RENEWABLE ENERGY POLICY NETWORK FOR THE 21st CENTURY

RENEW21 is the global renewable energy policy multi-stakeholder network that connects a wide range of key actors. REN21’s goal is to facilitate knowledge exchange, policy development and joint action towards a rapid global transition to renewable energy.

RENEW21 brings together governments, nongovernmental organisations, research and academic institutions, international organisations and industry to learn from one another and build on successes that advance renewable energy. To assist policy decision making, REN21 provides high quality information, catalyses discussion and debate and supports the development of thematic networks.

PROVIDE HIGH-QUALITY INFORMATION TO DRIVE INFORMED POLICY DECISIONS

Using its multi-stakeholder network, REN21 facilitates the collection of comprehensive and timely information on renewable energy. This information reflects diverse viewpoints from both private and public sector actors, serving to dispel myths about renewable energy and catalysing policy change.

Renewables Global Status Report (GSR)

First released in 2005, REN21's Renewables Global Status Report (GSR) has grown to become a truly collaborative effort, drawing on an international network of over 500 authors, contributors, and reviewers. Today it is the most frequently referenced report on renewable energy market, industry, and policy trends.

Thematic Reports

RENEW21 produces thematic reports which aim to provide in-depth analysis about a topic and stimulate discussion:
- Renewables Global Futures Report (GFR)
- Local Renewable Energy Policies Status Report
- 10 Years of Accelerating the Global Energy Transition
- Mini-Grid Policy Toolkit

Regional Reports

These reports detail the renewable energy developments of a particular region; their production also supports regional data collection processes and informed decision making.

Renewables Interactive Map

The Renewables Interactive Map is a research tool for tracking the development of renewable energy worldwide. It complements the perspectives and findings of the GSR by providing constantly updated market and policy information and detailed exportable country profiles.

INITIATE DISCUSSION AND DEBATE TO DRIVE POLITICAL COMMITMENT

International Renewable Energy Conferences (IRECs)

The International Renewable Energy Conference (IREC) is a high-level political conference series. Dedicated exclusively to the renewable energy sector, the biennial IREC is hosted by a national government and convened by REN21. SAIREC 2015 will be held in South Africa, 4–7 October 2015.

Renewables Academy

The REN21 Renewables Academy provides an opportunity for lively exchange among the growing community of REN21 contributors. It offers a venue to brainstorm on future-orientated policy solutions and allows participants to actively contribute on issues central to the renewable energy transition.

Thematic workshops, panel discussions and webinars

RENEW21 convenes and participates in a series of workshops, panel discussions, and webinars to spread information on renewable energy globally.

STRENGTHEN AND LEVERAGE REN21'S MULTI-STAKEHOLDER BASE

- Broad dissemination of activities of the REN21 Secretariat as well as network members through four editions of the REN21 newsletter.
- In-depth information for members through the REN21 newswire.
- Dynamic interaction with key institutional partners such as IEA, IRENA, SE4ALL, and UNEP.
The evolution of renewable energy over the past decade has surpassed all expectations. Global installed capacity and production from all renewable technologies have increased substantially. Substantial investments and supporting policies have continued to spread throughout the world. The push toward renewable energy is clear as we enter the Decade of Sustainable Energy for All (2014–2024).

First released in 2005, the annual Renewables Global Status Report provides a comprehensive and timely overview of renewable energy markets, industries, investments, and policy developments worldwide. It enables policymakers, industry leaders, investors, and civil society to make informed decisions.

Renewables, coupled with energy efficiency measures, can help reduce emissions by providing low-carbon energy services. Renewable energy provides an unprecedented opportunity to accelerate the transition to modern energy services—displacing traditional biomass, carbon-based fuels, and fossil-fuel grid-based electricity and, thereby, lowering the hurdles to sustainable development.

Renewables also contribute to climate mitigation efforts. The Intergovernmental Panel on Climate Change (IPCC), under the United Nations Framework Convention on Climate Change (UNFCCC), clearly states in its 2014 report that climate change is already having a sweeping effect on all continents and in every ocean. The problem will likely grow substantially worse unless greenhouse gas emissions are brought under control.

The combined modern and traditional renewable energy share is often to maintain or expand energy services, the far-reaching impact of these technologies adds several co-benefits including: reducing the health and environmental impacts associated with the use of fossil and nuclear fuels, improving educational opportunities, creating jobs, reducing poverty, and increasing gender equality.

In much of the world, considerable time and household income are spent securing energy services. Energy poverty presents a significant hurdle to achieving development goals of improved health, prosperity, and a liveable environment. Renewable energy systems provide an unprecedented opportunity to accelerate the transition to modern energy services—displacing traditional biomass, carbon-based fuels, and fossil-fuel grid-based electricity and, thereby, lowering the hurdles to sustainable development.

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Renewables, coupled with energy efficiency measures, can help reduce emissions by providing low-carbon energy services. It is clear that renewables are becoming a mainstream energy resource. This is welcome news as we enter the Decade of Sustainable Energy for All (2014–2024), which seeks to mobilize country action to ensure universal access to modern energy services, improved rates of energy efficiency, and expanded use of renewable energy sources by 2030. Although the following pages clearly document advancements in the uptake of renewables, the REN21 Renewables 2014 Global Status Report also demonstrates that we need to move faster and more deliberately if we are serious about ensuring access to clean and sustainable energy for all people by 2030.
capacity of all renewable technologies over the same period. In 2013, renewables accounted for more than 56% of net additions to global power capacity and represented far higher shares of capacity added in several countries.

Over the past few years, the levelised costs of electricity generation from onshore wind and, particularly, solar PV have fallen sharply. As a result, an increasing number of wind and solar power projects are being built without public financial support. Around the world, major industrial and commercial customers are turning to renewables to reduce their energy costs while increasing the reliability of their energy supply. Many set ambitious renewable energy targets, installed and operated their own renewable power systems, or signed power purchase agreements to buy directly from renewable energy project operators, bypassing utilities.

By the end of 2013, China, the United States, Brazil, Canada, and Germany remained the top countries for total installed renewable power capacity; the top countries for non-hydro capacity were again China, the United States, and Germany, followed by Spain, Italy, and India. Among the world’s top 20 countries for non-hydro capacity, Denmark had a clear lead for total capacity per capita. Uruguay, Mauritius, and Costa Rica were among the top countries for investment in new renewable power and fuels relative to annual GDP.

In the heating and cooling sector, trends included the increasing use of renewables in combined heat and power plants; the feeding of renewable heating and cooling into district systems; hybrid solutions in the building renovation sector; and the growing use of renewable heat for industrial purposes. Heat from modern biomass, solar, and geothermal sources accounts for a small but gradually rising share of final global heat demand, amounting to an estimated 10%. The use of modern renewable technologies for heating and cooling is still limited relative to their vast potential.

The growth of liquid biofuels has been uneven in recent years, but their production and use increased in 2013. There is also growing interest in other renewable options in the transport sector. The year saw a continued rise in the use of gaseous biofuels (mainly biomethane) and further development of hybrid options (e.g., biodiesel-natural gas buses, and electric-diesel transport). There are limited but increasing initiatives to link electric transport systems with renewable energy, particularly at the city and regional levels.

Some highlights of 2013 include:

- In the European Union, renewables represented the majority of new electric generating capacity for the sixth consecutive year. The 72% share in 2013 is in stark contrast to a decade earlier, when conventional fossil generation accounted for 80% of new capacity in the EU-27 plus Norway and Switzerland.
- Even as global investment in solar PV declined nearly 22% relative to 2012, new capacity installations increased by about 32%.
- China’s new renewable power capacity surpassed new fossil fuel and nuclear capacity for the first time.
- Variable renewables achieved high levels of penetration in several countries. For example, throughout 2013, wind power met 33.2% of electricity demand in Denmark and 20.9% in Spain; in Italy, solar PV met 7.8% of total annual electricity demand.
- Wind power was excluded from one of Brazil’s national auctions because it was pricing all other generation sources out of the market.
- Denmark banned the use of fossil fuel-fired boilers in new buildings as of 2013 and aims for renewables to provide almost 40% of total heat supply by 2020.
- Growing numbers of cities, states, and regions seek to transition to 100% renewable energy in either individual sectors or economy-wide. For example, Djibouti, Scotland, and the small-island state of Tuvalu aim to derive 100% of their electricity from renewable sources by 2020. Among those who have already achieved their goals are about 20 million Germans who live in so-called 100% renewable energy regions.

The impacts of these developments on employment numbers in the renewable energy sector have varied by country and technology, but, globally, the number of people working in renewable industries has continued to rise. An estimated 6.5 million people worldwide work directly or indirectly in the sector.

■ ◾️ ◾️ ◾️ AN EVOLVING POLICY LANDSCAPE

By early 2014, at least 144 countries had renewable energy targets and 138 countries had renewable energy support policies in place, up from the 138 and 127 countries, respectively, that were reported in GSR 2013. Developing and emerging economies have led the expansion in recent years and account for 95 of the countries with support policies, up from 15 in 2005. The rate of adoption remained slow relative to much of the past decade, due largely to the fact that so many countries have already enacted policies.

In 2013, there was an increasing focus on revisions to existing policies and targets, including retroactive changes, with some adjustments made to improve policy effectiveness and efficiency, and others aimed to curtail costs associated with supporting the deployment of renewables. At the same time, some countries expanded support and adopted ambitious new targets. Policy mechanisms continued to evolve, with some becoming more differentiated by technology. Feed-in policies in many countries evolved further towards premium payments in the power sector, and continued to be adapted for use in the heating sector. Particularly in Europe, new policies are emerging to advance or manage the integration of high shares of renewable electricity into existing power systems, including support for energy storage, demand-side management, and smart grid technologies.

As in past years, most renewable energy policies enacted or revised during 2013 focus on the power sector. A mix of regulatory policies, fiscal incentives, and public financing mechanisms continued to be adopted. Feed-in policies and renewable portfolio standards (RPS) remained the most commonly used support mechanisms, although their pace of adoption continued to slow. Public competitive bidding, or tendering, gained further prominence, with the number of countries turning to public auctions rising from 9 in 2009 to 55 as of early 2014. Although the heating and cooling sector lags far behind the renewable power sector for attention from policymakers, the adoption of targets and support policies has increased steadily.
### RENEWABLE ENERGY INDICATORS 2013

#### INVESTMENT

<table>
<thead>
<tr>
<th>Component</th>
<th>START 2004</th>
<th>END 2012</th>
<th>END 2013</th>
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</thead>
<tbody>
<tr>
<td>New investment (annual)</td>
<td>39.5</td>
<td>249.5</td>
<td>214.4</td>
</tr>
<tr>
<td>in renewable power and fuels</td>
<td></td>
<td>(249.4)</td>
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#### POWER

<table>
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<th>Component</th>
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<th>END 2012</th>
<th>END 2013</th>
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<tbody>
<tr>
<td>Renewable power capacity (total, not including hydro)</td>
<td>85</td>
<td>480</td>
<td>560</td>
</tr>
<tr>
<td>Hydropower capacity (total)</td>
<td>800</td>
<td>1,440</td>
<td>1,560</td>
</tr>
<tr>
<td>Bio-power capacity (total)</td>
<td>715</td>
<td>960</td>
<td>1,000</td>
</tr>
<tr>
<td>Bio-power generation</td>
<td>&lt;36</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>Geothermal power capacity</td>
<td>227</td>
<td>350</td>
<td>405</td>
</tr>
<tr>
<td>Solar PV capacity (total)</td>
<td>2.6</td>
<td>100</td>
<td>139</td>
</tr>
<tr>
<td>Concentrating solar thermal power (total)</td>
<td>0.4</td>
<td>2.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Wind power capacity (total)</td>
<td>48</td>
<td>283</td>
<td>318</td>
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#### HEAT

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<th>Component</th>
<th>START 2004</th>
<th>END 2012</th>
<th>END 2013</th>
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<tr>
<td>Solar hot water capacity (total)</td>
<td>98</td>
<td>282</td>
<td>326</td>
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#### TRANSPORT

<table>
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<th>END 2012</th>
<th>END 2013</th>
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<tr>
<td>Ethanol production (annual)</td>
<td>28.5</td>
<td>82.6</td>
<td>87.2</td>
</tr>
<tr>
<td>Biodiesel production (annual)</td>
<td>2.4</td>
<td>23.6</td>
<td>26.3</td>
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</table>

#### POLICIES

<table>
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<th>Component</th>
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<th>END 2012</th>
<th>END 2013</th>
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<tr>
<td>Countries with policy targets</td>
<td>#</td>
<td>48</td>
<td>138</td>
</tr>
<tr>
<td>Feed-in</td>
<td>#</td>
<td>34</td>
<td>97</td>
</tr>
<tr>
<td>Number of states / provinces / countries</td>
<td>#</td>
<td>11</td>
<td>79</td>
</tr>
<tr>
<td>RPS / quota policies</td>
<td>#</td>
<td>8</td>
<td>45</td>
</tr>
<tr>
<td>Number of states / provinces / countries</td>
<td>#</td>
<td>10</td>
<td>52</td>
</tr>
<tr>
<td>Heat obligations / mandates</td>
<td>#</td>
<td>n/a</td>
<td>19</td>
</tr>
<tr>
<td>Number of countries</td>
<td>#</td>
<td>10</td>
<td>52</td>
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</tbody>
</table>

#### DISTRIBUTED RENEWABLE ENERGY IN DEVELOPING COUNTRIES

In many parts of the world, the lack of access to modern energy services continues to impede sustainable development. Recent assessments suggest that as many as 1.3 billion people still do not have access to electricity, and more than 2.6 billion people rely on traditional biomass for cooking and heating. However, during 2013, people in remote and rural areas of the world continued to gain access to electricity, modern cooking, and heating as the installation and use of distributed renewable energy technologies increased. This expansion was a direct result of improvements in affordability, inclusion of distributed energy in national energy policies, greater access to financing, increased knowledge about local resources, and more advanced technologies that can be tailored to meet customers’ specific needs.

Furthermore, increased use of mini-grids supported the spread of renewable-energy-powered electrification in un-electrified peri-urban and rural areas. Recent technical advances that enable the integration of renewables in mini-grid systems, combined with information and communication technology (ICT) applications for power management and end-user devices, have allowed for a rapid growth in the use of renewable mini-grids.

There is a growing awareness that stand-alone cooking and electricity systems based on renewables are often the most cost-effective options available for providing energy services to households and businesses in remote areas. As a result, an increasing number of countries is supporting the development of distributed renewable energy-based systems to expand energy access.
With the rising awareness that off-grid, low-income customers can provide fast-growing markets for goods and services, and with the emergence of new business and financing models for serving them, rural energy markets are increasingly being recognised as offering potential business opportunities. Many companies have become active across Africa, Asia, and Latin America, selling household-level renewable energy systems and devices. Commercial, social venture capitalism, local and international development entities, governments, and others are actively engaged in the financing of distributed renewable energy. In 2013, levels of participation and progress varied from country to country depending on support policies, broader legal frameworks, and political stability.

### MARKET AND INDUSTRY TRENDS

#### BIOMASS FOR HEAT, POWER, AND TRANSPORT.

Biomas demand continued to grow steadily in the heat, power, and transport sectors. Total primary energy consumption of biomass reached approximately 57 exajoules (EJ) in 2013, of which almost 60% was traditional biomass, and the remainder was modern bioenergy (solid, gaseous, and liquid fuels). Heating accounted for the majority of biomass use, with modern biomass heat capacity rising about 1% to an estimated 296 gigawatts-thermal (GwT) in 2013. Bio-loo power capacity was up by an estimated 5 GW to 88 GW. Bio-power generation exceeded 400 Terawatt-hours (TWh) during the year, including power generated in combined heat and power (CHP) plants. Demand for modern biomass is driven increasing international trade in solid biofuels, including wood pellets.

Liquid biofuels met about 2.3% of global transport fuel demand. In 2013, global production rose by 7.7 billion litres to reach 116.6 billion litres. Ethanol production was up 6% after two years of decline, biodiesel rose 1%, and hydrotreated vegetable oil (HVO) rose by 36% to 3 million litres. New plants for making advanced biofuels, produced from non-food biomass feedstocks, were commissioned in Europe and North America. However, overall investment in new biofuel plant capacity continued to decline from its 2007 peak.

#### GEOThermal POWER AND HEAT.

About 350 MW of new geothermal generating capacity came on line in 2013. Accounting for replacements, the net increase was about 455 MW, bringing total global capacity to 12 GW. This net capacity growth of 4% compares to a average annual growth rate of 3% for the previous years (2010–12). Direct use of geothermal energy—for thermal baths and swimming pools, space heating, and agricultural and industrial processes— is estimated to exceed 300 petajoules (PJ) annually, but growth is not robust. Governments and industry continued to pursue technological innovation to increase efficient use of conventional geothermal resources. In parallel, the use of low-temperature fields for both power and heat continued to expand, including application of geothermal energy beyond high-temperature locations.

#### HydroPOWER.

Global hydropower generation during the year was an estimated 3,750 TWh. About 40 GW of new hydropower capacity was commissioned in 2013, increasing total global capacity (HWO) rose by 36% to approximately 1,000 GW. By far the most capacity was installed in China (29 GW), with significant capacity also added in Turkey, Brazil, Vietnam, India, and Russia. Growth in the industry has been relatively steady in recent years, fuelled primarily by China’s expansion. Modernisation of ageing hydropower facilities is a growing global market. Some countries are seeing a trend towards smaller reservoirs and other innovative designs. hydropower is also increasing recognition of the potential for hydropower to complement other renewable technologies, such as variable wind and solar power.
solar thermal collectors. International attention to quality standards and certification continued, largely in response to high failure rates associated with cheap tubes from China. Europe saw accelerated consolidation during the year, with several large suppliers announcing their exit from the industry. Industry expectations for market development are the brightest in India and Greece.

WIND POWER. More than 35 GW of wind power capacity was added in 2013, for a total above 318 GW. However, following several record years, the market was down nearly 10 GW compared to 2012, reflecting primarily a steep drop in the U.S. market. While the European Union remains the biggest market for wind power capacity, Asia was surprising at its heels and is set to take the lead in 2014. New markets continued to emerge in all regions, and, for the first time, Latin America represented a significant share of new installations. Offshore wind had a record year, with 1.6 GW added, almost all of it in the EU. However, the record level hides delays due to policy uncertainty and project cancellations or downsizing.

The wind industry continued to be challenged by downward pressure on prices, increased competition among turbine manufacturers, competition with low-cost gas in some markets, reductions in policy support driven by economic austerity, and declines in key markets. At the same time, failing to deliver good returns, technological advances increased capacity factors, improving the cost-competitiveness of wind-generated electri-city relative to fossil fuels. The offshore industry continued to move farther from shore and into deeper waters, driving new foundation designs and requiring more-sophisticated vessels.

MAINSTREAMING RENEWABLES: KEY FINDINGS FOR POLICYMAKERS

As the 2014 GSR clearly demonstrates, the question is no longer whether renewables have a role to play in the provision of energy services, but rather how we can best increase the current pace of deployment to achieve a 100% renewables future with full energy access for all. For this to become reality, current thinking needs to change: continuing with the status quo of a patchwork of sometimes contradictory policies and actions is no longer sufficient. Instead, technology and market developments, finance models, as well as stable and predictable renewable energy policies need to be systematically linked across the public and private sectors in order to support and drive the transition process.

Facilitating more-rigorous adaptation of the energy system to increase shares of renewable energy

Today, the penetration of renewables is no longer a question of technology or economics but one of developing more flexible markets and smarter energy systems. Thus, the policy focus should be on transforming power grids to become more flexible, increasing demand-side integration, and integrating power systems with transport, buildings, industry, and heating and cooling sectors, with the support of regulations, business, and finance models. Support policies such as feed-in-tariffs or premiums have been primary drivers of renewable energy market growth so far and have proven to be excellent market-introduction policies. With increasing renewable energy shares, however, support policies need to evolve. New policies are needed to restructure the electric power and heating markets, and to develop regulations to provide a fair and efficient basic for blending centralised and distributed generation with demand-flexibility measures. Thus, thinking about future energy systems needs to focus on how existing infrastructure must be adapted and enhanced with ongoing integration of large shares of renewable energy—not whether or not this should be done.

Creating a level playing field for the entire energy sector

Global subsidies for fossil fuels and nuclear power remain high despite reform efforts. The exact level of subsidies is unknown; estimates range from USD 544 billion (World Bank) to USD 1.9 trillion per year (International Monetary Fund), depending on how “subsidy” is defined and calculated. Whatever number is chosen, the fact is that subsidies for fossil fuels and nuclear power are significantly higher than financial support for renewables. Frequently, governments do not know how much they spend to subsidise fossil fuels, as many forms of support are often not quantified. Where information does exist, it is often scattered across various ministries, making it difficult to assess. These problems are exacerbated by poor budgetary transparency and limited resources for data gathering. Creating a level playing field can lead to a more-efficient allocation of financial resources, helping to strengthen initiatives for the development and implementation of energy efficiency and renewable energy technologies. Removing fossil-fuel and nuclear subsidies globally would better reflect the true cost of energy generation.

Securing stable policy frameworks for renewables

 Globally, policies have largely driven the expansion of renewable energy. Since 2004, the number of countries promoting renewables through direct policy support has nearly tripled, and an even-increasing number of developing and emerging countries is setting renewable energy targets and enacting supporting policies. However, recent years have also seen policy regression, with some countries reducing renewable energy support, at times retroactively, slowing market and industry development. Stability and predictability of policy frameworks are needed to underpin sustained deployment of renewable energy. Policymakers need to ensure that these frameworks are not short-lived but designed to establish continuity. The uptake of renewables is necessary not only to mitigate climate change but also to drive universal energy access.

Harnessing local action to ensure global renewable energy uptake

Over the past decade, local governments have become leaders in the advancement of renewable energy—particularly in combination with energy efficiency improvements—regularly exceeding efforts taken by state, provincial, and national governments. Motivated to create local jobs, reduce energy costs, address pollution issues, and advance their sustainability goals, hundreds of local governments worldwide have set renewable energy targets and enacted fiscal incentives or other policies to foster the deployment of renewables. Around the world, governments at the community, city, regional, island, and even country levels have begun to forge their own transition pathways towards a 100% renewable energy future. A better linking of local renewable energy developments with those at the national level will be key for driving the energy transition.

Ensuring long-term and differentiated policies to sustain and increase investment levels

Investment levels and regional allocation have shifted considerably over the past couple of years, with certain regions emerging as investment leaders. Developing and developed countries alike have increased their renewable energy investments during 2013, due largely to unstable policy frameworks, but also due to decreasing per-unit costs of renewable energy technologies. As solar, wind, biomass, and other energy sources gain market share, the levelised cost of energy (LCOE) is becoming an important metric in the decision-making process for building new power generation. Strong policy signals from governments are essential to ensure that renewables are a central component of national energy supply chains. Achieving universal access will take bold, diverse policy action aimed at doubling or tripling current financial flows.

Paying greater attention to the heating and cooling and the transport sectors

To achieve the transition towards renewable energy, more attention needs to be paid to the heating and cooling sectors, as well as to integrated approaches that facilitate the use of renewables in these sectors. Globally, heating and cooling accounts for almost half of total global energy demand. However, this sector continues to lag behind the renewable power sector when it comes to policies that support technology development and deployment. Experience has shown that well-designed support policies have been highly effective in increasing the market expansion of renewable heating and cooling technologies. Many large buildings in the building sector can help increase the penetration of renewable heating and cooling technologies. Improving the accuracy of national data collection on heating and cooling supply and demand is also important. The distributed nature of heat supply and local demand make it difficult to know what sources are available and what is needed; this information is crucial for good policy development.

Improving energy data to monitor advancements in achieving a renewable energy transition

Reliable, timely, and regularly updated data on renewable energy are essential for establishing energy plans, defining targets, designing and continuously evaluating policy measures, and attracting investment.

The data situation for renewable energy has improved signifi- cantly in recent years, but gaps, fragmentation, and lack transparency are still widespread, and data are often not quantified. Where information does exist, it is often not accessible and is often scattered across various ministries, making it difficult to assess. These problems are exacerbated by poor budgetary transparency and limited resources for data gathering. Creating a renewable energy transition requires better data, and data can improve and data quality improved. There is a critical need to broaden the definition of renewable energy data, to collect data in a regular and more systematic manner, and to increase transparency.

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. With increasingly ambitious targets and innovative policies, renewables can continue to surpass expecta- tions in recent years. Better create a clean and sustainable energy future.
**SELECTED FIGURES & TABLES GSR 2014**

**Estimated Renewable Energy Share of Global Final Energy Consumption, 2012**

- Fossil fuels: 78.4%
- Nuclear power: 2.6%
- All Renewables: 19%
- Traditional Biomass: 9%
- Modern Renewables (Wind/solar/biomass/geothermal power): 10%
- Biofuels: 3.8%
- Hydropower: 4.2%
- Biomass/geothermal/solar heat: 1.2%
- Waste-to-energy/biomas/geothermal power: 0.8%

**Estimated Renewable Energy Share of Global Electricity Production, End-2013**

- Fossil fuels and nuclear: 77.9%
- Renewable electricity: 22.1%

**Renewable Power Capacities EU-28, BRICS, and Top Six Countries, 2013**

**Biomass**

Wood Pellet Global Production, by Country or Region, 2004-2013

- World Total: 23.6 Million Tonnes

Ethanol, Biodiesel, and HVO Global Production, 2000-2013

- World Total: 116.5 Billion Litres

**Geothermal Power**

Geothermal Power Capacity and Additions, Top 10 Countries and Rest of the World, 2013

Additions are net of repowering and retirements.
Hydropower Global Capacity, Shares of Top Six Countries, 2013

- China: 26%
- Brazil: 8.6%
- United States: 7.8%
- Canada: 7.6%
- Russia: 4.7%
- Rest of the World: 41%
- India: 4.4%

Global capacity reaches 1,000 GW

Solar PV

Solar PV Total Global Capacity, 2004–2013

Solar PV Capacity and Additions, Top 10 Countries, 2013

Solar PV Global Capacity Additions and Annual Investment, 2004–2013

2013: SOLAR PV INVESTMENT -22%
SOLAR PV ADDITIONS +32%
### Solar Water Heating

**Collectors Global Capacity, Shares of Top 10 Countries, 2012**

- **China:** 64%
- **United States:** 5.8%
- **Germany:** 4.2%
- **Turkey:** 3.9%
- **Brazil:** 2.1%
- **Australia:** 1.8%
- **India:** 1.6%
- **Austria:** 1.2%
- **Japan:** 1.1%
- **Israel:** 1.0%

**Next 9 countries:** 23%

**Rest of the World:** 13%

**Data:** for solar water collectors only, including air collectors. Based on total of ~281.6 GW, glazed and unglazed water collectors.

### Wind Power

**Total World Capacity, 2000–2013**

- **World Total:** 318 Gigawatts
- **2000:** 17
- **2001:** 24
- **2002:** 31
- **2003:** 39
- **2004:** 48
- **2005:** 59
- **2006:** 74
- **2007:** 94
- **2008:** 121
- **2009:** 159
- **2010:** 198
- **2011:** 238
- **2012:** 283
- **2013:** 318

**Countries:**

- **China:** 71
- **United States:** 24
- **Germany:** 10
- **Spain:** 9
- **India:** 8
- **United Kingdom:** 7
- **Italy:** 7
- **France:** 7
- **Canada:** 5
- **Denmark:** 5

**Installation:**

- **71 countries have more than 10 MW installed.**
- **24 countries have more than 1 GW installed.**

**Market Shares of Top 10 Wind Turbine Manufacturers, 2013**

- **Vestas (Denmark):** 13.1%
- **Goldwind (China):** 11.0%
- **Enersys (Germany):** 9.8%
- **Siemens (Germany):** 7.4%
- **Others:** 30.5%

- **Next 5 manufacturers:**
  - Gamesa (Spain): 5.5%
  - Suzlon Group (India): 5.3%
  - United Power (China): 4.0%
  - Mignyang (China): 3.5%
  - Norske (Germany): 3.3%

**Based on total sales of ~37.5 GW**

**Share of Denmark’s Electricity Covered by Wind in 2013:** 33.2%
Global New Investment in Renewable Power and Fuels, Developed and Developing Countries, 2004–2013

Data include government and corporate R&D.

Global New Investment in Renewable Energy by Technology, Developed and Developing Countries, 2013

Change relative to 2012
- 20%  - 1%  - 28%  - 16%  - 26%  - 41%

Data include government and corporate R&D.
JOBS IN RENEWABLE ENERGY

Jobs in Renewable Energy

- Bioenergy (Biomass, Biowaste, Biodiesel)
- Geothermal
- Hydropower (Small-scale)
- Solar Energy (Solar PV, CSP, Solar Heating/Cooling)
- Wind Power

World Total: 6.5 Million Jobs

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

Data source: IRENA

Table 22: Estimated Direct and Indirect Jobs in Renewable Energy Worldwide, by Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>World</th>
<th>China</th>
<th>Brazil</th>
<th>United States</th>
<th>India</th>
<th>Bangladesh</th>
<th>Germany</th>
<th>Spain</th>
<th>Rest of EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass*</td>
<td>782</td>
<td>240</td>
<td></td>
<td>152</td>
<td>58</td>
<td>52</td>
<td>44</td>
<td></td>
<td>210</td>
</tr>
<tr>
<td>Biowaste</td>
<td>1,453</td>
<td>24</td>
<td>820</td>
<td>236</td>
<td>35</td>
<td>26</td>
<td>3</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Biogas</td>
<td>264</td>
<td>90</td>
<td></td>
<td>85</td>
<td>9.2</td>
<td>49</td>
<td>0.5</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Geothermal*</td>
<td>184</td>
<td></td>
<td></td>
<td>35</td>
<td></td>
<td>17</td>
<td>1.4</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Hydropower (Small)</td>
<td>156</td>
<td>12</td>
<td>8</td>
<td>12</td>
<td>4.7</td>
<td>13</td>
<td>1.5</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Solar PV</td>
<td>2,273</td>
<td>1,580</td>
<td></td>
<td>143</td>
<td>112</td>
<td>100</td>
<td>56</td>
<td>11</td>
<td>153</td>
</tr>
<tr>
<td>CSP</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>28</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar Heating / Cooling</td>
<td>503</td>
<td>350</td>
<td>30</td>
<td>41</td>
<td>11</td>
<td>1</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Power</td>
<td>834</td>
<td>356</td>
<td>32</td>
<td>51</td>
<td>48</td>
<td>0.1</td>
<td>138</td>
<td>24</td>
<td>166</td>
</tr>
<tr>
<td>Total</td>
<td>6,492</td>
<td>2,640</td>
<td>894</td>
<td>625</td>
<td>391</td>
<td>114</td>
<td>371</td>
<td>114</td>
<td>760</td>
</tr>
</tbody>
</table>

* - Data are for 2013, except for Germany. The “World” total and the “Rest of EU” total are calculated using the EU country data for 2012 (even if 2013 data for a specific country are available, e.g., Germany).

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

DISTRIBUTED RENEWABLE ENERGY IN DEVELOPING COUNTRIES

Share of Population with Electricity Access, and Rate of Electrification v. Population Growth

- Africa: 43%
- Developing Asia: 83%
- Latin America: 95%
- Middle East: 91%

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KEY FINDINGS

2014

RENEWABLES 2014
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