REN21 – the only global renewable energy multi-stakeholder community

**INTERGOVERNMENTAL ORGANISATIONS**
ADB, APERC, ECREEE, EC, GEF, IEA, IRENA, IsDB, RCREEE, UNDP, UN Environment, UNIDO, World Bank

**GOVERNMENTS**
Afghanistan, Brazil, Denmark, Dominican Republic, Germany, India, Mexico, Norway, Republic of Korea, South Africa, Spain, UAE, USA

**NGOs**
Club-ER, CLASP, CCA, CAN-I, CEEW, Energy Cities, FER, Global 100% RE, GFSE, GWNET, Greenpeace Intl, ICLEI, ISEP, IEC, JVE, MFC, SLoCaT, Power for All, REEEP, REI, SCI, WCRE, WFC, WRI, WWF

**INDUSTRY ASSOCIATIONS**
AMDA, ARE, ACORE, APREN, ALER, CREIA, CEC, EREF, GOGLA, GSC, GWEC, IREF, IGA, IHA, RES4Africa, WBA, WWEA

**SCIENCE & ACADEMIA**
AEE INTEC, Fundacion Bariloche, Higher School of Economics (Russia), IIASA, ISES, NREL, SANEDI, TERI
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Who we are...

What we do...

Global Status Report: yearly publication since 2005
Renewables in Cities Status Report:
Regional Reports
Global Futures Reports
Thematic Reports

23-25 October, 2019
Renewables Global Status Report

Collaborative annual reporting since 2005 building on international expert community.

The report features:

01. Global Overview
02. Policy Landscape
03. Market & Industry Trends
04. Distributed Renewables for Energy Access
05. Investment Flows
06. Energy Systems Integration and Enabling Technologies
07. Energy Efficiency
08. Feature: Renewable Energy in Cities

Over 1,500 experts have contributed to the GSR since its start in 2005.
70% of these experts have participated in more than one GSR.
Over 350 experts contributed to GSR 2019, working alongside an international authoring team and the REN21 Secretariat.
45% of these were new experts.
Around 55% of these new additions were solar PV

Added in 2018:
- 100 GW of solar PV
- 51 GW of wind power
- 20 GW of hydropower
- 10 GW of bio-power, CSP and geothermal power

2018 was the 4th consecutive year that more than 50 GW of wind power was added

181 gigawatts of renewable power added in 2018
Global investment in renewable power and fuels totalled **USD 288.9 billion**, a decrease of **11.5%**
- Fall driven mainly by China

- **Fifth consecutive year** in which investment topped USD 280 billion

- Investment in developing and emerging countries exceeded that in developed countries for the **fourth consecutive year**

Source: BNEF.
China accounted for majority of investment despite the decline in its market.

Investment varied by region:
- Rising in Europe, the Middle East and Africa, Asia and the United States.
- Falling in the Americas, China and India.

Investment fell sharply in China, rose elsewhere.

Note: Data are in current USD and include government and corporate research and development (R&D).

Source: BNEF.
Beyond Power: Over 80% of demand for heating, cooling, and transport

→ **Over half** of final energy demand is from the heating and cooling sector
  - Less than 10% of this demand is supplied by renewable energy

→ **32%** of final energy demand is for transport end-uses
  - Just over 3% is renewable and primarily met by biofuels
  - Renewable electricity still plays small role

→ Around **26%** of electricity was renewable in 2016

Source: OECD/IEA
Modern renewables account for just 10% of heating and cooling demand
• Demand growth is minimal (1.8%/year)

Lack of policy support in the sector
• Number of countries with regulatory policies fell from 21 to 20
• Only 47 countries had targets for RHC

Bio-heat provides majority but integration with power sector is key

Renewables in heating and cooling increasing very slowly

| Source: OECD/IEA |
|------------------|-------------------|
| 51%              | Heating and Cooling |
| 9.8%             | Renewable energy  |
| 5.3%             | Non-renewable electricity  |
| 8.0%             | Modern bioenergy, solar thermal and geothermal heat  |
| 1.8%             | Renewable electricity  |
Heating and Cooling – Distributed solutions and local markets
Global energy demand in transport increased **45%** since 2000.

Transport accounts for **23%** of global CO₂ emissions.

The renewable share of transport grew slightly to **3.3%**.

Biofuels make up majority of renewable contribution, but sector increasingly open to electrification.

Biofuels and EVs growing but renewable share in transport remains low.
Beyond Power: Over 80% of demand for heating, cooling, and transport

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Advances in power made possible by policy support, other sectors lacking

- Renewable power **auctions** were held in at least **48** countries
- **FITs** in place in **111** countries
- No new countries adopted biofuels mandates
- The number of countries with H&C regulatory policies **fell by 1**
Global subsidies for fossil fuel consumption reached an estimated **USD 300 billion** in 2017
- an 11% increase from the year before
- about double the estimated support for renewable power generation

Fossil fuel subsidies remained in place in at least **115 countries** in 2017

73 countries provide subsidies of **more than USD 100 million** each
Create a level playing field by removing fossil fuel subsidies and adopting carbon pricing

Encourage sector integration among power, heating and cooling, and transport

Align policies across the national, sub-national and local levels

Link to energy efficiency in renewable energy policy initiatives

From an electricity transition to an energy transition

We consume the most energy for heating, cooling and transport:
- Heating and Cooling: 51%
- Transport: 32%
- Power: 17%

10% renewable energy trend
3% renewable energy trend
26% renewable energy trend

RENWABLE ENERGY...
...is STAGNATING in the heating, cooling and transport sectors
...and NOT PROGRESSING FAST ENOUGH in the power sector

20 countries with RE heating and cooling policies
70 countries with RE transport policies
135 countries with RE power policies

Fossil fuel subsidies impede the deployment of renewables
300 billion USD in 2017

Policy imbalance slows uptake of renewables
In 2018, nearly twice as much renewable power capacity added as all other sources, the highest share ever.

Fourth consecutive year that net additions of renewable power were more than 50%.

2011 was the last year that clearly more non-renewable capacity was added than renewable.
Power sector leading: Renewables supply more than 26% of global electricity

→ Renewables supplied an estimated **26.2%** of global electricity at the end of 2018

→ For the first time, more electricity was from solar PV than bio-power

→ Strong growth in renewable generation, but rising electricity demand (up 4% in 2018) makes it challenging to achieve larger share

**Estimated Renewable Energy Share of Global Electricity Production, End-2018**

- **73.8%** Non-renewable electricity
- **26.2%** Renewable electricity
- **15.8%** Hydropower
- **5.5%** Wind power
- **2.4%** Solar PV
- **2.2%** Bio-power
- **0.4%** Geothermal, CSP and ocean power

Note: Data should not be compared with previous version of this figure due to revisions in data and methodology.
Targets uneven across sectors

- Targets in the **power sector** remain more ambitious, more numerous than in heating and cooling and transport

- Fewer than **10** countries and states/provinces had economy-wide targets for at least **50%** renewable energy

- Still **only 1** country with a target for 100% renewables in total final energy

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**National Sector-Specific Targets for Share of Renewable Energy by a Specific Year, by Sector, End-2018**

- **Heating and Cooling**
  - 47 countries have national targets for renewable energy in heating and cooling.

- **Transport**
  - 45 countries have national targets for renewable energy in transport.

- **Power**
  - 162 countries have national targets for renewable energy in power.
At least **54** carbon pricing initiatives implemented by end-2018
- 27 emission trading systems
- 27 carbon taxes
- Covering 44 countries

Covering only **13%** of global greenhouse gas emissions
Variable renewable shares have grown dramatically in some countries

- The power sector is transforming rapidly in some countries
- Variable renewables have seen penetration rates **above 20%** in at least nine countries in 2018
- Average annual growth rates of **more than 10%** in at least five countries
Bioenergy remains largest contributor to global renewable energy supply

- Modern bioenergy contributed 5% to total final energy consumption
- Growing at a rate of 9% per year in electricity sector, 7% in transport, 1.8% in heat
- Contribution by sector
  - 13.3 EJ in global supply of heat
  - 3.5 EJ in transport
  - 1.6 EJ in electricity

### Estimated Shares of Bioenergy in Total Final Energy Consumption, Overall and by End-Use Sector, 2017

<table>
<thead>
<tr>
<th>Sector</th>
<th>Traditional biomass</th>
<th>Modern bioenergy</th>
<th>Non-biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>20.7</td>
<td>6.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Electricity</td>
<td>4.0</td>
<td>2.2</td>
<td>2.1</td>
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<tr>
<td>Heat, buildings</td>
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</tr>
<tr>
<td>Heat, industry</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: OECD/IEA.
0.5 GW of new geothermal power capacity came online in 2018

Global total reached 13.3 GW

Turkey and Indonesia added two-thirds of new capacity

Geothermal Power Capacity Global Additions, Share by Country, 2018

- **42%** Turkey
- **27%** Indonesia
- **11%** United States
- **9%** Iceland
- **12%**

Next 4 countries:
- New Zealand: 5%
- Croatia: 3%
- Philippines: 2%
- Kenya: 2%

Note: Total may not add up due to rounding.
Hydropower characterised by market stability

- **20 GW** were added to reach a total of **1,132 GW** by end-2018
- China continues to lead the market, followed by Brazil, Canada, and the US
- Generation estimated at **4,210 TWh** in 2018

### Hydropower Global Capacity, Shares of Top 10 Countries and Rest of World, 2018

- **28%** China
- **9%** Brazil
- **7%** Canada
- **7%** United States
- **31%** Rest of World
- **17%**

Next 6 countries:
- Russian Federation: 4%
- India: 4%
- Norway: 3%
- Turkey: 3%
- Japan: 2%
- France: 2%

Note: Total may not add up due to rounding.
Solar PV capacity additions pass 100 GW mark

- Solar PV capacity additions were **more than 100 GW** for the first time
- Cumulative capacity reached **505 GW**, an increase of **25%** from 2017
- **11** countries added more than 1 GW in 2018
In 2018, installed capacity of Floating PV crossed the 1 GW mark.

Floating PV systems exist in at least 29 countries in nearly every world region.

Top markets include China, Japan, Republic of Korea, Chinese Taipei, and UK.

Floating solar PV cumulative capacity passes 1 GW mark.
An estimated **550 MW** of CSP came online in 2018,
- 11% increase in cumulative global capacity
- Total reached just under 5.5 GW

4 GW of total installed capacity is located in Spain and the United States

For the **third consecutive year**, new capacity came online only in **emerging markets**
Cumulative global operating capacity for solar water heating collectors increased 2% to reach 480 GW\textsubscript{th}.

The majority of this capacity is glazed collectors.

The 2018 increase of 8 GW\textsubscript{th} is the smallest in the last ten years.

Growth rate slows for solar water heating capacity additions.
Wind power capacity continues to increase steadily year-on-year

- The additions in 2018 pushed cumulative capacity up 9% to 591 GW
- Of the 51 GW added, nearly 47 GW was onshore and 4.5 GW was offshore
- This was the fifth consecutive year with annual additions exceeding 50 GW, but also the third year of decline following the peak in 2015

Wind Power Global Capacity and Annual Additions, 2008-2018

Source: GWEC.
Success of offshore wind in Europe has sparked interest elsewhere

By the end of 2018, 17 countries had offshore wind capacity.

The United Kingdom leads with 8 GW of installed capacity.

In 2018, seven countries in Europe and two in Asia connected 4.5 GW, increasing global cumulative capacity 24%.

Europe accounts for about 79% of global capacity.