STATUS OF SUSTAINABLE SOLUTIONS FOR ISLANDS

Arthouros Zervos
REN21 Chair
zervos@fluid.mech.ntua.gr

26 September 2019

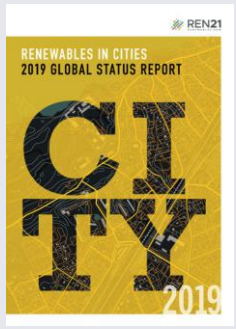
7th MEDENER International Conference on the Energy Transition in the Euro–Mediterranean Region

REN21 – A policy network to build a sustainable energy future with renewables

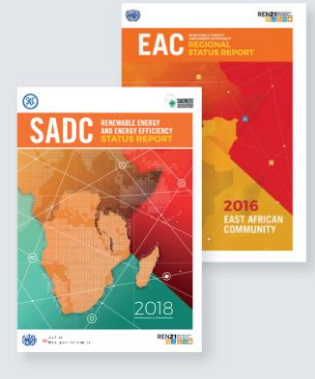
Who we are…

What we do…

Global Status Report: yearly publication since 2005

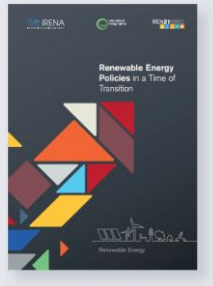


Renewables in Cities Status Report:



Regional Reports

Global Futures Reports



Thematic Reports

REN21 ACADEMY

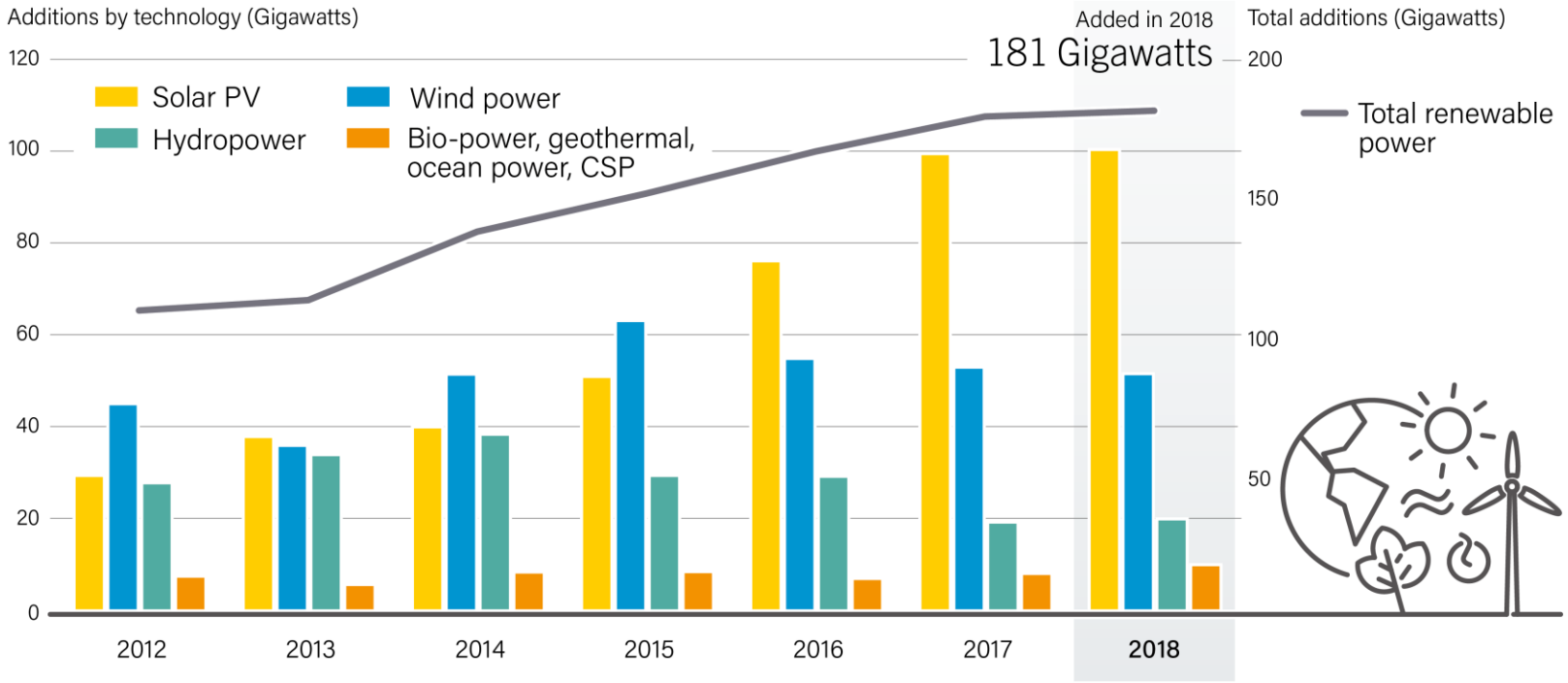
KIREC SEOUL 2019

23-25 October, 2019

181 gigawatts of renewable power added in 2018

- 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

Annual Additions of Renewable Power Capacity, by Technology and Total, 2012-2018

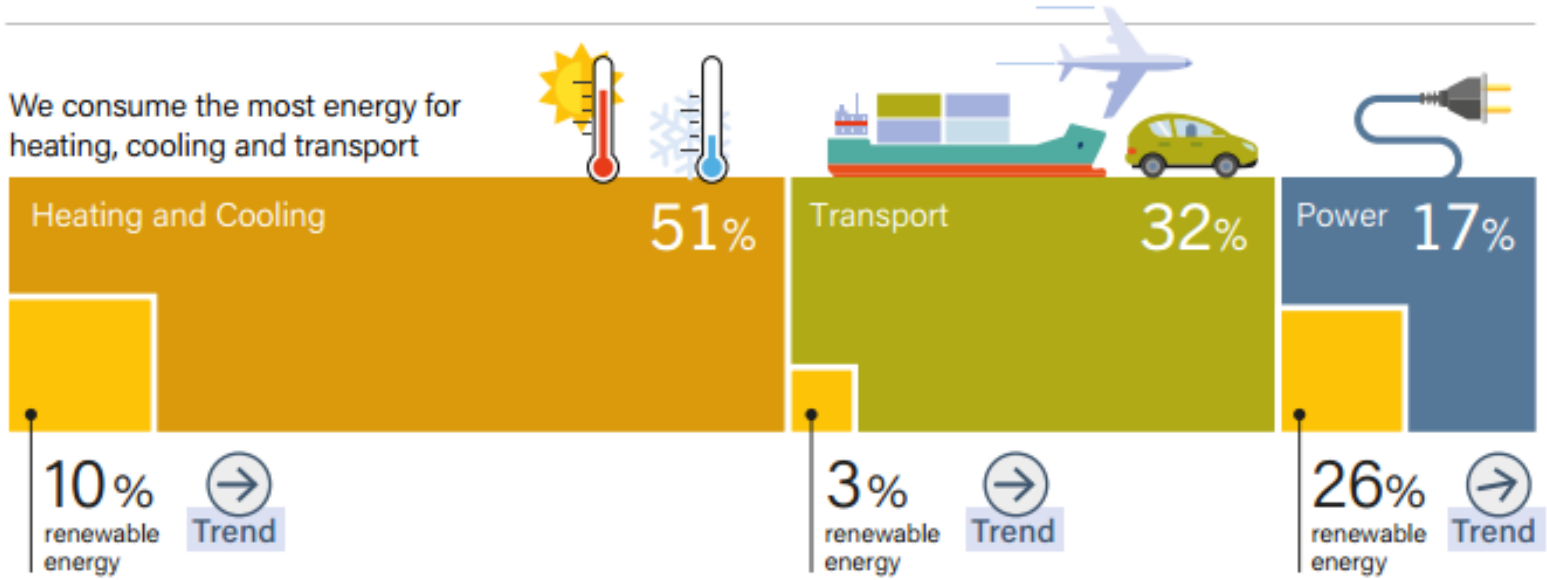


Note: Solar PV capacity data are provided in direct current (DC).

REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

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



REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

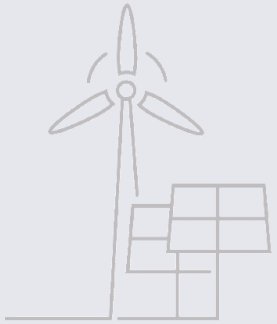
Source: OECD/IEA.

Sustainable energy trends in islands & remote areas (1/2)

➜ **Harnessing the different renewable energy sources in islands and remote areas:**

Wind & Solar PV:

+ The lowest-cost generation options in many islands
! Require energy storage earlier than in large interconnected power systems

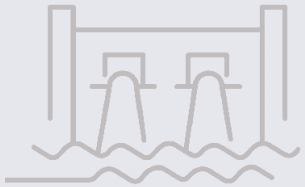


Biofuels:

+ Sugarcane biogas is by far the largest bioenergy contributor to electricity in (large tropical) islands
! Difficult supply chain and risk on fuel quality

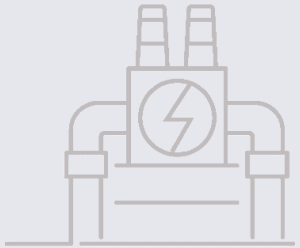
Hydropower:

+ Hydro with reservoir is the easiest and most common option
! Environmental impact studies & land occupation



Geothermal:

+ Can cover significant larger baseload demand, and is a good option for islands with resource
! Generally insufficient demand to cover exploration cost and investment



➜ **Hybridization helps capturing the full potential of local renewables**

Sustainable energy trends in islands & remote areas (2/2)

Some enabling technologies and supporting trends:

- **"islanded" Micro-grids enable cost reduction, enhanced stability, and resiliency**
  - Storage: in Spain, El Hierro island (Canary) has 5 wind turbines, 2 water deposits, 4 hydraulic turbines, and 1 pumping station. The storage station is supplied with water pumps running on wind power.
  - In Greece, Tilos island project has an 800kW wind turbine, 160kW PV panels, 2.8Mwh battery packs, 20 kW inverters.

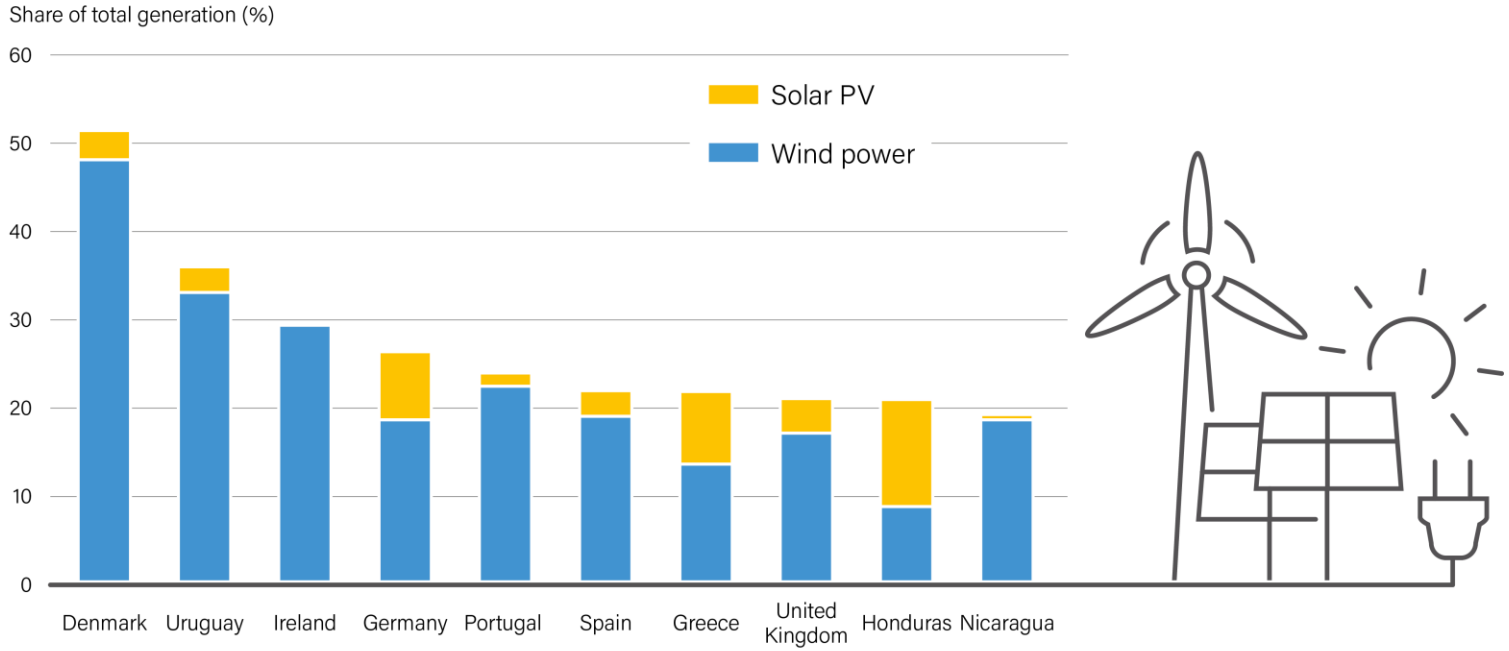
- **Variable Renewables provide an opportunity for sector coupling:**
  - Power-to-X and transport: in Scotland, Orkney islands have self-sufficient community-owned wind turbines electrifying a village. Surplus of generated power is used by islanders to charge electric vehicles at no cost. The Island's wind, wave and tide generators are expected to produce hydrogen for fueling ferries (Power-to-X).

- **Rising public awareness and the need to build social acceptance:**
  - Community energy: in Spain, citizens of La Palma island (Canary) pushed for solar PV energy production (mostly for self-consumption) and eventually geothermal (to generate baseload power and stabilise the energy system). They also included actions towards energy efficiency and consumption reduction.

Variable renewable energy is reaching high shares

- Power systems around the world are adapting to higher shares of variable renewables (wind power and solar PV)
- Shares are growing more than **10%** annually in several locations
- At least **9 countries** generated more than **20%** of their electricity from variable wind power and solar PV

Share of Electricity Generation from Variable Renewable Energy, Top 10 Countries, 2018



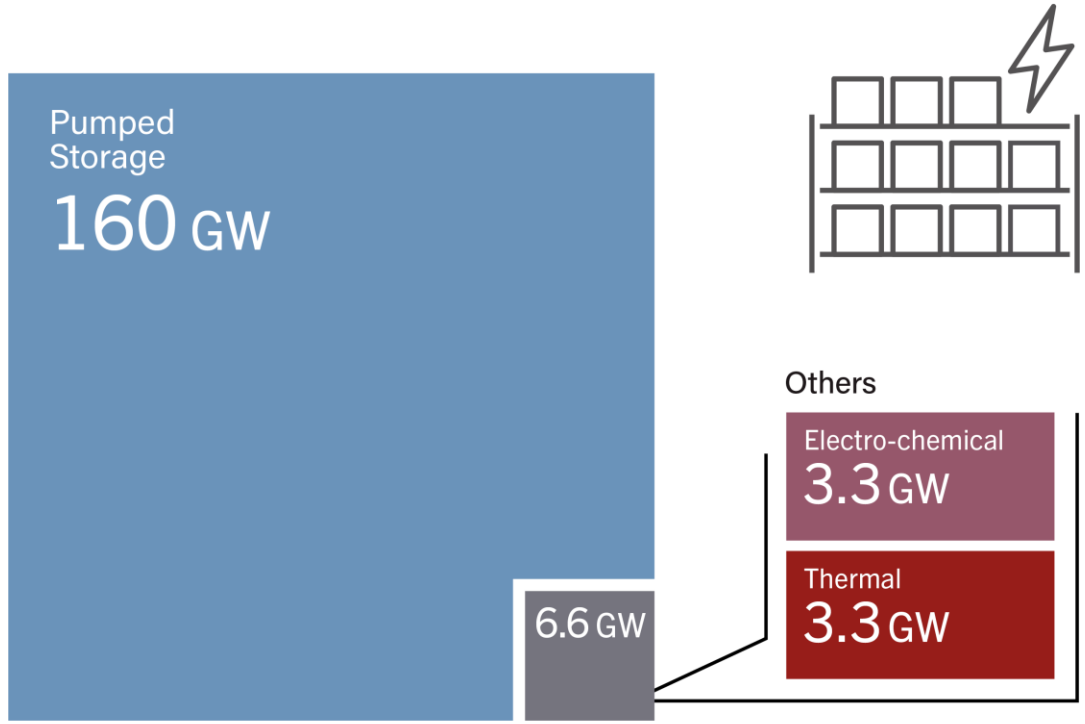
Note: This figure includes the top 10 countries according to the best available data known to REN21 at the time of publication.

REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

Pumped storage dominant for utility-scale energy storage

- Global stationary and grid-connected energy storage capacity: **167 GW**
  - Estimated value and excluding electro-mechanical storage beyond pumped storage.
- **1.9 GW** of pumped storage added
  - Less than 3 GW commissioned in 2017
- Grid-connected battery storage capacity totalled over **3 GW**
  - More than 80% of systems located in Australia, China, Republic of Korea, United Kingdom and United States

Utility-Scale Energy Storage Capacity, Selected Technologies, 2018



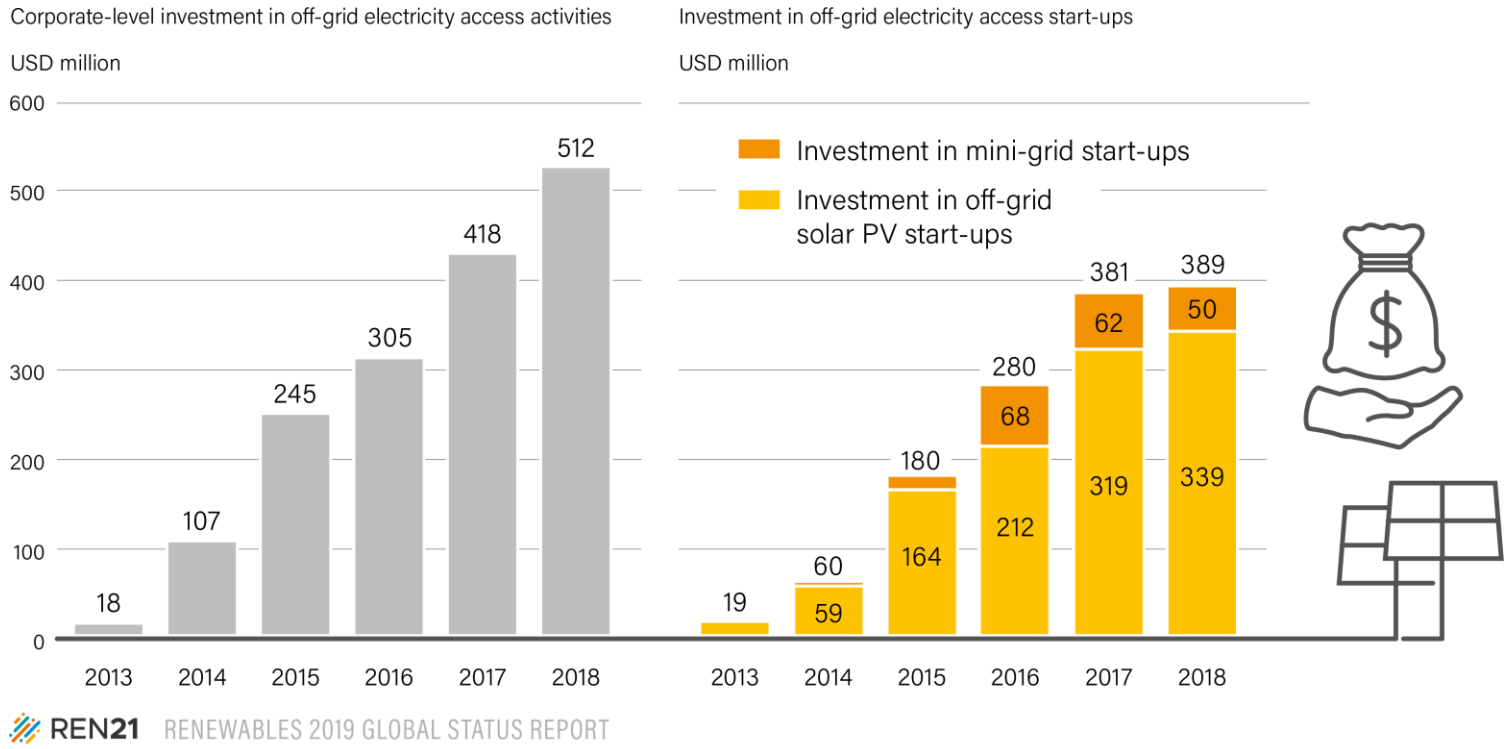
Note: Numbers should not be compared with prior versions of this figure to obtain year-by-year increases, as some adjustments are due to improved or revised data. The category of electro-mechanical storage has been excluded due to limited global data availability.

REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

Investment in off-grid electricity access continues to grow

- In 2018, **USD 512 million** of corporate-level investment into **off-grid electricity access** companies, +22% than 2017
- Off-grid solar systems in 2018:
  - Most of the investments flowed to PAYG solar home system companies: **USD 339 million**
  - East Africa remained the main recipient of capital inflows
- Mini-grids are gaining momentum
  - From 2010 to 2018: **USD 289 million**

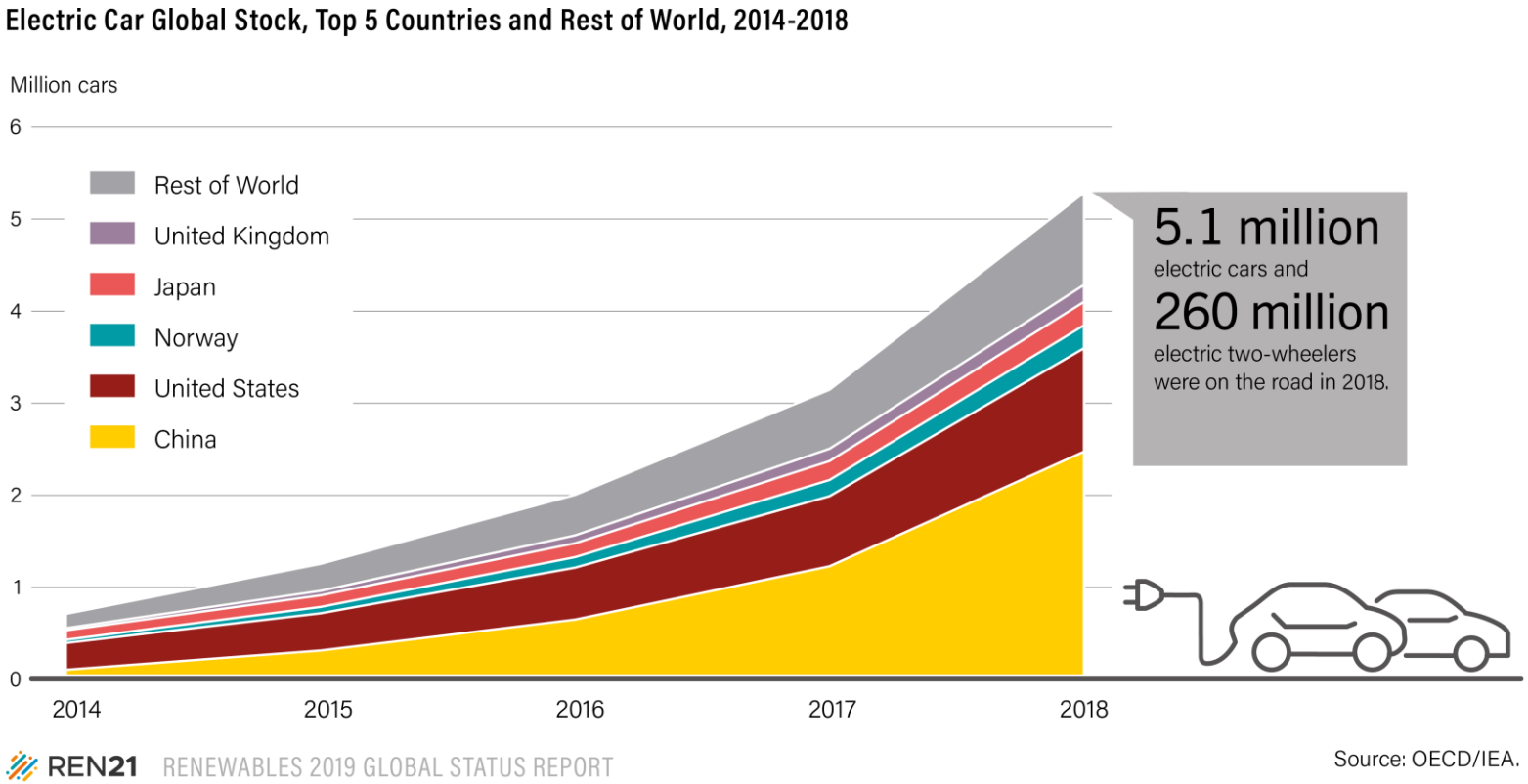
Global Investment in Off-grid Electricity Access Activities, 2013-2018



REN21 RENEWABLES 2019 GLOBAL STATUS REPORT

Electric passenger vehicle stock grew over 60%

- More than **2 million** electric cars (including battery EV and plug-in hybrid EV) were sold in 2018
- China had **nearly 50%** of global stock, followed by US at 22%
- EV markets **highly concentrated**: 40% of all EVs were in use in just 20 cities
- 260 million electric two-wheelers and 40 million electric three-wheelers



Conclusions – what is needed to advance the energy transition?

- Solar PV and Wind are the **cheapest** in islands, and a perfectly suited for **hybridization with other** renewables
- Encourage **sector integration** among the power, heating and cooling, and transport sectors
- **Align** regional, national and sub-national policies, and **support islands and remote areas** in their actions
- Enact integrated policies that enforce **energy efficiency** measures while promoting the uptake of renewable energy
- **Build social acceptance** and increase public buy-in through consultations and energy communities
- Support local job creation and a **just transition**

Want to know more? Explore the **Renewables 2019** Global Status Report

Collaborative annual reporting since 2005 building on **international expert community.**

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.

For further details and access to the report and references, visit **www.ren21.net/GSR**


REN21
RENEWABLES NOW