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

NGOs:
CAN, CEEW, FER, GACC, GFSE, Greenpeace International, ICLEI, ISEP, MFC, SLoCaT, REI, WCRE, WFC, WRI, WWF

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

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

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

National Governments:
Afghanistan, Brazil, Denmark, Germany, India, Norway, South Africa, Spain, UAE, UK, USA
REN21 Community

GSR Network:

- Over **800** active contributors and reviewers
- Tracking **155** countries
- Covering **96%** of global GDP
- Representing **96%** of global population
The report features:

- Global Overview
- Market & Industry Trends
- Distributed Renewable Energy for Energy Access
- Investment Flows
- Policy Landscape
- NEW: Enabling Technologies and Energy Systems Integration
- Energy Efficiency
- Feature: Deconstructing Baseload
Another extraordinary year for renewable energy

Total global capacity was up 9% compared to 2015, to more than 2,016 GW at year’s end (920 GW not including hydro)

- Solar PV - 47% of newly installed renewable power capacity in 2016
- Wind - 34%
- Hydropower - 15.5%

<table>
<thead>
<tr>
<th>INVESTMENT</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>New investment (annual)</td>
<td>312.2</td>
<td>241.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POWER</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable power capacity</td>
<td>785</td>
<td>921</td>
</tr>
<tr>
<td>Renewable power capacity (total, including hydro)</td>
<td>1,856</td>
<td>2,017</td>
</tr>
<tr>
<td>Hydropower capacity</td>
<td>1,071</td>
<td>1,096</td>
</tr>
<tr>
<td>Bio-power capacity</td>
<td>106</td>
<td>112</td>
</tr>
<tr>
<td>Bio-power generation (annual)</td>
<td>464</td>
<td>504</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>13</td>
<td>13.5</td>
</tr>
<tr>
<td>Solar PV capacity</td>
<td>228</td>
<td>303</td>
</tr>
<tr>
<td>Concentrating solar thermal power capacity</td>
<td>4.7</td>
<td>4.8</td>
</tr>
<tr>
<td>Wind power capacity</td>
<td>433</td>
<td>487</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>HEAT</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar hot water capacity</td>
<td>435</td>
<td>456</td>
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</table>

<table>
<thead>
<tr>
<th>TRANSPORT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol production (annual)</td>
<td>98.3</td>
<td>98.6</td>
</tr>
<tr>
<td>Biodiesel production (annual)</td>
<td>30.1</td>
<td>30.8</td>
</tr>
</tbody>
</table>
As of 2015, renewable energy provided an estimated **19.3%** of global final energy consumption.
## Renewable Energy “Champions”

### Annual Investment/Net Capacity Additions/Production in 2016

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

#### Total capacity or generation as of end-2016

<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)²</td>
<td>Iceland</td>
<td>Denmark</td>
<td>Sweden/Germany</td>
<td>Spain/Finland</td>
<td>–</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>New Zealand</td>
<td>Mexico</td>
</tr>
<tr>
<td>Hydropower capacity</td>
<td>China</td>
<td>Brazil</td>
<td>United States</td>
<td>Canada</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>Hydropower generation</td>
<td>China</td>
<td>Brazil</td>
<td>Canada</td>
<td>United States</td>
<td>Russian Federation</td>
</tr>
<tr>
<td>CSP</td>
<td>Spain</td>
<td>United States</td>
<td>India</td>
<td>South Africa</td>
<td>Morocco</td>
</tr>
<tr>
<td>Solar PV capacity</td>
<td>China</td>
<td>Japan</td>
<td>Germany</td>
<td>United States</td>
<td>Italy</td>
</tr>
<tr>
<td>Solar PV capacity per capita</td>
<td>Germany</td>
<td>Japan</td>
<td>Italy</td>
<td>Belgium</td>
<td>Australia/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>Portugal</td>
</tr>
</tbody>
</table>

#### HEAT

| Solar water heating collector capacity | China | United States | Turkey | Germany | Brazil |
| Solar water heating collector capacity per capita | Barbados | Austria | Cyprus | Israel | Greece |
| Geothermal heat capacity | China | Turkey | Japan | Iceland | India |
| Geothermal heat capacity per capita | Iceland | New Zealand | Hungary | Turkey | Japan |
Heating and Cooling

Modern renewable energy supplies approx. 9% of total global heat demand.

In 2016, the vast majority of renewable heat continued to be supplied by biomass, with smaller contributions from solar thermal and geothermal energy.

Deployment of renewable technologies in this market continued to be constrained by factors such as comparatively low fossil fuel prices and a relative lack of policy support.
Auctions are the most rapidly expanding form of renewable energy policy support.

Renewable energy auctions held in 34 countries in 2016 – more than double the year before.
Global new investment in renewables was USD 241.6 billion in 2016.

For the fifth consecutive year, investment in new renewable power capacity was roughly double that in fossil fuel capacity.
Global Investment in Renewable Energy

Note: Data include government and corporate R&D.
Solar and wind power continue to lead for money committed during 2016, each accounting for roughly 47% of total investment.
Solar PV

75 GW of solar PV capacity was added worldwide.

Global solar PV capacity totaled 303 GW.

Solar PV Global Capacity and Annual Additions, 2006-2016

REN21 Renewables 2017 Global Status Report
China added **34.5 GW** (up 126% over 2015), increasing its total solar PV capacity 45% to **77.4 GW**, far more than that of any other country.
Wind Power

55 GW of wind power capacity added

Global total increased 12% to 487 GW

Wind Power Global Capacity and Annual Additions, 2006-2016

REN21 Renewables 2017 Global Status Report
The UNECE Renewable Energy Status Report 2017

• Detailed look at the status of renewable energy in select 17 countries in the UNECE region

• Part of the initiatives of the UNECE Group of Experts on Renewable Energy (GERE) – building on existing process

• Utilisation of the established REN21 global data collection process from formal and informal sources

• Objective to obtain a reliable data baseline for increased investment activity

• Strong Involvement of governments, international organisations (IEA, EBRD, European Commission, World Bank, UNDP, etc.) and civil society during data collection and review
• Covered countries very diverse in terms of territory, economic, social and political characteristics

• Overall population of over 300 Million

• Density ranges from 6.4 persons/km to 123.9 persons/km

• Three countries amongst coldest globally in terms of heating degree days

• Countries partake in different forms of regional energy cooperation
Investment flows in UNECE (17)

- The covered countries only represent 0.2 % of new RE investment in 2015 worldwide

- Investment attraction remains an issue for RE development in the region
Conclusion UNECE

- South East and Eastern Europe, Caucasus, Central Asia and Russian Federation made strides into the realm of renewable energy and energy efficiency over the past two decades.

- Governments advance in developing targets and policies that promote renewable energy sources present abundantly in different forms across the region.

- Numerous barriers remain (energy subsidies, legal & administrative complexities, awareness of affordability, etc.) and delay projects implementation.

- Viewed from global perspective, capacity and investment in the covered 17 countries remain marginal.
100% Renewables: Pipe dream or reality?

→ 114 experts interviewed
→ Conservative, moderate, progressive perspectives
→ Giving their opinion on:
  • feasibility of 100% renewable energy future
  • macro-economic impact of such a future
→ All regions of the world represented
→ Not prescriptive but a starting point for debate
→ 12 Great Debates
“Is the transition to 100% renewables on a global level feasible and realistic?”
71% agree with this statement

What will be the share of global renewable final energy consumption by 2050?
72% of the experts expect RE share will double or even triple with the next 3 decades.
What will be the share of global renewable heating energy consumption by 2050?

78% expect the renewable heating share at least to triple within the next 30 years

“The electrification of the heating sector will continue and will lead to an almost complete electrification.”

39% agree
41% disagree
20% undecided

>> the race is still wide open
Various storage technologies for various purposes. There is no “on-size-fits-all” application.
What will the annual global investment volume in renewable energy be by 2050?
63% believe that the RE investment volume will at least double

How many people will be employed in this sector by 2050? (8.1 million in 2016)
56% expect the workforce to quadruple by 2050
In Conclusion – Global Futures Report

• More than 70% of the experts interviewed consider a global transition to 100% renewable energy to be both feasible and realistic.

• There is an overwhelming consensus that renewable power will dominate in the future, with many noting that even large international corporations are increasingly choosing renewable energy products either from utilities or through direct investment in their own generating capacity.

• Numerous companies, regions, islands and cities have set 100% renewable energy targets.
Global renewable energy transition advancing with record capacity additions and rapidly falling costs – more capacity installed for less money

2016 was the third year in a row where decoupling of economic growth and energy-related CO₂ emissions occurred

However, progress not fast enough to reach Paris Agreement goals

Better-integrated sectoral planning

Smarter, more flexible systems integrating variable renewables

More use of enabling technologies
Historic Projections Fall Short...

In 1997, the World Bank predicted about 6 GW of wind in China for 2020, nearly ten times of this amount was reached nearly a decade earlier with close to 60 GW installed wind capacity in China in 2011.

"The future of renewable energy is fundamentally a choice. All of the resources and technologies are there, but legislators and governments have to choose a long-term renewables path."
Renewable Energy Policy Network for the 21st Century

Thank you!

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