

GLOBAL RENEWABLE ENERGY STATUS

CESC SOUTH-EAST ASIA WEBINAR

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REN21 Renewables 2014 Global Status Report



www.ren21.net/gsr

Launched at SE4All Forum on 4 June 2014 in New York

Network of over 500 contributors, researchers & reviewers worldwide

The report features:

- Global Overview
- Market & Industry Trends
- Investment Flows
- Policy Landscape
- Distributed Renewable Energy in Developing Countries
- Feature: Tracking the Global Energy Transition (10 years of RE progress)

The report covers:

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



A Decade of Renewable Energy Growth Surpassing Expectations

Projected levels of renewable energy for 2020 were already surpassed by 2010.

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 ¹	END 2012	END 2013
INVESTMENT				
New investment (annual) in renewable power and fuels ²	billion USD	39.5	249.5	214.4 (249.4)
POWER				
Renewable power capacity (total, not including hydro)	GW	85	480	560
Renewable power capacity (total, including hydro)	GW	800	1,440	1,560
Hydropower capacity (total) ³	GW	715	960	1,000
Bio-power capacity	GW	<36	83	88
Bio-power generation	TWh	227	350	405
Geothermal power capacity	GW	8.9	11.5	12
Solar PV capacity (total)	GW	2.6	100	138
Concentrating solar thermal power (total)	GW	0.4	2.5	3.4
Wind power capacity (total)	GW	48	283	318
HEAT				
Solar hot water capacity (total) ⁴	GW _{th}	98	282	326
TRANSPORT				
Ethanol production (annual)	billion litres	28.5	82.6	87.2
Biodiesel production (annual)	billion litres	2.4	23.6	26.3

Data source: REN21 Renewables 2014 Global Status Report

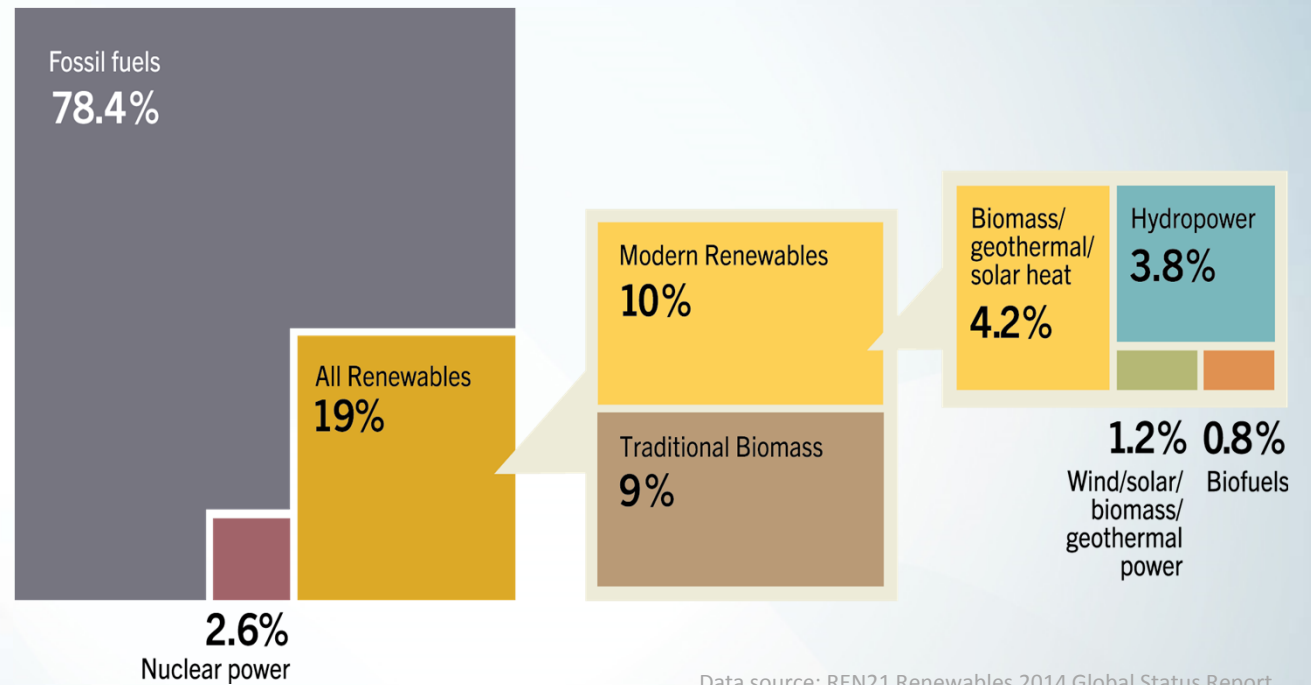
Renewable Energy in the World

Renewable energy provided an estimated **19% of global final energy consumption** in 2012.

The share of **modern renewable energy** increased to **10%**.

The share of **traditional biomass** was of **9%**.

Estimated Renewable Energy Share of Global Final Energy Consumption, 2012











Data source: REN21 Renewables 2014 Global Status Report



Renewable Energy “Champions” - annual investment/capacity additions

ANNUAL INVESTMENT / NET CAPACITY ADDITIONS / PRODUCTION IN 2013

	1	2	3	4	5
Investment in renewable power and fuels	China	United States	Japan	United Kingdom	Germany
Share of GDP 2012 (USD) invested ¹	Uruguay	Mauritius	Costa Rica	South Africa	Nicaragua
 Geothermal power capacity	New Zealand	Turkey	United States	Kenya	Philippines
 Hydropower capacity	China	Turkey	Brazil	Vietnam	India
 Solar PV capacity	China	Japan	United States	Germany	United Kingdom
 CSP capacity	United States	Spain	United Arab Emirates	India	China
 Wind power capacity	China	Germany	United Kingdom	India	Canada
 Solar water heating capacity ²	China	Turkey	India	Brazil	Germany
 Biodiesel production	United States	Germany	Brazil	Argentina	France
 Fuel ethanol production	United States	Brazil	China	Canada	France

Data source: REN21 Renewables 2014 Global Status Report



Renewable Energy “Champions” – total capacity

TOTAL CAPACITY OR GENERATION⁶ AS OF END-2013

	1	2	3	4	5
POWER					
Renewable power (incl. hydro)	China	United States	Brazil	Canada	Germany
Renewable power (not incl. hydro)	China	United States	Germany	Spain / Italy	India
Renewable power capacity per capita (not incl. hydro) ³	Denmark	Germany	Portugal	Spain / Sweden	Austria
🔌 Biopower generation	United States	Germany	China	Brazil	India
🔌 Geothermal power	United States	Philippines	Indonesia	Mexico	Italy
🌊 Hydropower ⁴	China	Brazil	United States	Canada	Russia
🌊 Hydropower generation ⁴	China	Brazil	Canada	United States	Russia
☀️ Concentrating solar thermal power (CSP)	Spain	United States	United Arab Emirates	India	Algeria
☀️ Solar PV	Germany	China	Italy	Japan	United States
☀️ Solar PV capacity per capita	Germany	Italy	Belgium	Greece	Czech Republic
🌬️ Wind power	China	United States	Germany	Spain	India
🌬️ Wind power capacity per capita	Denmark	Sweden	Spain	Portugal	Ireland
HEAT					
☀️ Solar water heating ²	China	United States	Germany	Turkey	Brazil
☀️ Solar water heating capacity per capita ²	Cyprus	Austria	Israel	Barbados	Greece
🔌 Geothermal heat ⁵	China	Turkey	Iceland	Japan	Italy

Data source: REN21 Renewables 2014 Global Status Report



Power Sector

Renewable energy comprise **26.4%** of **global power generation capacity**

22.1% of **global electricity** was produced from renewable energy

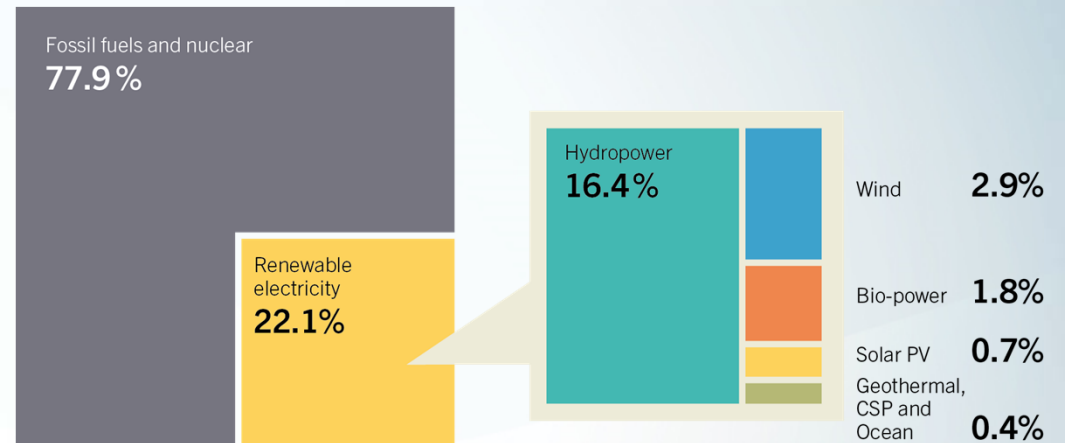
Renewables accounted for 56% of new installed power capacity in 2013.

Total RE power capacity: **1,560 GW**

BRICS lead for total RE power capacity (incl. hydro): **38%** of global capacity.



Estimated Renewable Energy Share of Global Electricity Production, End-2013



Based on renewable generating capacity in operation end-2013

Data source: REN21 Renewables 2014 Global Status Report

Heating & Cooling

Small but growing renewable energy share of final global heat demand: approx. **10%**.

Trends:

- Increasing use of renewables in **combined heat and power** plants
- Renewables in district systems as best practice for RE integration in cities
- Growing use of renewable heat for industrial purposes

Renewable Energy met more than 20% of final energy demand in **Thailand**, 11% in **India**, and 7% in **Indonesia**.



Transport



Liquid biofuels met about 2.3% of total transport fuel demand.

Growing interested in gaseous biofuels and hybrid options (e.g. biodiesel-natural gas buses, or electric-diesel transport)

Limited, but increasing initiatives to link electric transport systems with RE, particular at city/regional level



Hydropower - global capacity

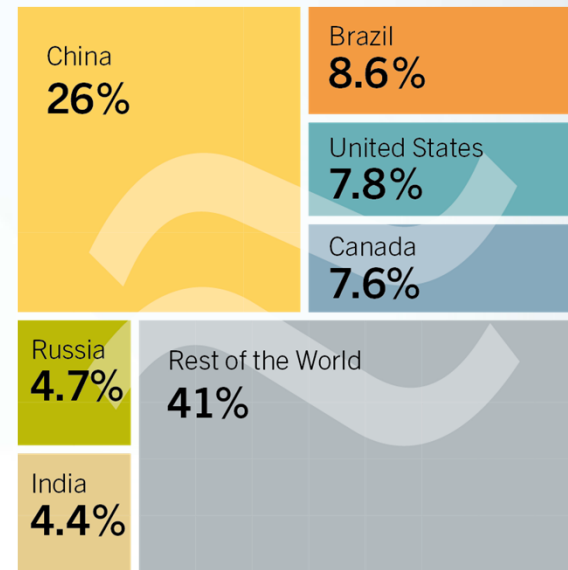
Total global hydropower capacity: **1,000 GW**

40 GW of new capacity were commissioned in 2013, presenting a **4%** increase.

Steady industry growth, driven by:

- China's expansion
- modernisation of ageing hydropower facilities.

Hydropower Global Capacity, Shares of Top Six Countries, 2013



Data source: REN21 Renewables 2014 Global Status Report



Solar Photovoltaics (PV) – total global capacity

Solar PV had a **record year** in 2013:

- About **+39 GW** added
- Total capacity: **139 GW**

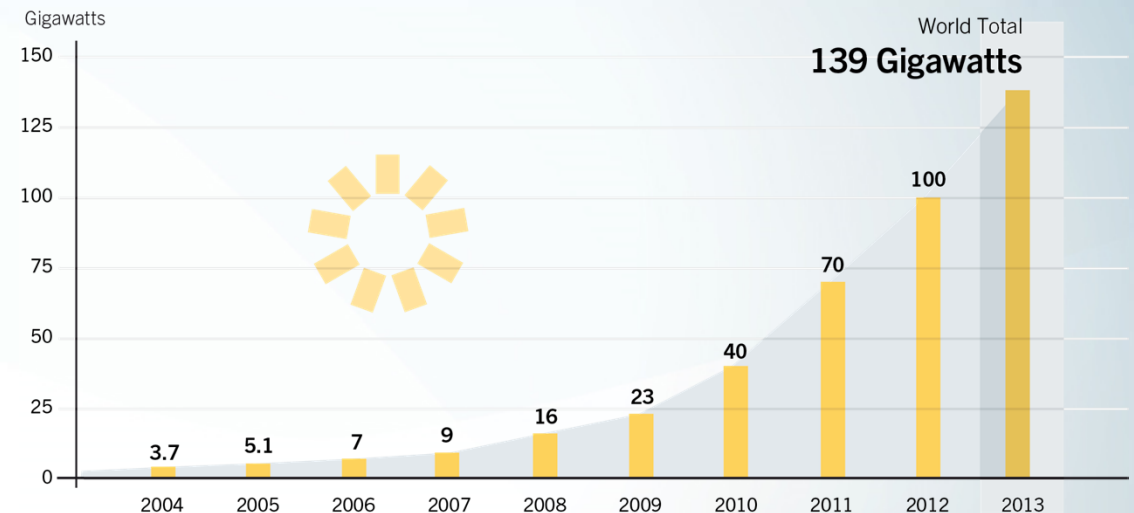
For the first time, **more PV capacity** was added than wind capacity.

China accounted for a **third** of global capacity additions, followed by **Japan** & the U.S.

India added 1.1 GW generation capacity and **Thailand** 0.3 GW



Solar PV Total Global Capacity, 2004–2013



Data source: REN21 Renewables 2014 Global Status Report

Wind Power – total world capacity

35 GW of capacity were added
(down 10 GW from 2012)

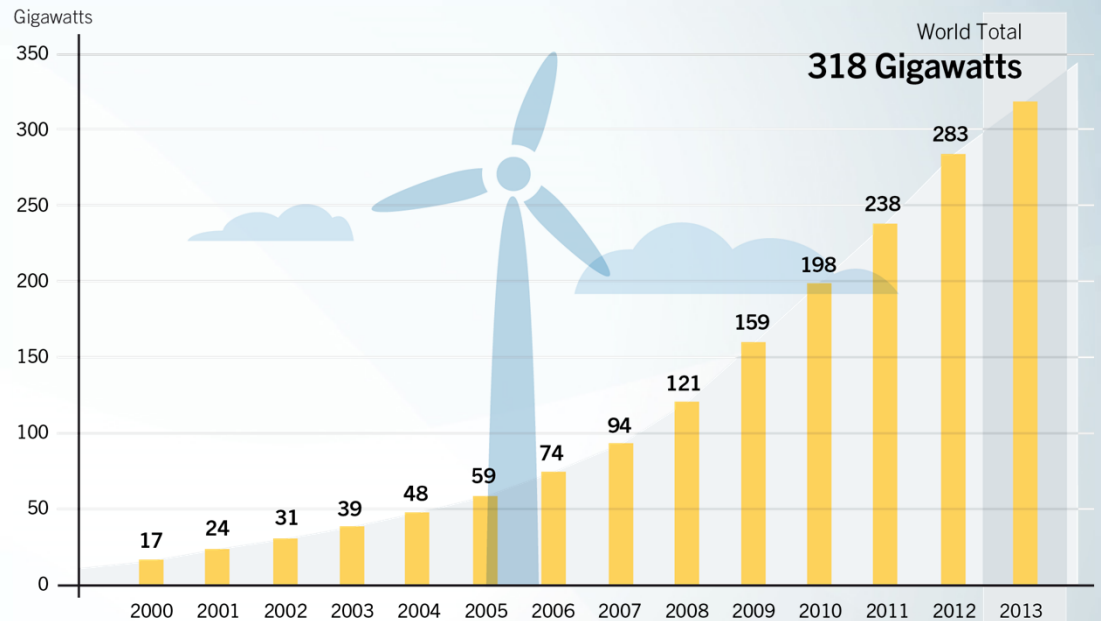
Total capacity : **318 GW**.

Wind market **slowed down**
following several record years
(mainly steep drop in US)

Offshore wind had a record
year: **+1.6 GW** added.

Europe remained top region,
closely followed by **Asia**

Wind Power Total World Capacity, 2000–2013



Data source: REN21 Renewables 2014 Global Status Report



Bioenergy

Total primary energy consumption of biomass was **~57 EJ in 2013**.

Almost **60%** was **traditional biomass**.

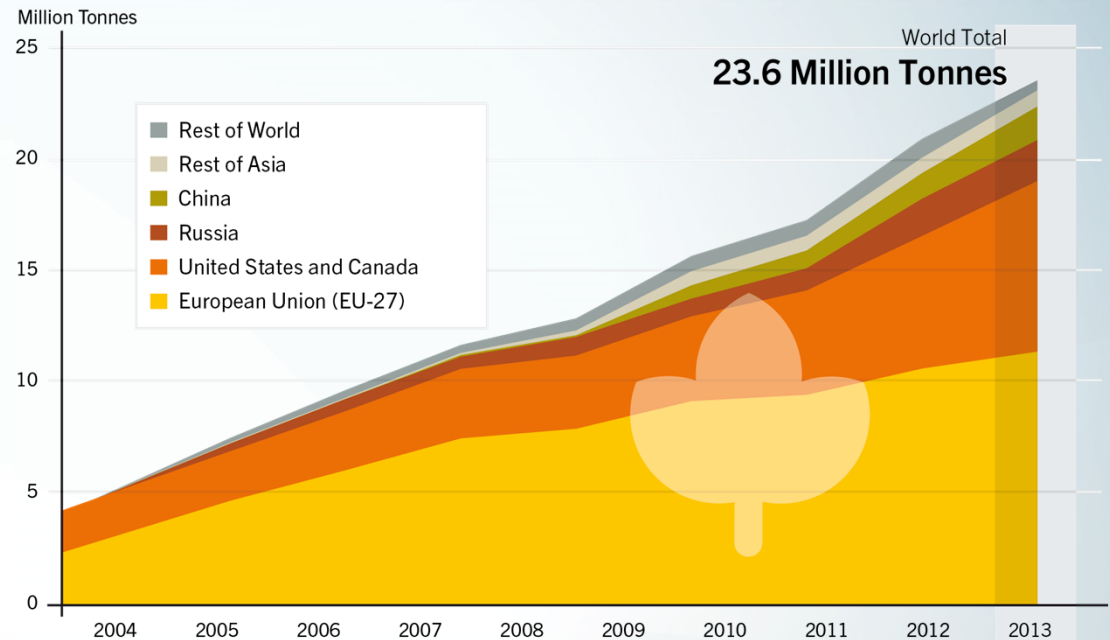
Modern biomass **heat capacity**:
296 GW_{th} (increase of 1 %)

Global **bio-power capacity**: **88 GW**
(increase: + 5 GW)

Bio-power generation: **China**
number 3 (6.2 GW) and **India**
number 6 (4.4 GW)



Wood Pellet Global Production, by Country or Region, 2004–2013



Data source: REN21 Renewables 2014 Global Status Report

Bioenergy – liquid biofuels

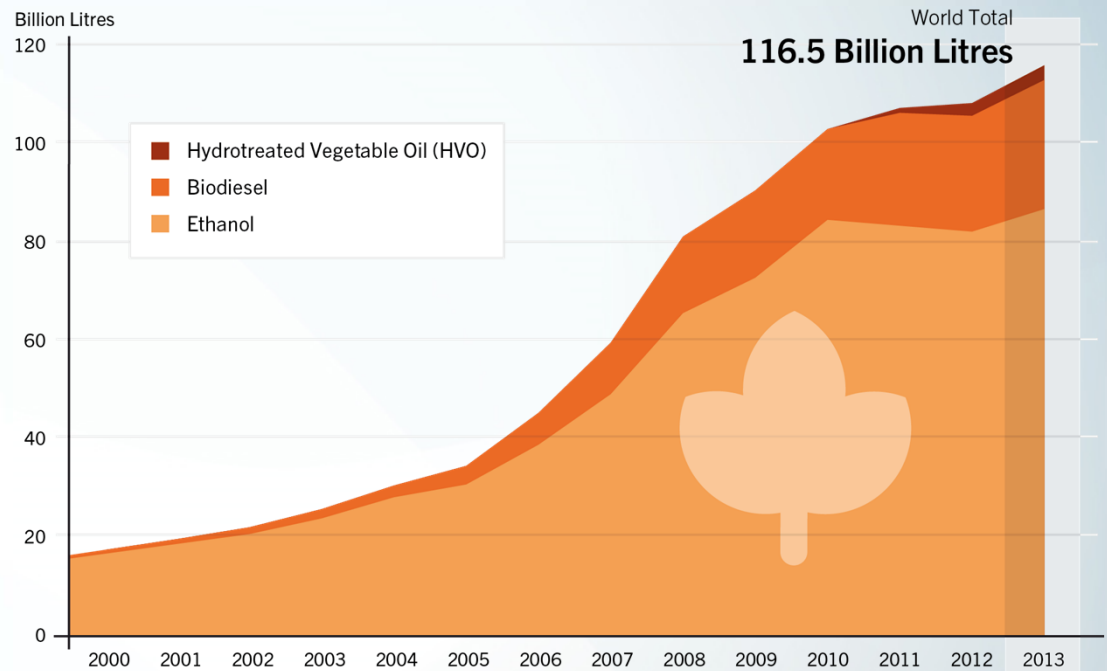
Liquid biofuels met **2.3%** of global transport fuel demand.

Global production rose by 7.7 billion litres to **116.6 billion litres**.

Investment in biofuel plant capacity continued to decline from its 2007 peak.

China produced 2 billion litres of bioethanol, **Singapore** 0.9 litres of HVO. **Thailand** continues expansion.

Ethanol, Biodiesel, and HVO Global Production, 2000–2013



Data source: REN21 Renewables 2014 Global Status Report



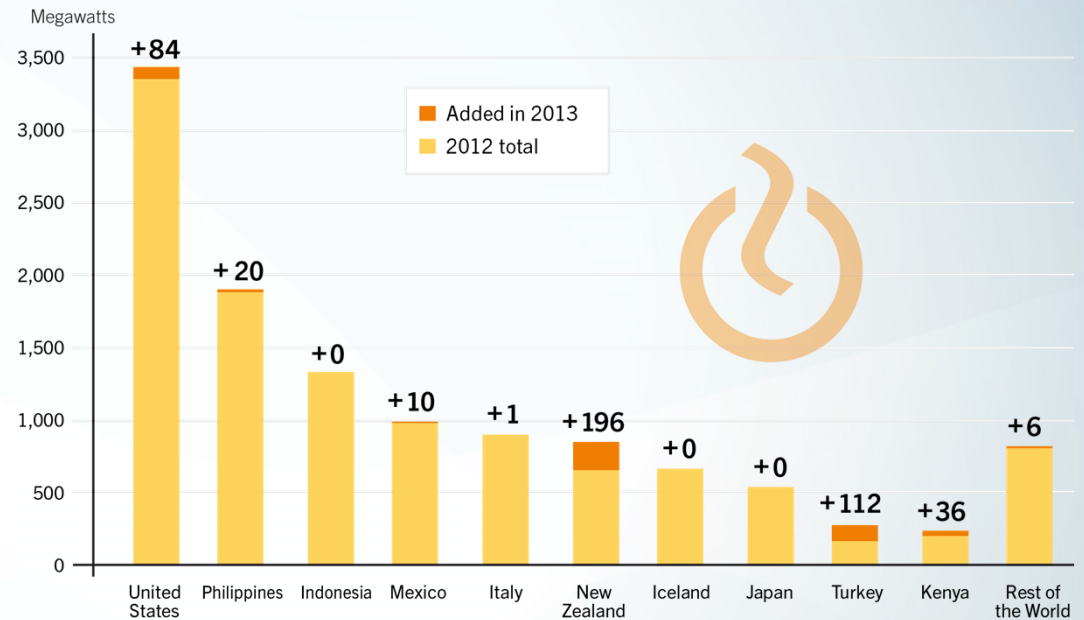
Geothermal Energy

About **455 MW net additions** came on line, bringing total global geothermal capacity to **12 GW**.

The use of low-temperature fields for power and heat continued to expand.

Lead countries for geothermal electric generating capacity:
United States (3.4 GW), **Philippines** (1.9 GW), **Indonesia** (1.3 GW), Mexico (1.0 GW), Italy (0.9 GW)

Geothermal Power Capacity and Additions, Top 10 Countries and Rest of World, 2013



Additions are net of repowering and retirements

Data source: REN21 Renewables 2014 Global Status Report



Solar Thermal Heating & Cooling

Solar water and air collector capacity: **~330 GW_{th}**

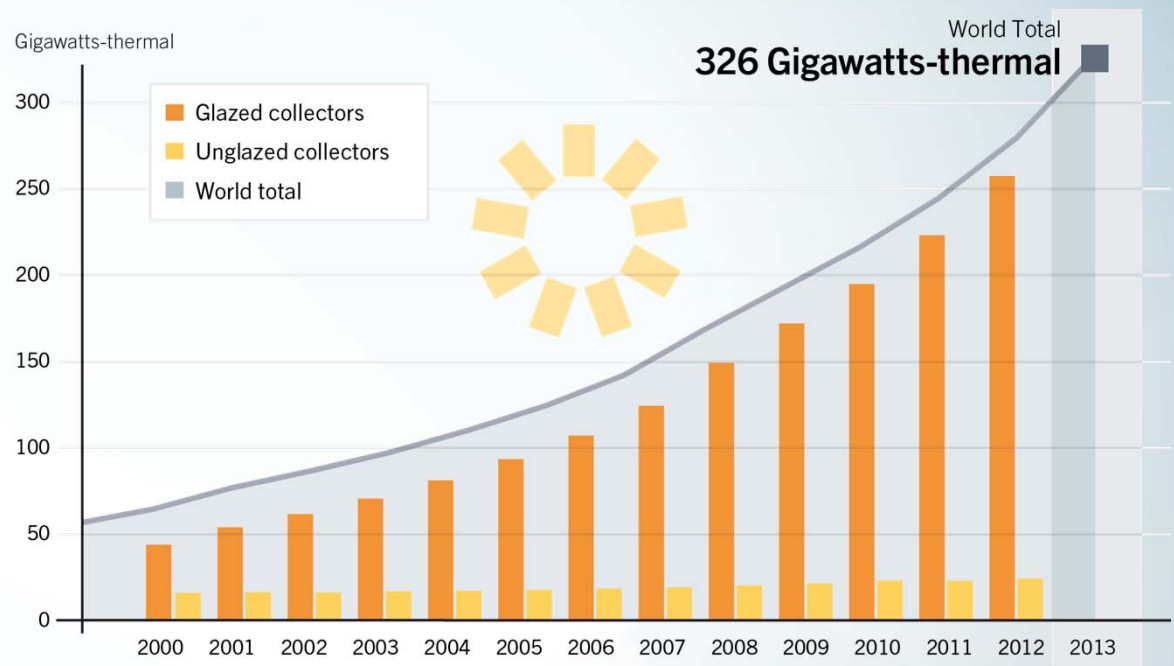
2013 Trends:

- large domestic systems
- growing interest district heating & cooling as well as industrial applications
- industry consolidation

China remained leader (80% of market), added a capacity of **44.7 GW_{th}** and maintained lead in manufacture of collectors



Solar Water Heating Collectors Global Capacity, 2000–2013



Data are for solar water collectors only (not including air collectors)

Data source: REN21 Renewables 2014 Global Status Report






Jobs in Renewable Energy


Global employment continued to increase.

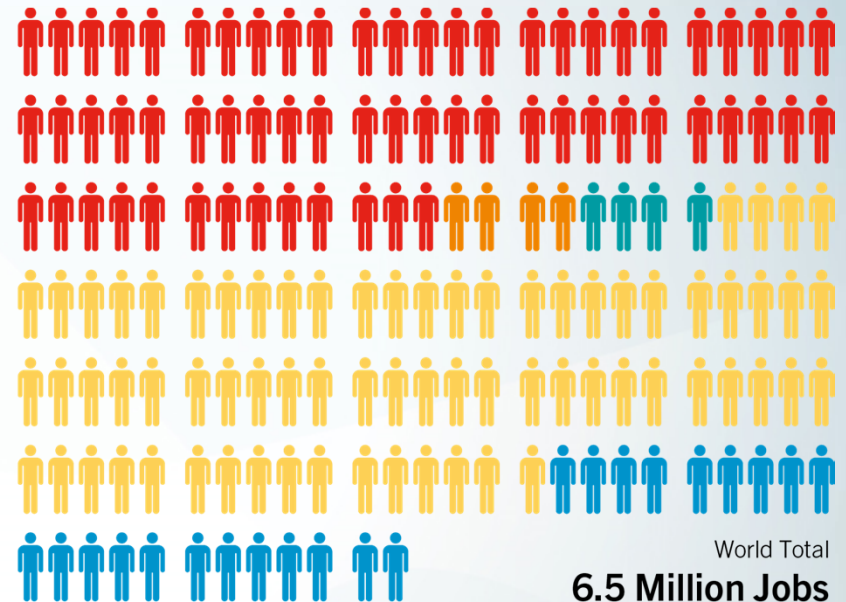
An estimated **6.5 million direct or indirect jobs** in the renewable energy industry

Noteworthy shifts along the value chain segments and from manufacturing to installation and maintenance

Jobs in Renewable Energy

-  **Bioenergy**
(Biomass, Biofuels, Biogas)
-  **Geothermal**
-  **Hydropower**
(Small-scale)
-  **Solar Energy**
(Solar PV, CSP, Solar Heating/Cooling)
-  **Wind Power**

 = 40,000 jobs



* Employment information for large-scale hydropower is incomplete and not included

Data source: IRENA



Global Investment in Renewable Energy

Global new investment estimated **USD 214.4 billion** in 2013, **down 14%** from 2012.

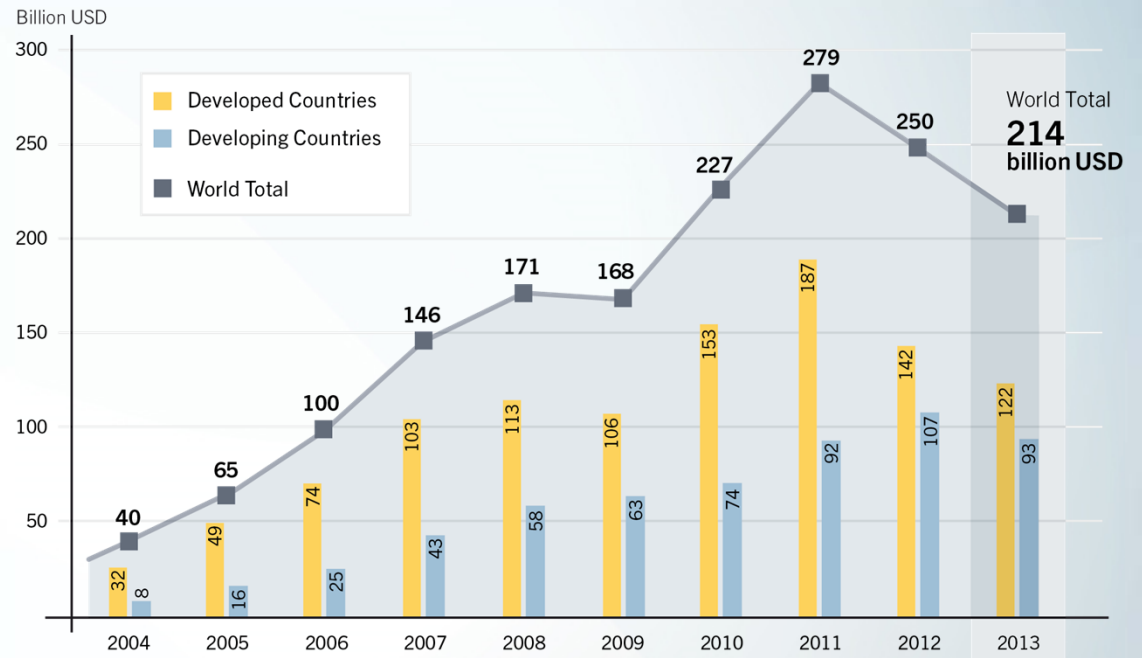
incl. hydropower > 50MW, it reached **USD 249.4 billion**.

Reasons for the decline:
policy uncertainty, retroactive support reductions, sharp reductions in technology costs

Net investment in new renewables power capacity outpaced fossil fuels for the fourth year running.



Global New Investment in Renewable Power and Fuels, Developed and Developing Countries, 2004–2013



Does not include investment in hydropower >50MW

Data source: UNEP FS/ BNEF Global Trends in Renewable Energy Investment 2014

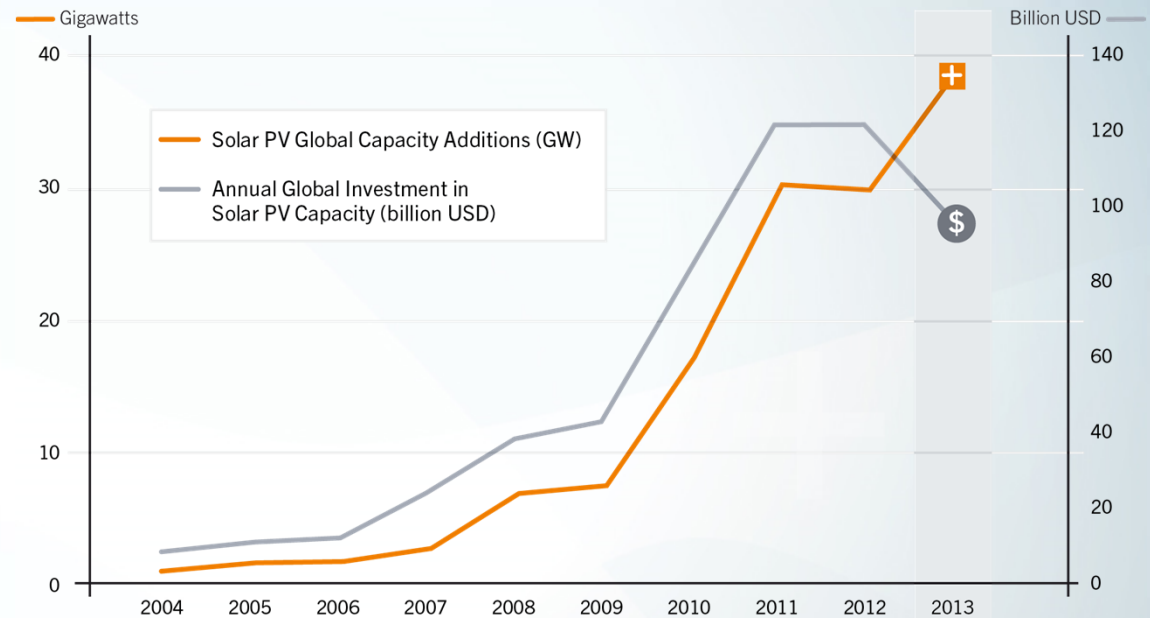
Solar Photovoltaics (PV) – global capacity additions and investment

22% decrease in investment in 2013, despite record capacity additions of more than **32%**.

Main reason: **low module prices**.

Opportunities for **new markets** to be developed.

Solar PV Global Capacity Additions and Annual Investment, 2004–2013

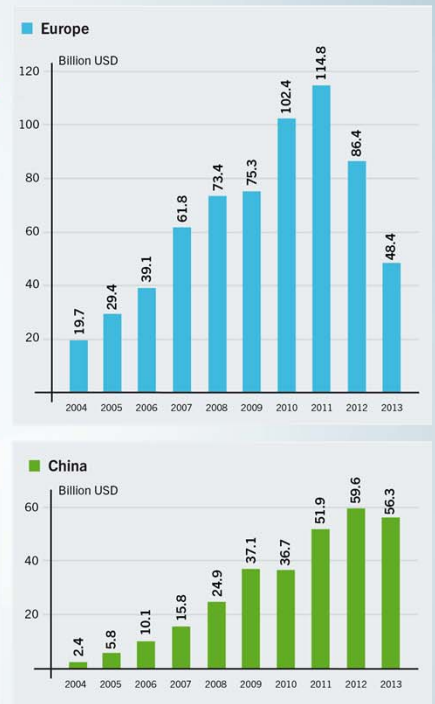
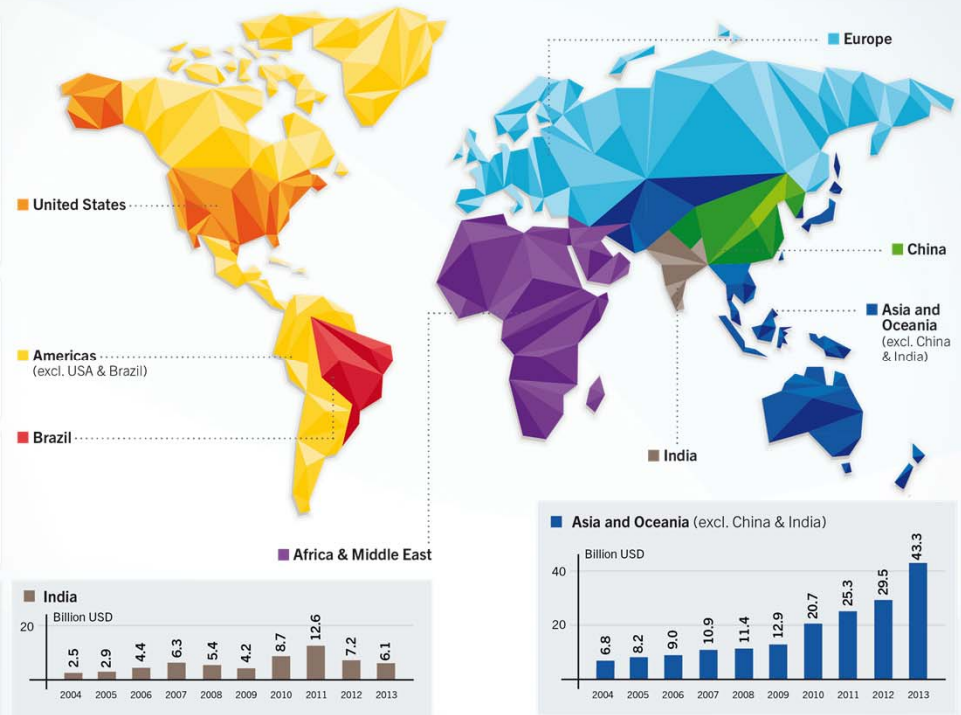


Data source: REN21 Renewables 2014 Global Status Report



Global Investment in Renewable Energy by World Regions

Global New Investment in Renewable Power and Fuels, by Region, 2004–2013



Data source: UNEP FS/ BNEF Global Trends in Renewable Energy Investment 2014

Data include Government and corporate R&D



Developed Countries: annual investment in 2013: USD122 billion

Developing Countries: annual investment in 2013: USD 93 billion

RE POLICY LANDSCAPE

		START 2004 ¹	END 2012	END 2013
POLICIES				
Countries with policy targets	#	48	138	144
Feed-in Number of states / provinces / countries	#	34	97	98
RPS / quota policies Number of states / provinces / countries	#	11	79	79
Tendering Number of states / provinces / countries	#	8	45	55
Heat obligations / mandates Number of countries	#	n/a	19	19
Biofuel obligations / mandates ⁵ Number of countries	#	10	52	63

At least **144 countries** had **renewable energy targets**.

At least **138 countries** had **renewable energy policies** in place, out of which **95** are developing countries (up from 15 in 2005).

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

Revision and retroactive reductions in several countries, mainly in Europe and the US



RE POLICY LANDSCAPE SOUTH-EAST ASIA

Targets

- Thailand increased existing long-term targets for electricity and over target for RE share of final energy consumption

Policies

- Indonesia expanded FIT support and Thailand introduced new FIT for distributed solar energy and revised others.
- Malaysia extended B5 blend mandate to more regions – national enacted targeted for July 2014, Philippines began implementing E1- mandated delayed since 2011.
- Thailand extended subsidies for SWH to 2021 and established a USD 121 million fund to encourage state agencies to deploy PV systems on their buildings.
- Philippines brought into effect the net metering policy established in 2008.
- Singapore raised the cap on total power provided by variable RE to 600 MW during peak demand.



DISTRIBUTED RENEWABLE ENERGY IN DEVELOPING COUNTRIES

Energy access and the use of distributed renewable energy increased.

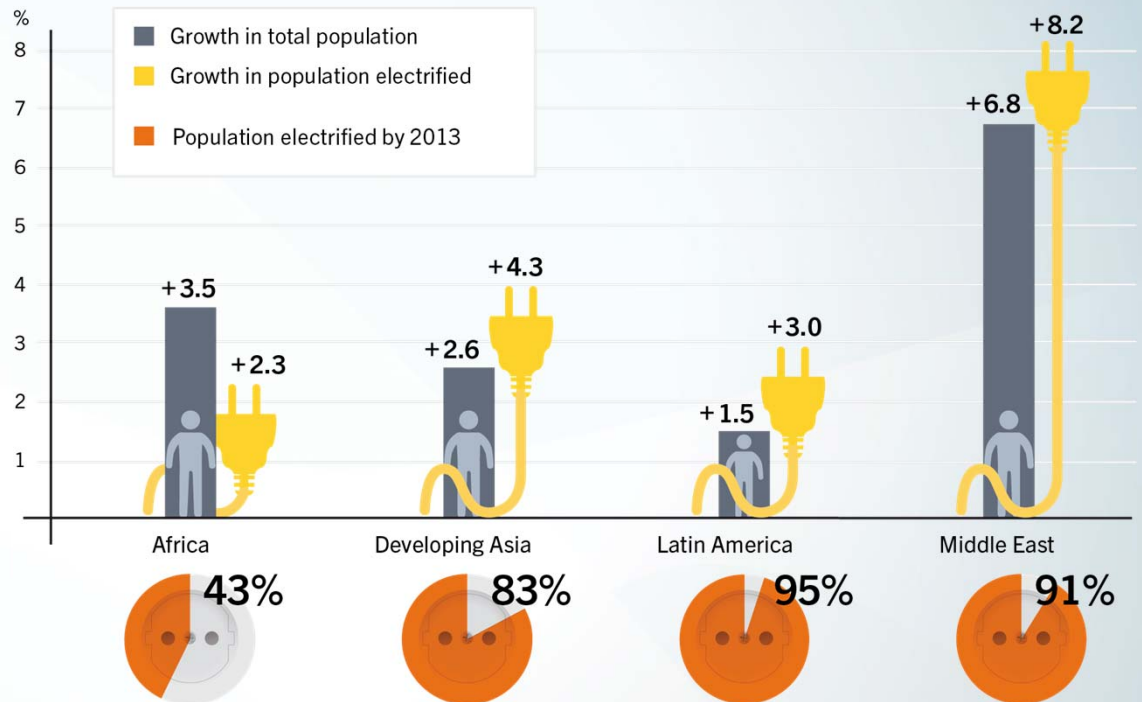
On all continents except Africa, growth in population electrified is bigger than the growth in total population.

Rural energy markets are increasingly being recognised as business opportunities.

Increasing development of mini-grids



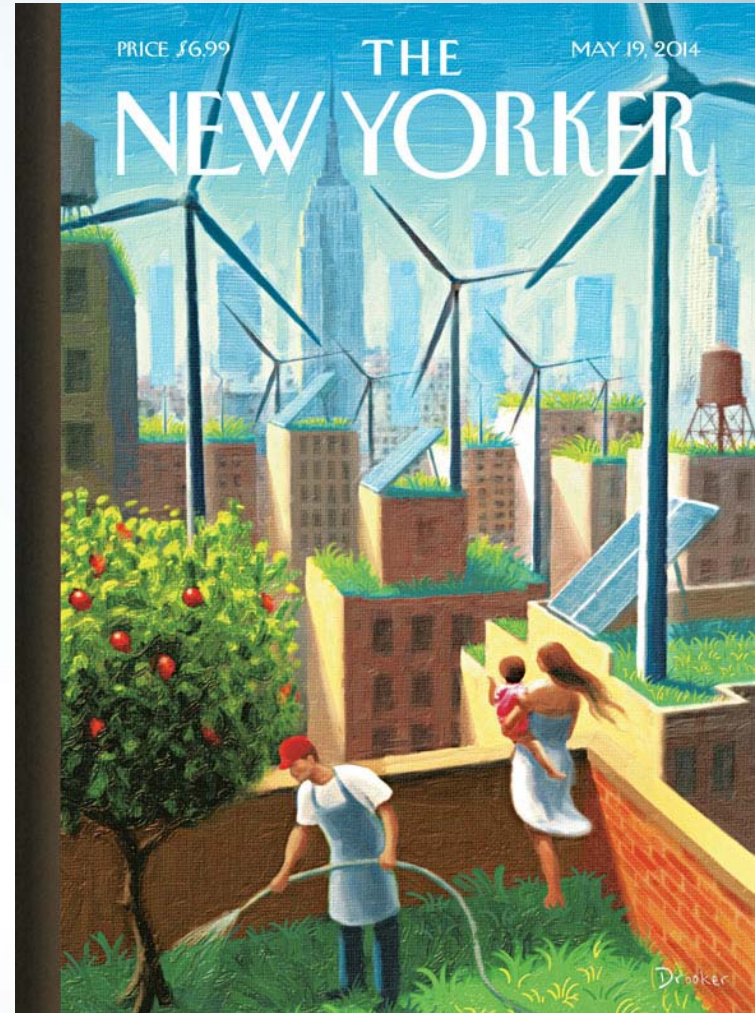
Share of Population with Electricity Access, and Rate of Electrification versus Population Growth



Conclusions

Global perceptions of renewable energy have shifted considerably. 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:

- More-rigorous integration of renewable energy
- A levelised playing field for the entire energy sector
- Long-term and differentiated stable policy frameworks to sustain and increase investment levels
- Greater attention to the heating and cooling and the transport sector
- Improved energy data to monitor advancements in achieving a renewable energy transition



RENEWABLE ENERGY POLICY NETWORK FOR THE 21st CENTURY



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