Renewable Energy Status

Christine Lins
Executive Secretary of REN21

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About REN21

A Multi-stakeholder Policy Network grouping

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

Industry Associations:
ACORE, ARE, CEC, CREIA,
EREC, GWEC, IGA, IHA,
WBA, WWEA

Science & Academia:
IIASA, ISES, SANEDI, TERI

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

National Governments:
Brazil, Denmark
Germany, India, Norway,
Spain, Uganda, UAE, UK

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Launched along with UNEP’s Global trends in RE investment.

Team of over 500 Contributors, researchers & reviewers worldwide.

The report features:

- Global Market Overview.
- Industry Trends.
- Policy Landscape.
- Rural Renewable Energy.

All renewable energy technologies.

Sectors: power, heating/cooling, transport.

New elements in 2013:

- Feature on system transformation.
Renewable Energy in the World

- RE supplied an estimated **19%** of global final energy consumption in 2011.

Source: REN21 Renewables 2013 Global Status Report
### Top 5 RE champions

**ANNUAL INVESTMENT/ADDITIONS/PRODUCTION IN 2012**

<table>
<thead>
<tr>
<th>Rank</th>
<th>New capacity investment</th>
<th>Hydropower capacity</th>
<th>Solar PV capacity</th>
<th>Wind power capacity</th>
<th>Solar water collector (heating) capacity¹</th>
<th>Biodiesel production</th>
<th>Ethanol production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>China</td>
<td>Germany</td>
<td>United States</td>
<td>China</td>
<td>United States</td>
<td>United States</td>
</tr>
<tr>
<td>2</td>
<td>United States</td>
<td>Turkey</td>
<td>Italy</td>
<td>China</td>
<td>Turkey</td>
<td>Germany</td>
<td>Brazil</td>
</tr>
<tr>
<td>3</td>
<td>Germany</td>
<td>Brazil/Vietnam</td>
<td>China</td>
<td>Germany</td>
<td>Germany</td>
<td>Argentina</td>
<td>China</td>
</tr>
<tr>
<td>4</td>
<td>Japan</td>
<td>Russia</td>
<td>United States</td>
<td>India</td>
<td>India</td>
<td>Brazil</td>
<td>Canada</td>
</tr>
<tr>
<td>5</td>
<td>Italy</td>
<td>Canada</td>
<td>Japan</td>
<td>United Kingdom</td>
<td>Brazil</td>
<td>France</td>
<td>France</td>
</tr>
</tbody>
</table>

**TOTAL CAPACITY AS OF END-2012**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Renewable power capacity (incl. hydro)</th>
<th>Renewable power capacity (not incl. hydro)</th>
<th>Renewable power capacity per capita (not incl. hydro)²</th>
<th>Biopower capacity</th>
<th>Geothermal power capacity</th>
<th>Hydropower capacity</th>
<th>Concentrating solar thermal power (CSP) capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>China</td>
<td>Germany</td>
<td>United States</td>
<td>United States</td>
<td>China</td>
<td>Spain</td>
</tr>
<tr>
<td>2</td>
<td>United States</td>
<td>United States</td>
<td>Sweden</td>
<td>Brazil</td>
<td>Philippines</td>
<td>Brazil</td>
<td>United States</td>
</tr>
<tr>
<td>3</td>
<td>Brazil</td>
<td>Germany</td>
<td>Spain</td>
<td>China</td>
<td>Indonesia</td>
<td>United States</td>
<td>Algeria</td>
</tr>
<tr>
<td>4</td>
<td>Canada</td>
<td>Spain</td>
<td>Italy</td>
<td>Germany</td>
<td>Mexico</td>
<td>Canada</td>
<td>Egypt/Morocco</td>
</tr>
<tr>
<td>5</td>
<td>Germany</td>
<td>Italy</td>
<td>Canada</td>
<td>Sweden</td>
<td>Italy</td>
<td>Russia</td>
<td>Australia</td>
</tr>
</tbody>
</table>

Source: REN21 Renewables 2013 Global Status Report
Global Market Overview – Power Markets

Renewable energy comprise more than **26%** of global power generation capacity.

**21.7% of global electricity** is produced from renewable energy.

Renewables accounted for just over half of the estimated 280GW of new electric capacity installed in 2012.
Global Market Overview

- **Heating and Cooling**
  - Transition towards the use of larger systems, increasing use of CHP, for district schemes and industrial purposes.
  - Solar collectors are used in more than 56 countries for water (and increasingly for space) heating.

- **Transport**
  - RE used in the form of liquid and gaseous biofuels, electricity and renewably produced hydrogen for fuel cell vehicles.
  - Liquid biofuels provided about 3.4% of global road transport fuels in 2012.
  - Electric transport is being tied directly with renewable energy through policy directives particularly at local level.
• 30GW of new hydropower was added in 2012, increasing capacity by nearly 3%, bringing installed capacity to 990GW.

• Globally hydropower generated 3,700TWh of electricity in 2012. Canada alone produced 376 TWh followed by United States (277 TWh).

• Growing prominence of joint-venture business models involving local and international partnerships as the size of the projects increase.

Source: REN21 Renewables 2013 Global Status Report
Solar Photovoltaics (PV)

- Total global operating capacity of solar PV reached the 100 GW milestone.
- Prices of solar PV modules fell by more than 30% in 2012.

- In Latin America solar PV demand is shifting from small off-grid applications to large-scale systems—especially in Brazil, Chile, and Mexico.

Source: REN21 Renewables 2013 Global Status Report
• Interest in CSP is on the rise, particularly in developing countries, with investment spreading across Africa, the Middle East, Asia, and Latin America.

• Argentina, Chile and Mexico have projects under construction or have indicated intentions to install CSP plants.
Almost 45GW of wind power capacity began operation, increasing global wind capacity 19% to 283 GW.

Latin America saw the most significant growth in wind power. Brazil, Mexico, Argentina, Costa Rica, Nicaragua, Uruguay, and Venezuela added capacity during 2012.
Bioenergy

- **Use of biomass** in the heat, power and transport sectors increased 2–3% to approximately 55 EJ.

- **Bio-power capacity** was up 12% to nearly 83 GW, with notable increases in some BRICS countries.

- In 2012, around 350 TWh of electricity was generated worldwide (bio-power).

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**BIOPower generation of top 20 countries, annual average 2010–2012**

<table>
<thead>
<tr>
<th>Country</th>
<th>Terawatt-hours per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>62</td>
</tr>
<tr>
<td>Germany</td>
<td>37</td>
</tr>
<tr>
<td>Brazil</td>
<td>36</td>
</tr>
<tr>
<td>China</td>
<td>28</td>
</tr>
<tr>
<td>Japan</td>
<td>22</td>
</tr>
<tr>
<td>Sweden</td>
<td>13</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>12</td>
</tr>
<tr>
<td>Finland</td>
<td>11</td>
</tr>
<tr>
<td>Italy</td>
<td>10</td>
</tr>
<tr>
<td>Canada</td>
<td>7.7</td>
</tr>
<tr>
<td>Netherlands</td>
<td>7.1</td>
</tr>
<tr>
<td>Poland</td>
<td>5.3</td>
</tr>
<tr>
<td>Denmark</td>
<td>5.2</td>
</tr>
<tr>
<td>Austria</td>
<td>4.9</td>
</tr>
<tr>
<td>Belgium</td>
<td>4.6</td>
</tr>
<tr>
<td>France</td>
<td>4.5</td>
</tr>
<tr>
<td>Spain</td>
<td>4.3</td>
</tr>
<tr>
<td>India</td>
<td>3.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>3.2</td>
</tr>
<tr>
<td>Portugal</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Source: REN21 Renewables 2013 Global Status Report
Ethanol and Biodiesel

- Liquid biofuels provided about 3.4% of global road transport fuels, with small but increasing use by the aviation and marine sectors.

- Global production of fuel ethanol was down about 1.3% by volume from 2011, while biodiesel production increased slightly.

Source: REN21 Renewables 2013 Global Status Report
Geothermal Energy

- 233 TWh (805PJ) of district heat and electricity was provided by geothermal resources in 2012.
- The use of ground-source heat pumps is growing fast and reached an estimated 50 GWth of capacity in 2012.
- Geothermal electric generating capacity grew by an estimated 300 MW during 2012, bringing the global total to 11.7 GW.
Global solar thermal capacity reached an estimated of 255 GW$_{th}$ for glazed water collectors.

Growing trend to use solar resources to generate process heat for industry.
Renewable Energy and Jobs

Worldwide renewable energy employment continues to increase.

An estimated **5.7 million people** work in the renewable energy sector.

The bulk of employment remains concentrated in **Brazil**, China, India, the EU, and the United States.
Global New Investment in Renewable Energy

- Global new investment in renewable power went down 12% from the previous year’s record (still the second highest ever).
- Installed capacity, which continued to grow due to falling technology costs.
- The most dramatic shift yet in the balance of investment activity between developed and developing economies.


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Investment Flows

- **Developing countries** reached USD 112 billion, representing 46% of the world total; this was up from 34% in 2011, and continued an unbroken eight-year growth trend.
- **Developed economies** fell 29% to USD 132 billion, the lowest level since 2009.

Data Source: UNEP FS/ BNEF Global Trends in Renewable Energy Investment 2013
At least **138 countries had renewable energy targets by the end of 2012.**

- The number of countries with renewable energy targets more than doubled between 2005 and 2012.
Outlook 2030

Three complementary goals by 2030:

1. Ensure universal access to modern energy services.
2. Double the global rate of improvement in energy efficiency.
3. Double the share of renewable energy in the global energy mix.

Sustainable energy for all
Starting point for SE4ALL goals can be established on this basis

<table>
<thead>
<tr>
<th>Proxy indicator</th>
<th>Universal access to modern energy services</th>
<th>Doubling global rate of improvement of energy efficiency</th>
<th>Doubling share of renewable energy in global energy mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of population with electricity access</td>
<td>Percentage of population with primary reliance on non-solid fuels</td>
<td>Rate of improvement in energy intensity</td>
<td>Renewable energy share in TFEC</td>
</tr>
<tr>
<td>1990</td>
<td>76</td>
<td>47</td>
<td>16.6</td>
</tr>
<tr>
<td>2010</td>
<td>83</td>
<td>59</td>
<td>–1.3</td>
</tr>
<tr>
<td>2030</td>
<td>100</td>
<td>100</td>
<td>–2.6</td>
</tr>
</tbody>
</table>

Source: Global Tracking Framework @ International Energy Agency and World Bank, 2013
Future outlook – the best is yet to come

Figure 1: Conservative, Moderate, and High-Renewables Scenarios to 2050

- High renewables
- Moderate
- Conservative

Greenpeace (2012)
GEA (2012) "Efficiency" (highest)
IEA ETP (2012) "2DS"

SE4All target
IEA WEO (2012) "New Policies"
ExxonMobil (2012)
Historic Projections Fall Short…

IEA (2000) -- Wind Power Globally (GW)

- 2010 Projected
- 2010 Actual

World Bank (1997)--Wind Power in China (GW)

- 2020 Projected
- 2011 Actual
In conclusion

- Achieving objectives will take bold policy action aimed at doubling or tripling financial flows.
- Stable and predictable policy frameworks are key for the industry.
- Doubling the share of renewables by 2030 will need to result in at least a tripling of the share of modern renewables incl. sustainable hydropower.
- Both centralised and decentralised renewables will be needed.
- Phase out of untargeted fossil fuel subsidies is indispensable (RE support is still 6 times less than fossil fuel subsidies).
- Integration of renewable energy will become more important.
REN21 Flagship Products & Activities

Renewables Global Status Report
www.ren21.net/gsr

Renewables Interactive Map
www.map.ren21.net

Renewables Global Futures Report
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The True Cost of Electric Power

Facilitation of IRECs

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