

# GLOBAL RENEWABLE DEVELOPMENT AND TRANSPORT

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Transport webinar  
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# 2015

**REN21 is a multi stakeholder network dedicated to the rapid uptake of renewable energy worldwide.**

**Science & Academia:**

IIASA, ISES, SANEDI, TERI, Fundacion Bariloche, NREL

**NGOs:**

CURES, GFSE, Greenpeace,  
ICLEI, ISEP, JREF, RCREEE,  
WCRE, WFC, WRI, WWF

**Industry Associations:**

ACORE, ARE, CEC, CREIA, EREF,  
GWEC, IGA, IHA, IREF, WBA,  
WWEA



**International Organisations:**

ADB, EC, ECREEE, GEF, IEA,  
IRENA, UNDP, UNEP,  
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**National Governments:**

Brazil, Denmark, Germany,  
India, Norway, South Africa,  
Spain, UAE, United States of  
America

# REN21 Renewables Global Status Report

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## RENEWABLES 2015 GLOBAL STATUS REPORT



[www.ren21.net/gsr](http://www.ren21.net/gsr)

**Annual report on renewable energy progress and trends**

**Network of over 500 contributors, researchers & reviewers worldwide**

**The report features:**

- Global Overview
- Market & Industry Trends
- Investment Flows
- Policy Landscape
- Distributed Renewable Energy for Energy Access
- Feature: Using Renewables for Climate Change Adaptation

**The report covers:**

- All renewable energy technologies
- The power, heating & cooling, and transport sector
- Energy Efficiency

**Country data** available under new REN21 Renewables Interactive Map [www.ren21.net/map](http://www.ren21.net/map)











# A Decade Of Renewable Energy Growth Surpassing Expectations

The evolution of renewable energy has surpassed all expectations.

**Global installed capacity and production from all renewable technologies have increased substantially.**

Significant cost reductions for most technologies.

**Supporting policies spread throughout the world.**

		START 2004	2013	2014
<b>INVESTMENT</b>				
New investment (annual) in renewable power and fuels	billion USD	45	232	270
<b>POWER</b>				
Renewable power capacity (total, not including hydro)	GW	85	560	657
Renewable power capacity (total, including hydro)	GW	800	1,578	1,712
 Hydropower capacity (total)	GW	715	1,018	1,055
 Bio-power capacity	GW	<36	88	93
 Bio-power generation	TWh	227	396	433
 Geothermal power capacity	GW	8.9	12.1	12.8
 Solar PV capacity (total)	GW	2.6	138	177
 Concentrating solar thermal power (total)	GW	0.4	3.4	4.4
 Wind power capacity (total)	GW	48	319	370
<b>HEAT</b>				
 Solar hot water capacity (total)	GW <sub>th</sub>	86	373	406
<b>TRANSPORT</b>				
 Ethanol production (annual)	billion litres	28.5	87.8	94
 Biodiesel production (annual)	billion litres	2.4	26.3	29.7

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## Energy transition trends

**Renewable energy continued to grow in 2014** against the backdrop of increasing global energy consumption, and a dramatic decline in oil prices during the second half of the year.

Despite rising energy use, for the first time in four decades, **global carbon emissions** associated with energy consumption **remained stable in 2014** while the global economy grew;

This **stabilisation** has been **attributed to increased penetration of renewable energy** and to improvements in **energy efficiency**.

Countries from all around the world embark on an **energy transition with renewables** and energy efficiency: Germany, China, Denmark, Morocco, India, South Africa, Brazil, Costa Rica Chile, Mexico, etc.



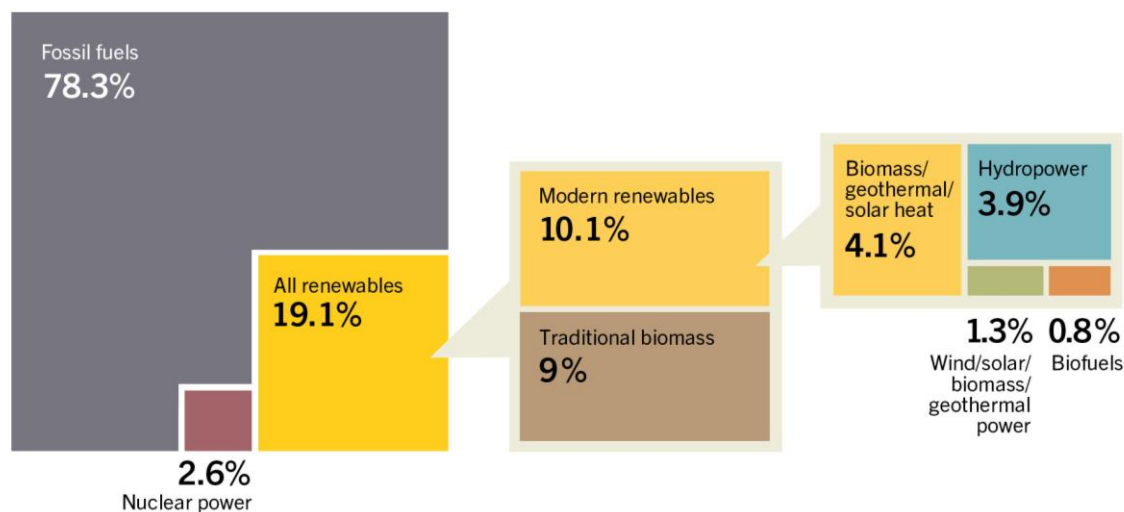
# Renewable Energy in the World

Renewable energy provided an estimated **19.1%** of global final energy consumption in 2013.

The share of **modern renewable energy** increased to 10.1%.

The share of **traditional biomass** was of 9%, same as in 2012.

Estimated Renewable Energy Share of Global Final Energy Consumption, 2013



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# Renewable Energy “Champions” - annual investment/capacity additions

## ANNUAL INVESTMENT / NET CAPACITY ADDITIONS / PRODUCTION IN 2014

	1	2	3	4	5
Investment in renewable power and fuels (not including hydro > 50 MW)	<b>China</b>	United States	Japan	United Kingdom	Germany
Investment relative to annual GDP <sup>1</sup>	<b>Burundi</b>	Kenya	Honduras	Jordan	Uruguay
 Geothermal power capacity	<b>Kenya</b>	Turkey	Indonesia	Philippines	Italy
 Hydropower capacity	<b>China</b>	Brazil	Canada	Turkey	India
 Solar PV capacity	<b>China</b>	Japan	United States	United Kingdom	Germany
 CSP capacity	<b>United States</b>	India	–	–	–
 Wind power capacity	<b>China</b>	Germany	United States	Brazil	India
 Solar water heating capacity <sup>2</sup>	<b>China</b>	Turkey	Brazil	India	Germany
 Biodiesel production	<b>United States</b>	Brazil	Germany	Indonesia	Argentina
 Fuel ethanol production	<b>United States</b>	Brazil	China	Canada	Thailand

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# Renewable Energy “Champions” – total capacity

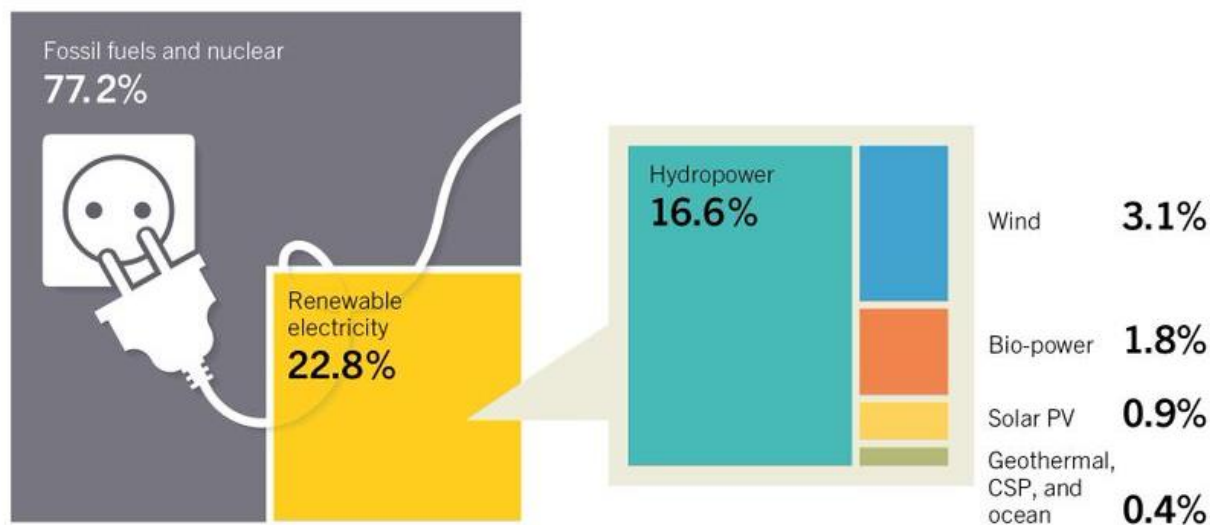
TOTAL CAPACITY OR GENERATION AS OF END-2014					
	1	2	3	4	5
<b>POWER</b>					
Renewable power (incl. hydro)	<b>China</b>	United States	Brazil	Germany	Canada
Renewable power (not incl. hydro)	<b>China</b>	United States	Germany	Spain / Italy	Japan / India
Renewable power capacity per capita (not incl. hydro)	<b>Denmark</b>	Germany	Sweden	Spain	Portugal
Biopower generation	<b>United States</b>	Germany	China	Brazil	Japan
Geothermal power capacity	<b>United States</b>	Philippines	Indonesia	Mexico	New Zealand
Hydropower capacity <sup>4</sup>	<b>China</b>	Brazil	United States	Canada	Russia
Hydropower generation <sup>4</sup>	<b>China</b>	Brazil	Canada	United States	Russia
Concentrating solar thermal power (CSP)	<b>Spain</b>	United States	India	United Arab Emirates	Algeria
Solar PV capacity	<b>Germany</b>	China	Japan	Italy	United States
Solar PV capacity per capita	<b>Germany</b>	Italy	Belgium	Greece	Czech Republic
Wind power capacity	<b>China</b>	United States	Germany	Spain	India
Wind power capacity per capita	<b>Denmark</b>	Sweden	Germany	Spain	Ireland
<b>HEAT</b>					
Solar water collector capacity <sup>2</sup>	<b>China</b>	United States	Germany	Turkey	Brazil
Solar water heating collector capacity per capita <sup>2</sup>	<b>Cyprus</b>	Austria	Israel	Barbados	Greece
Geothermal heat capacity <sup>3</sup>	<b>China</b>	Turkey	Japan	Iceland	India
Geothermal heat capacity per capita <sup>3</sup>	<b>Iceland</b>	New Zealand	Hungary	Turkey	Japan

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## Power Sector

### Estimated Renewable Energy Share of Global Electricity Production, End-2014



Based on renewable generating capacity in operation at year-end 2014.

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- Renewables accounted **27.7%** of global power generation capacity and **22.8%** of global electricity demand.
- Renewables made up for **59%** of net additions to global power capacity.
- Total RE power capacity: **1712 GW**, an increase of more than 8.5% over 2013.

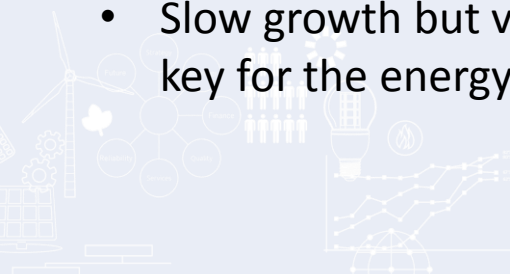
## Heating & Cooling

Energy use for heat accounted for about half of total world final energy consumption in 2014.

Small but growing modern renewable energy share of final global heat demand: **approx. 8%.**

Trends:

- Growing interest, although advanced systems represent a small fraction of the global market
- Slow growth but vast potential—key for the energy transition



## Transport

Renewable energy accounted for an estimated **3.5%** of global energy demand for road transport in 2013, up from **2%** in 2007.

Trends in the development of **gaseous fuels** and electricity continued to create pathways for the integration of renewables into transportation.

As of early 2015, China was home to 97% of the world's 235 million electric two wheelers and 79% of the world's 46,000 electric buses.



## Solar Photovoltaics (PV) – total global capacity

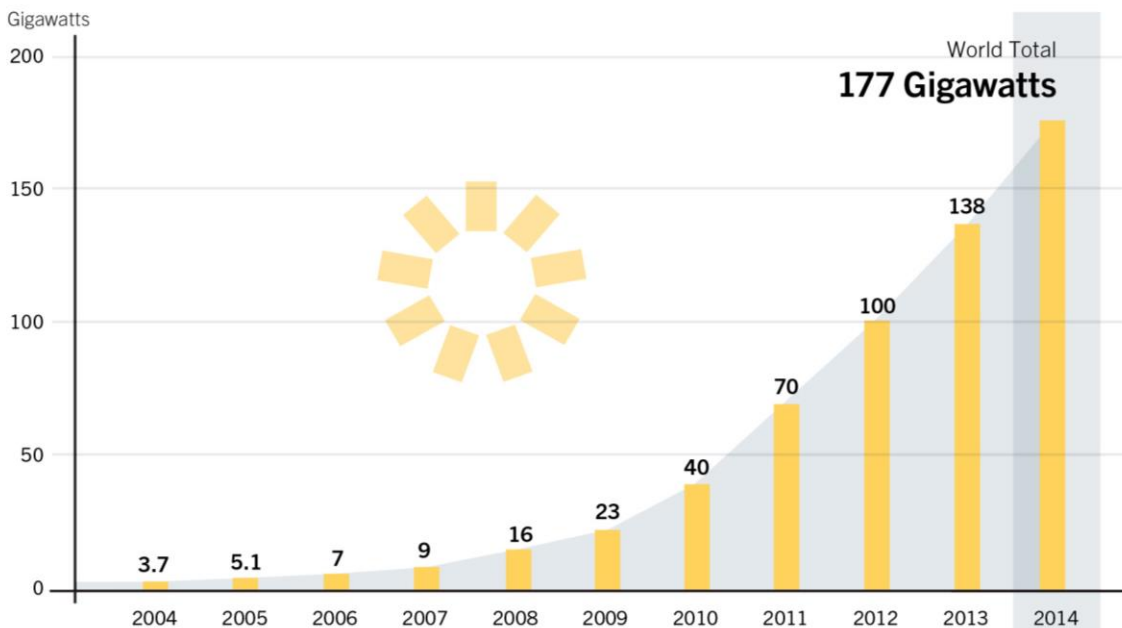
Solar PV:

- **+40 GW** added (10.6 GW in China)
- Total capacity: **177 GW**

**More than 60% of all PV capacity** in operation worldwide at the end of 2014 was **added over the past three years.**

**Asia** accounted for almost **60%** of global additions.

Solar PV Global Capacity, 2004–2014



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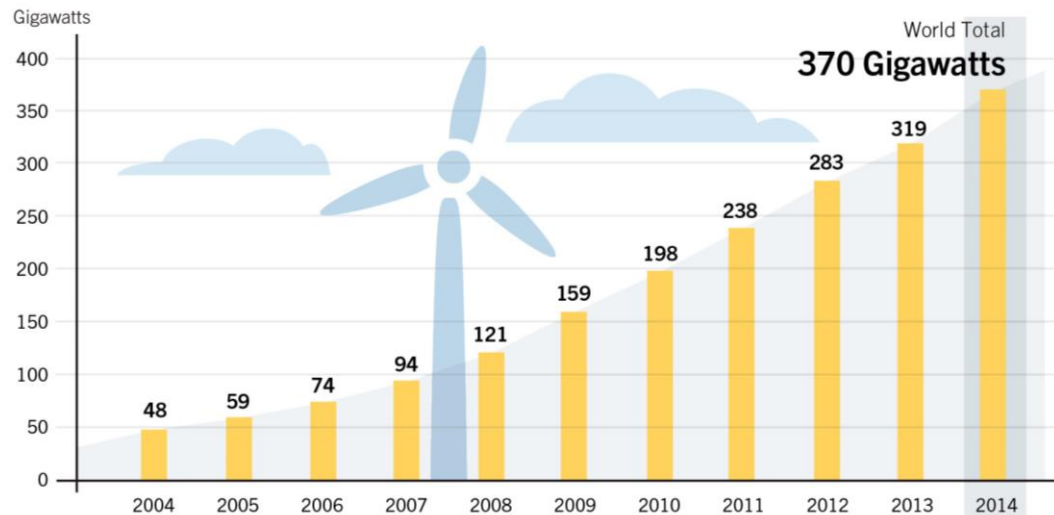
## Wind Power – total world capacity

**51 GW** of capacity were added (out of which 23.2 GW in China)

Total capacity: **370 GW** (out of which 115 GW in China generating 2.8 % of China's total electricity consumption)

Offshore, an estimated **1.7 GW** of grid-connected capacity was added in 2014, for a world total exceeding **8.5 GW**

Wind Power Global Capacity, 2004–2014



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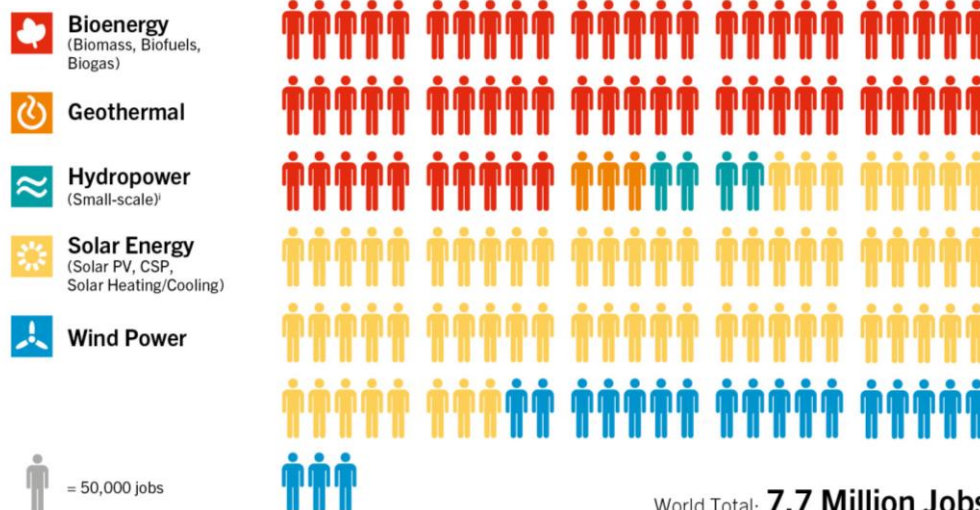
# Jobs in Renewable Energy

Global employment continued to increase

An estimated **7.7 million direct or indirect jobs** in the renewable energy industry (out of which 3.4 million in China)

Solar PV: 2.5 million jobs, global wind 1 million jobs in 2014

## Jobs in Renewable Energy, 2014



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Source: IRENA

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# Global Investment in Renewable Energy

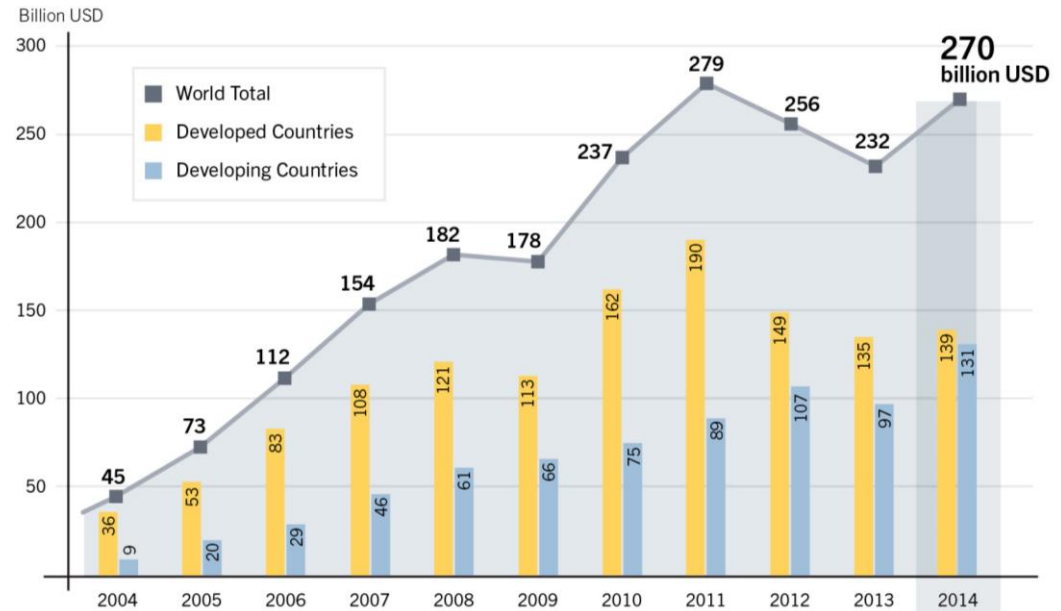
Global new investment estimated **USD 270.2 billion in 2014**

(including hydropower USD 301 billion)

Reasons for the increase:

- Increase in solar power installations in China and Japan
- Investment in solar power up **25%**
- Record investment in offshore wind projects in Europe

Global New Investment in Renewable Power and Fuels, Developed and Developing Countries, 2004–2014

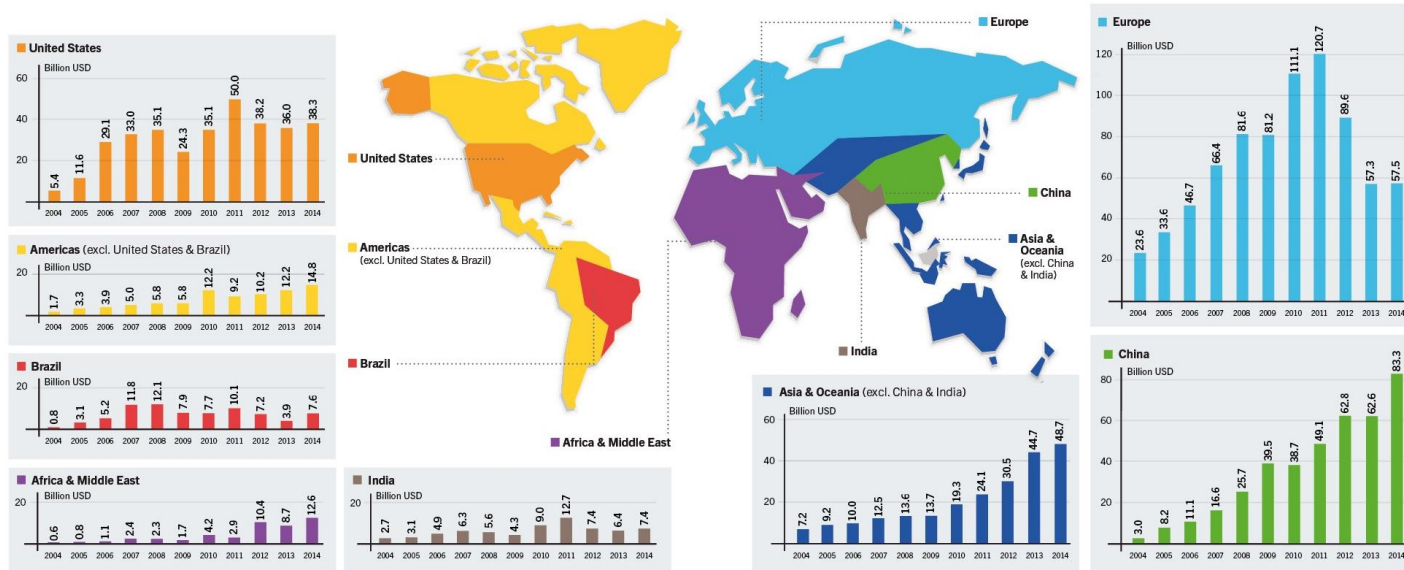


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Source: Frankfurt School–UNEP and BNEF

# Global New Investment in Renewable Power and Fuels, by Region, 2004–2014



Data include government and corporate R&D.

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Source: Frankfurt School–UNEP and BNEF

**Developed Countries:** Annual investment in 2014: **USD 138.9 billion**  
(increase of 3 % compared to 2013)

**Developing Countries:** annual investment in 2014: **USD 131.3 billion**  
(increase of 36% compared to 2013)

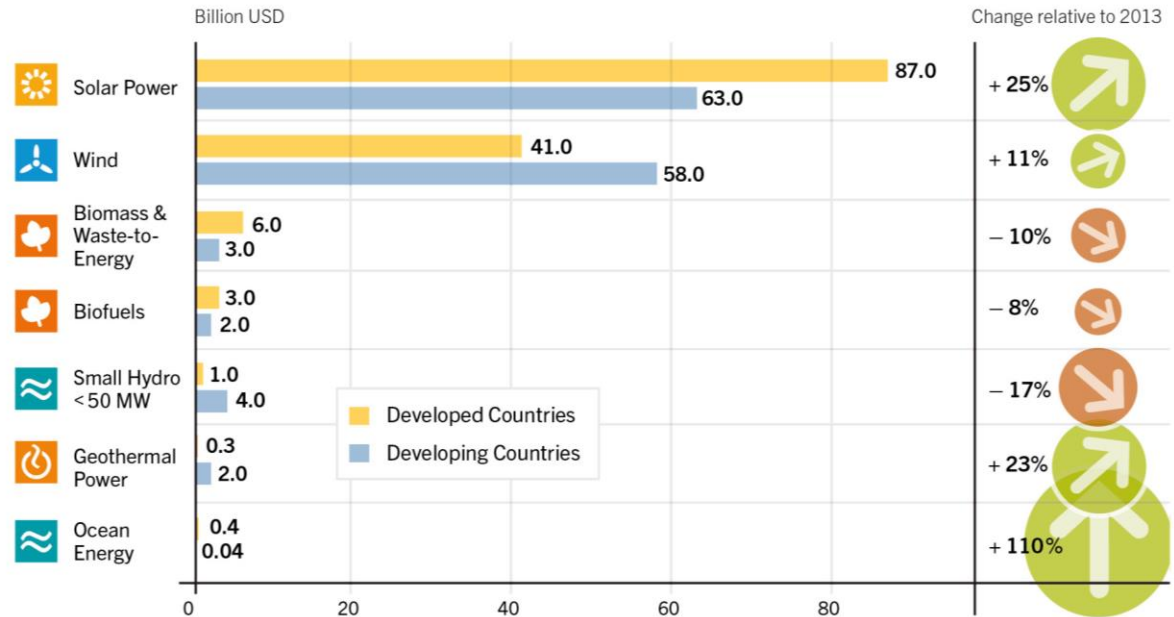


# Global Investment in Renewable Energy by Technology

Solar power - leading sector for money committed during 2014, receiving more than **55%** (USD 149.6 billion) of total new investment in renewable power and fuels

Wind power followed with **USD 99.5 billion**

Global New Investment in Renewable Energy by Technology, Developed and Developing Countries, 2014



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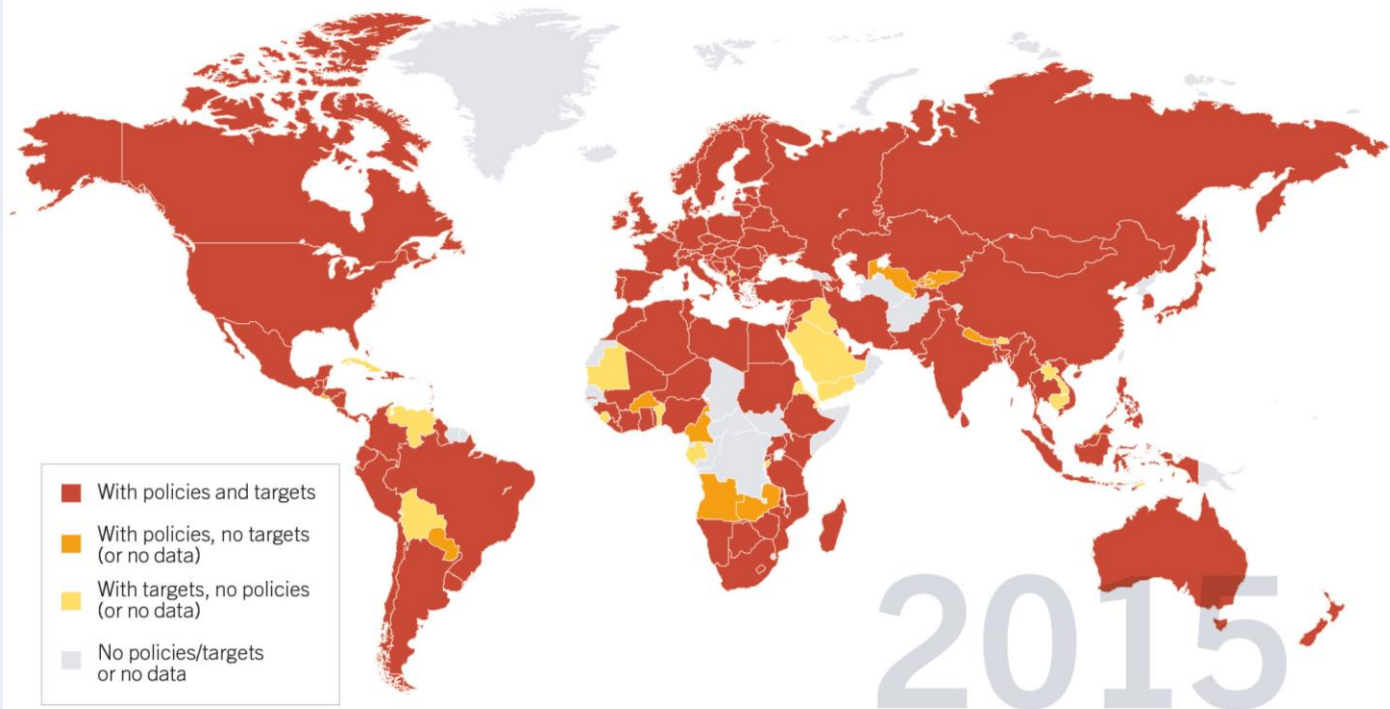


Source: Frankfurt School-UNEP and BNEF



# Renewable Energy Policy Landscape

Countries with Renewable Energy Policies and Targets, Early 2015



Countries are considered to have policies when at least one national or state/provincial-level policy is in place.

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# Renewable Energy Policy Landscape

		START 2004 <sup>1</sup>	2013	2014
<b>POLICIES</b>				
Countries with policy targets	#	48	144	164
States/provinces/countries with feed-in policies	#	34	106	108
States/provinces/countries with RPS/quota policies	#	11	99	99
Countries with tendering/ public competitive bidding <sup>5</sup>	#	n/a	55	60
Countries with heat obligation/mandate	#	n/a	19	21
States/provinces/countries with biofuels mandates <sup>6</sup>	#	10	63	64

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At least **164 countries** had **renewable energy targets**.

At least **145 countries** had **renewable energy policies** in place.

Most policies focus on power: mainly feed-in-tariffs and renewable portfolio standards.

Recent trends: Merging of components from different policy mechanisms.

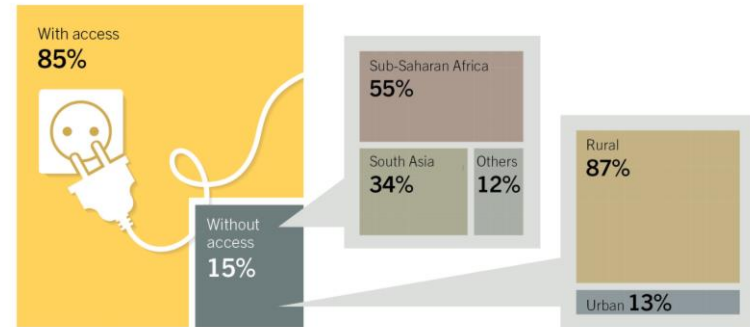
# Distributed Renewable Energy in Developing Countries

15% of the global population still lack electricity access

**Distributed renewable energy** systems offer unprecedented opportunity to accelerate the transition to modern energy services in remote areas and new markets, as they are **more cost-competitive**.

Little quantitative information on DRE markets, but information available indicates that **markets are significant**, e.g. **off-grid solar PV** attracted approx. **USD 64 billion of investment in 2014**.

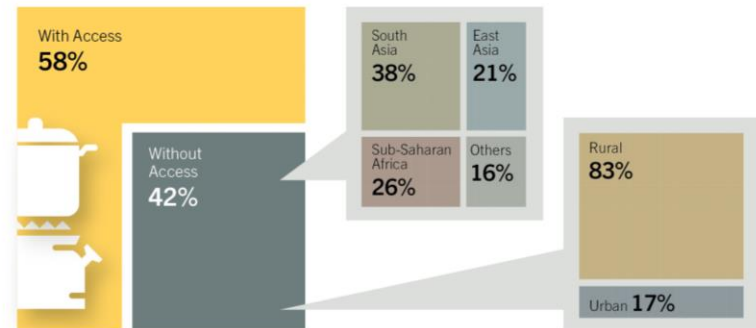
World Electricity Access and Lack of Access by Region, 2012



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World Clean Cooking Access and Lack of Access by Region, 2012

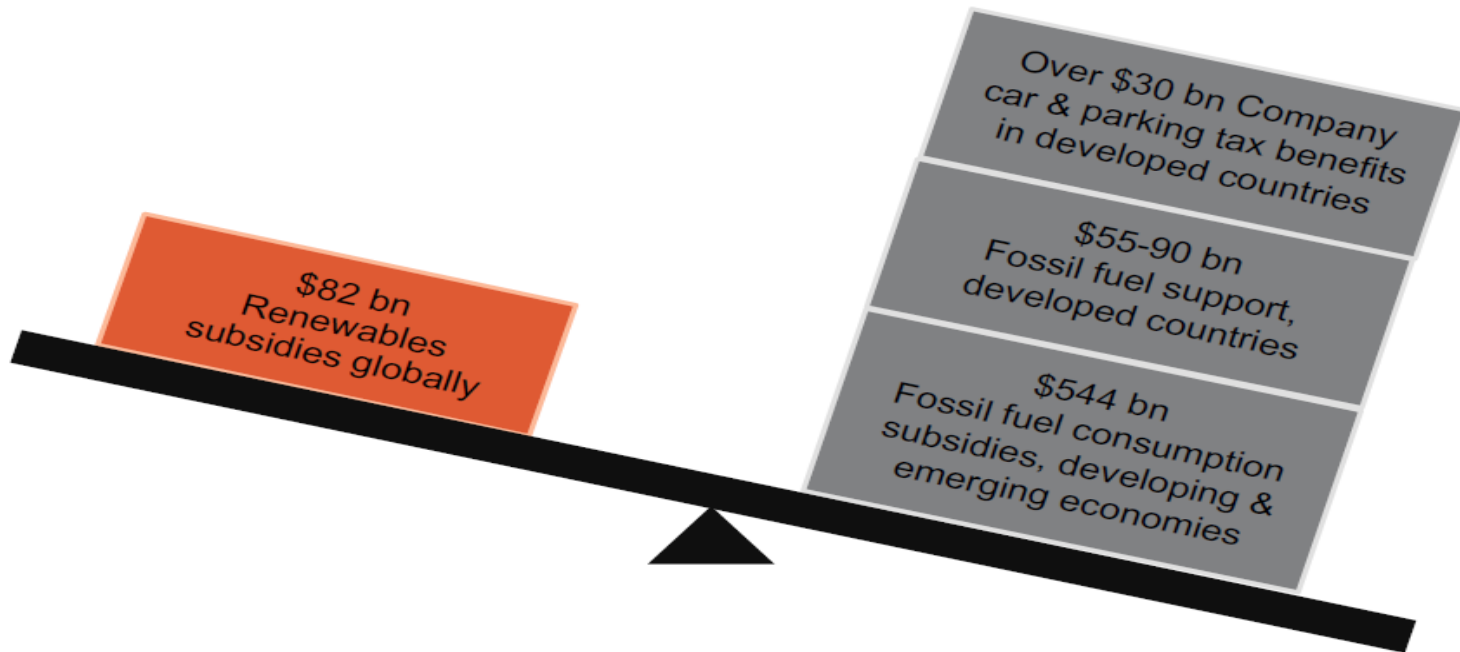


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# Why do we have to support renewables?

## ELIMINATING ENVIRONMENTALLY HARMFUL SUBSIDIES - ENERGY



Sources: OECD (2013), Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels; IEA (2013), World Energy Outlook; IEA (2013), OECD (2014, forthcoming)

# Conclusions

The past decade has set the wheels in motion for a global transition to renewables, but a concerted and sustained effort is needed to achieve it:

- **Long-term and stable policy frameworks**, which can adapt to changing environment, to sustain and increase investment levels
- **Greater attention to the heating and cooling** and the **transport** sector and “energy system thinking”
- Improve information on **distributed renewable energy markets in developing countries** and improve access to up-front finance



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