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

**Industry Associations:**
ACORE, ARE, CEC, CREIA, EREF, GSC, GWEC, IGA, IHA, IREF, RES4MED, WBA, WWEA

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

**NGOs:**
ALER, CURES, GFSE, Gogla, Greenpeace, ICLEI, ISEP, Renewable Energy Institute, RCREEE, SLoCaT, WCRE, WFC, WRI, WWF

**International Organisations:**
ADB, EC, ECREEE, GEF, IEA, IRENA, UNDP, UNEP, UNIDO, World Bank

**National Governments:**
Brazil, Denmark, Germany, India, Norway, Spain, UAE, US, UK
The report covers:
• All renewable energy technologies
• Power, heating & cooling, and transport sectors

Country data available on REN21 Renewables Interactive Map: www.ren21.net/map
REN21 Community

GSR Network: 700 renewable energy, energy access & energy efficiency experts

GSR 2016: 180 experts joined the report process, equivalent to the total number of GSR experts in 2012
An extraordinary year for renewable energy

- **147 GW** of renewable power capacity added in 2015 – the largest annual increase ever
- Renewable heat capacity increased by **38 GWth**
- Total biofuels production also rose

### Renewable Energy Indicators 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INVESTMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New investment (annual) in renewable power and fuels</td>
<td>billion USD</td>
<td>273</td>
</tr>
<tr>
<td><strong>POWER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable power capacity (total, not including hydro)</td>
<td>GW</td>
<td>665</td>
</tr>
<tr>
<td>Renewable power capacity (total, including hydro)</td>
<td>GW</td>
<td>1,701</td>
</tr>
<tr>
<td>Hydropower capacity</td>
<td>GW</td>
<td>1,036</td>
</tr>
<tr>
<td>Bio-power capacity</td>
<td>GW</td>
<td>101</td>
</tr>
<tr>
<td>Bio-power generation (annual)</td>
<td>TWh</td>
<td>429</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>GW</td>
<td>12.9</td>
</tr>
<tr>
<td>Solar PV capacity</td>
<td>GW</td>
<td>177</td>
</tr>
<tr>
<td>Concentrating solar thermal power</td>
<td>GW</td>
<td>4.3</td>
</tr>
<tr>
<td>Wind power capacity</td>
<td>GW</td>
<td>370</td>
</tr>
<tr>
<td><strong>HEAT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar hot water capacity</td>
<td>GWth</td>
<td>409</td>
</tr>
<tr>
<td><strong>TRANSPORT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethanol production (annual)</td>
<td>billion litres</td>
<td>94.5</td>
</tr>
<tr>
<td>Biodiesel production (annual)</td>
<td>billion litres</td>
<td>30.4</td>
</tr>
</tbody>
</table>

[REN21 Renewables 2016 Global Status Report](#)
# Renewable Energy “Champions”

Annual investment/capacity additions/production

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment in renewable power and fuels (not including hydro &gt; 50 MW)</td>
<td>China</td>
<td>United States</td>
<td>Japan</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Investment in renewable power and fuels per unit GDP¹</td>
<td>Mauritania</td>
<td>Honduras</td>
<td>Uruguay</td>
<td>Morocco</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>Turkey</td>
<td>United States</td>
<td>Mexico</td>
<td>Kenya</td>
</tr>
<tr>
<td>Hydropower capacity</td>
<td>China</td>
<td>Brazil</td>
<td>Turkey</td>
<td>India</td>
</tr>
<tr>
<td>Solar PV capacity</td>
<td>China</td>
<td>Japan</td>
<td>United States</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Concentrating solar thermal power (CSP) capacity²</td>
<td>Morocco</td>
<td>South Africa</td>
<td>United States</td>
<td>—</td>
</tr>
<tr>
<td>Wind power capacity</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Brazil</td>
</tr>
<tr>
<td>Solar water heating capacity</td>
<td>China</td>
<td>Turkey</td>
<td>Brazil</td>
<td>India</td>
</tr>
<tr>
<td>Biodiesel production</td>
<td>United States</td>
<td>Brazil</td>
<td>Germany</td>
<td>Argentina</td>
</tr>
<tr>
<td>Fuel ethanol production</td>
<td>United States</td>
<td>Brazil</td>
<td>China</td>
<td>Canada</td>
</tr>
</tbody>
</table>
# Renewable Energy “Champions”

## Total capacity

<table>
<thead>
<tr>
<th>POWER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable power (incl. hydro)</td>
<td>China</td>
<td>United States</td>
<td>Brazil</td>
<td>Germany</td>
<td>Canada</td>
</tr>
<tr>
<td>Renewable power (not incl. hydro)</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Japan</td>
<td>India</td>
</tr>
<tr>
<td>Renewable power capacity per capita (among top 20, not including hydro)</td>
<td>Denmark</td>
<td>Germany</td>
<td>Sweden</td>
<td>Spain</td>
<td>Portugal</td>
</tr>
<tr>
<td>Biopower generation</td>
<td>United States</td>
<td>China</td>
<td>Germany</td>
<td>Brazil</td>
<td>Japan</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>United States</td>
<td>Philippines</td>
<td>Indonesia</td>
<td>Mexico</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Hydropower capacity</td>
<td>China</td>
<td>Brazil</td>
<td>United States</td>
<td>Canada</td>
<td>Russia</td>
</tr>
<tr>
<td>Hydropower generation</td>
<td>China</td>
<td>Brazil</td>
<td>Canada</td>
<td>United States</td>
<td>Russia</td>
</tr>
<tr>
<td>CSP</td>
<td>Spain</td>
<td>United States</td>
<td>India</td>
<td>Morocco</td>
<td>South Africa</td>
</tr>
<tr>
<td>Solar PV capacity</td>
<td>China</td>
<td>Germany</td>
<td>Japan</td>
<td>United States</td>
<td>Italy</td>
</tr>
<tr>
<td>Solar PV capacity per capita</td>
<td>Germany</td>
<td>Italy</td>
<td>Belgium</td>
<td>Japan</td>
<td>Greece</td>
</tr>
<tr>
<td>Wind power capacity</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>India</td>
<td>Spain</td>
</tr>
<tr>
<td>Wind power capacity per capita</td>
<td>Denmark</td>
<td>Sweden</td>
<td>Germany</td>
<td>Ireland</td>
<td>Spain</td>
</tr>
</tbody>
</table>

## HEAT

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar water heating collector capacity</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Turkey</td>
<td>Brazil</td>
</tr>
<tr>
<td>Solar water heating collector capacity per capita</td>
<td>Austria</td>
<td>Cyprus</td>
<td>Israel</td>
<td>Barbados</td>
<td>Greece</td>
</tr>
<tr>
<td>Geothermal heat capacity</td>
<td>China</td>
<td>Turkey</td>
<td>Japan</td>
<td>Iceland</td>
<td>India</td>
</tr>
<tr>
<td>Geothermal heat capacity per capita</td>
<td>Iceland</td>
<td>New Zealand</td>
<td>Hungary</td>
<td>Turkey</td>
<td>Japan</td>
</tr>
</tbody>
</table>
173 countries had renewable energy targets, and an estimated 146 countries had renewable energy support policies:

- **114 countries** with power policies
- **66 countries** with transport policies
- **21 countries** with H&C policies
At least **173** countries had renewable energy targets

At least **146** countries had renewable energy policies in place

Most policies focus on power: Mainly FIT and RPS
Renewables accounted **28.9%** of global power generation capacity and **23.7%** of global electricity demand.

Renewables made up for **60%** of net additions to global power capacity.

Total RE power capacity: **1,849 GW**, an increase of almost 9% over 2014.
Power Sector

Electricity continues to dominate policy makers’ focus.

Countries with Renewable Energy Power Policies, by Type, 2015

More than one policy
Feed-in tariff / premium payment
Tendering
Net metering
No policy or no data

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

Source: REN21 Policy Database

REN21 Renewables 2016 Global Status Report
Energy use for heat accounts for about **half** of total world final energy consumption.

RE share of final global heat demand: **approx. 8%**
Transport Sector

Renewable energy accounted for an estimated 4% of global energy demand for road transport in 2013, up from 2% in 2007.

Countries with Renewable Energy Transport Obligations, 2010–2015

Note: Bolivia, Dominican Republic, State of Palestine and Zambia added policies during 2010-2012 but removed them during 2013-2015. Countries are considered to have policies when at least one national or state/provincial-level policy is in place.

Source: REN21 Policy Database
Biomass makes up 14% of total final energy consumption.

By end-use sector:

- 28.6% of heating in buildings
- 7.2% of heating in industry
- 2.8% of transport
- 2.0% of power

**Shares of Biomass in Total Final Energy Consumption and in Final Energy Consumption by End-use Sector, 2014**

Source: REN21 Renewables 2016 Global Status Report
Geothermal Power and Heat

Turkey added about half of new global capacity

Lead countries for cumulative geothermal power generating capacity:
- The United States (3.6 GW)
- The Philippines (1.9 GW)
- Indonesia (1.4 GW)
- Mexico (1.1 GW)
- New Zealand (1.0 GW)

**Geothermal Power Capacity Additions, Share by Country, 2015**

- Turkey: 50%
- United States: 22%
- Mexico: 17%
- Kenya: 6%
- Japan: 2%
- Germany: 2%

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Hydropower

Total global hydropower capacity: 1,064 GW

Global hydropower generation: 3,940 TWh

28 GW of new capacity were commissioned in 2015

Hydropower Global Capacity, Shares of Top Six Countries, 2015

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>27.9%</td>
</tr>
<tr>
<td>Brazil</td>
<td>8.6%</td>
</tr>
<tr>
<td>United States</td>
<td>7.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>7.4%</td>
</tr>
<tr>
<td>Russia</td>
<td>4.5%</td>
</tr>
<tr>
<td>India</td>
<td>4.4%</td>
</tr>
<tr>
<td>Rest of World</td>
<td>39.7%</td>
</tr>
</tbody>
</table>
Solar PV

Capacity added: +50 GW
Total capacity: 227 GW

Annual PV market in 2015 was nearly 10 times the world’s cumulative solar PV capacity of a decade earlier.
22 countries had enough PV capacity at end-2015 to meet more than 1% of their electricity demand, with far higher shares in some countries:

- Italy 7.8%
- Greece 6.5%
- Germany 6.4%
Concentrating Solar Thermal Power (CSP)

Total capacity: 4.8 GW

With +0.4 GW added, this represents an increase of 10%.

Markets continue to shift to developing countries.
Total capacity of water collectors increased by more than 6% in 2015, bringing operating global solar thermal capacity to about \(435 \text{ GW}_{\text{th}}\).

The slowdown in market growth continued in 2015.
Wind Power

63 GW of capacity were added

Total capacity: 433 GW

Offshore, an estimated 3.4 GW of grid-connected capacity was added in 2015, for a world total exceeding 12 GW
Wind power was the leading source of new power generating capacity in Europe and the United States in 2015, and the second largest in China.

Wind power is playing a major role in meeting electricity demand in an increasing number of countries, e.g.:

- Denmark: 42% of demand
- Uruguay: 15.5%
Distributed Renewable Energy for Energy Access

17% of the global population still lack electricity access – approx. 1.2 billion people

38% of the global population lack access to clean cooking

By year’s end, approx. 28 million households worldwide were using clean cook stoves
Distributed Renewable Energy for Energy Access

Little quantitative information exists on DRE markets, but information available indicates that markets are significant.

DRE solar PV markets continue to flourish:

- 44 million off-grid pico-solar products sold
- Represents annual market of USD 300 million
- 70 countries had off-grid PV capacity or programmes to support off-grid PV

Total Solar Lighting Systems in Top Five Countries, End-2014

- India: 960,000
- Tanzania: 790,038
- Kenya: 764,900
- Ethiopia: 661,630
- Uganda: 84,352

Total Solar Home Systems in Top Five Countries, End-2014

- Bangladesh: 3,600,000
- India: 1,100,000
- China: 500,000
- Nepal: 500,000
- Kenya: 320,000

Total Biogas Installations in Top Five Countries, End-2014

- China: 43,000,000
- India: 4,750,000
- Nepal: 300,000
- Vietnam: 182,805
- Bangladesh: 37,059

Total Installed Clean Cookstoves in Top Five Countries, 2012–2014

- China: 12,989,744
- Ethiopia: 4,494,681
- Cambodia: 2,964,717
- Kenya: 2,565,954
- India: 2,411,966

REN21 Renewables 2016 Global Status Report
2015 saw positive market trends and increased investment in DRE

Innovative business models continued to mature and expand

DRE deployment in 2015 received policy support through a variety of policy types and incentives

Capital Raised by Distributed Renewable Energy Companies in 2015, 2015

- USD 276 million total in off-grid solar companies in 2015
- USD 160 million total in Pay-As-You-Go companies in 2015

RENEWABLES 2016 GLOBAL STATUS REPORT
Global employment continued to increase by 5% in 2015. An estimated 8.1 million direct and indirect jobs in the renewable energy industry. Leading employers in 2015 were China, Brazil, the United States, and India. 

Source: IRENA
Global Investment in Renewable Energy

Global new investment in renewables estimated at **USD 286 billion** in 2015

→ A new **record high**

→ Increase of **5%** from 2014

→ Including hydropower: **USD 328.9 billion**
Global Investment in Renewable Energy

Developing & emerging countries:
- USD 156 billion
- Increase of 19% compared to 2014

Developed countries:
- USD 130 billion
- Decrease of 8% compared to 2014

Data include government and corporate R&D.

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Source: BNEF
Solar power leading sector for money committed during 2015, receiving more than 56% (USD 161 billion) of total new investment in RE.

Wind power followed with USD 109.6 billion (38.3% of total, up 4%).

Source: BNEF
Energy Efficiency

Increased emphasis on activities to improve energy efficiency in all sectors

→ 146 countries with policies
→ 128 countries with targets

Countries with Energy Efficiency Policies and Targets, 2015

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City and Local Government Renewable Energy Policies

100% Renewable Energy movement expanded in 2015:

➜ Byron Shire, Coffs Harbour, and Uralla in Australia

➜ Oxford County and Vancouver in Canada

➜ US cities of Rochester (Minnesota) and San Diego (California)
Consolidated data on community initiatives are very limited

Since 2008, there has been a marked rise in initiatives focused on community renewable energy, especially in **Europe**:

- Europe: more than 2800 energy co-operatives
- Germany: 772
- The Netherlands: 500
Renewable energy provided an estimated **19.2%** of global final energy consumption in 2014.

Share of modern renewable energy increased to **10.3%** while the share of traditional biomass was of **8.9%**.
Conclusions

- Largest global capacity additions from renewables to date
- Majority of remaining fossil fuel reserves will have to be kept in the ground, and both renewable energy and energy efficiency will have to be scaled up dramatically in order to reach 2° climate target
- More emphasis on renewable energy in the heating and cooling as well as transport sectors and on sector-coupling
- Need to build a smarter, more flexible system that accommodates both centralised as well as decentralised and community-based generation
Renewable Energy Policy Network for the 21st Century

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