RENEWABLES 2014 GLOBAL STATUS REPORT

CESC INDIA WEBINAR

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Executive Secretary

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RENEWABLES 2014 GLOBAL STATUS REPORT

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

www.ren21.net/gsr
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.

<table>
<thead>
<tr>
<th>INVESTMENT</th>
<th>START 2004</th>
<th>END 2012</th>
<th>END 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>New investment (annual) in renewable power and fuels</td>
<td>billion USD</td>
<td>39.5</td>
<td>249.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POWER</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Renewable power capacity (total, not including hydro)</td>
<td>GW</td>
<td>85</td>
<td>480</td>
</tr>
<tr>
<td>Renewable power capacity (total, including hydro)</td>
<td>GW</td>
<td>800</td>
<td>1,440</td>
</tr>
<tr>
<td>Hydropower capacity (total)</td>
<td>GW</td>
<td>715</td>
<td>960</td>
</tr>
<tr>
<td>Bio-power capacity</td>
<td>GW</td>
<td>&lt;36</td>
<td>83</td>
</tr>
<tr>
<td>Bio-power generation</td>
<td>TWh</td>
<td>227</td>
<td>350</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>GW</td>
<td>8.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Solar PV capacity (total)</td>
<td>GW</td>
<td>2.6</td>
<td>100</td>
</tr>
<tr>
<td>Concentrating solar thermal power (total)</td>
<td>GW</td>
<td>0.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Wind power capacity (total)</td>
<td>GW</td>
<td>48</td>
<td>283</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HEAT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Solar hot water capacity (total)</td>
<td>GW</td>
<td>98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRANSPORT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol production (annual)</td>
<td>billion litres</td>
<td>28.5</td>
</tr>
<tr>
<td>Biodiesel production (annual)</td>
<td>billion litres</td>
<td>2.4</td>
</tr>
</tbody>
</table>
Renewable energy provided an estimated 19% of global final energy consumption.

The share of modern renewable energy increased to 10%.

The share of traditional biomass was of 9%.
# RENEWABLE ENERGY CHAMPIONS - annual investment/capacity additions

## ANNUAL INVESTMENT / NET CAPACITY ADDITIONS / PRODUCTION IN 2013

<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</strong></td>
<td><strong>China</strong></td>
<td><strong>United States</strong></td>
<td><strong>Japan</strong></td>
<td><strong>United Kingdom</strong></td>
</tr>
<tr>
<td><strong>Share of GDP 2012 (USD) invested</strong></td>
<td><strong>Uruguay</strong></td>
<td><strong>Mauritius</strong></td>
<td><strong>Costa Rica</strong></td>
<td><strong>South Africa</strong></td>
</tr>
<tr>
<td><strong>Geothermal power capacity</strong></td>
<td><strong>New Zealand</strong></td>
<td><strong>Turkey</strong></td>
<td><strong>United States</strong></td>
<td><strong>Kenya</strong></td>
</tr>
<tr>
<td><strong>Hydropower capacity</strong></td>
<td><strong>China</strong></td>
<td><strong>Turkey</strong></td>
<td><strong>Brazil</strong></td>
<td><strong>Vietnam</strong></td>
</tr>
<tr>
<td><strong>Solar PV capacity</strong></td>
<td><strong>China</strong></td>
<td><strong>Japan</strong></td>
<td><strong>United States</strong></td>
<td><strong>Germany</strong></td>
</tr>
<tr>
<td><strong>CSP capacity</strong></td>
<td><strong>United States</strong></td>
<td><strong>Spain</strong></td>
<td><strong>United Arab Emirates</strong></td>
<td><strong>India</strong></td>
</tr>
<tr>
<td><strong>Wind power capacity</strong></td>
<td><strong>China</strong></td>
<td><strong>Germany</strong></td>
<td><strong>United Kingdom</strong></td>
<td><strong>India</strong></td>
</tr>
<tr>
<td><strong>Solar water heating capacity</strong></td>
<td><strong>China</strong></td>
<td><strong>Turkey</strong></td>
<td><strong>India</strong></td>
<td><strong>Brazil</strong></td>
</tr>
<tr>
<td><strong>Biodiesel production</strong></td>
<td><strong>United States</strong></td>
<td><strong>Germany</strong></td>
<td><strong>Brazil</strong></td>
<td><strong>Argentina</strong></td>
</tr>
<tr>
<td><strong>Fuel ethanol production</strong></td>
<td><strong>United States</strong></td>
<td><strong>Brazil</strong></td>
<td><strong>China</strong></td>
<td><strong>Canada</strong></td>
</tr>
</tbody>
</table>
# RENEWABLE ENERGY CHAMPIONS – total capacity

## TOTAL CAPACITY OR GENERATION\(^c\) AS OF END-2013

<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>Canada</td>
<td>Germany</td>
</tr>
<tr>
<td>Renewable power (not incl. hydro)</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Spain / Italy</td>
<td>India</td>
</tr>
<tr>
<td>Renewable power capacity per capita (not incl. hydro) (^2)</td>
<td>Denmark</td>
<td>Germany</td>
<td>Portugal</td>
<td>Spain / Sweden</td>
<td>Austria</td>
</tr>
<tr>
<td>Biopower generation</td>
<td>United States</td>
<td>Germany</td>
<td>China</td>
<td>Brazil</td>
<td>India</td>
</tr>
<tr>
<td>Geothermal power</td>
<td>United States</td>
<td>Philippines</td>
<td>Indonesia</td>
<td>Mexico</td>
<td>Italy</td>
</tr>
<tr>
<td>Hydropower (^4)</td>
<td>China</td>
<td>Brazil</td>
<td>United States</td>
<td>Canada</td>
<td>Russia</td>
</tr>
<tr>
<td>Hydropower generation (^5)</td>
<td>China</td>
<td>Brazil</td>
<td>Canada</td>
<td>United States</td>
<td>Russia</td>
</tr>
<tr>
<td>Concentrating solar thermal power (CSP)</td>
<td>Spain</td>
<td>United States</td>
<td>United Arab Emirates</td>
<td>India</td>
<td>Algeria</td>
</tr>
<tr>
<td>Solar PV</td>
<td>Germany</td>
<td>China</td>
<td>Italy</td>
<td>Japan</td>
<td>United States</td>
</tr>
<tr>
<td>Solar PV capacity per capita</td>
<td>Germany</td>
<td>Italy</td>
<td>Belgium</td>
<td>Greece</td>
<td>Czech Republic</td>
</tr>
<tr>
<td>Wind power</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Spain</td>
<td>India</td>
</tr>
<tr>
<td>Wind power capacity per capita</td>
<td>Denmark</td>
<td>Sweden</td>
<td>Spain</td>
<td>Portugal</td>
<td>Ireland</td>
</tr>
</tbody>
</table>

## HEAT

<table>
<thead>
<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar water heating (^6)</td>
<td>China</td>
<td>United States</td>
<td>Germany</td>
<td>Turkey</td>
<td>Brazil</td>
</tr>
<tr>
<td>Solar water heating capacity per capita (^7)</td>
<td>Cyprus</td>
<td>Austria</td>
<td>Israel</td>
<td>Barbados</td>
<td>Greece</td>
</tr>
<tr>
<td>Geothermal heat (^8)</td>
<td>China</td>
<td>Turkey</td>
<td>Iceland</td>
<td>Japan</td>
<td>Italy</td>
</tr>
</tbody>
</table>
POWER SECTOR

Renewable energy comprise 26.4% of global power generation capacity.

22.1% of global electricity was produced from renewable energy.

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

Total RE power capacity: 1,560 GW

Renewables represented less than 17% of total additions in 2013, due to India’s rapidly expanding power capacity.
HEATING & COOLING

Small but growing renewable energy share of final global heat demand: approx. 10%

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**
- Hybrid solutions in building renovation
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
HYDROPOWER

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
- increasing recognition of the potential for hydropower to complement other renewable technologies, such as variable wind and solar power
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, accounting for about one-third of renewable power capacity added during the year.

India added 1.1GW PV capacity.
India is ranked fourth for capacity of facilities >50MW.
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 had a record year: +1.6 GW added
CONCENTRATING SOLAR POWER (CSP)

Total CSP capacity: **3.4 GW**

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

Markets continue to expand with projects coming online in the United Arab Emirates, India and China.

India is number 4 for CSP net capacity additions 2013 and CSP power capacity/generation.
Total primary energy consumption of biomass was approx. **57 EJ in 2013**.

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

Modern biomass **heat capacity:** 296 GW\(_{th}\) (increase of 1 %)

Global **bio-power capacity:** 88 GW (increase: + 5 GW)
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.
Solar water and air collector capacity: ~330 GWth

2013 Trends:
- large domestic systems
- growing interest district heating & cooling as well as industrial applications
- industry consolidation

India is ranked third for SWH capacity additions – added 0.9GWth for a total of 5.2GWth.
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.

*Employment information for large-scale hydropower is incomplete and not included*

Data source: IRENA
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

Net investment in new renewables power capacity outpaced fossil fuels for the fourth year running.
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.
India was the seventh largest investor in renewables excluding R&D (USD 6 billion); just under half of 2011 peak of USD 12.5 billion. India came in sixth for investment in wind power.
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
RE POLICY LANDSCAPE India

• India fell short of its target to add 4,325MW RE power capacity in the fiscal year 2013-2014
• Plans to more than double RE capacity from 25GW in 2012 to 55GW by 2017 were announced.

Policies

• several policy changes made on sub-national level in 2013
• Phase 2 of the Jawaharlal Nehru National Solar Mission was launched with a call for bids on 750MW of grid-connected PV contracts (tender was twice delayed as of early 2014).
• India reintroduced Generation Based Incentive (GBI) scheme (expired April 2012)
• Allocation of USD 6.9 billion (INR 430 billion) to grid modernization program (Green Energy Corridor) to enable integration of RE.
• A 2-year rebate program for solar hot water and solar process heat installations was introduced.
• Ethanol blend was raised from E5 to E10.
• India introduced plans to produce 5-6 million EVs by 2020 (part of National Electric Mobility Mission Plan 2020)

City and Local Policies

• 36 cities finalized solar city master plans by end 2013 in response to National Solar Cities Programme (will support total of 60 cities in move towards becoming green cities)
• A minimum of 90 cities in 8 states had amended building by-laws to mandate SWH as of 2013.
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
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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Global Futures Report

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