NEW INVESTMENT IN CLEAN ENERGY
2004–14 ($BN)

Note: Total values include estimates for undisclosed deals. Includes corporate and government R&D, and spending for
digital energy and energy storage projects (not reported in quarterly statistics), as well as a BNEF estimate for large hydro
investment.

Source: Bloomberg New Energy Finance
NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q3 2015 ($BN)

Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D, and spending for digital energy and energy storage projects (reported in annual statistics only).

Source: Bloomberg New Energy Finance
Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D, and spending for digital energy and energy storage projects (reported in annual statistics only).

Source: Bloomberg New Energy Finance
Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D, and spending for
digital energy and energy storage projects (reported in annual statistics only).

Source: Bloomberg New Energy Finance
EMEA NEW INVESTMENT IN CLEAN ENERGY BY SECTOR Q1 2004-Q3 2015 ($BN)

Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D, and spending for digital energy and energy storage projects (reported in annual statistics only).

Source: Bloomberg New Energy Finance
SPAIN NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q2 2015 ($BN)

Note: Total values include estimates for undisclosed deals

Source: Bloomberg New Energy Finance
ITALY NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q2 2015 ($BN)

Source: Bloomberg New Energy Finance

Note: Total values include estimates for undisclosed deals
GERMANY NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q2 2015 ($BN)

Note: Total values include estimates for undisclosed deals

Source: Bloomberg New Energy Finance
FRANCE NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q2 2015 ($BN)

Note: Total values include estimates for undisclosed deals

Source: Bloomberg New Energy Finance
UK NEW INVESTMENT IN CLEAN ENERGY
Q1 2004-Q2 2015 ($BN)

Note: Total values include estimates for undisclosed deals
Source: Bloomberg New Energy Finance
PAYMENT MECHANISM

- **Red**: Feed-in tariff (FiT)
- **Blue**: Premium
- **Green**: Green certificates

Source: Bloomberg New Energy Finance.
SUPPORT SCHEMES FOR LARGE-SCALE RENEWABLE ENERGY PROJECTS IN THE EU

PAYMENT MECHANISM

- Feed-in tariff (FiT)
- Premium
- Green certificates

ALLOCATION

- Competitive auctions
- Auctions legislated but yet to be held or pilot auctions only

Source: Bloomberg New Energy Finance.
SUPPORT SCHEMES FOR LARGE-SCALE RENEWABLE ENERGY PROJECTS IN THE EU

PAYMENT MECHANISM
- Feed-in tariff (FiT)
- Premium
- Green certificates

ALLOCATION
- Competitive auctions
- Auctions legislated but yet to be held or pilot auctions only

SUBSIDY BUDGET
- Capped
- Frozen / no new support

Source: Bloomberg New Energy Finance.
Market-based mechanisms – eg, auctions, renewable energy certificate schemes, renewable portfolio standards

Feed-in tariff/premiums

Country switched to auction or tender programme since 2010
LEVELISED COST OF ELECTRICITY
2014 ($/MWh)

Fossil technologies:
- US
- China
- Europe
- Australia

Note: LCOEs for coal and CCGTs in Europe and Australia assume a carbon price of $20/t. No carbon prices are assumed for China and the US.

Source: Bloomberg New Energy Finance
"Emissions must be cut 40-70% by mid-century and phased out entirely by 2100"
There is an urgent need to develop sources of renewable energy.

Pope Francis
Note: The Green line represents the WTI Spot price, and has been adjusted for inflation and is represented here in real 2015 US$
Note: Japan-Korea Marker is based on broker assessments of the spot price of un-contracted LNG cargoes delivered into the Northeast Asia market.

Source: Bloomberg New Energy Finance, ICAP, Platts
AN AGE OF ENERGY PLENTY…

… AGE OF COMPETITION
US SHALE GAS PRODUCTION BY FIELD, 2000–2015

Source: Bloomberg New Energy Finance, EIA
AVERAGE LATERAL LENGTH (FEET)

http://www.slideshare.net/MarcellusDN/range-resources-company-presentation-july-28-2015

Range Resources, 28 July 2015, Bloomberg
New Energy Finance

+114%
DRILLING COST/LATERAL LENGTH (INCLUDES VERTICAL) ($/FOOT)

-71%

Range Resources, 28 July 2015, Bloomberg
New Energy Finance

http://www.slideshare.net/MarcellusDN/range-resources-company-presentation-july-28-2015
COMPLETION COST/LATERAL LENGTH ($/FOOT)

http://www.slideshare.net/MarcellusDN/range-resources-company-presentation-july-28-2015

Range Resources, 28 July 2015, Bloomberg
New Energy Finance
WELL COST/LATERAL LENGTH ($/FOOT)

http://www.slideshare.net/MarcellusDN/range-resources-company-presentation-july-28-2015

Range Resources, 28 July 2015, Bloomberg
New Energy Finance
NORTHEAST GAS PRODUCTION PER RIG (MCFD)
MAJOR GLOBAL SHALE FIELDS

Source: EIA Assessment of World Shale Gas Resources, April 2011

Note: Technically recoverable shale gas resources shown

200 trillion cubic feet

Source: EIA Assessment of World Shale Gas Resources, April 2011
LNG EXPORT CAPACITY BY COUNTRY/REGION (MMTPA)

Note: For the underlying data to this chart, go to BI LNGGG<GO>

Source: Bloomberg New Energy Finance
AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

AUSTRALIA NATIONAL ELECTRICITY MARKET
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AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

### Australia National Electricity Market

**Actual vs Forecast Electricity Demand FY2004–FY2025**

**TWh**

- FY04
- FY06
- FY08
- FY10
- FY12
- FY14
- FY16
- FY18
- FY20
- FY22
- FY24

**AUD trillion**

- 2010
- 2011
- 2012
- 2013

**GDP**

- Historical

AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

TWh AUD trillion

FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24

GDP Historical

AUSTRALIA NATIONAL ELECTRICITY MARKET
ACTUAL VS FORECAST ELECTRICITY DEMAND
FY2004–FY2025

DEMAND UNDER NEO WILL BE 15% LOWER IN 2040 THAN IEA NEW POLICIES SCENARIO

Source: Bloomberg New Energy Finance

Note: Prices have been adjusted for inflation according to YoY CPI Index from UK Office of National Statistics

Source: Bloomberg New Energy Finance, ONS
NEX CLEAN ENERGY INDEX 2013 – 2015 YTD

Note: Values as of 08 September 2015; Stowe and S&P 500 rebased to 100 on 01 Jan 2013

Source: Bloomberg New Energy Finance
COAL BANKRUPTCIES

Image: various company sources
“The coal business in the United States has kind of died, so we’re out of the coal business now.”

Bill Koch

Picture: Forbes
The greatest crisis society confronts is not a future environmental crisis predicted by computer models but a human crisis today that is fully within our power to solve... with coal.

‘Energy Access For All With Green Coal’ campaign

Picture: Peabody Energy
AFRICAN PROVERB

“The gazelle does not have to outrun the cheetah. It has to outrun the slowest gazelle.”

Image: Denis Donohue / Shutterstock
Note: Capacity factors – onshore wind: 25-35%; solar PV: 10-15%

Source: Bloomberg New Energy Finance:
Note: Capacity factors – onshore wind: 25-35%; solar PV: 10-15%
Note: Capacity factors – onshore wind: 25-35%; solar PV: 10-15%

Source: Bloomberg New Energy Finance:
Note: Capacity factors – onshore wind: 25-35%; solar PV: 10-15%

Source: Bloomberg New Energy Finance:
TOTAL INVESTMENTS PER TECHNOLOGY, 2015-40
(US$ REAL)

- Solar: $1.5tn - $2.2tn
- Wind: $2.4tn
- Fossil fuels: $2.6tn

RENEWABLES TAKE 65% OF THE $12.2 TRILLION POWER INVESTMENT TO 2040

Source: Bloomberg New Energy Finance
Renewables are poised to seize the crucial top spot in global power supply growth…

Affordable renewables are set to dominate the emerging power systems of the world

Fatih Birol
Chief Economist, IEA
RENEWABLE ENERGY PROPORTION OF POWER GENERATION- INTERMITTENT ENERGY (WIND & SOLAR), 2014 (%)

- US 4%
- France 3%
- UK 9%
- Germany 16%
- Brazil 3%
- Mexico 3%
- Japan 5%
- China 5%
- Australia 8%
- ME + Africa 0%
- India 3%

Note: This only shows the combination of wind and solar energy generation. All numbers come from BNEF’s New Energy Outlook 2015.

Source: Bloomberg New Energy Finance
RENEWABLE ENERGY PROPORTION OF POWER GENERATION- INTERMITTENT ENERGY (WIND & SOLAR), 2040 (%)

- France 30%
- UK 63%
- Germany 77%
- Brazil 34%
- Mexico 32%
- US 24%
- Japan 20%
- China 37%
- India 32%
- Australia 52%
- ME + Africa 26%
- France 30%
- US 24%
- Mexico 32%
- Brazil 34%
- Japan 20%
- China 37%
- India 32%
- Australia 52%
- ME + Africa 26%

Note: This only shows the combination of wind and solar energy generation. All numbers come from BNEF’s New Energy Outlook 2015.

Source: Bloomberg New Energy Finance
E.ON SPLIT

e.on
e.off
ELECTRIC VEHICLE UPTAKE

CARS AND TRUCKS IN USE WORLDWIDE, 2013
1.2 billion

ELECTRIC VEHICLES IN USE WORLDWIDE, 2014
0.75 million (to scale)

Source: Bloomberg New Energy Finance, International Organization of Motor Vehicle Manufacturers
Note: Values from 2010-2014 are based on BNEF’s annual battery price index. *2015 based on H1 data. For more see here: https://www.bnef.com/Insight/10299. Cumulative production is based on total EVs sold and their respective battery pack size.
EV LITHIUM-ION BATTERY PACKS & CRYSTYALLINE SI PV MODULES: HISTORICAL COST REDUCTIONS

Note: Values from 2010-2014 are based on BNEF’s annual battery price index. *2015 based on H1 data. For more see here: https://www.bnef.com/Insight/10299. Cumulative production is based on total EVs sold and their respective battery pack size.

Bloomberg New Energy Finance

Michael Liebreich
BNEF EMEA Summit, London, 12 October 2015
@MLiebreich
LOS ANGELES, USA
PARIS, FRANCE

Photo: DENNIS/Creative Commons
VW DIESELGATE
GAP BETWEEN EUROPEAN TEST AND REAL WORLD EMISSIONS, VARIOUS VEHICLES, 2001-2014 (%)

Source: International Council on Clean Transportation
URBAN TRANSPORT REVOLUTION

Images: Transport for London, Zipcar, Uber, Proterra
CHANGING UK ELECTRICITY MIX

POWER GENERATED BY SOURCE, 1998-2014 (TWH)

SHARE OF GENERATION, 2015 YTD (%)

- Renewables: 23.8%
- Nuclear: 26.2%
- Coal: 27.5%
- Gas: 20.1%
- Oil: 0.5%
- Other: 1.9%
UK HOUSEHOLD ELECTRICITY BILL
2014 (£)

- VAT @ 5%
- Energy and climate change policies
- Supplier costs and margins
- Network costs
- Wholesale energy costs

Source: UK DECC Annual domestic energy bills 2013, Bloomberg New Energy Finance,

Note: Real 2014 Sterling.
UK LCOE BY TECHNOLOGY
H2 2015 ($/MWH)

PV - c-Si (U)
Coal
Natural gas CCGT
Wind - onshore

Note: Natural gas CCGT and coal includes a carbon cost of $26/tonne

Source: Bloomberg New Energy Finance
Michael Liebreich @MLiebreich · Jun 28
Breaking! First picture of the UK's #HinkleyC #nuclear power station...
The old is dying and the new struggles to be born; in this interregnum a great variety of morbid symptoms appear.

Antonio Gramsci
Co-Founder & Leader, Italian Communist Party
Thanks!

MARKETS
Renewable Energy
Energy Smart Technologies
Advanced Transport
Gas
Carbon and RECs

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