

# GLOBAL RENEWABLE ENERGY STATUS

## NORTH AMERICA CECS WEBINAR

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# REN21 Renewables 2014 Global Status Report



[www.ren21.net/gsr](http://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 <sup>1</sup>	END 2012	END 2013
<b>INVESTMENT</b>				
New investment (annual) in renewable power and fuels <sup>2</sup>	billion USD	39.5	249.5	<b>214.4 (249.4)</b>
<b>POWER</b>				
Renewable power capacity (total, not including hydro)	GW	85	480	<b>560</b>
Renewable power capacity (total, including hydro)	GW	800	1,440	<b>1,560</b>
Hydropower capacity (total) <sup>3</sup>	GW	715	960	<b>1,000</b>
Bio-power capacity	GW	<36	83	<b>88</b>
Bio-power generation	TWh	227	350	<b>405</b>
Geothermal power capacity	GW	8.9	11.5	<b>12</b>
Solar PV capacity (total)	GW	2.6	100	<b>138</b>
Concentrating solar thermal power (total)	GW	0.4	2.5	<b>3.4</b>
Wind power capacity (total)	GW	48	283	<b>318</b>
<b>HEAT</b>				
Solar hot water capacity (total) <sup>4</sup>	GW <sub>th</sub>	98	282	<b>326</b>
<b>TRANSPORT</b>				
Ethanol production (annual)	billion litres	28.5	82.6	<b>87.2</b>
Biodiesel production (annual)	billion litres	2.4	23.6	<b>26.3</b>

Data source: REN21 Renewables 2014 Global Status Report

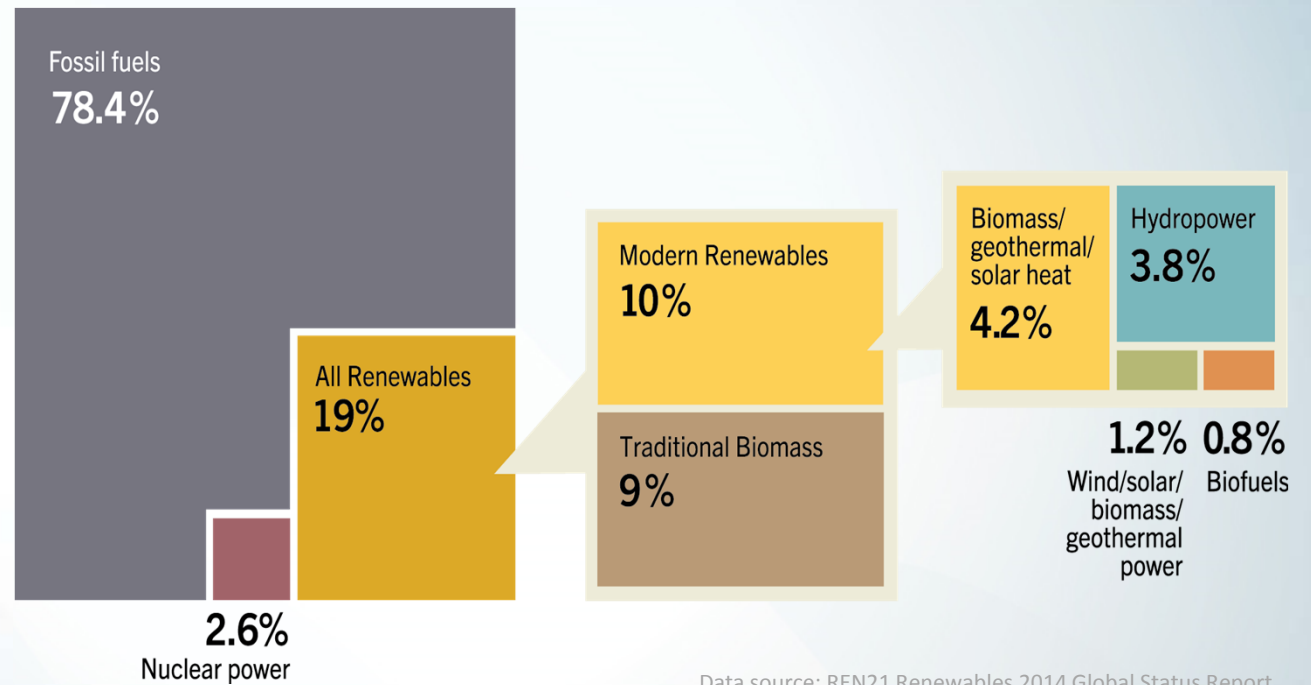
# Renewable Energy in the World

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	<b>China</b>	United States	Japan	United Kingdom	Germany
Share of GDP 2012 (USD) invested <sup>1</sup>	<b>Uruguay</b>	Mauritius	Costa Rica	South Africa	Nicaragua
 Geothermal power capacity	<b>New Zealand</b>	Turkey	United States	Kenya	Philippines
 Hydropower capacity	<b>China</b>	Turkey	Brazil	Vietnam	India
 Solar PV capacity	<b>China</b>	Japan	United States	Germany	United Kingdom
 CSP capacity	<b>United States</b>	Spain	United Arab Emirates	India	China
 Wind power capacity	<b>China</b>	Germany	United Kingdom	India	Canada
 Solar water heating capacity <sup>2</sup>	<b>China</b>	Turkey	India	Brazil	Germany
 Biodiesel production	<b>United States</b>	Germany	Brazil	Argentina	France
 Fuel ethanol production	<b>United States</b>	Brazil	China	Canada	France

Data source: REN21 Renewables 2014 Global Status Report



# Renewable Energy “Champions” – total capacity

## TOTAL CAPACITY OR GENERATION<sup>6</sup> AS OF END-2013

	1	2	3	4	5
<b>POWER</b>					
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 <b>per capita</b> (not incl. hydro) <sup>3</sup>	Denmark	Germany	Portugal	Spain / Sweden	Austria
🔌 Biopower generation	United States	Germany	China	Brazil	India
🔌 Geothermal power	United States	Philippines	Indonesia	Mexico	Italy
🌊 Hydropower <sup>4</sup>	China	Brazil	United States	Canada	Russia
🌊 Hydropower generation <sup>4</sup>	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 <b>per capita</b>	Germany	Italy	Belgium	Greece	Czech Republic
🌬️ Wind power	China	United States	Germany	Spain	India
🌬️ Wind power capacity <b>per capita</b>	Denmark	Sweden	Spain	Portugal	Ireland
<b>HEAT</b>					
☀️ Solar water heating <sup>2</sup>	China	United States	Germany	Turkey	Brazil
☀️ Solar water heating capacity <b>per capita</b> <sup>2</sup>	Cyprus	Austria	Israel	Barbados	Greece
🔌 Geothermal heat <sup>5</sup>	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 (1,560 GW)**

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

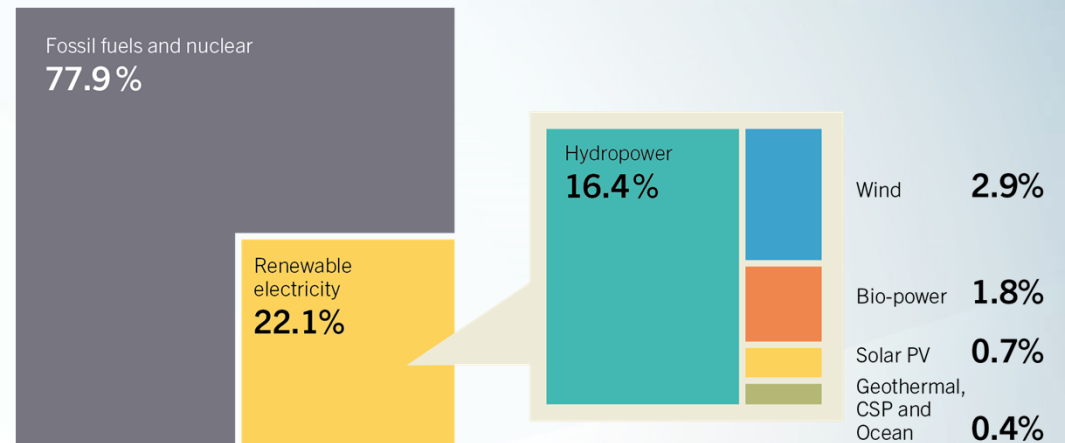
Renewables accounted for 56% of new installed power capacity in 2013.

**U.S.:** share of renewable power rose to nearly **12.9%** despite drop of hydropower and shale gas competition

Trend in **North America:** community owned and cooperative projects



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%**.

At least 20 countries in Europe use renewables in their district heat system, with at least 20% of EU wide district heat generated by renewable sources.

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
- **US trend:** use of biomass for heating





## 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

More than **8,000 electric charging stations** operating in the **US** in 2013



## Hydropower - global capacity

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

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

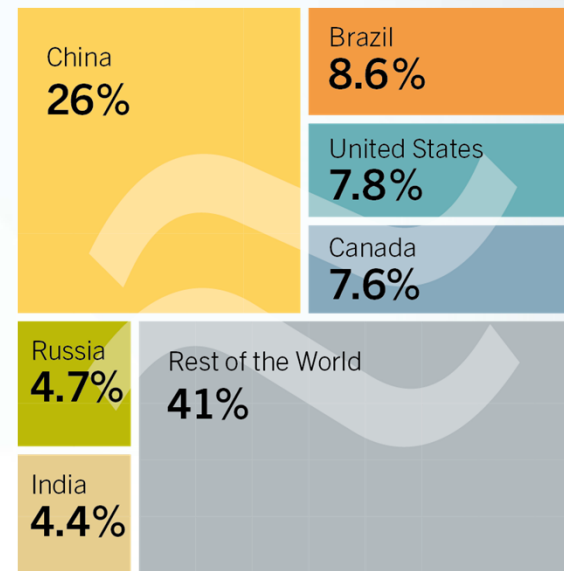
**Steady industry growth**, driven by:

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

Installed hydropower capacity and generation:

- US: 78.4 GW producing 269 TWh
- Canada: 76.2 GW producing 388 TWh

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**

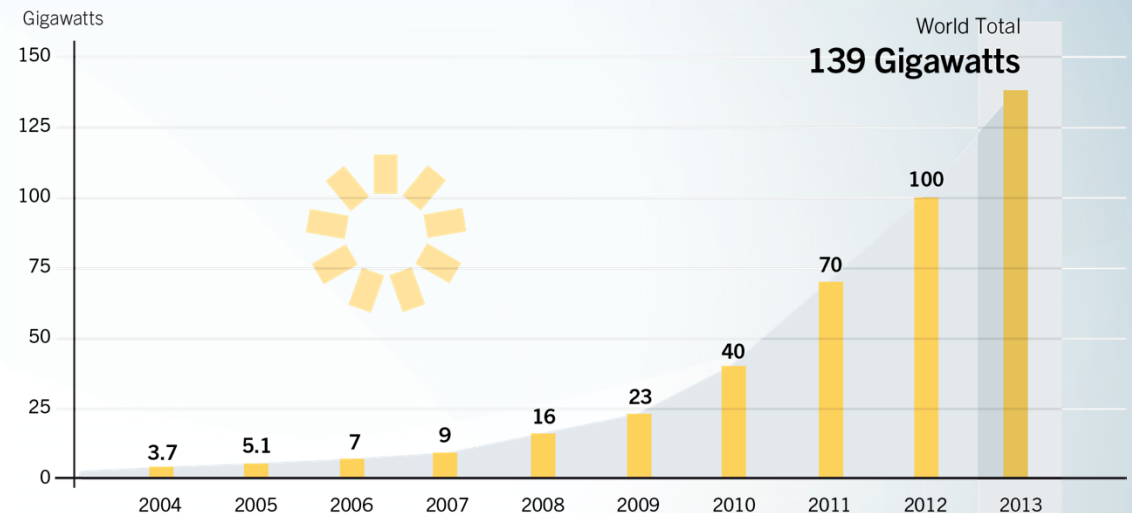
For the first time, **more PV capacity** was added than wind capacity.

**China** accounted for a **third** of global capacity additions, followed by Japan & the **U.S. (+4.8 GW)**

Sizeable CPV projects in the US making it a leading CPV countries



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**.

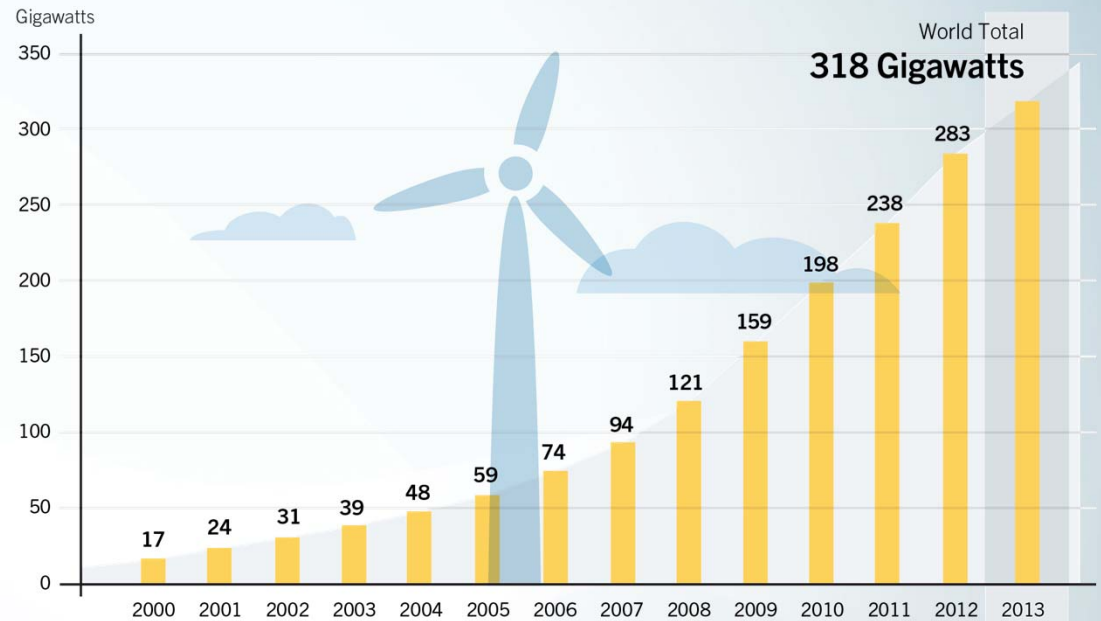
Wind market **slowed down** following several record years (mainly steep drop in US market)

**Offshore wind - record year: +1.6 GW**

**North America** third largest regional market with less than 8% of global added capacity

- **US:** +1GW reaching 61.6 GW
- **Canada:** +1.6 GW reaching 7.8 GW

Wind Power Total World Capacity, 2000–2013



Data source: REN21 Renewables 2014 Global Status Report



# Concentrating Solar Power (CSP) – global capacity

Total CSP capacity: **3.4 GW**

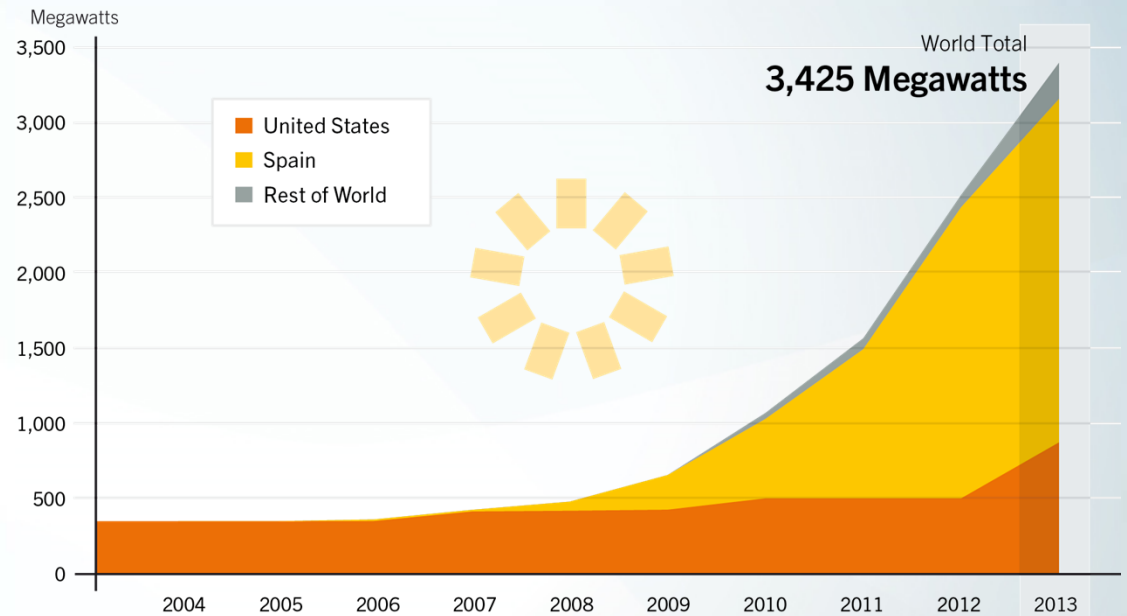
With **+0.9 GW** added, this represents an increase of **36%**.

Markets continue to shift to **developing countries**.

Trends towards larger plants

**US**: market leader with **375 MW** of added capacity total of **0.9 GW**

Concentrating Solar Thermal Power Global Capacity, by Country or Region, 2000–2013



Data source: REN21 Renewables 2014 Global Status Report



## Bioenergy

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

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

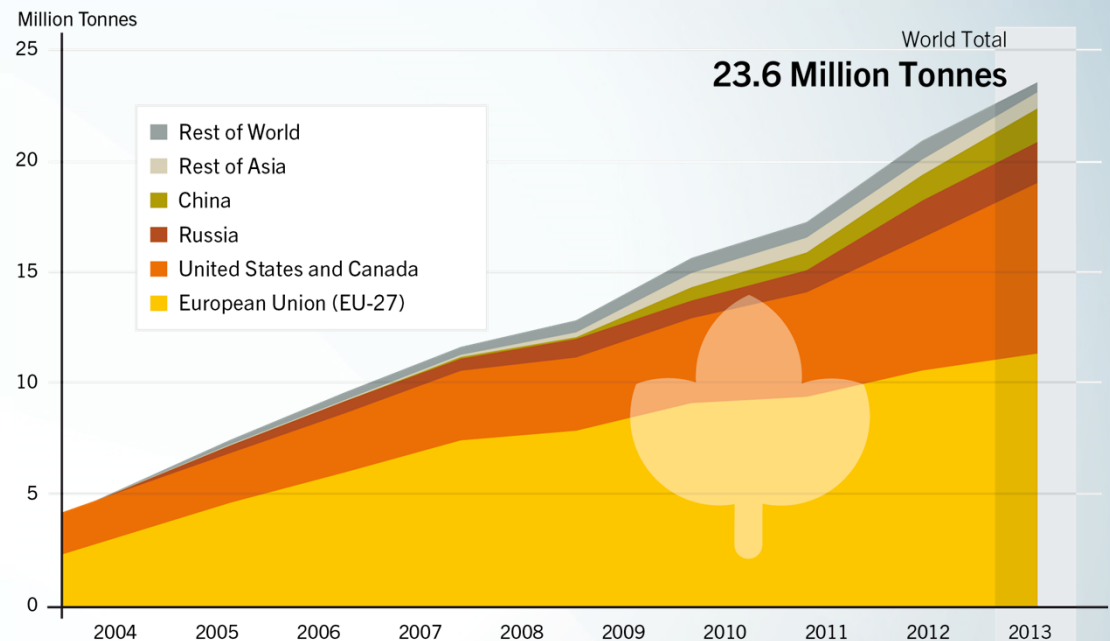
Modern biomass **heat capacity**: 296 GW<sub>th</sub> (increase of 1 %)

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

US and Canadian pellet industry expanded to keep up with European demand



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.

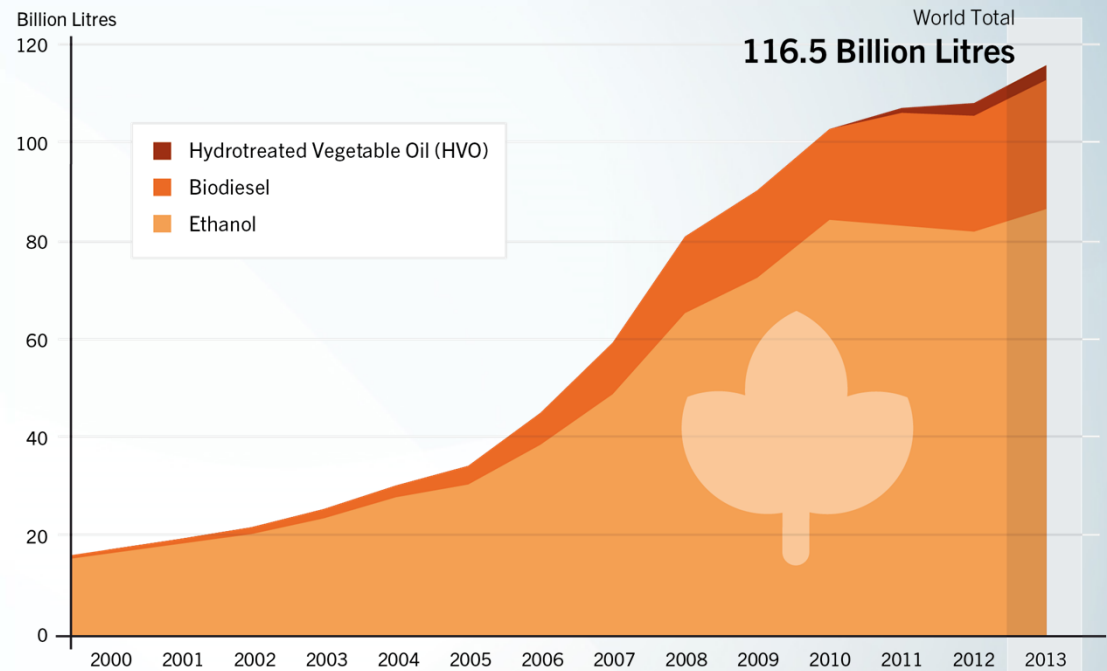
Global production rose by 7.7 billion litres to **116.6 billion litres**.

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

**North America** remained top region for ethanol production & consumption

- US : 50 billion litres
- Canada: 1.8 billion litres

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



Data source: REN21 Renewables 2014 Global Status Report



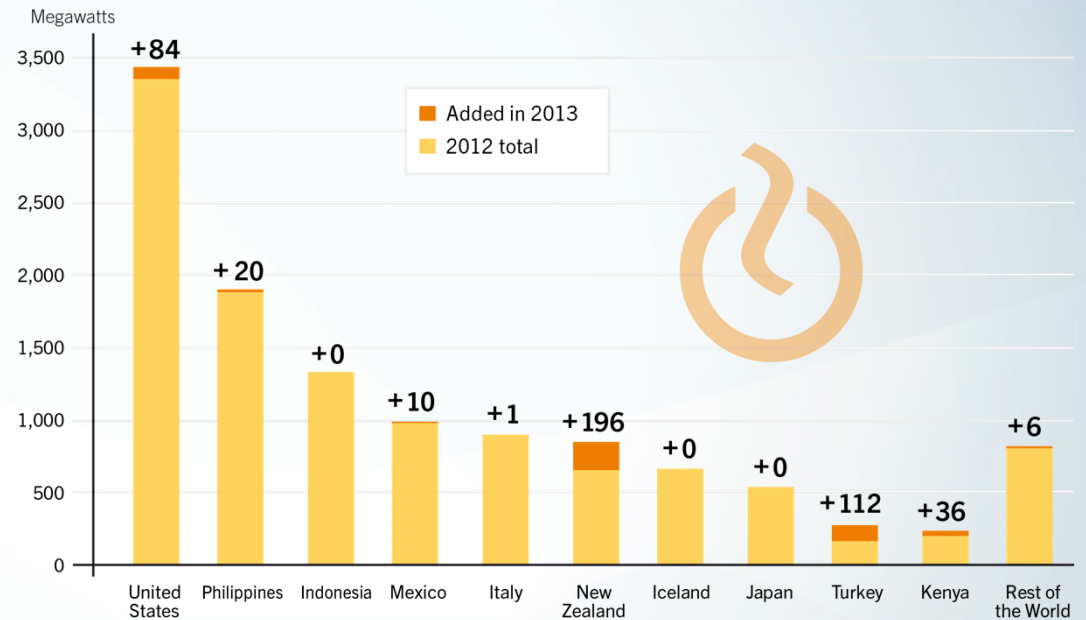
# Geothermal Energy

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.

**US** added 85 MW for a total installed capacity of 3.4 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<sub>th</sub>**

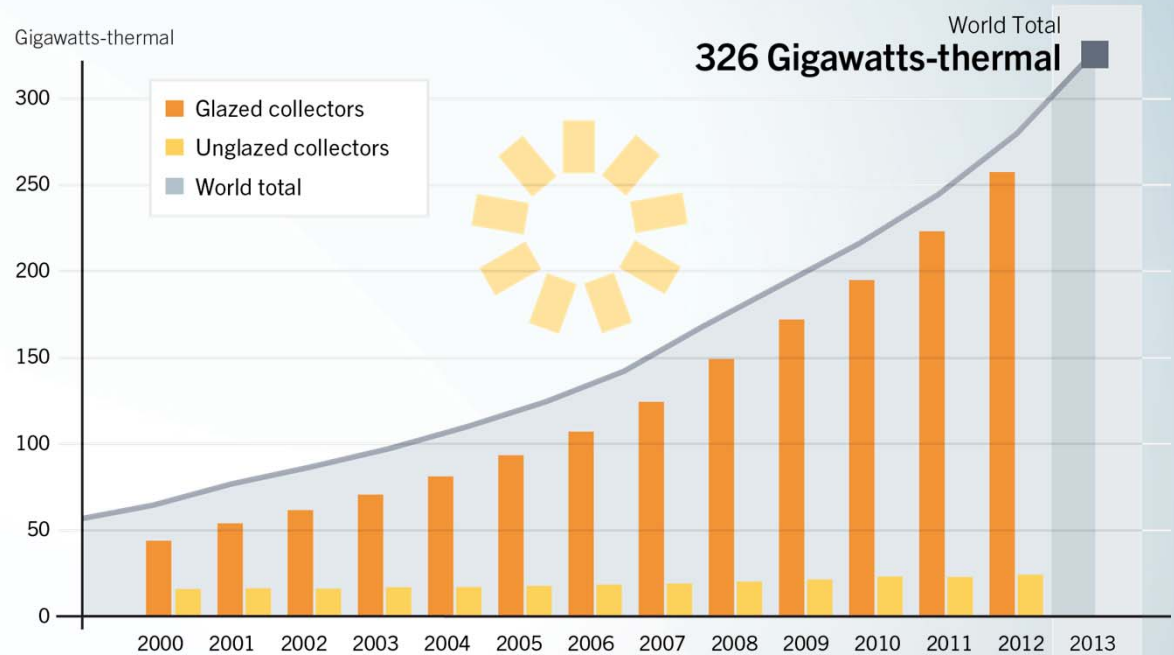
## 2013 Trends:

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

**US** number 2 in terms of operational capacity (16.2 GW<sub>th</sub>)



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)

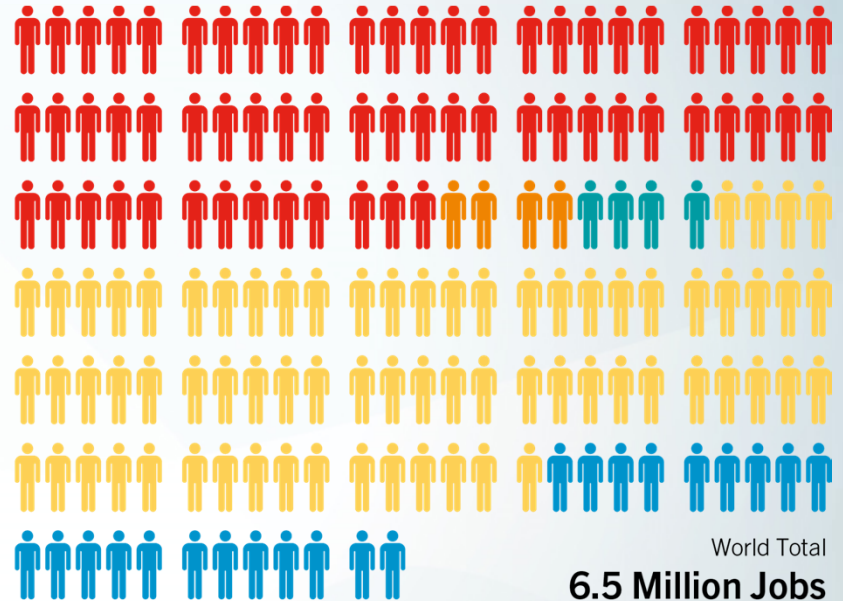
 **Geothermal**

 **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.

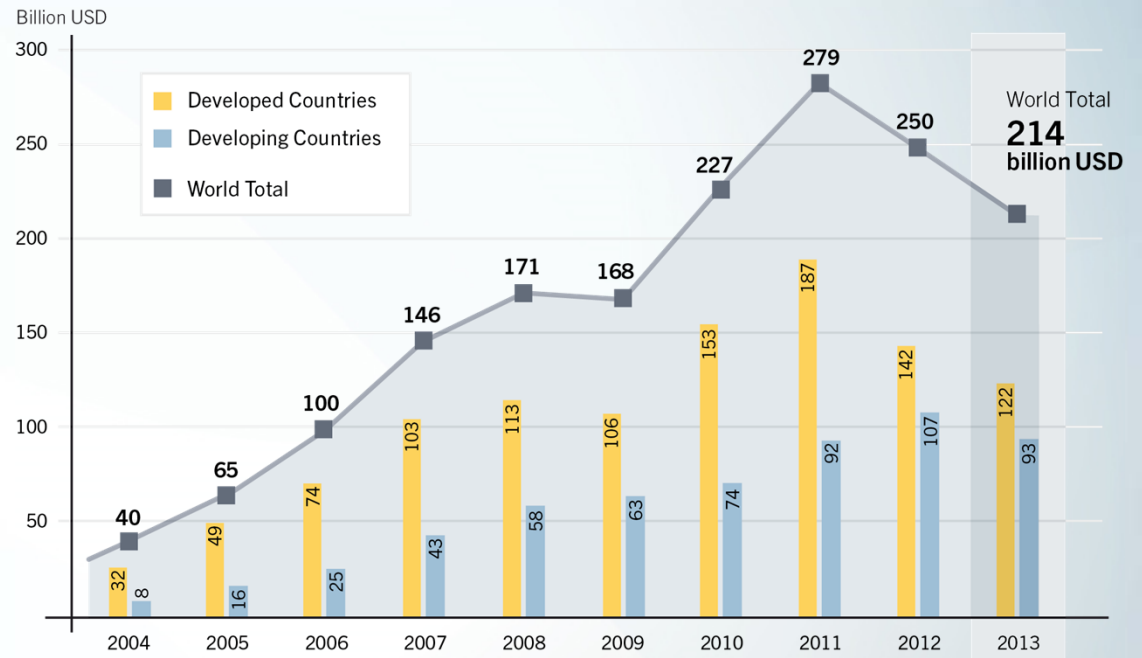
incl. hydropower > 50MW, it reached **USD 249.4 billion**.

Reasons for the decline:  
policy uncertainty, retroactive support reductions, sharp reductions in technology costs (10% decline in the **US**)

**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

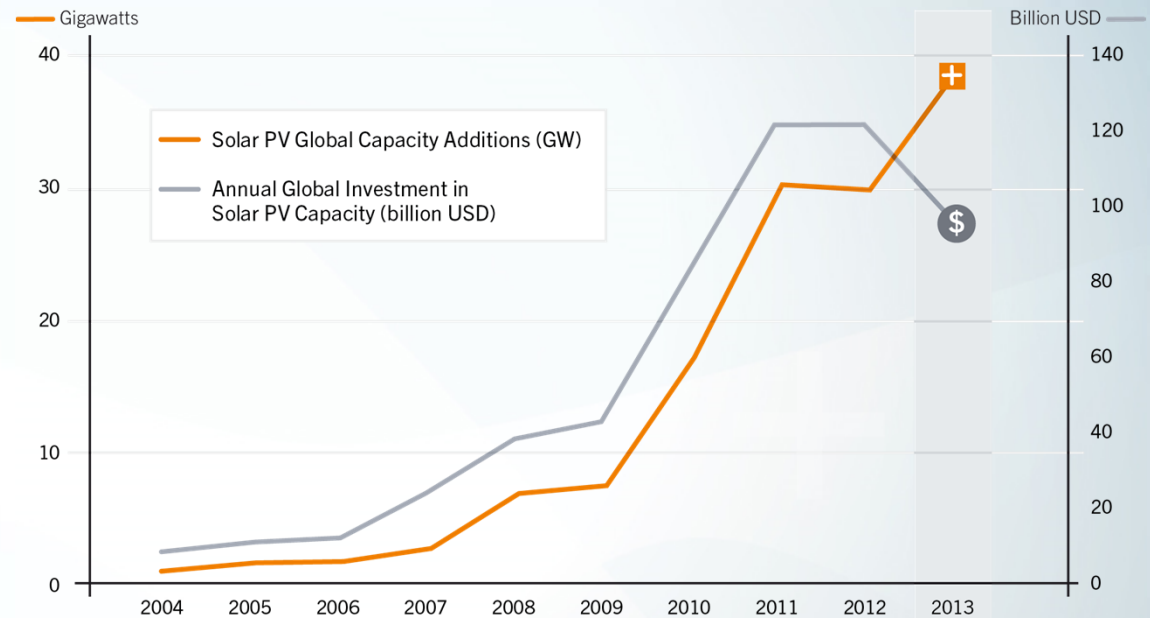
# Solar Photovoltaics (PV) – global capacity additions and investment

**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

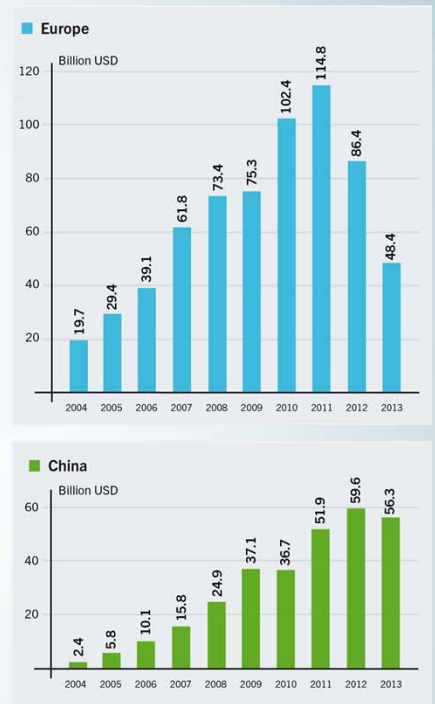
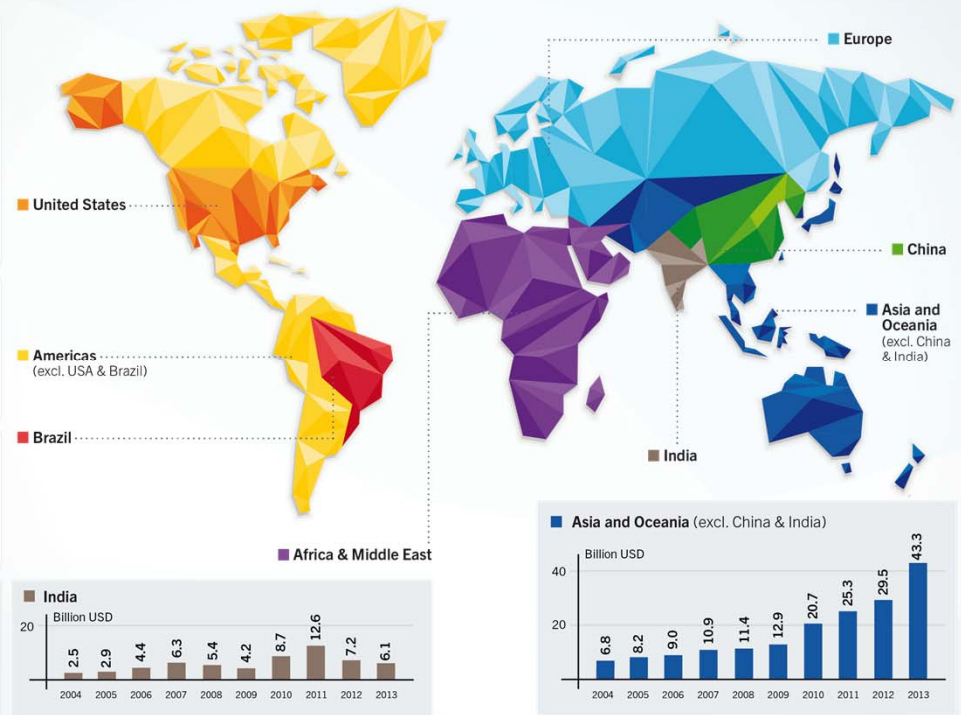
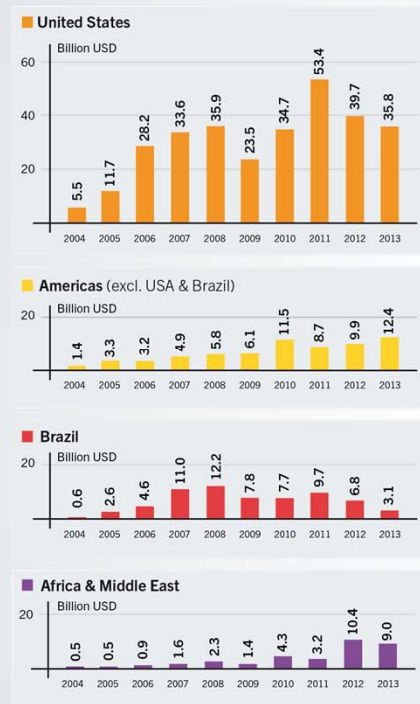


Data source: REN21 Renewables 2014 Global Status Report



# 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**

# Renewable Energy Policy Landscape

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

Data source: REN21 Renewables 2014 Global Status Report

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**.



# DISTRIBUTED RENEWABLE ENERGY IN DEVELOPING COUNTRIES

Energy access and the use of distributed renewable energy increased.

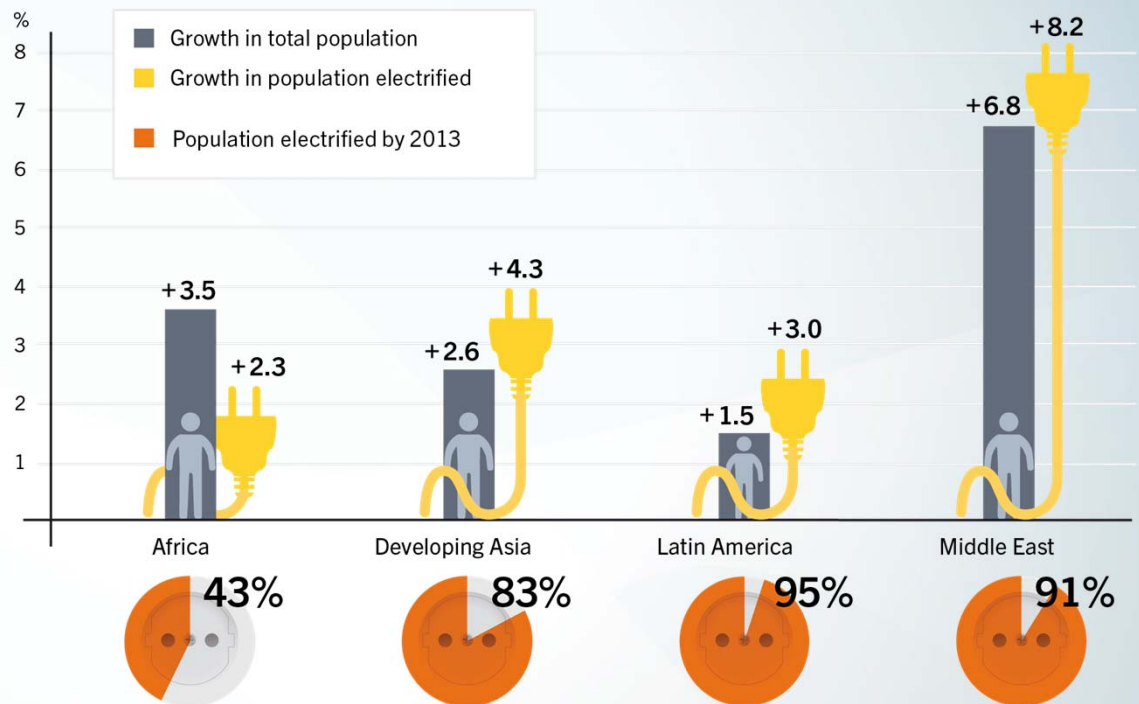
On all continents except Africa, growth in population electrified is bigger than the growth in total population.

Rural energy markets are increasingly being recognised as business opportunities.

Increasing development of **mini-grids** to address energy access and bridge off-grid and grid-connected power



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

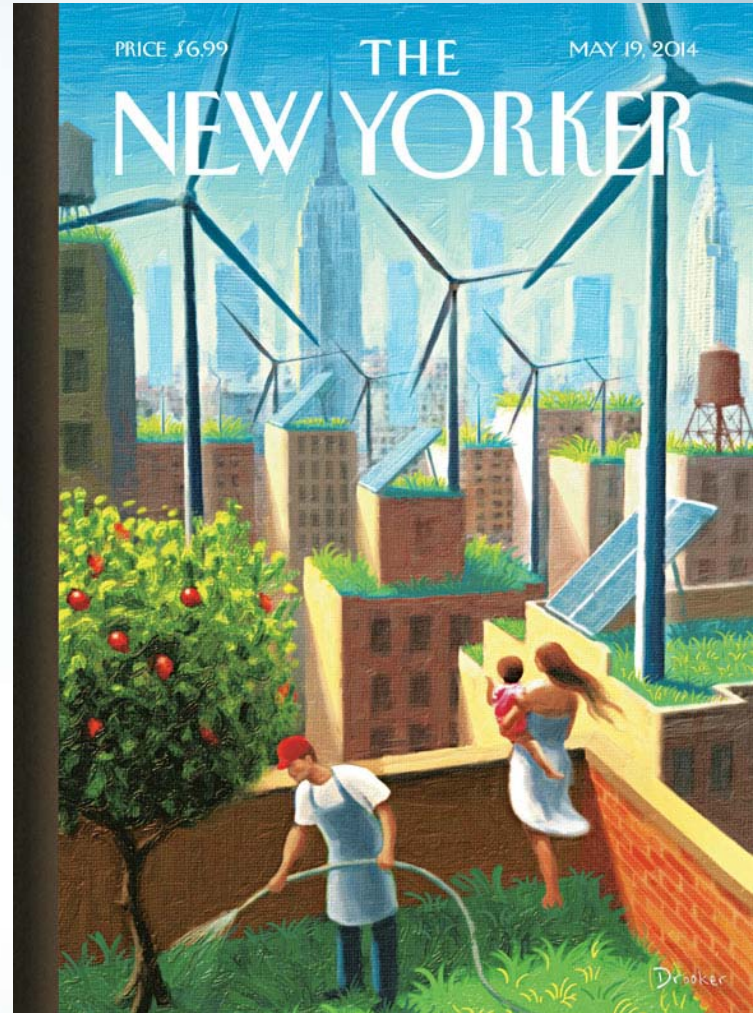


Data source: IEA, REN21 Renewables 2014 Global Status Report

## 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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