RENEWABLES 2015 GLOBAL STATUS REPORT

DISTRBUTED RENEWABLE ENERGY FOR ENERGY ACCESS

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CESC Webinar
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2015

REN21 Renewable Energy Policy Network for the 21st Century

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

Science & Academia:
IIASA, ISES, SANEDI, TERI, Fundacion Bariloche

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

International Organisations:
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Industry Associations:
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National Governments:
Brazil, Denmark, Germany, India, Norway, Spain, Uganda, UAE, UK

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REN21 Renewables 2015 Global Status Report

www.ren21.net/gsr

Launched at Vienna Energy Forum on 18 June 2015

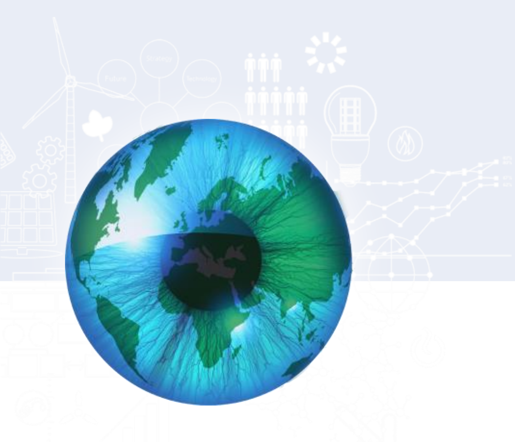
Network of over 500 contributors, researchers & reviewers worldwide

The report features:

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

The report covers:

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



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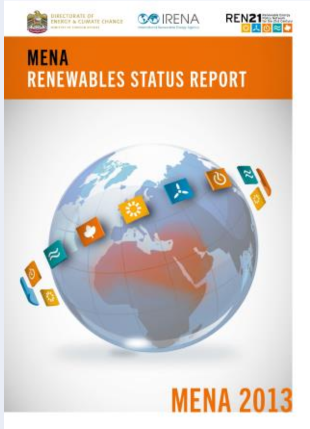
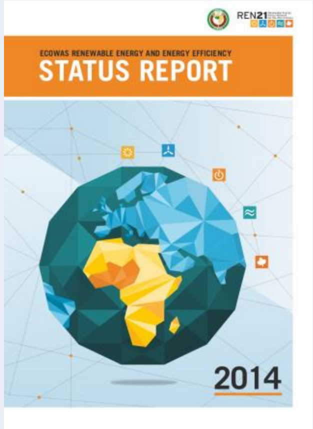
Regional Renewable Energy & Energy Efficiency Status Reports

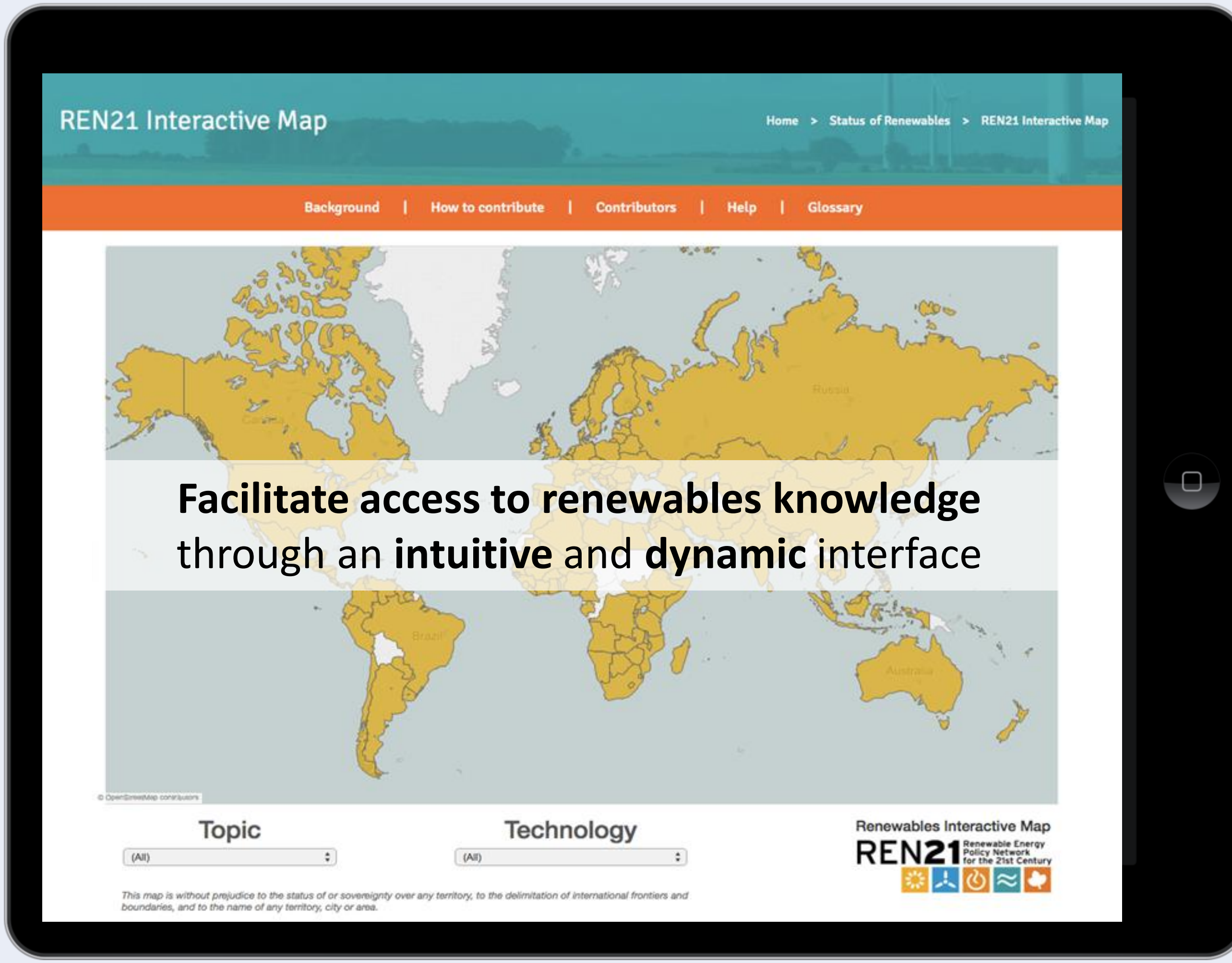
REN21 produces regional status reports on renewable energy and energy efficiency

- **ECOWAS** launched in November 2014
- **SADC** to be launched at SAIREC, October 2015
- **UNECE** report to be launched at COP21, December 2015
- **EAC** to be launched early 2016





REN21 Renewables Interactive Map



Facilitate access to renewables knowledge
through an **intuitive** and **dynamic** interface

www.ren21.net/map

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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
INVESTMENT				
New investment (annual) in renewable power and fuels	billion USD	45	232	**270**
POWER				
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**
HEAT				
Solar hot water capacity (total)	GW_{th}	86	373	**406**
TRANSPORT				
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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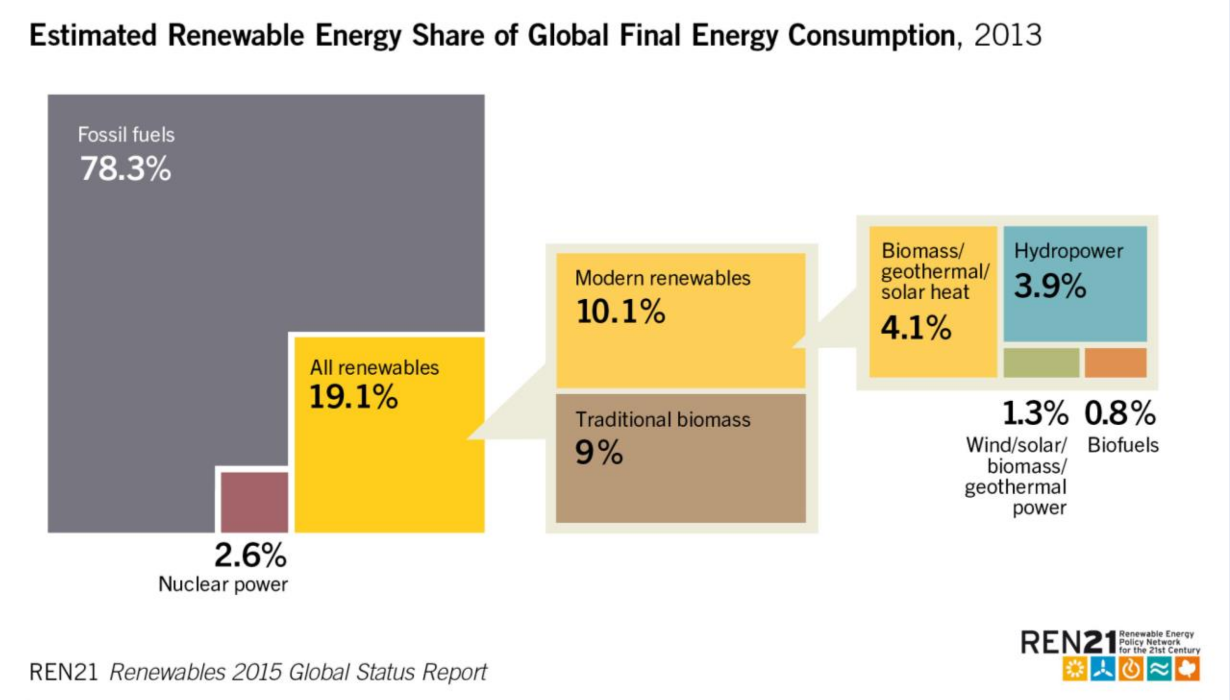
Renewable Energy in the World

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.



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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)	**China**	United States	Japan	United Kingdom	Germany
Investment relative to annual GDP[1]	**Burundi**	Kenya	Honduras	Jordan	Uruguay
Geothermal power capacity	**Kenya**	Turkey	Indonesia	Philippines	Italy
Hydropower capacity	**China**	Brazil	Canada	Turkey	India
Solar PV capacity	**China**	Japan	United States	United Kingdom	Germany
CSP capacity	**United States**	India	–	–	–
Wind power capacity	**China**	Germany	United States	Brazil	India
Solar water heating capacity[2]	**China**	Turkey	Brazil	India	Germany
Biodiesel production	**United States**	Brazil	Germany	Indonesia	Argentina
Fuel ethanol production	**United States**	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
POWER					
Renewable power (incl. hydro)	**China**	United States	Brazil	Germany	Canada
Renewable power (not incl. hydro)	**China**	United States	Germany	Spain / Italy	Japan / India
Renewable power capacity *per capita* (not incl. hydro)	**Denmark**	Germany	Sweden	Spain	Portugal
Biopower generation	**United States**	Germany	China	Brazil	Japan
Geothermal power capacity	**United States**	Philippines	Indonesia	Mexico	New Zealand
Hydropower capacity[4]	**China**	Brazil	United States	Canada	Russia
Hydropower generation[4]	**China**	Brazil	Canada	United States	Russia
Concentrating solar thermal power (CSP)	**Spain**	United States	India	United Arab Emirates	Algeria
Solar PV capacity	**Germany**	China	Japan	Italy	United States
Solar PV capacity *per capita*	**Germany**	Italy	Belgium	Greece	Czech Republic
Wind power capacity	**China**	United States	Germany	Spain	India
Wind power capacity *per capita*	**Denmark**	Sweden	Germany	Spain	Ireland
HEAT					
Solar water collector capacity[2]	**China**	United States	Germany	Turkey	Brazil
Solar water heating collector capacity *per capita*[2]	**Cyprus**	Austria	Israel	Barbados	Greece
Geothermal heat capacity[3]	**China**	Turkey	Japan	Iceland	India
Geothermal heat capacity *per capita*[5]	**Iceland**	New Zealand	Hungary	Turkey	Japan

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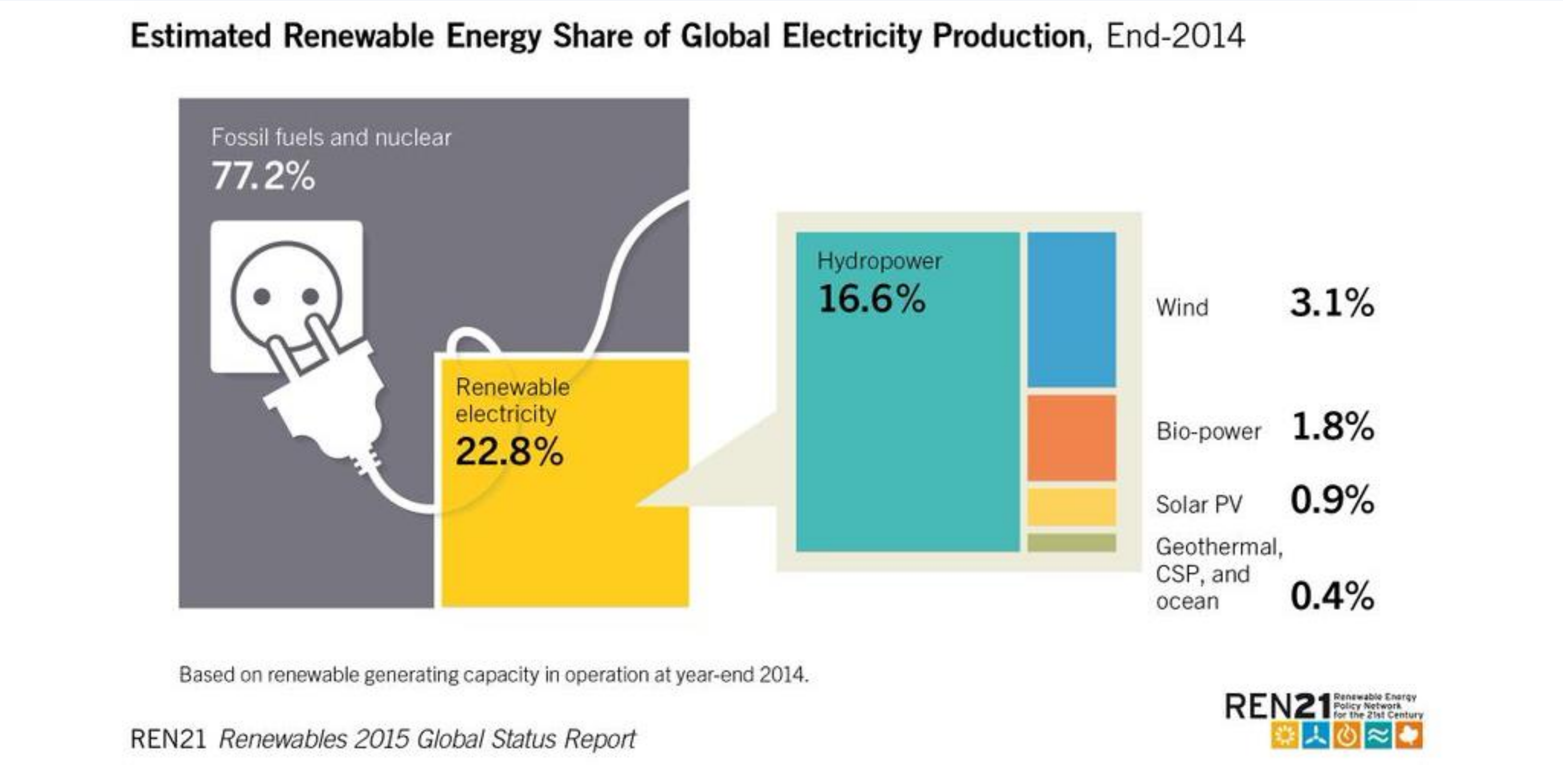
Power Sector



- 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.

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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.

Primary focus of policies, markets, industry: **liquid biofuels**

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

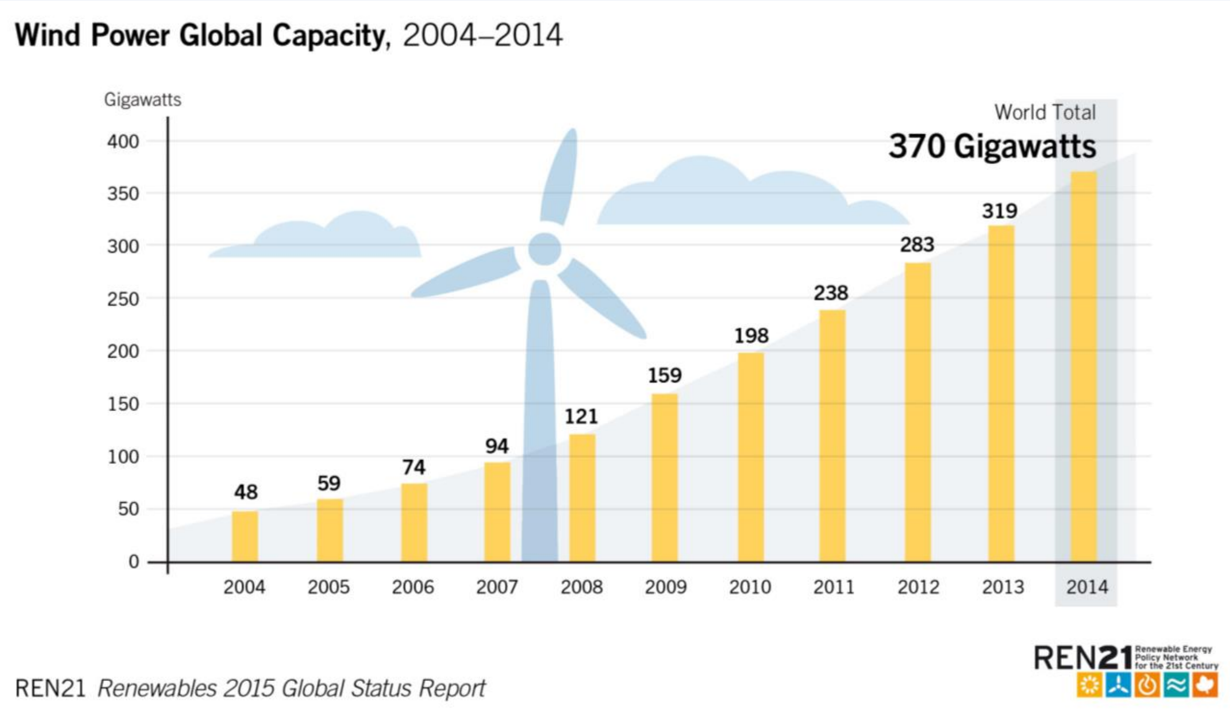
Growing interest in new applications and markets for biofuels.

Wind Power – total global capacity

51 GW of capacity were added

Total capacity: **370 GW**

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



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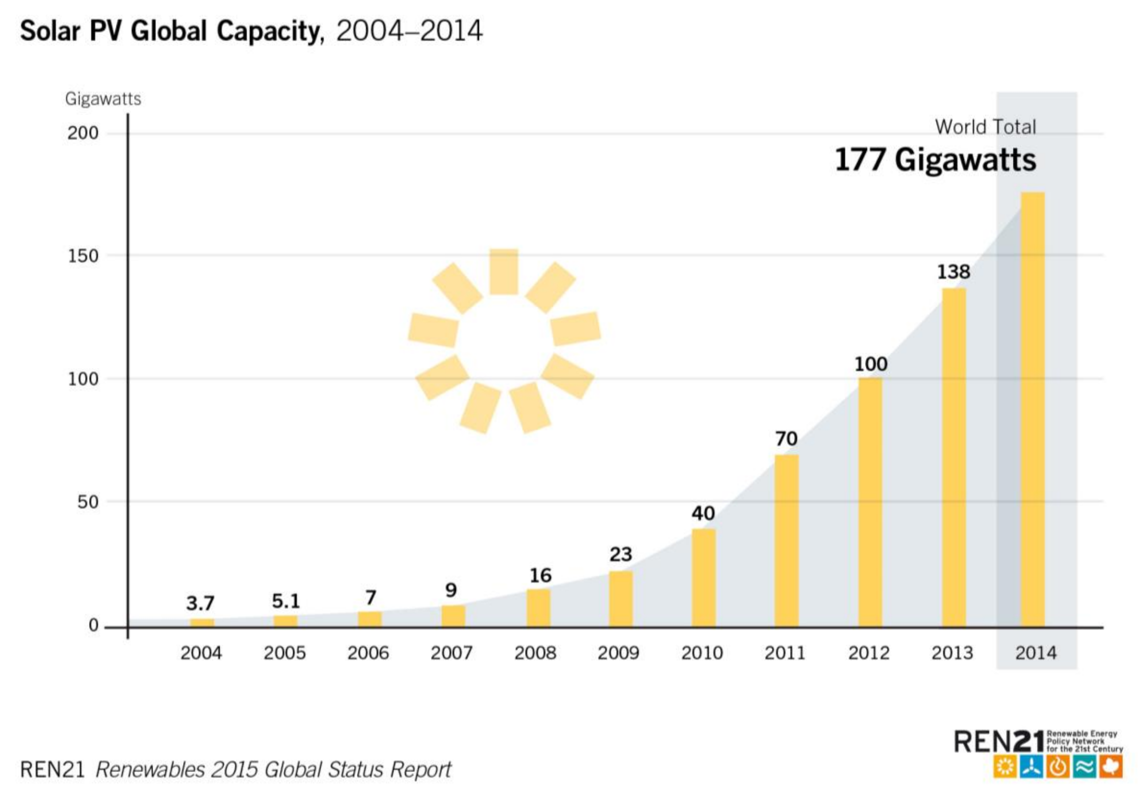
Solar Photovoltaics (PV) – total global capacity

Solar PV:

- **+40 GW** added
- 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 eclipsed all other markets, accounting for almost **60%** of global additions.



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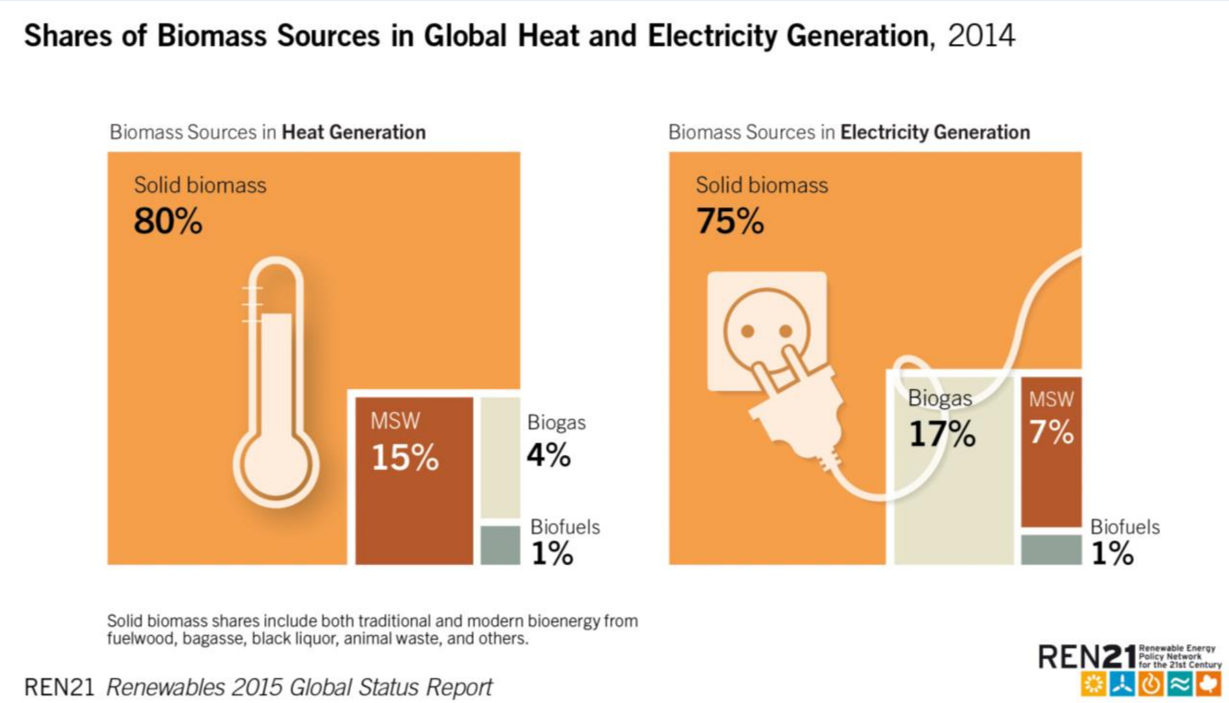
Bioenergy



Total primary energy demand from biomass was approximately **16,250 TWh** (58.5 EJ).

Biomass was used to produce an estimated **12,500 TWh** (45 EJ) of heat (addition of $9GW_{th}$).

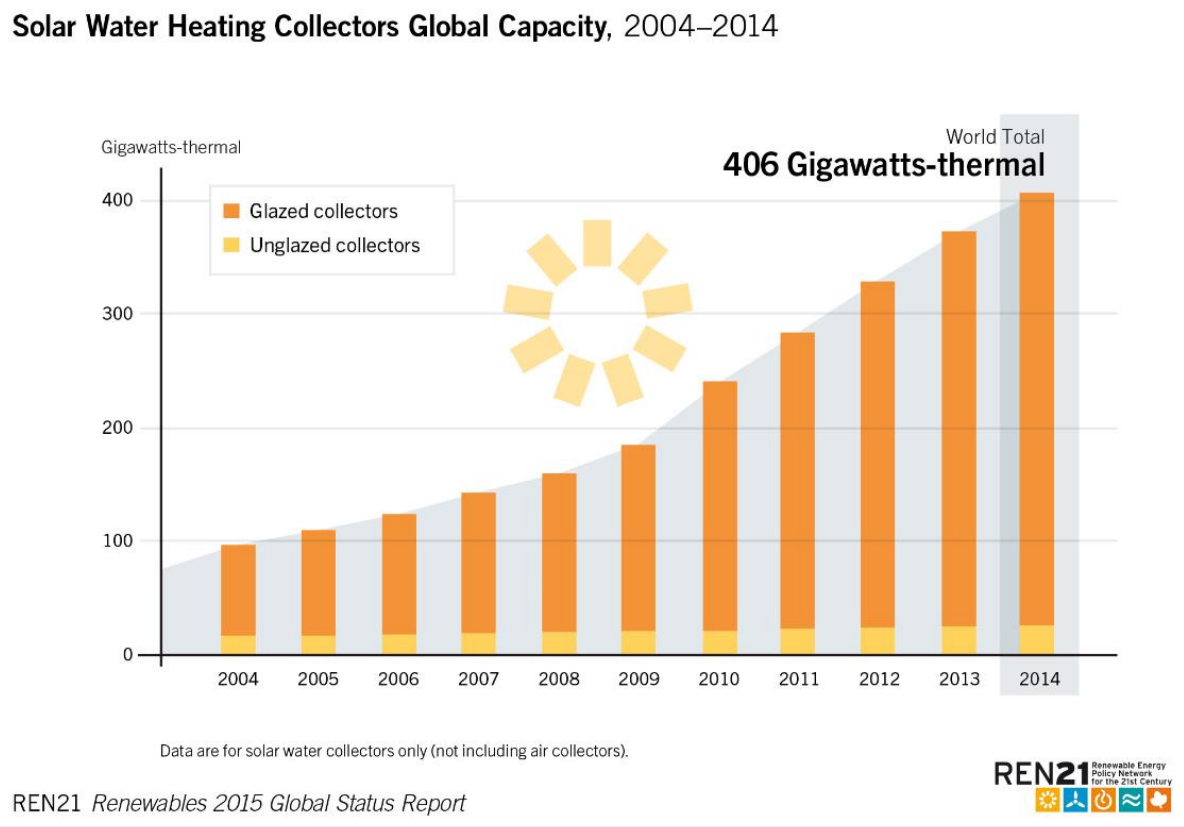
Bio-power capacity increased by an estimated **5 GW** in 2014 to a total of approx. 93 GW.

Solar Thermal Heating & Cooling

Cumulative capacity of all collector types in operation of **374.7 GWth (+ 44 GWth**)

China accounts for nearly **81%** of the global market.

2014 Trends:
- focus on glazed water collectors
- slowdown in market growth continued in 2014
- China seeing a trend away from market to commercial



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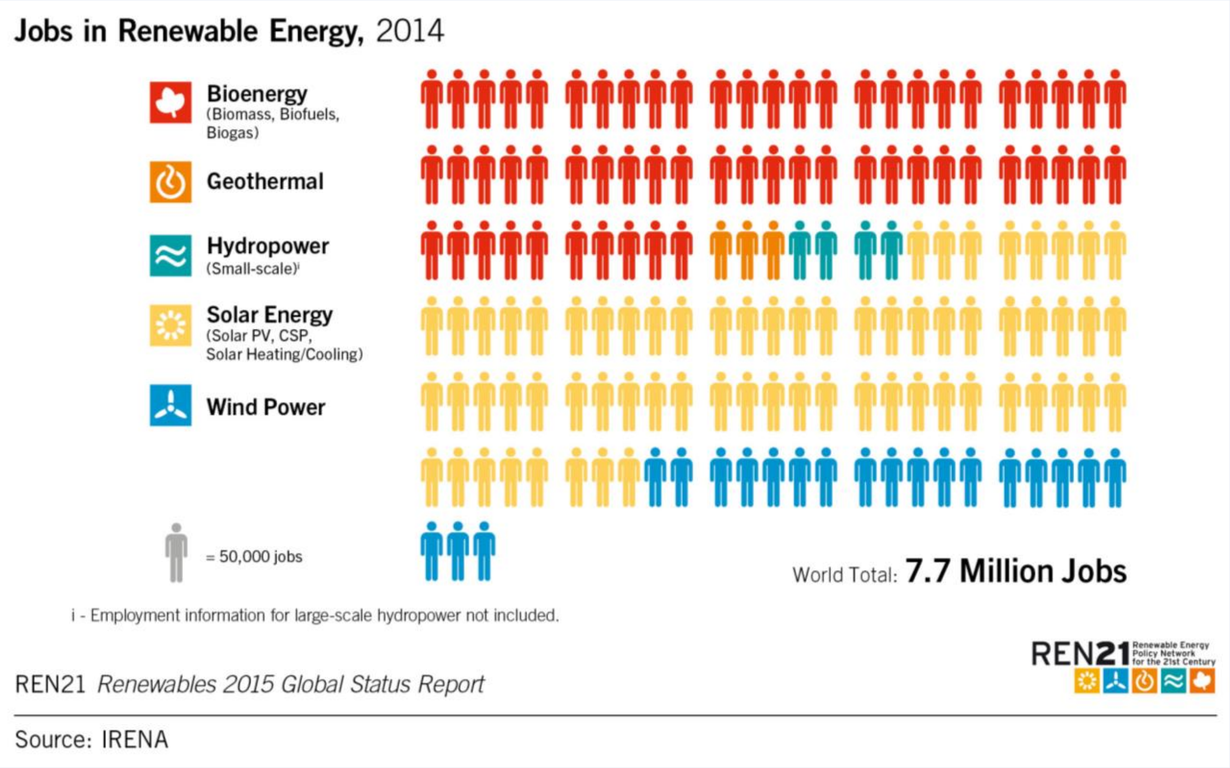
Jobs in Renewable Energy

Global employment continued to increase

An estimated **7.7 million direct or indirect jobs** in the renewable energy industry

Global wind power employment crossed the 1 million jobs threshold in 2014



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Global Investment in Renewable Energy

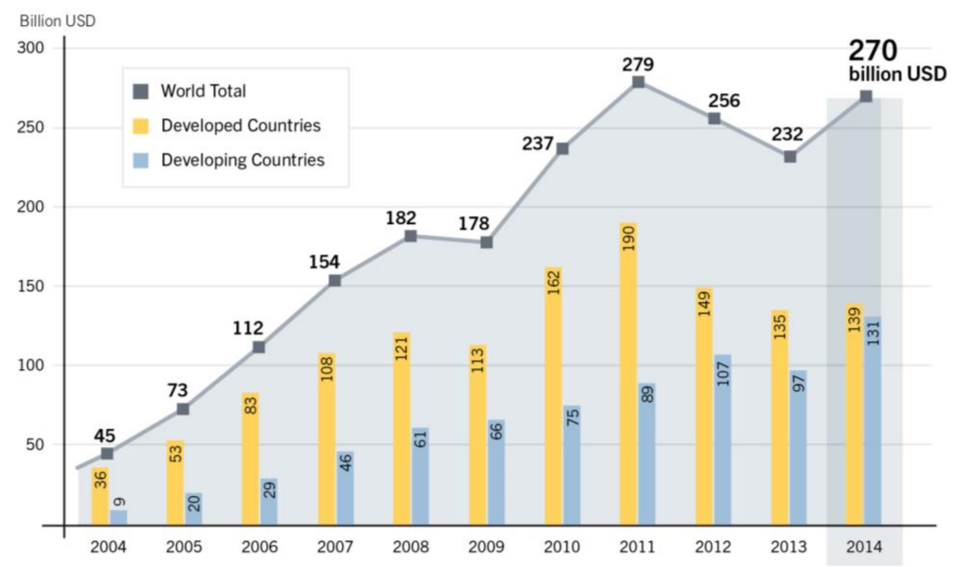
Global new investment estimated **USD 270.2 billion in 2014**

(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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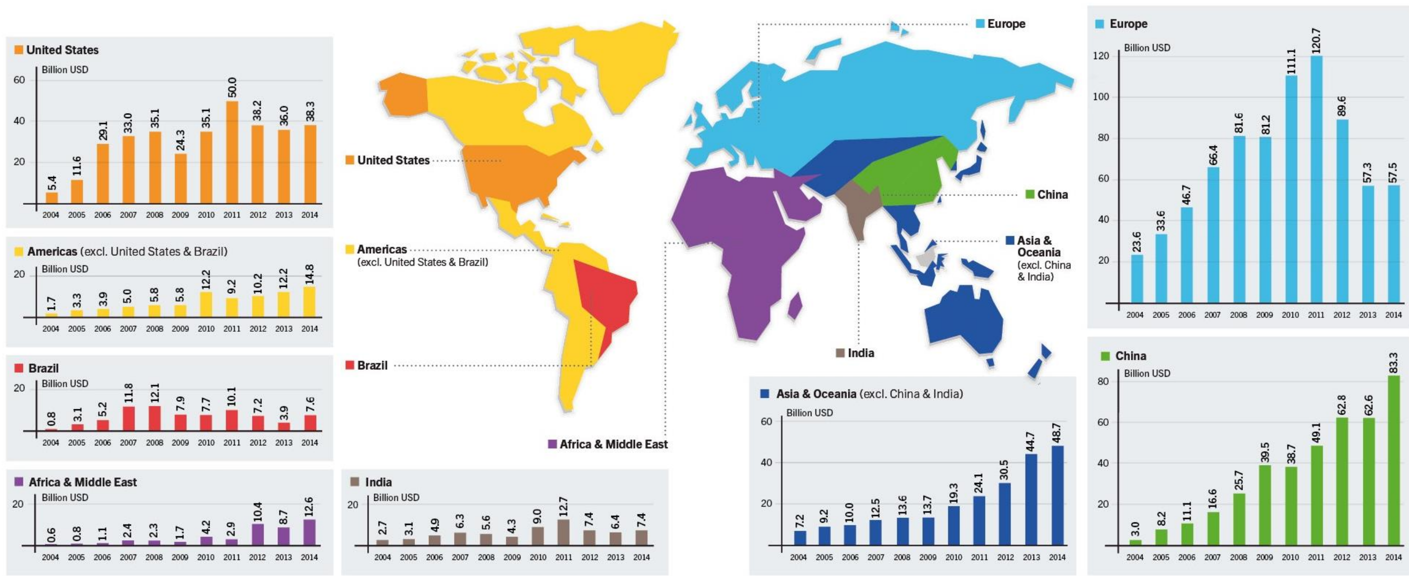
Source: Frankfurt School–UNEP and BNEF

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



Data include government and corporate R&D.

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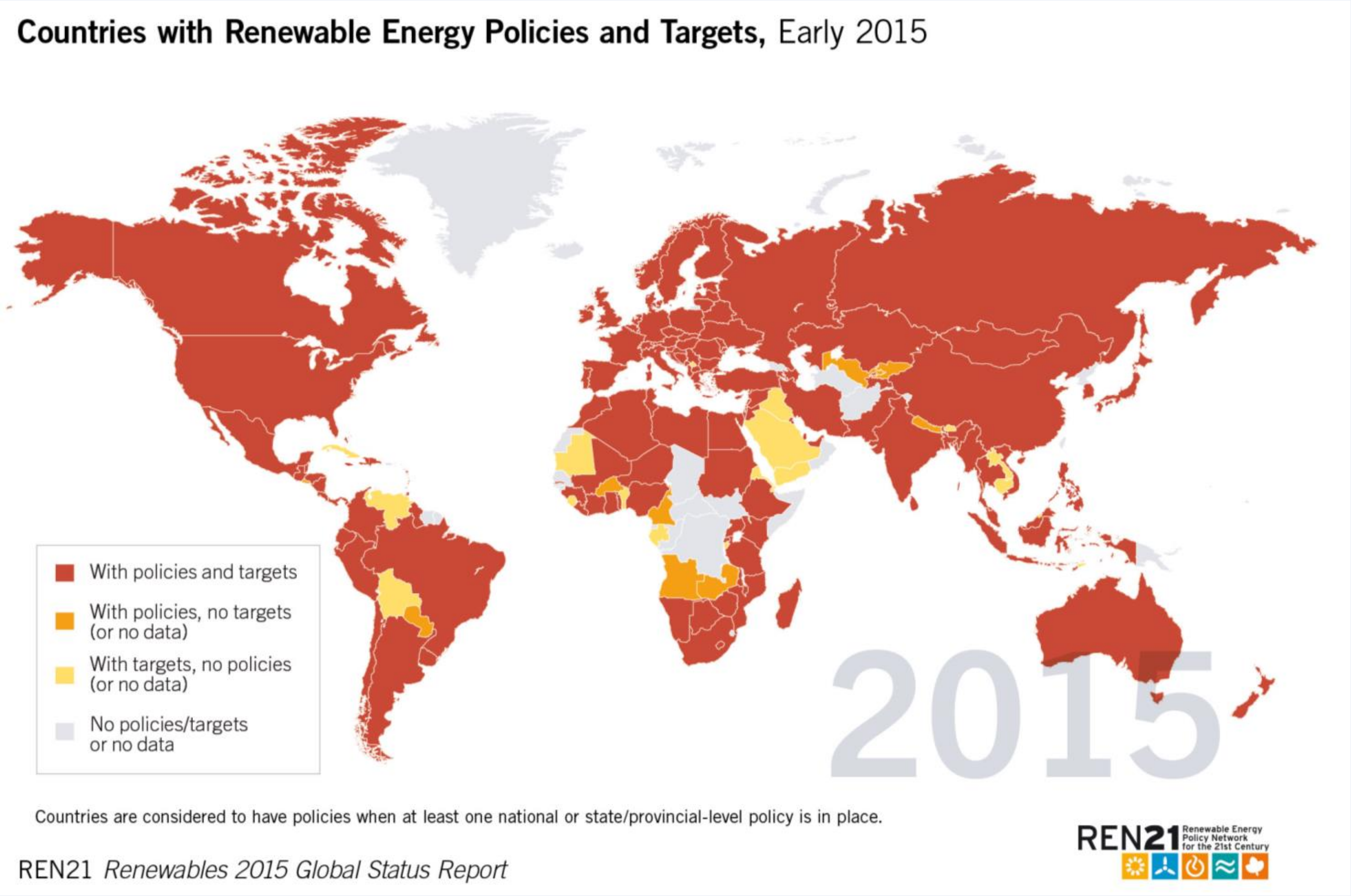
Source: Frankfurt School–UNEP and BNEF

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)

Renewable Energy Policy Landscape



Renewable Energy Policy Landscape

POLICIES		START 2004[1]	2013	2014
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[5]	#	n/a	55	**60**
Countries with heat obligation/mandate	#	n/a	19	**21**
States/provinces/countries with biofuels mandates[6]	#	10	63	**64**

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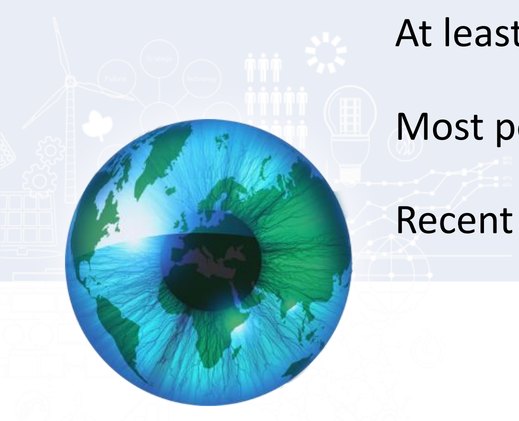
At least **164 countries** had **renewable energy targets**.

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.



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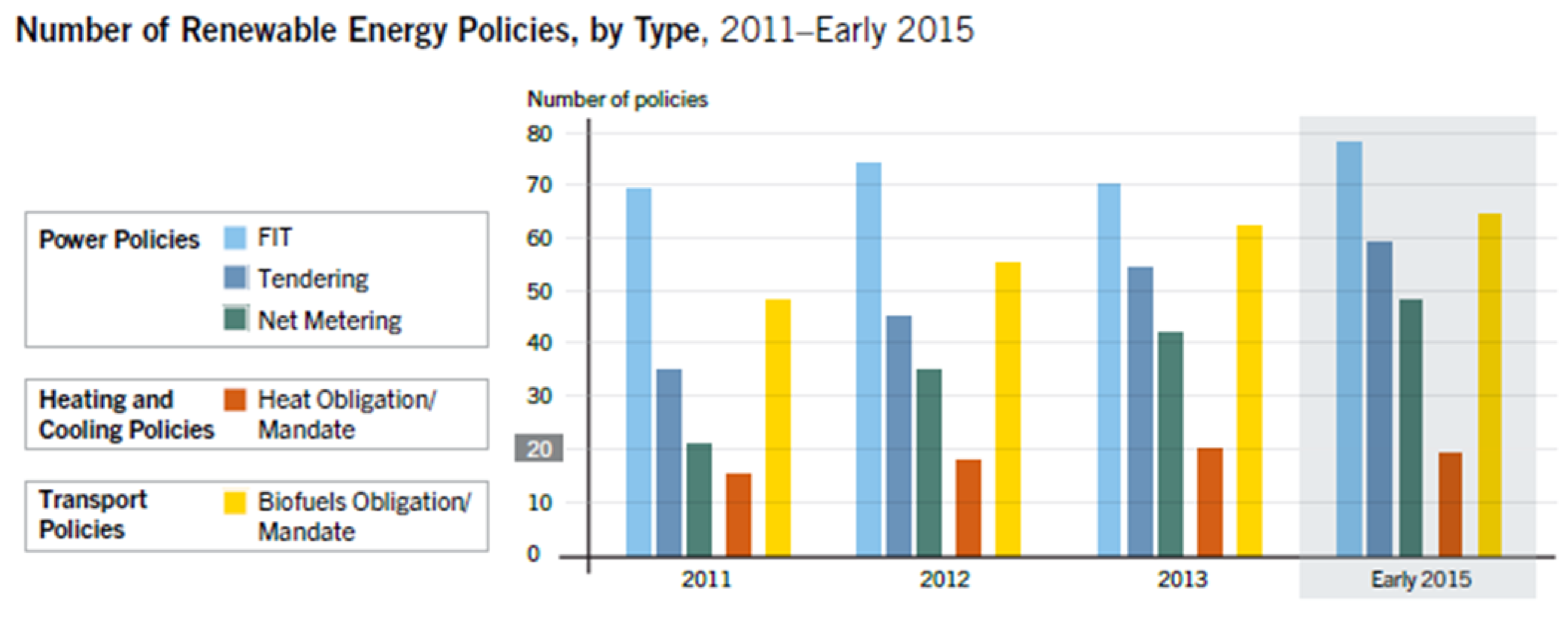
Renewable Energy Policy Landscape



Data source: REN21 Renewables 2015 Global Status Report

Power sector: the main focus of policies over the last years

FITs were the most popular type of policy

Net metering or net billing policies were in force in 48 countries as of early 2015, increase of approx. 220% . *(2010: 15 countries, 2015: 48 countries)*

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Distributed Renewable Energy in Developing Countries

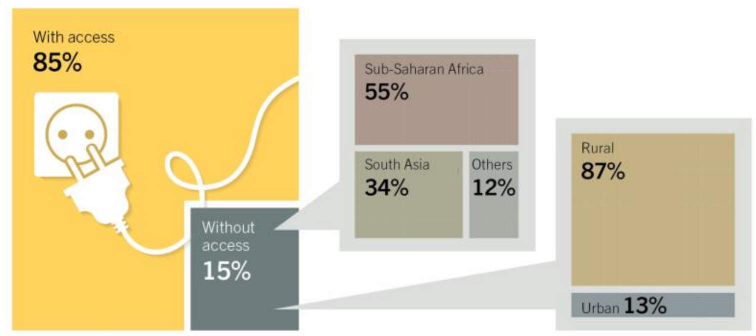
15% of the global population still lack any access to an electricity grid.

2.9 billion people lack access to cleaner forms of cooking.

Distributed renewable energy systems offer unprecedented opportunity to accelerate the transition to modern energy services in remote areas, 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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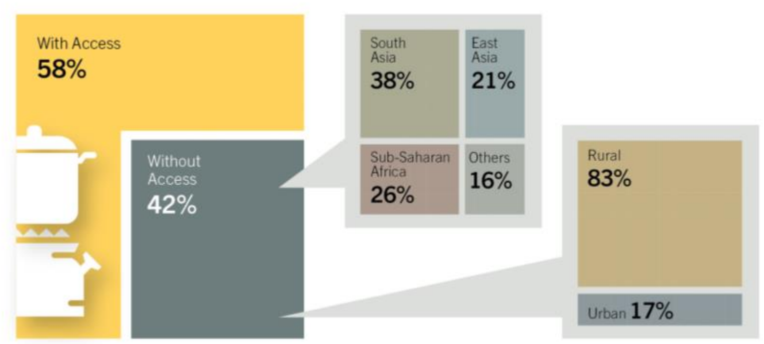
World Clean Cooking Access and Lack of Access by Region, 2012



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Distributed Renewable Energy in Developing Countries

Regional differences :

- 23 GW of renewable energy power capacities in Sub-Saharan Africa (excluding South Africa) – less than one third installed in India
- Bangladesh: 3 million SHS operational at the end of May 2014, electrifying 9% of the country's population

Trends:

- Involvement of the private sector
- Increased recognition of the role renewable energy play for energy access
  → Increase in development of off-grid renewable energy programmes and creation of DRE institutions

Distributed Renewable Energy in Developing Countries

TABLE R22. DISTRIBUTED RENEWABLE ENERGY MARKETS AND INSTALLED CAPACITIES: EXAMPLES

COUNTRY	TECHNOLOGY/ SYSTEM	CAPACITY ADDED IN 2014	CUMULATIVE AT END-2014	ADDITIONAL INFORMATION (including programme, financing partner and project developer)
AFRICA				
Angola	Solar powerpack[1]		299 kW_p	- 897 residents electrified - Installed by ARE members
Benin	Solar PV (pico)	100 units	100 units	Implemented under the EnDev Programme[2]
	Solar lamps	1,500 units	2,825 units	Implemented under the SNV-funded Off-grid Solar Market Development Programme
	Solar powerpack[1]		50 kW_p	- 250 people electrified - Installed by ARE members
	Hybrid mini-grid		30 kW_p (2013)	Implemented in North Benin under an Energias Sin Fronteras (EsF) project
	Biogas digesters	100 units	107 units	Implemented by SNV with government funding
	Improved cookstoves	60,900 units	214,600 units	Implemented under the EnDev Programme[2]
Burkina Faso	Solar home systems (SHS)	159 kW_p	342 kW_p	- 3,365 people electrified - Installed by ARE members (FRES)
	Solar lamps	3,000 units	3,325 units	Implemented under the SNV-funded Pico PV for Africa Project
	Solar PV (pico)	21,352 units		Implemented under a joint GOGLA and World Bank project[3]
	Hybrid mini-grid (PV / diesel)		45 kW_p	- Three hybrid PV-diesel mini-grid projects, each with an installed capacity of 15 kW_p (as of July 2014) - Consolidated at country level
	Biogas digesters	1,448 units	5,462 units	- 4,741 households - Implemented by SNV/HIVOS under the African Biogas Partnership Programme funded by the Directorate General for International Cooperation, Netherlands (DGIS)
	Improved cookstoves	24,500 units	124,700 units	Implemented under the EnDev Programme[2]
	Improved cookstoves	845 units	966 units	- For productive use in agricultural SMEs[4] - Implemented under the SNV-funded Energy, Poverty and Gender in Agro Processing (EPGAP) project
Burundi	Solar lanterns	250 units	500 units	Consolidated at country level
	Solar PV (pico)	5,300 units	9,800 units	Implemented under the EnDev Programme[2]
	Improved cookstoves	900 units	1,700 units	Implemented under the EnDev Programme[2]
Cameroon	Hybrid mini-grids		23 MW	- 30 hybrid mini-grids operating - Consolidated at country level
	Biogas digesters	104 units	302 units	Implemented under an SNV-funded project
Congo	Solar PV		60 kW_p	Consolidated at country level
Côte d'Ivoire	Solar streetlights		9 kW_p	- 45 solar streetlights installed - Installed by ARE members
Democratic Republic of the Congo	Solar lamps	508 units	508 units	Implemented under the SNV-funded Pico PV for Africa Project
	Solar PV (pico)	37,452 units		Implemented under a joint GOGLA and World Bank project[3]
	Mini-grid (biofuel)	16 kW_p	16 kW_p	- Palm oil biofuel-based mini-grid run by co-operative - 100 households electrified - Implemented by SNV under a DGIS and FACT Foundation project
	Improved cookstoves	1,528 units	1,728 units	Implemented under the SNV-funded Improved Cookstove Programme
Ethiopia	Solar PV		5 MW	- 60% installed for rural telecom applications, 20% for water pumping, and 20% for solar home systems - Consolidated at country level

TABLE R22. DISTRIBUTED RENEWABLE ENERGY MARKETS AND INSTALLED CAPACITIES: EXAMPLES (continued)

COUNTRY	TECHNOLOGY/ SYSTEM	CAPACITY ADDED IN 2014	CUMULATIVE AT END-2014	ADDITIONAL INFORMATION (including programme, financing partner and project developer)
AFRICA				
Ethiopia (continued)	Solar PV		5 MW	- 60% installed for rural telecom applications, 20% for water pumping, and 20% for solar home systems - Consolidated at country level
	Solar PV (pico)	44,300 units	71,700 units	Implemented under the EnDev Programme[2]
	Solar PV (pico)	580,930 units		Implemented under a joint GOGLA and World Bank project[3]
	Solar water pumping systems		15 units (2012)	Implemented by Plan International under the ACP–EU Energy Facility Programme
	Solar lanterns		9,000 units	Installed by ARE members
	Solar powerpacks[1]		500 kWp	- 1,500 people electrified - Installed by the ARE network
	Solar home systems	1,600 units	3,200 units	Implemented under the EnDev Programme[2]
	Solar home systems		500 units	Installed by ARE members
	Biogas digesters	1,465 units	10,678 units	- 3,136 households from 2012 to 2014 - Implemented by SNV/HIVOS under the DGIS-funded Africa Biogas Partnership Program
	Improved cookstoves	15,100 units	352,200 units	Implemented under the EnDev Programme[2]
	Improved cookstoves	3,200 units	3,200 units	Implemented under the SNV-funded Integrated Renewable Energy Services project
Eritrea	Solar PV		310 kW_p	Installed in 429 community courts by ARE members
Gambia	Solar water pumping systems		26 kW_p	- 16 solar water pumping systems for community water supply and irrigation - Installed by ARE members
	Mini-grid (wind)		350 kW_p	Consolidated at country level
Ghana	Solar PV		3.2 MW	Consolidated at country level
	Solar lamps	1,033 units		Implemented under an SNV-funded project
	Solar outdoor microstation		6 kW_p	- Two outdoor microstations providing electricity to 1,800 people - Installed by ARE members
	Mini-grid (solar)		6 kW_p	- Two compact mini-grids - Installed by ARE members
	Improved cookstoves	1,200 units	1,233 units	- For productive use in agricultural SMEs[4] - Implemented through the SNV-funded EPGAP project
Guinea-Bissau	Solar PV		127 units	Consolidated at country level
	Solar home systems	138 kW_p	279 kW_p	- 2,041 people electrified - Installed by ARE members (FRES)
Kenya	Solar PV (pico)	36,900 units	56,800 units	Implemented under the EnDev Programme[2]
	Solar PV (pico)		695 units (2012)	Implemented under an SNV-funded project
	Solar PV (pico)	599,052 units	1,574,078 units	Implemented under a joint GOGLA and World Bank project[3]
	Solar kits	150 units	150 units	Implemented by Oolux under a REPIC co-funded project
	Solar kits	100 units	100 units	Implemented by Oolux under a SYMPHASIS co-funded project
	Solar lanterns		7,155 units (2012)	Implemented under an SNV-funded project
	Solar powerpack[1]		430 kW_p	- 1,290 residents electrified - Installed by ARE members
	Solar home systems		100 units	Implemented by Mobisol under a REPIC co-funded project

Conclusions

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

For the first time in 40 years, economic and CO_2 growth has " decoupled" – marking a record year for renewables.

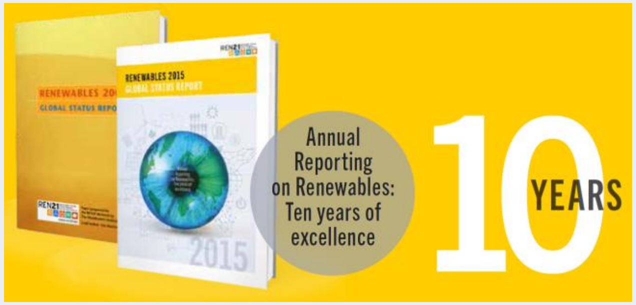
The past decade has set the wheels in motion for a global transition to renewables, but a concerted and sustained effort is needed to achieve it:

- 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

See you at SAIREC 2015

Cape Town, 4-7 October 2015

SAIREC 2015
South African International Renewable Energy Conference



Outlook GSR2016 - Distributed Renewable Energy

Objective

- Portray the distributed renewable energy market using qualitative and quantitative data
- Highlight the importance growing role of this renewable energy market segment

GSR2016 Milestones

- October 2015:
  - Collection of country/regional information
  - Collection of quantitative data for 2014 (from programmes, projects, industries etc.)
- January: expert peer review
- February: update of quantitative data for 2015

Please send a mail to gsr@ren21.net to participate!

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South Africa International Renewable Energy Conference
4-7 October 2015

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