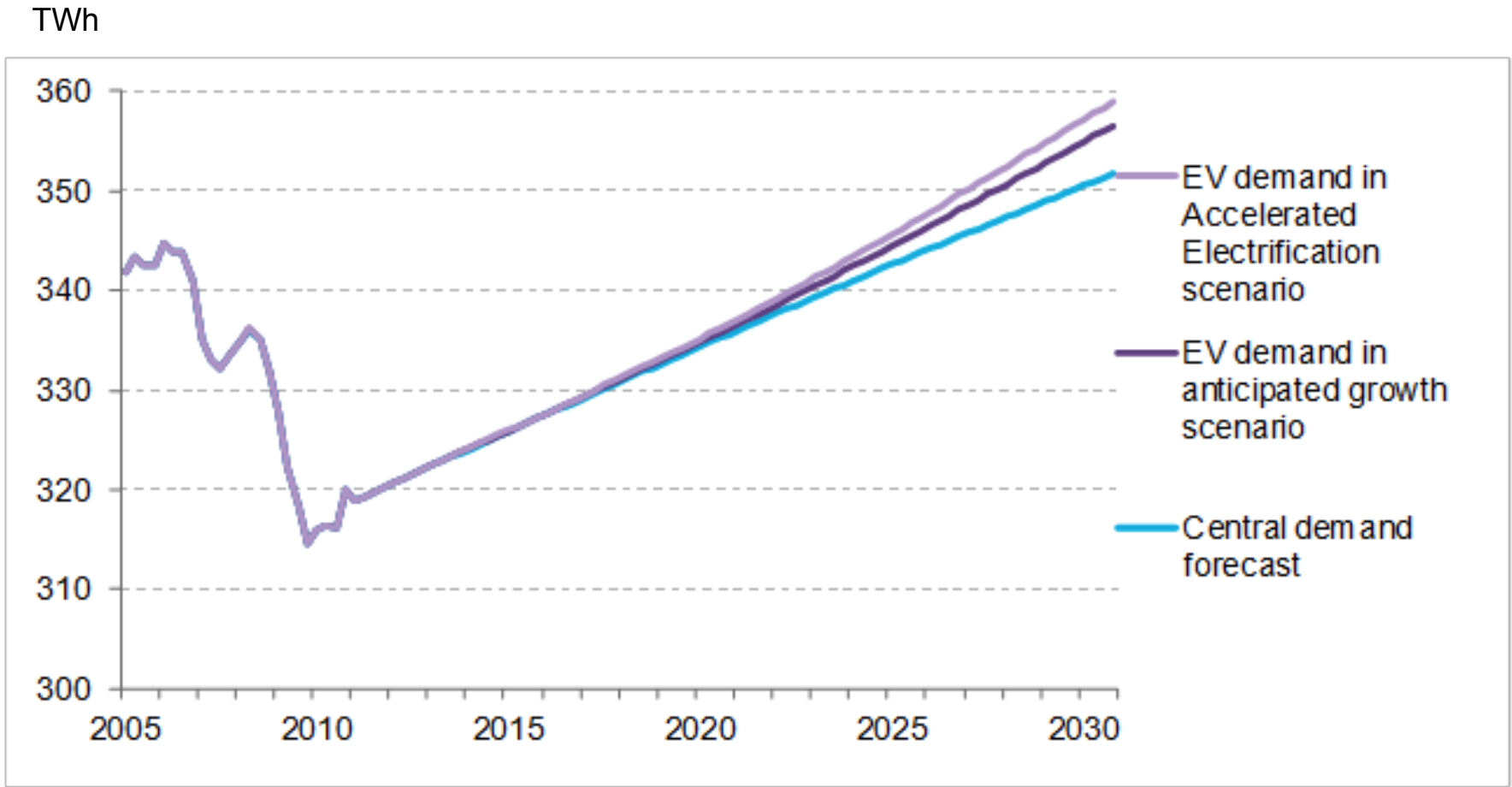
# EFFECTS ON INTRADAY LOAD, JANUARY 2025 (WED)



Source: Bloomberg New Energy Finance



# IMPACTS ON ELECTRICITY DEMAND IN THE UK



Source: Bloomberg New Energy Finance

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# GREECE SENIOR 5-YEAR USD DENOMINATED CDS



Bloomberg Terminal

# SPAIN SENIOR 5-YEAR USD DENOMINATED CDS



Bloomberg Terminal

# ITALY SENIOR 5-YEAR USD DENOMINATED CDS



Bloomberg Terminal

# FRANCE SENIOR 5-YEAR USD DENOMINATED CDS



Bloomberg Terminal

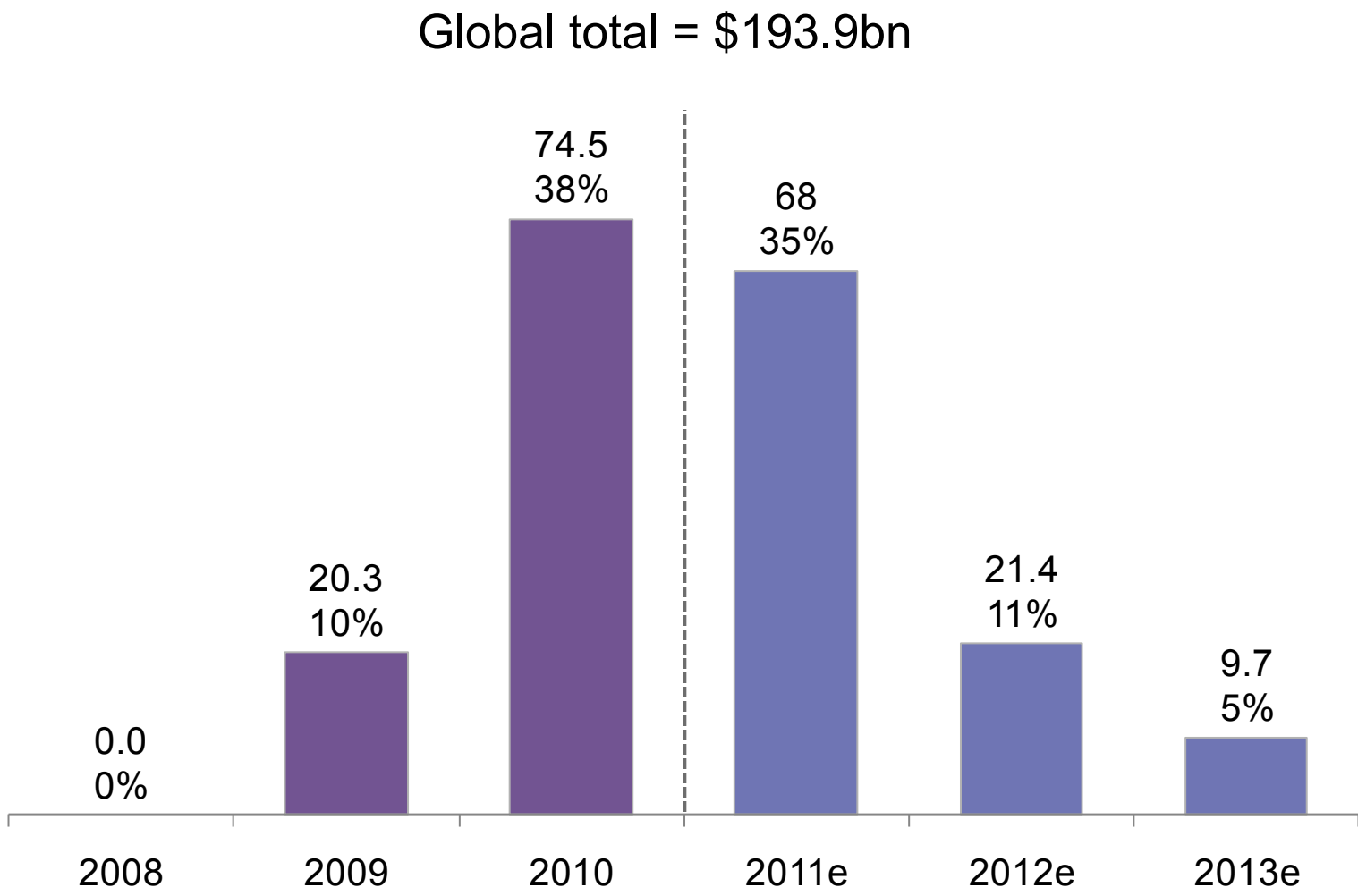
# CDS SPREADS - PORTUGAL

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

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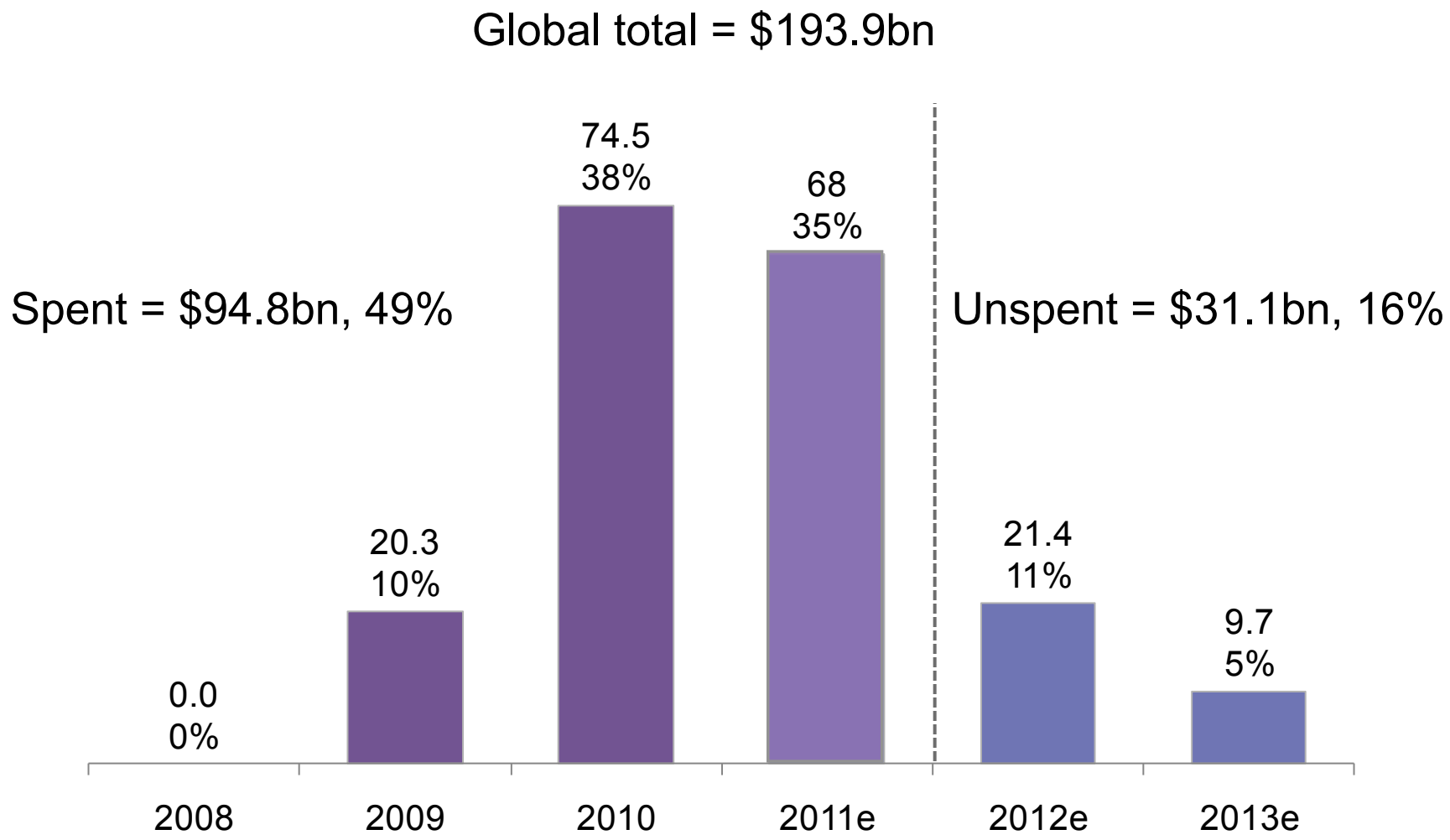
Note: 2011–13 according to Bloomberg New Energy Finance expectations

Source: Bloomberg New Energy Finance

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# 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

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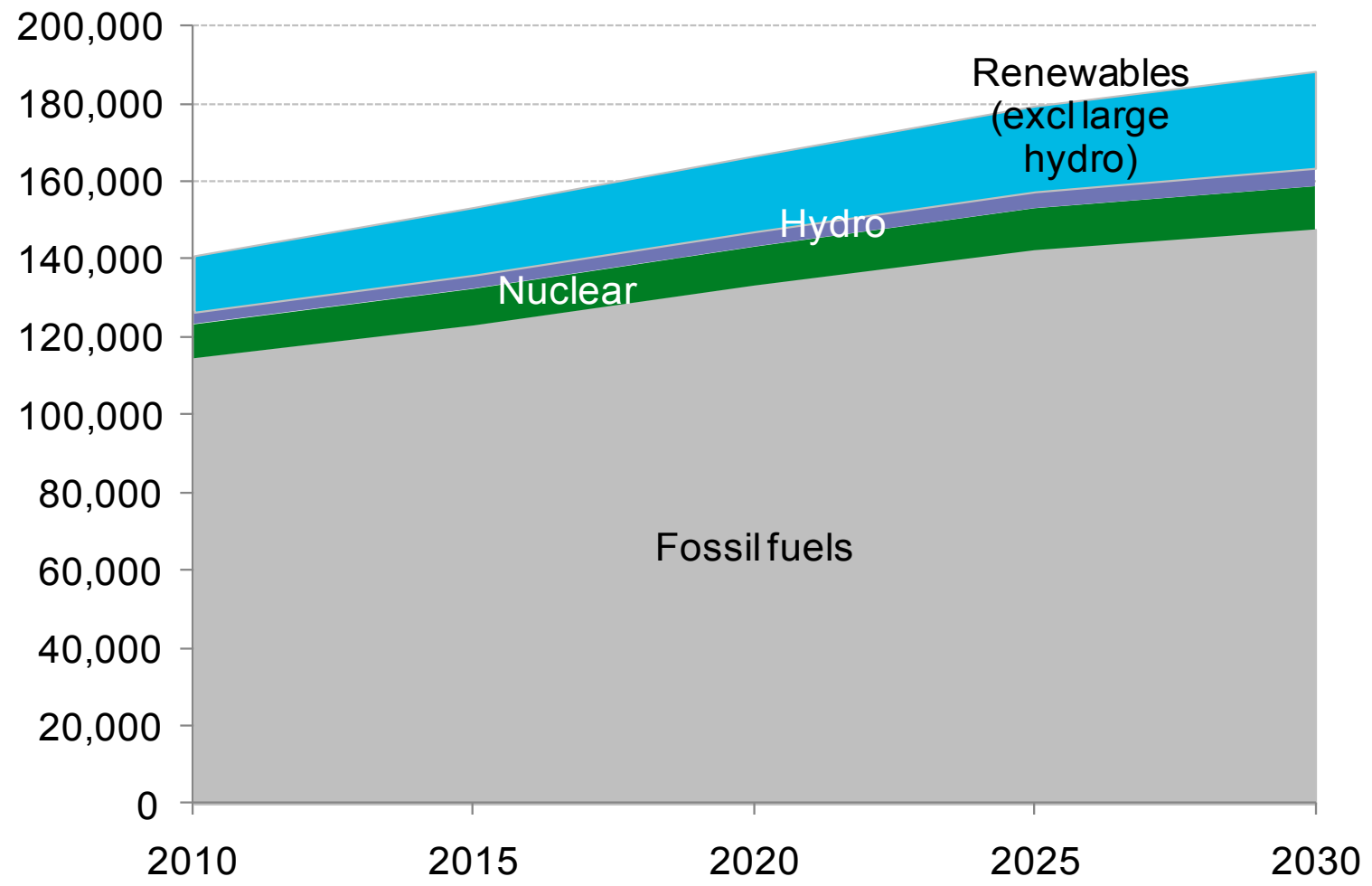
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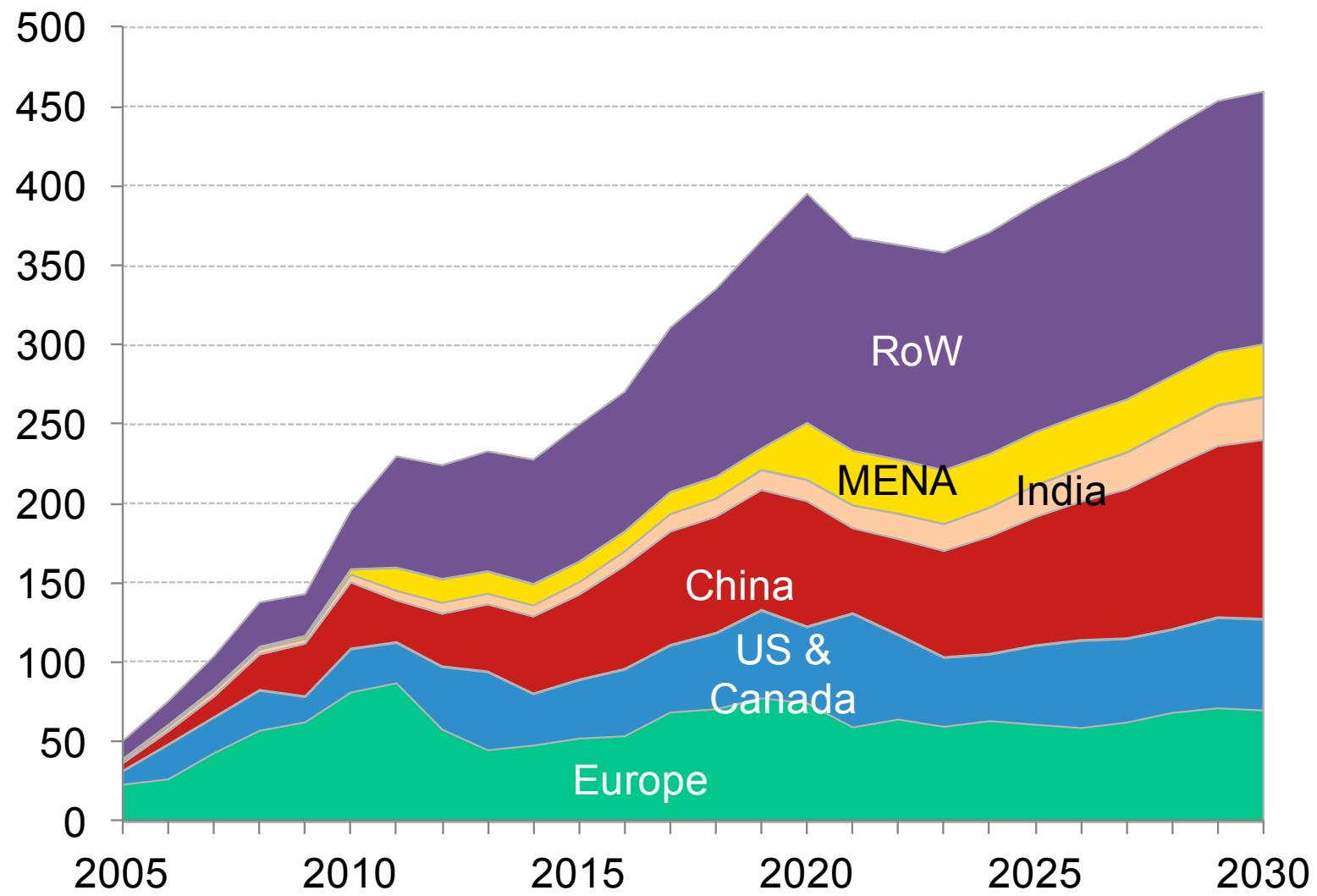
# WORLD PRIMARY ENERGY CONSUMPTION

2010-30 (TWH)



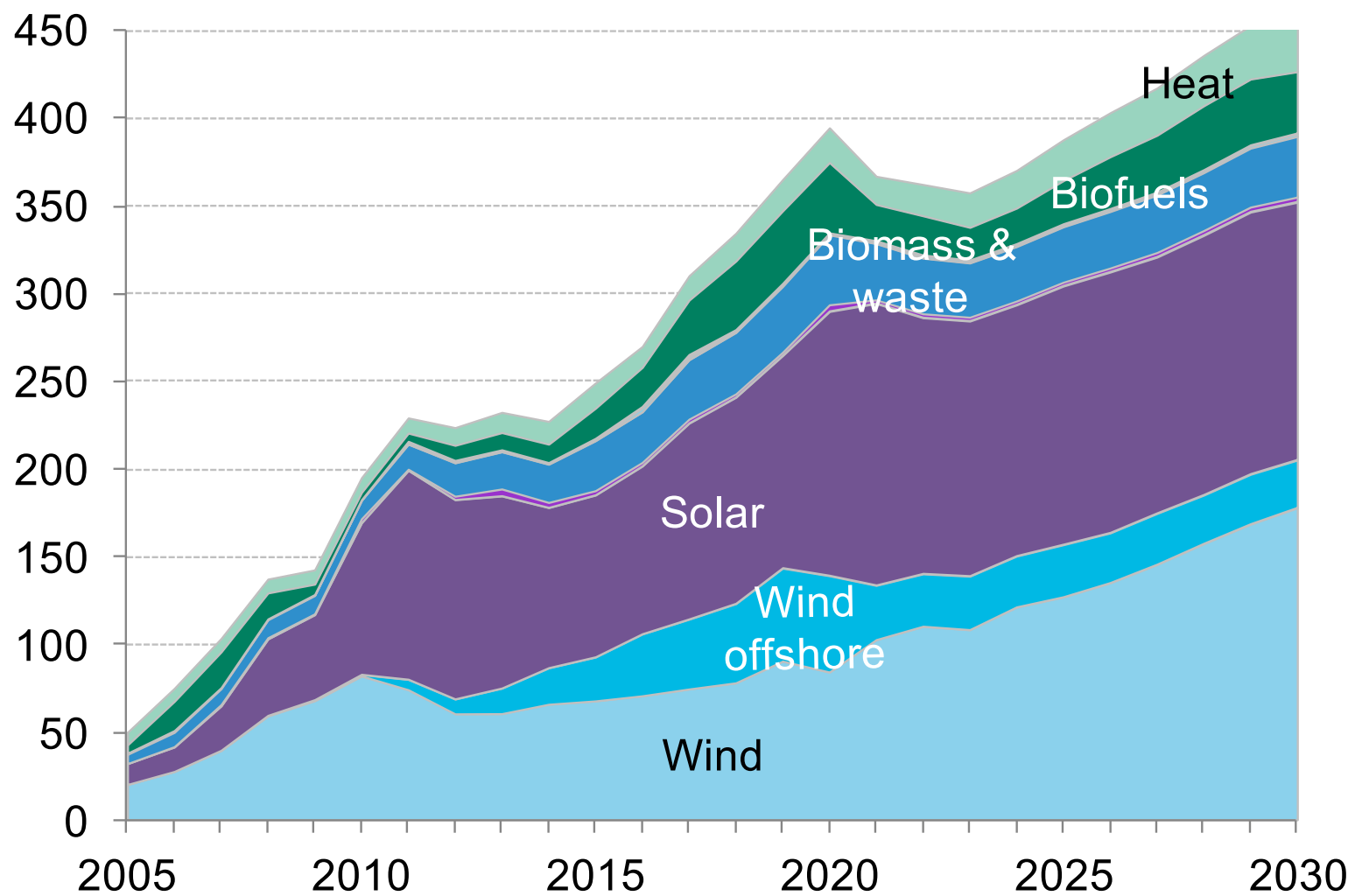
Source: Bloomberg New Energy Finance

# ANNUAL VALUE OF RENEWABLE ENERGY CAPACITY INSTALLED BY REGION, 2005-30 (\$BN)



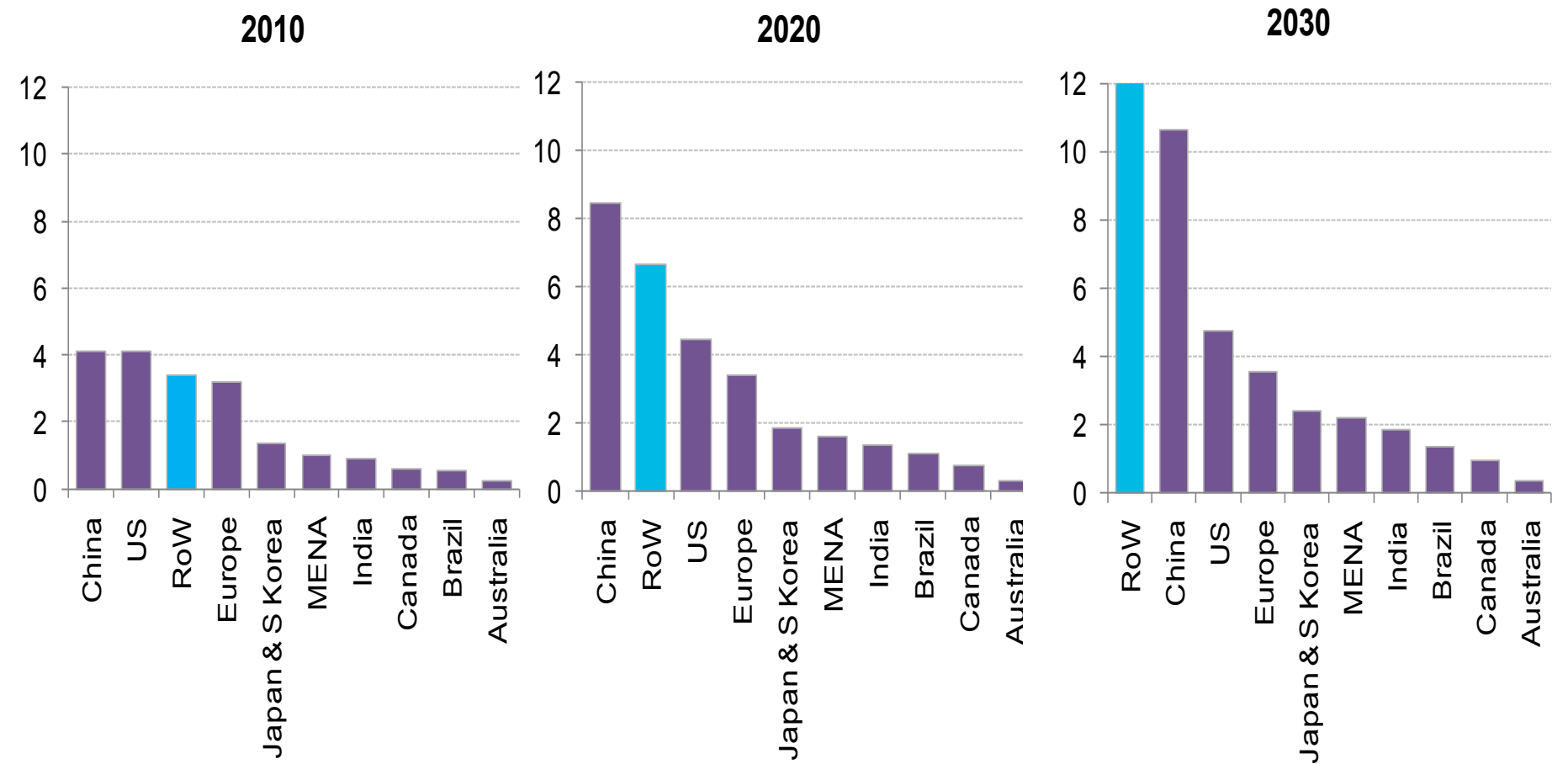
Source: Bloomberg New Energy Finance

# ANNUAL VALUE OF RENEWABLE ENERGY CAPACITY INSTALLED BY TECHNOLOGY SECTOR, 2005-30 (\$BN)



Source: Bloomberg New Energy Finance

# 'REST OF THE WORLD' ELECTRICITY GENERATION (TWH)

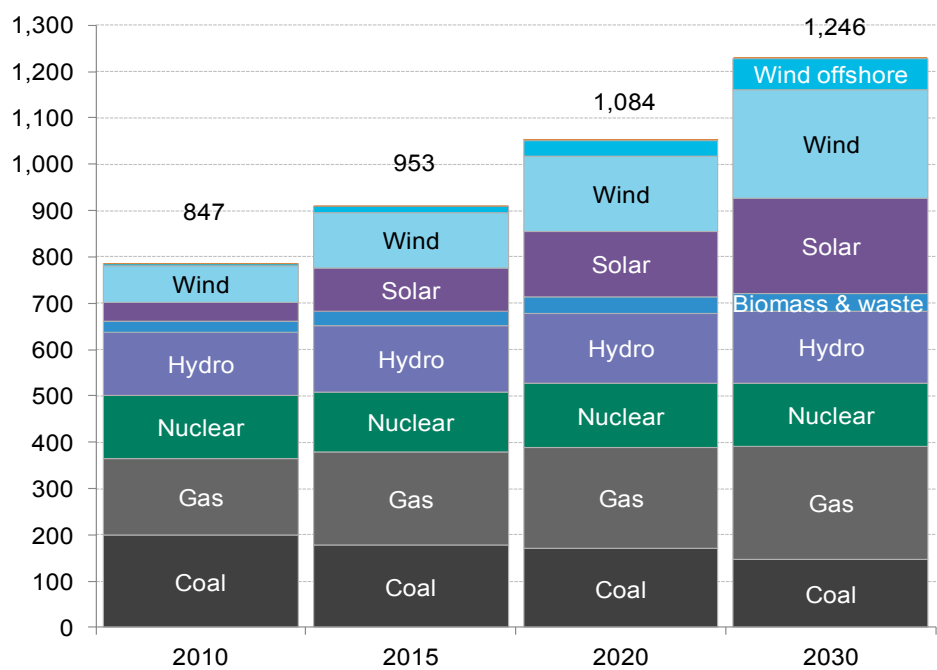


Source: Bloomberg New Energy Finance

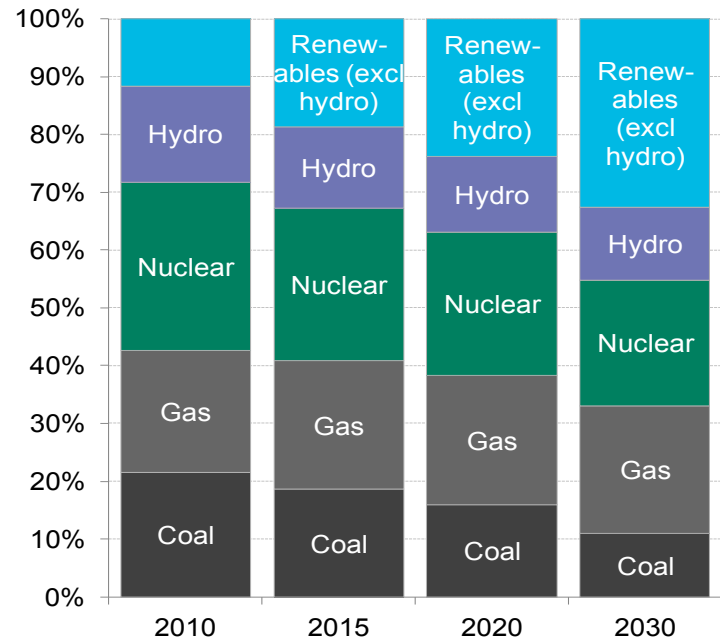
# EUROPEAN UNION

## POWER GENERATION

TOTAL INSTALLED CAPACITY BY TECHNOLOGY (GWTH)



EU-27 POWER GENERATION FUEL MIX (%)

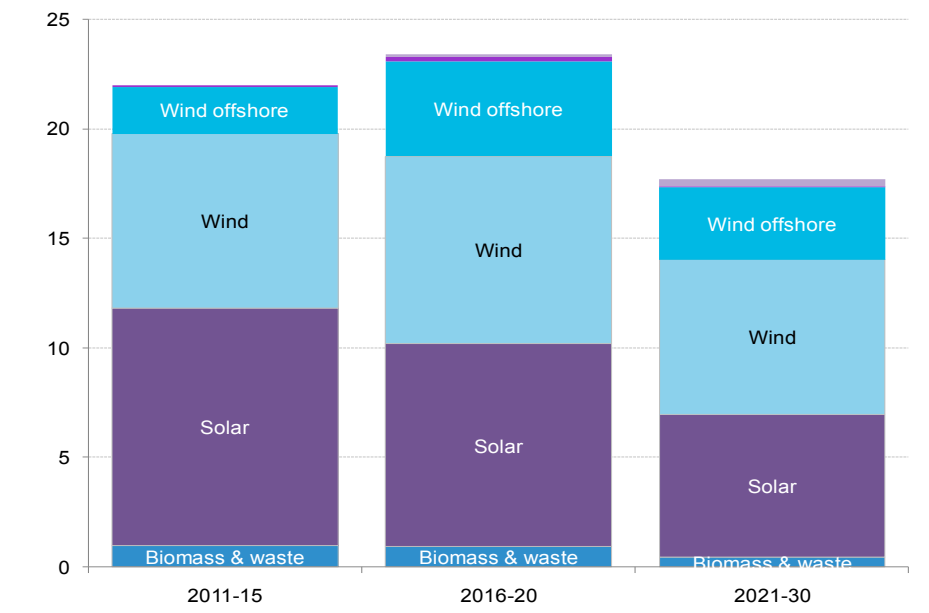


Source: Bloomberg New Energy Finance

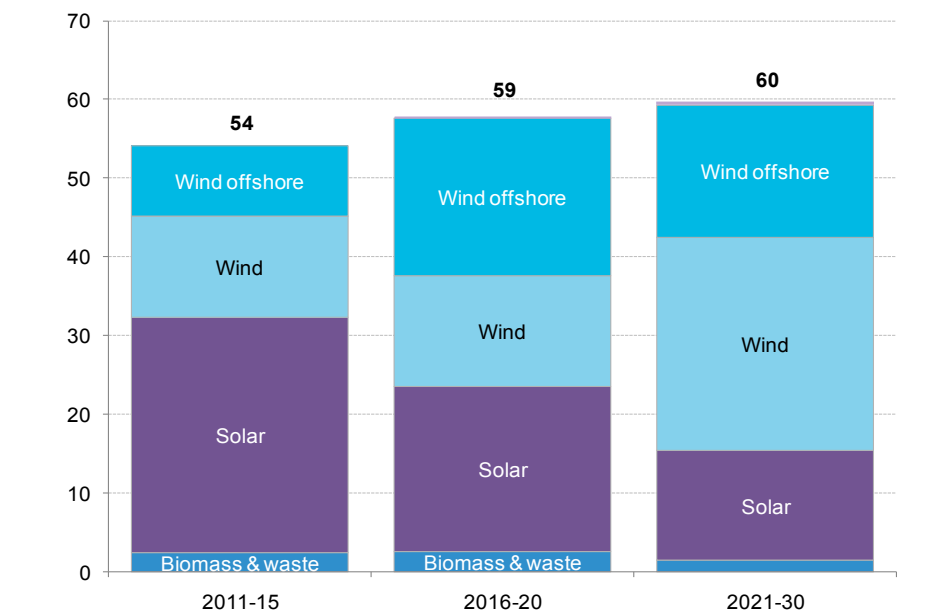
# EUROPEAN UNION

## POWER GENERATION

AVERAGE ANNUAL NEW BUILD OF RENEWABLES (GW)



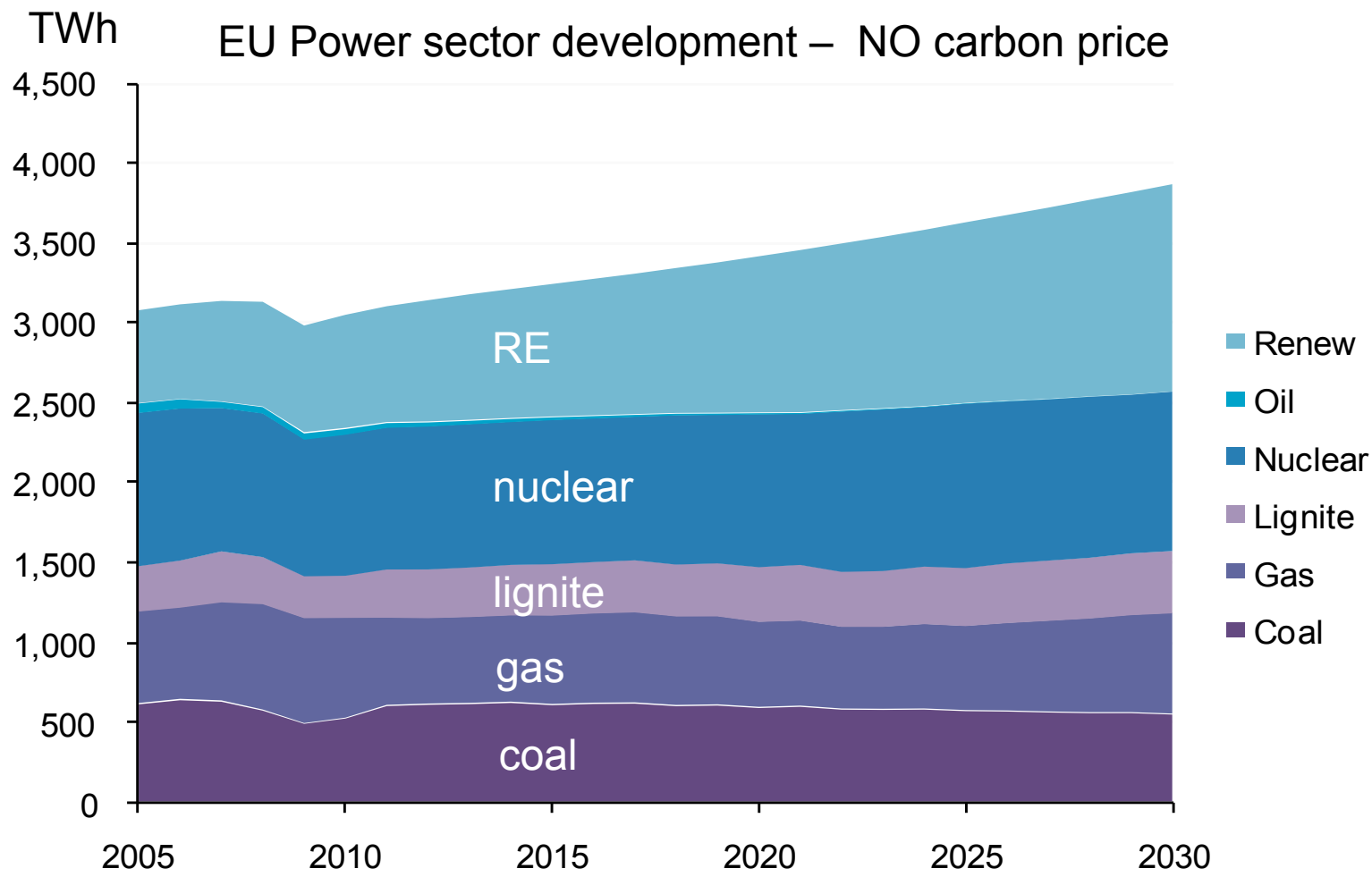
AVERAGE ANNUAL CLEAN INVESTMENT IN POWER GENERATION



Source: Bloomberg New Energy Finance

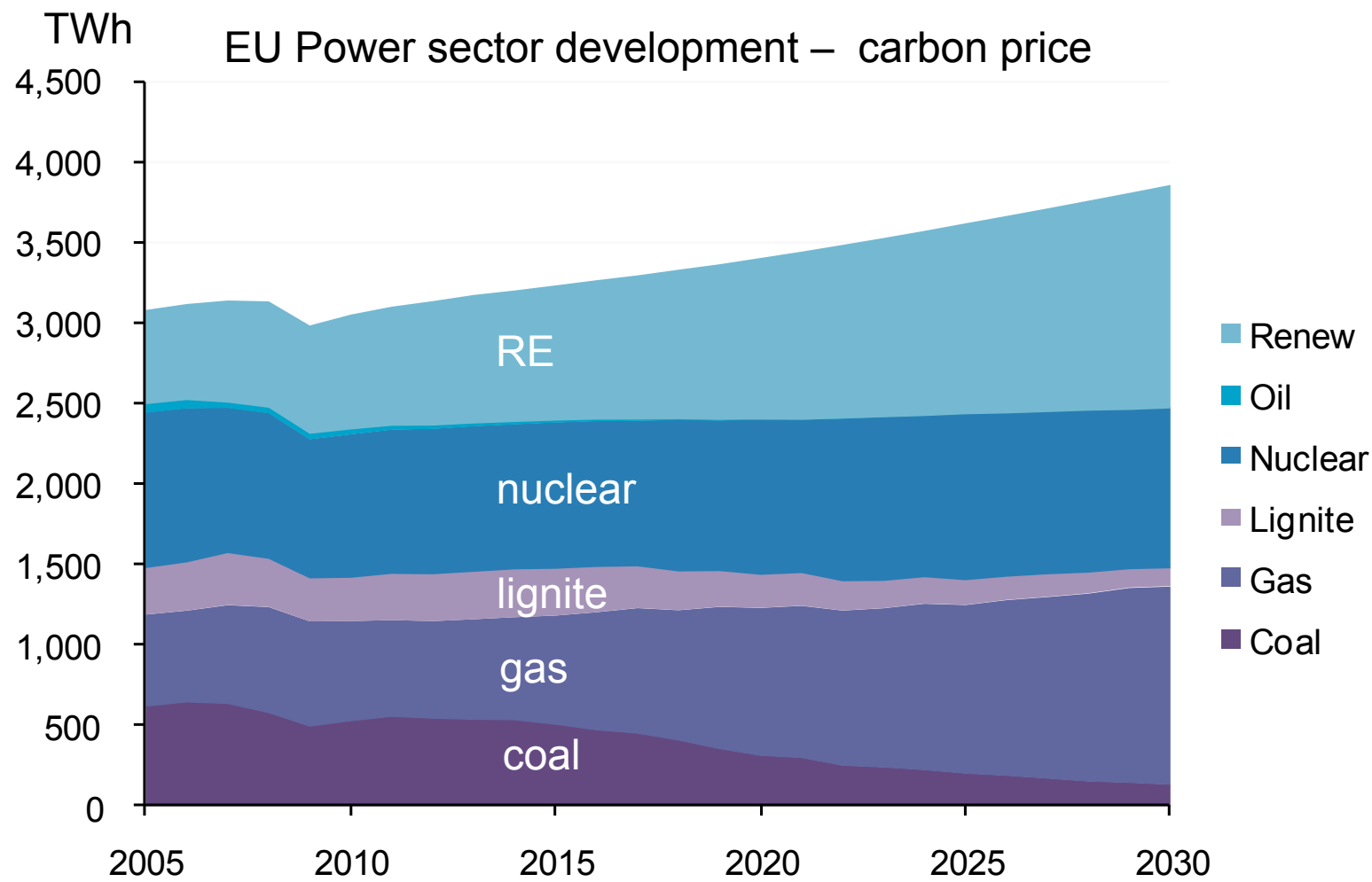


# IMPACTS OF EU ETS ON POWER SECTOR



Source: Bloomberg New Energy Finance, Global Energy and Emissions Model

# IMPACTS OF EU ETS ON POWER SECTOR



(CO2 price €45/t by 2020)

Source: Bloomberg New Energy Finance, Global Energy and Emissions Model

# GUY TURNER

## MARKETS

Renewable Energy

Carbon Markets

Energy Smart Technologies

Renewable Energy Certificates

Carbon Capture & Storage

Power

Water

Nuclear

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and water and the carbon markets

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