

Renewables in Cities 2019 Global Status Report

Webinar

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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

REN21: WHAT WE DO



Global Status Report: yearly publication since 2005



Renewables in Cities Global Status Report

Knowledge



Regional Reports



Global Futures Reports



Thematic Reports



Debates



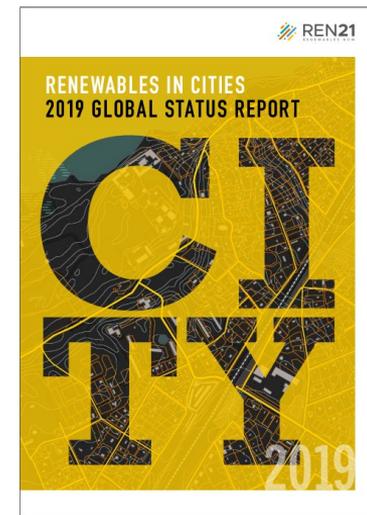
23-25 October 2019

Renewables in Cities 2019 Global Status Report

First annual stocktake of renewable energy in cities

The report features:

1. Cities in the Renewable Energy Transition
2. Drivers for Renewable Energy in Cities
3. Urban Policy Landscape: Targets and Policies
4. Urban Renewable Energy Markets
5. Mobilising Finance and Enabling Business Models
6. Citizen Participation



380

experts contributed to the REC-GSR, working alongside an international authoring team and the REN21 Secretariat



61%

of contributors are new members of the REN21 Community, indicating the attractiveness of this focus on cities in the energy transition



More than

50

interviews were conducted with city or sector-specific experts from around the world

Cities in the world

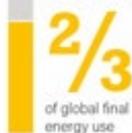
Bring cities to the energy debate, the energy debate to cities



Cities account for three-quarters of human-caused global carbon dioxide emissions

Energy consumption

Cities account for an estimated



One billion
people living in urban slums



City definitions differ

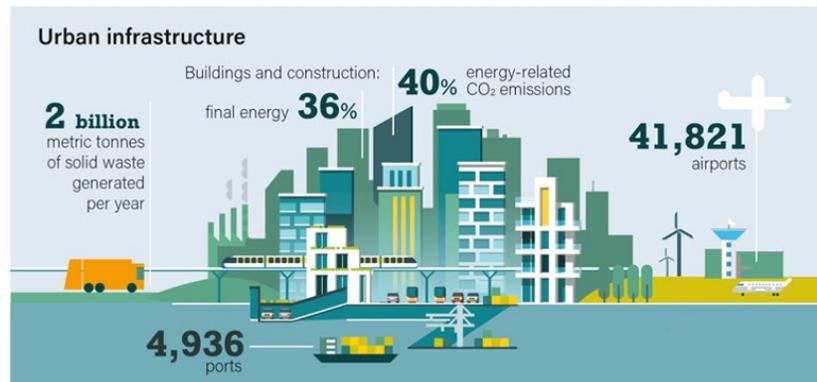
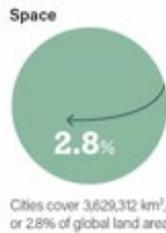
Japan: **50,000** inhabitants
Norway: **200** inhabitants

Distribution of megacities in the world



Population
55%
of the world's population, (or **4.2 billion** people) lives in cities

GDP
80%
of global GDP is generated in cities

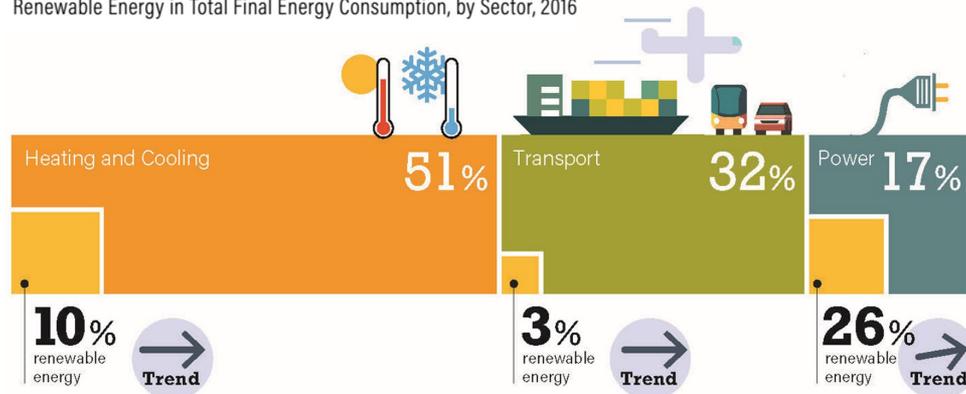


Beyond power

Over 80% of demand for heating, cooling and transport

- Globally, around 26% of electricity is renewable
- Renewables lagging behind in heating, cooling and transport
- **Heating and cooling**
 - approx. 50% buildings / 50% industry
 - local markets
- **Urban transport:** 40% of final energy in transport sector

Renewable Energy in Total Final Energy Consumption, by Sector, 2016



Note: Data should not be compared with previous editions of the Renewables Global Status Reports. Electricity also supplies final energy demand in the heating and cooling sector (71% in 2016), and transport sector (11% in 2016).
Source: Based on OECD/IEA.

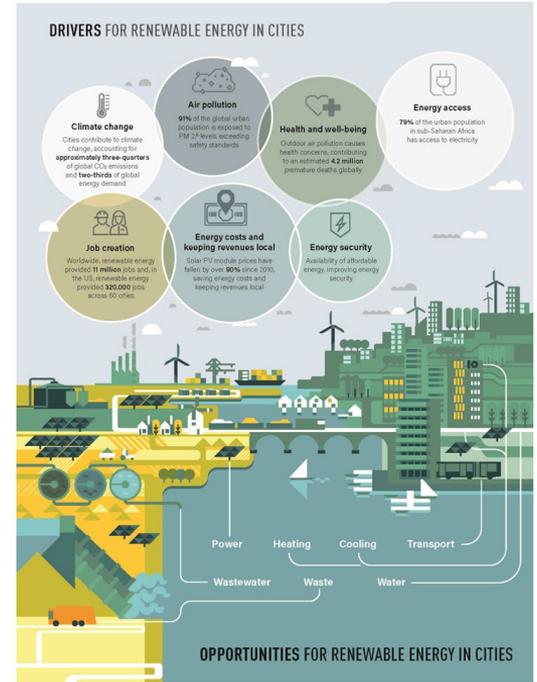
 **REN21** RENEWABLES IN CITIES 2019 GLOBAL STATUS REPORT

Drivers for renewable energy

Cities pursue renewables to meet a range of objectives

- Climate change
- Ensuring healthy living environment - addressing air pollution
- Reducing municipal costs
- Economic development
- Local jobs
- Energy security
- Access to energy

Drivers and Opportunities for Urban Renewable Energy



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Cities have a direct responsibility for their residents

Cities have ambitious targets, not only in the power sector

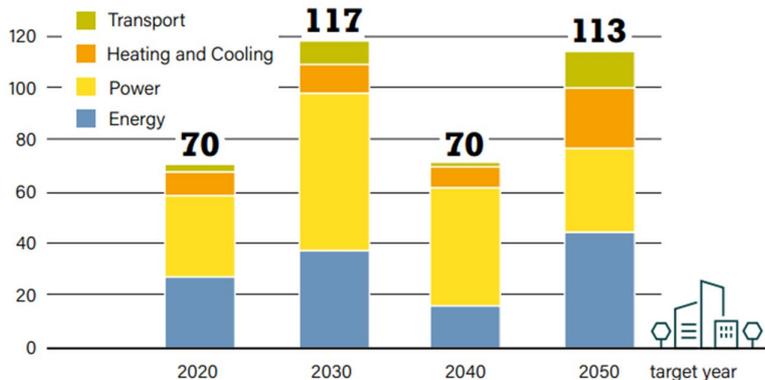
Target and vision setting for municipal operations and city-wide energy

Ambition tends to be:

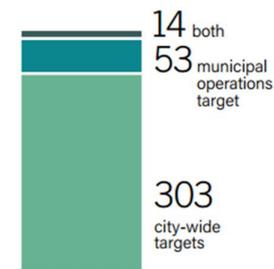
- **Higher:** cities target larger shares of renewables than national counterparts
- **Broader:** cities also set targets in heating, cooling and transport sectors
- **250 cities** worldwide have adopted some form of **100%** renewables target

100% Renewable Energy Targets in Cities, As of Mid-2019

Number of 100% targets
(10 year period aggregate)



370 targets in over
250 cities



Note: By mid-2019, 370 targets in over 250 cities have been identified. In addition, several 100% target exist in villages as well as provinces around the world. Data included in this figure were compiled by REN21, ICLEI and The Global 100% Renewable Energy Platform with material provided by a variety of stakeholders, including CDP, CAN, C40, IRENA, Sierra Club, Renewable Cities (2018); and may not be comprehensive.

Policies and actions in municipal operations

Advancing renewable energy in municipal operations

- Procuring renewable energy for consumption of municipal operations
- Scaling-up renewable generation on public buildings (e.g. Solar PV, solar thermal)
- Integrating renewable energy in district energy networks and switching municipal fleets to biofuels and EVs
- Using municipal waste and wastewater to generate biogas, biomethane



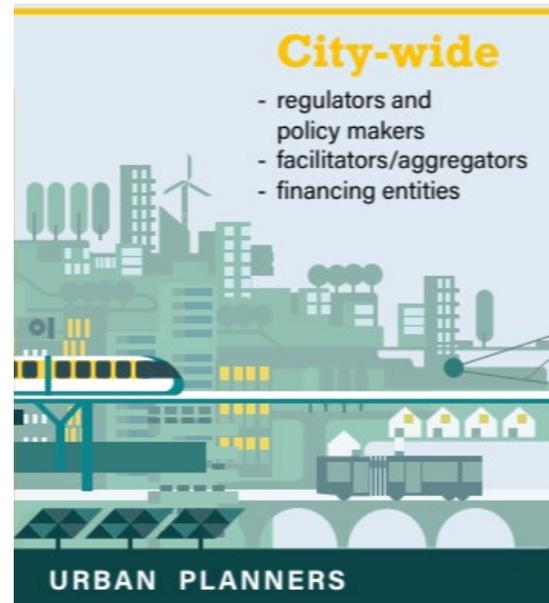
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Cities leading by example, shifting to renewables in municipal operations

Beyond municipal operations

Cities are using regulatory policies to advance renewable energy city-wide

- Regulators and policy-makers: creating environment for **city-wide** renewable in power, heating and cooling
 - Building codes requiring zero-emissions
 - Solar power mandates
- Facilitating renewable deployment for other actors in urban environment (businesses, citizens, communities, places of worships, urban delivery companies)
 - Raising awareness about RE benefits
 - Contribute to knowledge sharing and dialogue



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Beyond the city

Cities are champions for renewable energy at the global scale

- Champions, trend setters and advocates at the national level
 - Pushing for higher ambition
 - Proving the viability of renewables
- Inspiring and learning from other cities worldwide, organisation city networks



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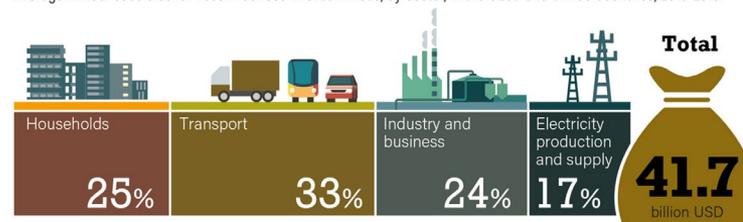
Cities cannot advance the transition to renewable energy transition alone

Multi-level governance

Cities need the support from national governments to realise renewable energy

- City power and authority over energy issues
 - is often limited, in particular in Asia, Latin America and Middle East
 - cities cannot achieve sustainability alone
- Conflicting/unsupportive national policies
 - building codes, vehicle regulation
 - national fossil-fuel subsidies

Average Annual Subsidies for Fossil Fuel Use in Urban Areas, by Sector, in the OECD and BRICS Countries, 2015-2016



Note: Subsidies for fossil fuel consumption in urban areas were identified for most countries. OECD = Organisation for Economic Cooperation and Development; BRICS = Brazil, Russian Federation, India, Indonesia, China and South Africa. A further USD 27.7 million in subsidies in urban areas of the selected countries goes to fossil fuel use in social and public services (too small to be included in figure).

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Cities cannot advance renewable energy transition in isolation

Global Solar Markets

Renewable energy continues to grow

Global reach of renewable power

- Total global capacity rose 8% in 2018: 2,378 GW capacity including hydropower
- 181 GW of renewable power additions led by Solar PV with 100 GW (55% of new additions)

RENEWABLE ENERGY INDICATORS 2018

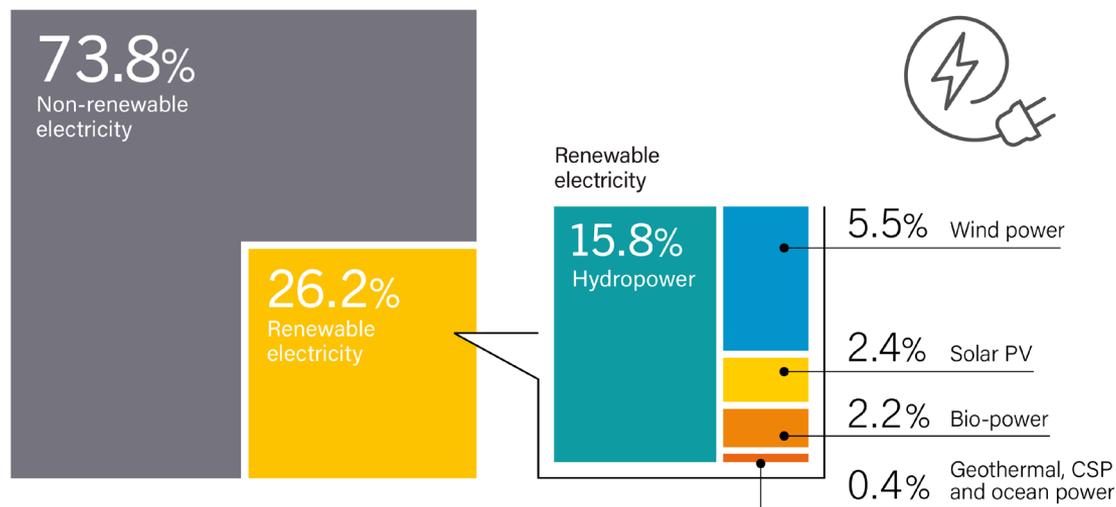
		2017	2018
INVESTMENT			
New investment (annual) in renewable power and fuels ¹	billion USD	326	289
POWER			
Renewable power capacity (including hydropower)	GW	2,197	2,378
Renewable power capacity (not including hydropower)	GW	1,081	1,246
 Hydropower capacity ²	GW	1,112	1,132
 Wind power capacity	GW	540	591
 Solar PV capacity ³	GW	405	505
 Bio-power capacity	GW	121	130
 Geothermal power capacity	GW	12.8	13.3
 Concentrating solar thermal power (CSP) capacity	GW	4.9	5.5
 Ocean power capacity	GW	0.5	0.5
 Bioelectricity generation (annual)	TWh	532	581
HEAT			
 Solar hot water capacity ⁴	GW _{th}	472	480
TRANSPORT			
 Ethanol production (annual)	billion litres	104	112
 FAME biodiesel production (annual)	billion litres	33	34
 HVO biodiesel production (annual)	billion litres	6.2	7.0

Power sector leading

Renewables supply more than 26% of global electricity

- For the first time, more electricity was from solar PV than bio-power
- Strong growth in renewable generation, but rising electricity demand (up to 4% in 2018) makes it challenging to achieve larger share

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



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

181 gigawatts of renewable power added in 2018

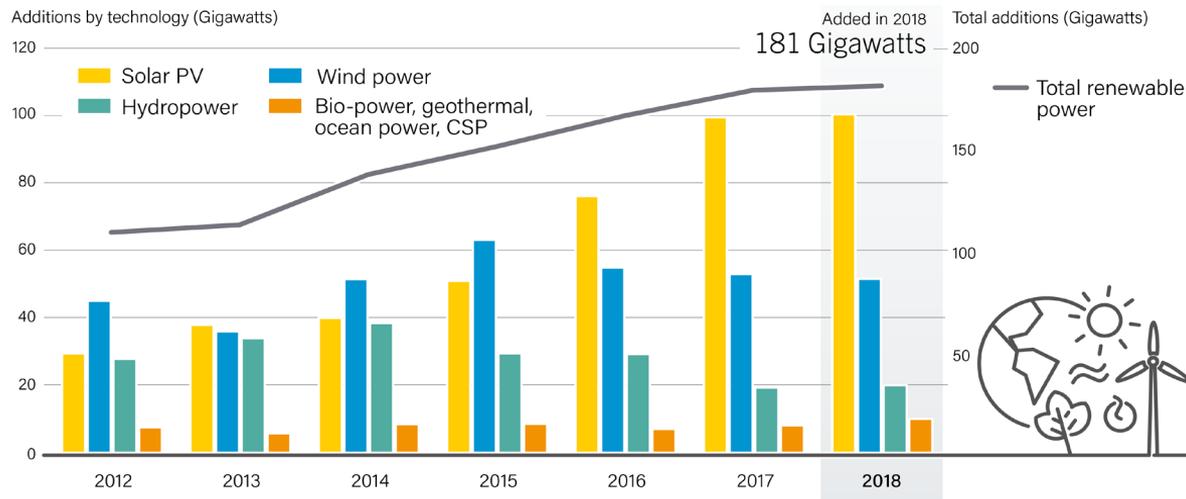
Around 55% of these new additions were solar PV

● 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

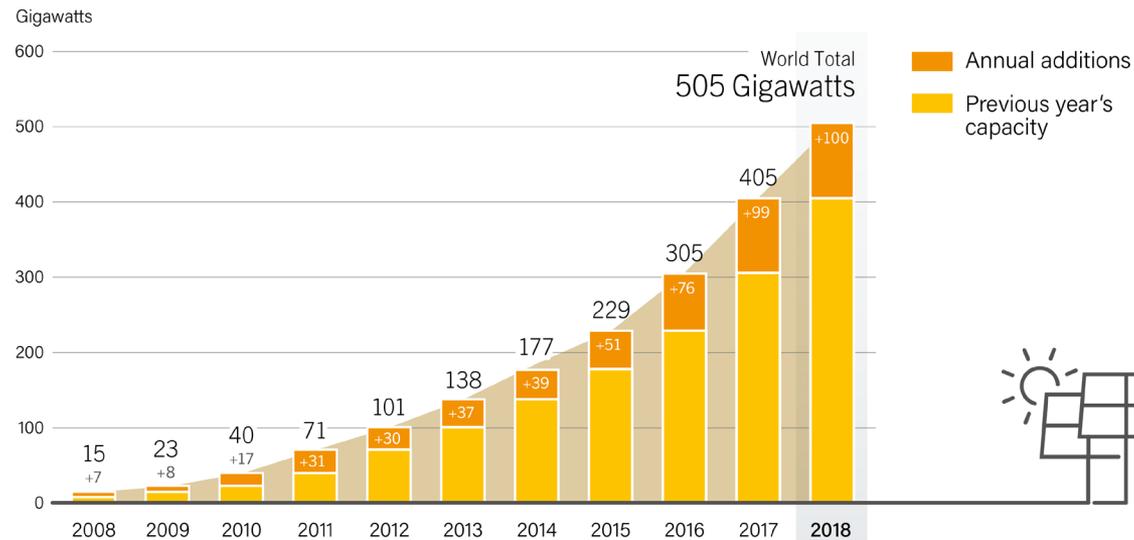


Note: Solar PV capacity data are provided in direct current (DC).

Solar PV capacity additions pass 100 GW mark in 2018

- Solar PV capacity additions were more than 100GW for the first time
- Cumulative capacity: 505GW an increase of 25% from 2017

Solar PV Global Capacity and Annual Additions, 2008-2018



Note: Data are provided in direct current (DC).
Totals may not add up due to rounding.

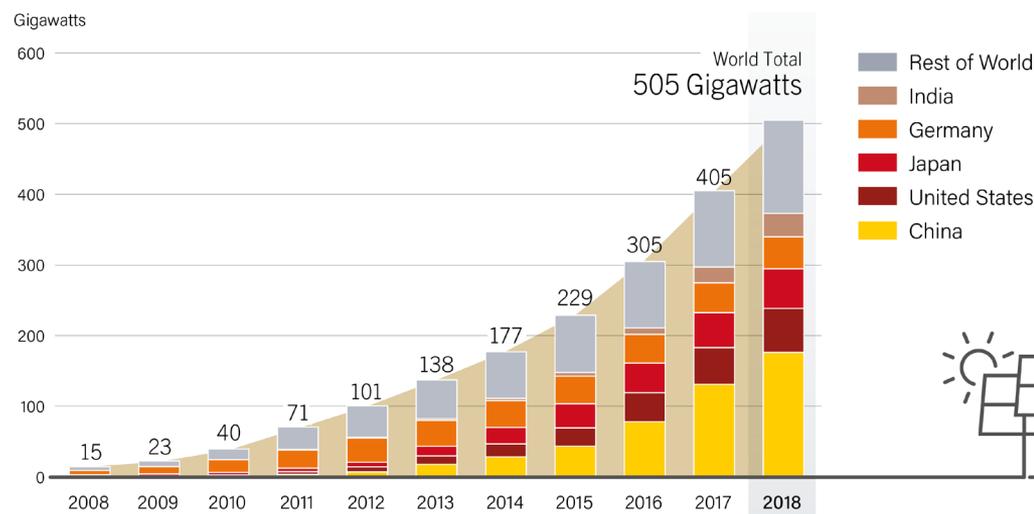
Source: Becquerel Institute and IEA PVPS.

Solar PV now fastest growing energy technology worldwide

Around 55% of these new additions were solar PV

- Solar PV is the fastest growing energy technology, and in an increasing number of countries
- 11 countries added more than 1GW in 2018
- 32 countries had cumulative capacity of at least 1GW

Solar PV Global Capacity, by Country and Region, 2008-2018

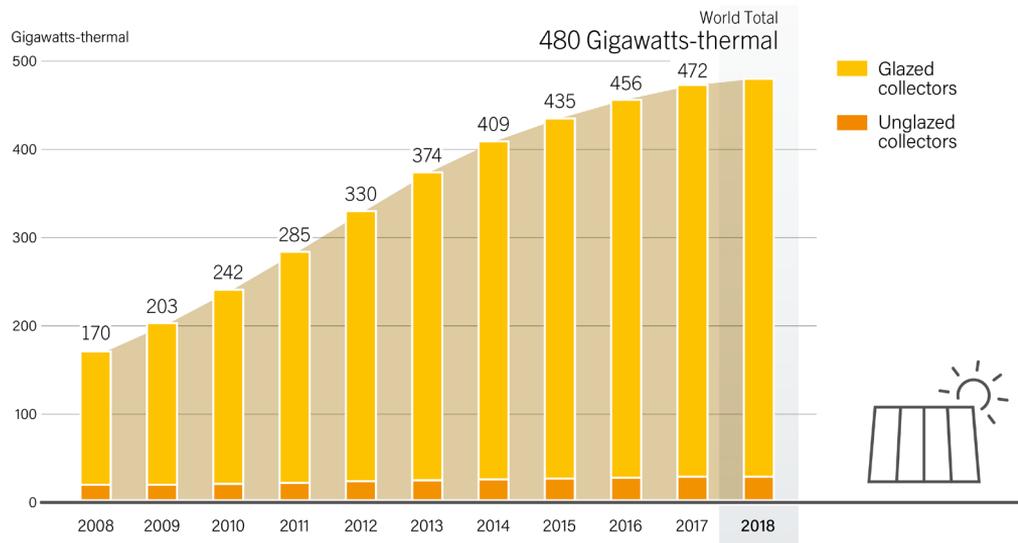


Note: Data are provided in direct current (DC).

Growth rate slows for solar water heating capacity additions

- Cumulative global operating capacity for solar water heating collectors increased 2% to reach 480 GW_{th}
- The majority of this capacity is glazed collectors
- The 2018 increase of 8 GW_{th} is the smallest in the last ten years

Solar Water Heating Collectors Global Capacity, 2008-2018



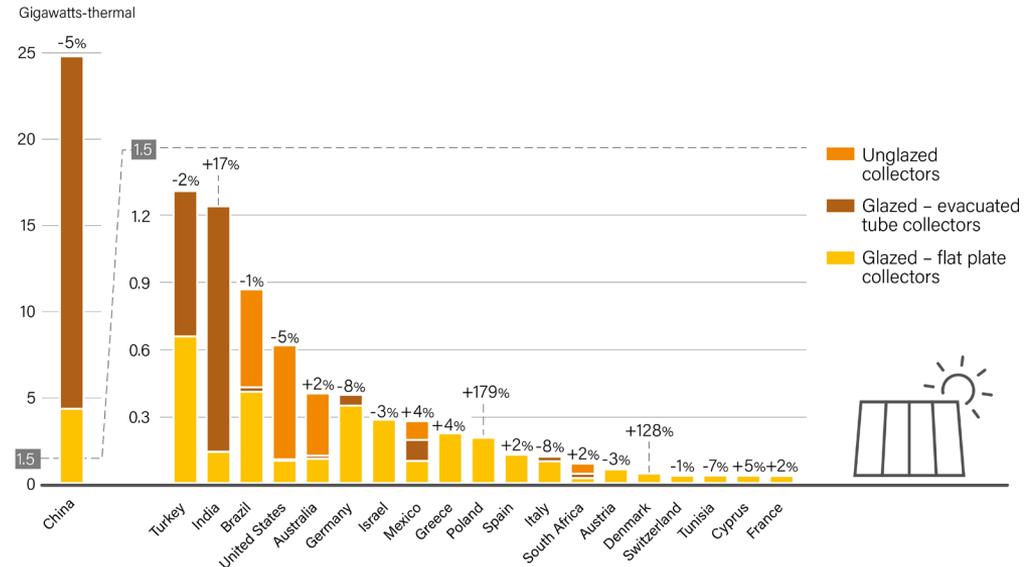
Note: Data are for glazed and unglazed solar water collectors and do not include concentrating and air collectors.

Source: IEA SHC.

More markets report solar thermal sales increases in 2018

- Globally, 33.3 GW_{th} of solar thermal capacity was added in 2018
- China accounted for 74% of gross additions, with 24.8 GW_{th}
- Annual installations rose in 10 of the world's 20 largest markets

Solar Water Heating Collector Additions, Top 20 Countries for Capacity Added, 2018



Note: Additions represent gross capacity added.

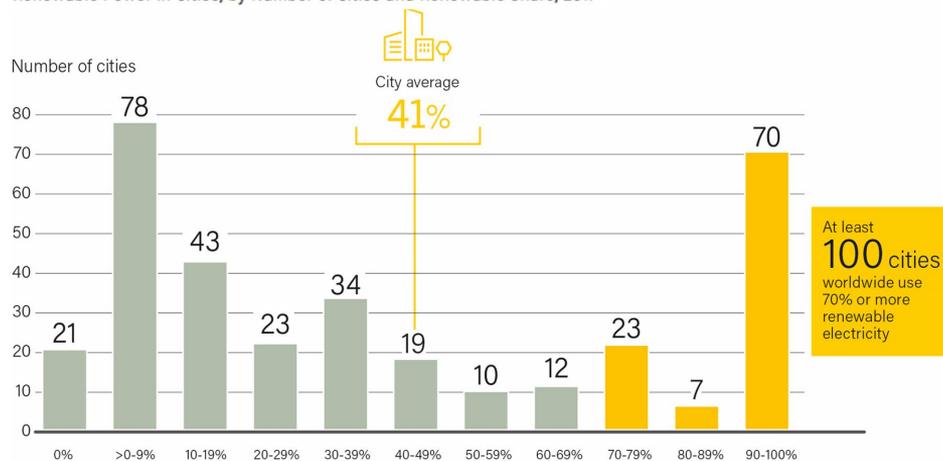
Urban Renewable Energy Markets - Focus: Solar PV and Solar Thermal

Renewable power in cities

Cities are increasingly shifting to renewable power use

- City governments and other actors are shifting to renewables for power consumption
 - applications: street/indoor lighting, appliances, cooking, etc
 - contracting their renewable electricity supply via PPAs
- More than 100 cities use at least 70% of renewable power (2017)
- Renewable power consumption in cities also depends on regional/national power mix

Renewable Power in Cities, by Number of Cities and Renewable Share, 2017



Note: The figure shows shares of renewables in the electricity consumption of 340 cities that self-reported to CDP. REN21 RENEWABLES IN CITIES 2019 GLOBAL STATUS REPORT

City average is calculated based on the 340 cities shown.

Beyond renewables in power consumption

Solar PV as an opportunity to become decentralised electricity producers

- Renewable energy activity in cities has focused on distributed solar PV:
 - Adapted to resource availability and potentials: main renewable energy technologies are currently rooftop/building-integrated solar PV
 - Cumulative distributed solar PV installation totalled 213 GW (2018)
- Municipal governments have become active in distributed renewable energy generation
 - public buildings: schools, administrative buildings, etc
 - drivers: reducing costs, showing leadership, increasing local awareness



Urban solar markets: beyond municipal governments

Important role of other urban actors in scaling up renewables

- Private solar PV installations have also increased in cities, facilitated by favourable policies and financial or tax incentives
- Other urban actors are also producing renewables:
 - Many large corporations have scaled up their use of renewable electricity from solar PV
 - Places of worship
- Obtaining data on distributed solar PV is difficult



Municipal governments have a key role to stimulate local renewable power generation

Street lighting

Solar-powered street lighting helps to reduce municipal energy costs

- Municipal public lighting can account for up to 40% of municipal electricity budget
- Sales in solar powered street lighting reached 3.8 million cumulatively in 2017: almost half in Asia and the Pacific
- Energy efficiency: large potential for future savings in developing and emerging economies



Solar thermal markets in cities

An opportunity for local heat generation

- Solar thermal can provide low-temperature heat for water and space heating
- **Stand-alone system:** typically on building facades and rooftops
- Municipal building codes facilitate the use of solar thermal systems in cities, e.g. Barcelona
- Overall data on urban renewable heat capacity and generation is lacking, but numerous examples exist:
 - Kyiv: installed solar water heaters at preschools and nurseries
 - Belo Horizonte: 3500 solar water heating systems installed in flats



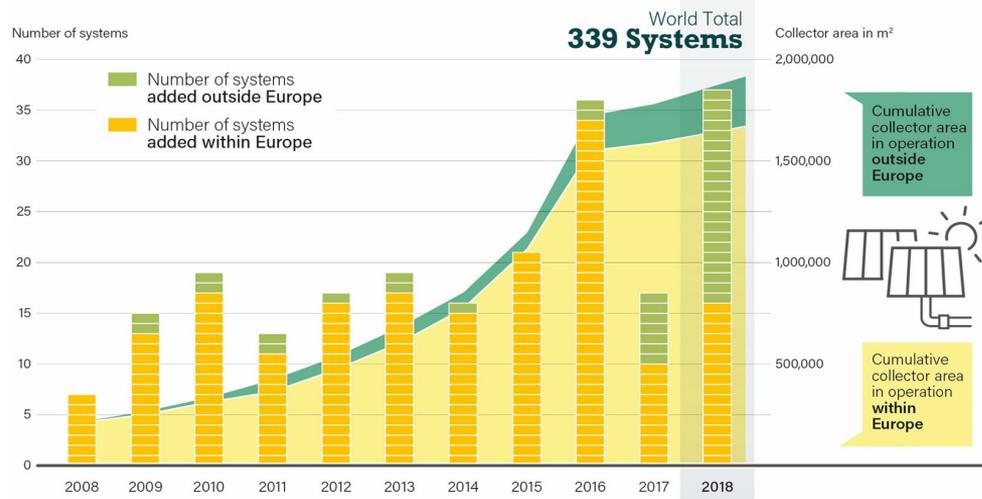
Solar thermal systems

Role: target and vision setting, for municipal operations and city-wide energy

- **District heating and cooling networks** mostly in Europe, China and North America

- **Biomass** sources account for around 95% of renewable energy
- **Geothermal** is increasing
- **Solar thermal**: 339 large-scale systems, the majority within Europe

Solar District Heating Systems, Global Annual Additions and Total Area in Operation, 2008-2018



Note: Includes large-scale solar thermal installations for residential, commercial and public buildings.
Data are for solar water collectors and concentrating collectors.

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In Europe, 6,000 district heating systems supplied around 12% of EU heat demand

In conclusion

Cities and renewable energy – taking advantage of each other

- Renewable energy in cities
 - Nature of renewable energy empowers cities to become key players in the energy transition
 - Renewables offer cities the opportunity to achieve a wide range of objectives: air pollution, economic growth, etc
- Cities in renewable energy
 - Various roles: target setters, energy consumers & producers, policy makers and regulators, facilitator, etc.
 - Advancing renewable energy in all end-use sectors



From an energy consumer to a change agent of the energy transition

In conclusion

How to take advantage of the opportunities

- Strengthen data on renewable energy in cities
 - Inform decision makers
 - Change historic perception
 - Bridge cities and energy debates
 - Track advancement
- Align policies across the national, sub-national and local level
- Empowering cities: increase the awareness of their role in the energy transition



Better data to inform decision makers in all relevant sectors

Contribute to the *Renewables in Cities 2020 Global Status Report*

Become part of a community to advance renewable energy in cities

Contact us to get involved!

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www.ren21.net/cities

Bridging and
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QUESTIONS?

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