Annex to the Dossier on transition pathways towards 100% RE for cities and regions

Overview of selected existing transition pathways towards 100%RE

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About

ICLEI Local Governments for sustainability (www.iclei.org) is a global network of more than 1,750 local and regional governments committed to sustainable urban development. Active in 100+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.

The dossier has been developed in the framework of the "100% Renewables Cities and Regions Roadmap" project (https://renewablesroadmap.iclei.org/).
The project facilitates the energy transition by raising local awareness on renewable energy sources, showcasing how local and national governments can create coordinated, enabling frameworks and policies, exploring access to public and private sector finance and building local renewable energy projects to address electricity, heating and cooling.

By working with local and regional governments from Argentina, Indonesia and Kenya, the project will foster multilevel governance, and put that collaboration at the heart of the sustainable energy transition.

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Disclaimer

Dossier package on 100% transition pathways

The present document should be considered part of a package of Dossiers (and Annex) assessing existing pathways towards climate neutrality in order to pursue the objectives of the 100% Renewables Cities and Regions Roadmap project, as well as support Local Governments (LG) wanting to set a 100% Renewable energy target.
The "Dossier on transition pathways towards 100% RE for cities and regions" (Badino 2020a) and its Annex includes pathways to 100% Renewable Energy and give policy recommendations, on top of clarifications needed for the LG to pursue successfully their vision.
The "Dossier on the applicability of existing transition pathways towards 100% RE for cities and regions" (Badino 2020b) assesses the pathways according to replicability criteria in order to reach a climate neutral future.

Finally, the specific context of the deep-dive cities and regions supported by the project are considered in the "Dossier on the applicability of transition pathways towards 100% RE for each deep-dive city and region of the "100% Renewables Cities and Regions Roadmap" Project" (Badino 2020c), where strategic considerations and suggestions can be found for each of them.

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Overview of selected existing transition pathways towards 100%RE - Annex to the "Dossier on transition pathways towards 100% RE for cities and regions"

At the global level, many local governments pledged to go 100% RE in the future. Some governments have already started the path and an overview is given below.

Selection criteria for choosing the case studies:

1. **Clear commitment**: the local governments in the list have a clear binding commitment towards reaching a complete supply for at least one sector (electricity, heating/cooling or transportation) with renewable energy sources (RES). When the analysis of the available resources showed inconsistency or unclear binding commitment on certain aspects of the local government strategy, that piece of information has either not been reported or reported partially, focusing exclusively on certain and verifiable data in order not to leverage on altered commitments. Differently, whether the strategy contained technical or substantial mistakes, a "note" has been added.
2. **Applicability**: the experience presents policy elements that may be useful for policy makers in other regions.
3. **Geographic representativeness**: local governments have been selected from different parts of the world and grouped into Africa, Asia, Central America, Eastern Europe, European Union, North America, Oceania, South America and Caribbean.
4. **Integrated strategies**: when available, priority has been given to local governments with strategies including all energy sectors for the entire community (100% RE) or, at least, for more than one sector.
5. **Levels of Government**: the selection has included different levels of governments: towns, cities, state or regional governments, national governments as well as island regions.

As mentioned, it is not meant to be a comprehensive list of all commitments, but to provide inspiration and examples to local leaders, to share the lessons learnt and to improve and inform policy recommendations.

Africa

1. **Cape verde** (Brot für die Welt and World Future Council 2018, Cape Verde 2018, World Future Council 2014)

Target: 100% of the total electricity generated to be from RE by 2020, 100% of additionally installed capacity from RES by 2030.
Renewable energy share: wind, solar PV (Concentrated Solar Power - CSP)
Key strategies: SEforALL strategy with initial public investments with progressive involvement of the private sector (both businesses and citizens) to take over; strong sustainable energy access focus for vulnerable parts of the communities: either by grid connection where it is technically and economically feasible or by the creation of isolated systems or by the distribution of individual equipment. "*A sustainable energy system must be based on renewable or regenerative capabilities, universal accessibility*".
Note: the target is given on generated energy and installed capacity rather than on energy consumption. "Promoting Butane Gas penetration rate exceeding 90% by 2030" is also part of the strategy"
Results: 20% of the electricity produced from RES in 2013.

2. **Kasese (Uganda)** (Brot für die Welt and World Future Council 2018, 100%RE Energy Atlas 2020)

Target: bringing access to clean energy services for all domestic, productive and social needs in rural and urban areas by 2020, described elsewhere as "renewable energy access is integral in all government-funded projects and institutions, including schools, health centres, markets and other public infrastructure".
Renewable energy share: biomass, solar, geothermal and mini- hydroelectric technologies.
Key strategies: tax breaks for RE related business; traineeships for the installation, maintenance and distribution of RE technologies; collaboration with universities, businesses and NGOs to implement small and localised RE projects; partnership with WWF and Barefoot Power Uganda for small-scale solar installations in mountain villages.
Note: It is unclear whether the target is community-scale or comprising only the energy consumption of the entities owned by the local government. The target was probably not achieved, as it is not mentioned in the official website of the district.
Results: 26,8% energy supply of Kasese district; the number of people and businesses dealing with green jobs increased; RE deployment increased for lighting and cooking, as well as energy access rate increased.

3. **Uganda** (Brot für die Welt and World Future Council 2018)

Target: More than 96% of total electricity mix is RE by 2030; 67% of the population is expected to have access to on-grid and 33% to off-grid electricity by 2030; achieving 64% of the projected households using clean stoves by 2020, universal access to clean cooking for households by 2030.
Renewable energy share: mostly large hydro.
Key strategies: energy access, sustainable cooking alternative.

The contribution of RE for thermal purposes (mostly cooking) is expected to be around 36%. It is not clear which sources will provide the remaining 64% of energy, but it appears to be mostly firewood, charcoal and LPG.
Results: 90% RE in the electricity energy mix in 2012.

4. **Kenya** (Brot für die Welt and World Future Council 2018)

Target: almost 80% of total installed capacity from RES by 2030 (see Note below).
Renewable energy share: "*geothermal 37.13%, hydro 20.44%, wind 10.22%, solar PV 8.17%, biogas 0.07%"* (see Note below).
Other sources in the mix are: "*coal 16.49%, natural gas 10.22%, co-generation/gasification 4.08%, diesel 3.4%, gas 3.38%" (*Kenya Action Agenda).
Key strategies: investment projects target grid and transmission lines expansion, and large-scale hydro projects. One on-grid solar project and three off-grid projects are listed among the investment opportunities.
Note: The target is given in installed capacity rather than in energy consumption. Also, given the division contained in the Kenya Action Agenda (reported here), it is possible to notice that, in order for the sum to reach 80%, some of the gas and natural gas capacity has to be considered as renewable and coal and diesel, exclusively, have to be categorised as completely non-renewable (Kenya Action Agenda, p. 12, table 12).
Results: 68% of the total installed power generation capacity in 2014 came from RES.

5. **Tshwane (South Africa)** (ICLEI 2020a)

Target: 50% RE of energy consumption for all sectors at community-scale by 2030 and clear political interest in exploring the 100 %RE pathway.
Renewable energy share: biogas recovery from waste, solar power.
Key strategies: the city is part of the national Sustainable Energy and Climate Change (SEED) Programme, aimed at encouraging the integration of sustainable energy and environmental concerns into urban development in South Africa.
City initiatives include biogas recovery from waste, fuel for the city-operated bus fleet, the installation of two solar powered electric vehicle charging stations. Tshwane is retrofitting municipal buildings with renewable energy installations and encouraging the installation of solar water heaters for private homes.
Results: energy efficiency in lighting, bike lanes, awareness raising and education activities.

Asia

Japan

1. **Fukushima (Japan)** (IRENA 2019, 100%RE Energy Atlas 2020, World Future Council 2014)

Target: 100% RE target in primary energy consumption by 2040, with intermediate milestones of around 40% by 2020 and almost 64% by 2030.[1]
Renewable energy share: wind, solar PV and solar thermal, hydro and geothermal.
Key strategies: The vision for the revitalisation of the region is very ambitious and the strategy very broad. Renewable Energy Pioneer Action Plan focuses on the expansion and integration of wind and solar resources, as well as on giving support to research and development (aiming at a hydrogen-based society) and it includes policies and initiatives regarding the establishment of a renewable energy promotion centre, concerning a demonstration project foreseeing the creation of a floating offshore wind farm and as regards the permission to use devastated agricultural land for renewable energy purposes. Finally, the plan concentrates on the creation of a regional subsidy programme and feed in tariff system to support solar photovoltaic installations for privates and businesses.
Note: One source reports only targets in the electricity sector.
Results: 26.6% of RE supply in 2015, primarily from a growth in solar PV installations followed by biomass, wind and small hydro.

Republic of Korea

2. **Inje County (Republic of Korea)** (100%RE Atlas 2020, Go100RE 2017, ICLEI 2020a, World Future Council 2014)

Target: 100% total installed capacity of RES by 2045.
Renewable energy share: wind, solar thermal and PV, geothermal and small/mini hydropower plants.
Key strategies: Inje County's Zero Energy Independence Plan identified several main policy fields: expansion of new renewable energy production, energy efficiency, energy conservation, creation of a civic culture, expansion of carbon sinks and building and strengthening the cooperative foundation. The strategy also envisages the development of solar hot water systems, pellet stoves for on-site heating, as well as biomass and micro-hydro systems.
Note: The target is not homogeneously reported in the sources: in most of the sources, the target is given in installed capacity rather than in energy consumption; in some cases, it is defined in terms of electricity needs only.
Results: 20% of electricity needs from RES in 2009; 6 MW of wind power and 1.7 MW of mini-hydropower generation capacity installed.

3. **Jeju Province (Republic of Korea)** (100%RE Atlas 2020, ICLEI 2020a, Jeju 2019)

[1] 40,2% and 63,7% respectively

Target: 100% renewable electricity and transport by 2030, "carbon-free island" by 2030; Intermediate target of increasing the share of RES in the total energy demand up to 50% by 2020.
Renewable energy share: The energy mix includes wind, solar, and small hydro plants.
Key strategies: Jeju Province is implementing smart grid business models through battery-based energy storage systems and fuel cell power plants to ensure grid stability and address wind and solar intermittency.
Note: As part of Korea's commitment to reduce its greenhouse gas emissions by 37% by 2030, the Korean government selected Jeju Island as test-bed for clean energy solutions.
Results: Jeju Province has already witnessed the success of this approach on Gapa Carbon Free Island, a small island with 126 households located near the main island of Jeju. Gapa has achieved a reduction of 776 tons of CO_2 emissions and a saving of 300.000 litres of fuel every year.

Canada

1. **District of Saanich (Canada)** (100% RE Atlas 2020, ICLEI 2020a, Saanich 2017)

Target: 100% RE community-wide target (electricity, heating and cooling, transportation) by 2050, middle-term: reduce GHG emissions by 33% in the community and 50% in municipal operations by 2020, based on 2007 levels.
Renewable energy share: Solar hot water and photovoltaic installations.
Key strategies: Throughout 2018 Saanich developed a plan for achieving 100% renewable energy, with a focus on a systems framework to identify potential areas of intervention across sectors.
Results: In 2016, Saanich began developing a RE strategy for each municipal building, providing beneficial examples to the community and the Region.

2. **City of Vancouver (Canada)** (100%RE Energy Atlas, Brot für die Welt and World Future Council 2018, Go100RE 2017, ICLEI 2020a, IRENA 2018)

Target: community-wide 100% RE use by 2050, including electricity, thermal energy and transportation, together with city-wide GHG emissions reductions of at least 80% from 2007 levels; intermediate target of greenest city in the world by 2020 and 55% RE use by 2030.
Renewable energy share: Not clear. Sources for each case are selected on a project-by-project basis, depending on availability, site conditions, technical considerations, environmental impact and potential risk factors. The plan shares foreseen renewable energy efforts in as 60% renewable electricity, 15% district energy, 14% biofuels, 10% bio methane and 1% hydrogen[2], but it is not clear what the percentages are referring to. For district energy, sewage heat recovery, wood chips, geothermal energy and heat recovery from industrial processes will be used.

[2] see chapter 3

Note: the RES types are not defined and are worth exploring, as it seems that potentially a big part of the share is expected to be covered with biofuels and large hydro.
Key strategies: The city of Vancouver aims at becoming the Greenest City in the world through 10 sectoral targets. The action plan was developed through a wide consultation and participation process, with contributions from over 60 City staff, more than 120 organizations and thousands of individuals. The Renewable City Strategy looks at increasing the amount of rooftop solar generation and promoting electric vehicles or biofuel hybrids for transportation and it has been integrated with other strategies focusing on sustainable transportation, health and economic development. The Renewable City Strategy – in conjunction with the Zero Emissions Building Plan – aims at reducing emissions from new buildings by 70% by 2020, by 90% by 2025 and by 100% by 2030, arranging changes gradually to build standards that allow the construction industry to adapt over time.
Results: 31% of city energy RE as of 2014 (25% large hydro, 2% run-of-river hydro, 3% biomass, and less than 1% solar and wind power) and 11% GHG emissions reduction (compared to 2007 levels) as of 2016; goal of reaching over 50% of trips made by walking, cycling or public transit was hit five years earlier, in March 2015. Green jobs have increased by 49% against a 2010 baseline.

Caribbean

1. **Aruba (Caribbean Netherlands)** (100%RE Energy Atlas 2020)

Target: 100% renewable electricity by 2020.
Renewable energy share: wind, waste-to-energy through biogas.
Key strategies: Comprehensive plans publishing the economic vision and policy with the title “The Green Gateway”, aiming at promoting renewable energy on the island in order to secure and preserve its valuable but fragile natural resources.
Results: 15.4% electricity from RES in 2019.

2. **Bonaire (Caribbean Netherlands)** (100%RE Energy Atlas 2020)

Target: 100% renewable electricity.
Renewable energy share: hybrid wind-diesel, with plan to develop biodiesel from algae.
Key strategies: storage system in place; plan to develop large-scale production of biodiesel from algae. Public-private partnership to develop the RE project, with financial support from the Dutch bank.
Note: target and results years are unclear; it is unclear the sustainability impact and resource availability figures on biodiesel from algae.
Results: 33% of the annual required electricity demand covered by RES (wind turbines).

Central America

1. **Costa Rica** (Brot für die Welt and World Future Council 2018, Go 100RE 2017, IRENA 2019, World Future Council 2020)

Target: zero-net emissions by 2050, 100% RE electricity by 2030.
Renewable energy share: solar photovoltaic, wind energy, biogas and geothermal.
Key strategies: Decarbonisation Plan promotes the modernisation of the country through green growth. The process involved different stakeholders to create a common policy roadmap based on scientific findings and embracing perspectives and needs from the civil society, industry, academia, private sector and various governmental bodies. The National Programme Carbon Neutrality 2.0 launched in 2017 serves as a tool to reduce GHG emissions to zero as part of a decarbonised economy. Municipalities are encouraged to develop a GHG emissions inventory for the community.
An electric mobility law to provide incentives for public and private electric transportation technologies and to create the needed infrastructures entered into force as of early 2018.
Results: 95-98% of the country's electricity has come from renewable sources since 2014, while providing access to energy to almost the entirety of the population. Since October 2018, 98.15% of the country's electricity was generated through five different renewable sources: hydropower (72.24%), wind (16.14%), geothermal energy (8.92%), biomass (0.76%) and solar (0.09%). However, renewable electricity only accounts for about one-quarter of the total energy consumption.

Eastern Europe

1. **Šentrupert (Slovenia) (**Go 100RE 2017)

Target: 100% of electricity and heating consumption from RES by 2020.
Renewable energy share: wood biomass, hydro, solar PV.
Key strategies: Local Energy Concept was adopted, with energy efficiency measures, new energy solutions and focus on raising consumers' awareness on renewable energy sources and energy efficiency measures. An energy manager was appointed to gather data on energy supply and consumption levels in the community.

Results: interventions on the heating systems in school buildings and in the local prison

European Union

Europe set a carbon-neutrality target by 2050 (IISD 2019). By approving the Green Deal roadmap which seeks to design a set of "deeply transformative policies" at regional and national level across eight key areas:

- increased climate ambition for 2030 and 2050;
- clean, affordable and secure energy; a clean and circular economy;
- energy and resource-efficient buildings;
- sustainable and smart mobility;
- a fair, healthy and environmentally-friendly "farm to fork" food system;
- preservation and restoration of ecosystems and biodiversity;
- zero pollution for a toxic-free environment.

The plan has the objective of driving policy reforms aimed at making Europe the frontrunner in climate-friendly industries, green technologies and green financing, while ensuring that no one is left behind.

Austria

1. **Burgerland (Austria)** (100%RE Energy Atlas 2020)

Target: 100% electricity needs from local RES by 2020.
Renewable energy share: wind, biomass.
Key strategies: in 2009, the Burgenland Energieteam was established to set an energy self-sufficiency target by 2050, accompanied by an action plan.
Results: 100% of electricity needs supplied through wind power by 2013.

2. **Güssing (Austria)** (100%RE Energy Atlas 2020, Go100RE 2017, Go 100 percent 2020, Gussing Clean Energy 2020)

Target: 100% RE community-wide consumption.
Renewable energy share: biomass.
Key strategies: 100%RE strategy adopted while experiencing economic decline, as a mean for development.
Results: the 100%RE target has been reached in just over one decade with very positive outcomes: the use of local biomass as an energy source created more than 1000 jobs and produced a regional value added of around 14 million Euros per year. The transition to 100% RE increased municipal tax revenue from 400.000 (1990) to 1.4 million Euros (2008). Currently, Güssing is a net renewable energy exporter, producing about 10 times more energy than what is required by the city and approximately 40 times more electricity.

Denmark

3. **Denmark** (Brot für die Welt and World Future Council 2018, Go100RE 2017, IRENA 2019, NER 2015, World Future Council 2014)

Target: 100% RE in the overall energy mix (electricity, heat and fuels, transportation) by 2050, with mid-term milestones: 50% in net electricity consumption from wind power in 2020, phasing out coal consumption at power plants by 2030, phasing out oil burners by 2030 and covering all electricity and heat supply with renewables by 2035.
Renewable energy share: (offshore) wind power, green biogas, energy efficiency.
Key strategies: The vision builds on a long history of leadership on energy and climate change, both at the European level and on the international stage.
Budget and policies are set in place to achieve the national targets (green electricity, green biogas, energy saving in industry and building sector, green mobility), tax relieves policies supporting the modernisation of the heating sector. Budget is also annually allocated for energy and climate-related research.

Note: the country has little energy-intensive industry compared to other Nordic countries. Results: 32% of gross energy consumption from RE in 2017, GHG reduction of 33% compared to 1990 levels, 43% of net energy consumption from wind power.

4. **Frederikshavn (Denmark)**(Energy Cities 2017)

Target: 100% RES community-wide target by 2030.
Renewable energy share: wind, local bioenergy.
Key strategies: Support by all political parties for the strategy was ensured. Biomass is viewed as an opportunity to boost the agricultural sector by developing a new activity as energy supplier. Off-shore wind power is also harnessed, partly through DONG Energy, an 80% state-controlled company. Partnership with the University of Aalborg, businesses and private investors and strong participative approach have been developed. Results: energy production from RES doubled between 2005 and 2015, while energy requirements decreased in the heating (-25%) and electricity (-25%) sectors.

Germany

5. **Frankfurt (Germany)** (Brot für die Welt and World Future Council 2018, Go100RE 2017, IRENA 2019, World Future Council 2019)

Target: 100% RE community-wide target, envisioning 50% energy efficiency increase by 2050.
Renewable energy share: solar PV and thermal, wind, local organic waste for heating and power generation.
Key strategies: Frankfurt's 100 % renewable energy target is closely connected to its climate strategy, which has an ambitious and pioneering vision on sustainability and climate protection: they feature mutually reinforcing components and policy objectives. Collaboration with Fraunhofer ISE to develop a technical scenario; combination between top-down and bottom-up approaches involving citizens and businesses; integrated strategy comprising emissions reduction and increased adoption of renewable energy and energy efficiency technologies.
Note: it is not clear the base year on which the energy efficiency increase is calculated.
Results: between 1990 and 2012, the City managed to reduce its emissions by 15% while the economy grew by over 50%.

6. **City of Osnabrück, City of Rheine and the Counties of Osnabrück and Steinfurt (Germany)** (Go100RE 2017, Osnabrück 2020)

Target: 95% of the region's energy demand with renewable energy, reduce GHG emissions by 95% and final energy consumption by 50% of the 1990 levels by 2050.
Renewable energy share: hydro, wind, biomass, solar.
Key strategies: "Masterplan 100% Climate Protection" region, a comprehensive, large-scale cooperation between neighbouring regions, through offsets and shared accounting of electricity generation and consumption, strong cross-border cooperation (especially in

transportation) between urban centres and hinterlands, cooperation on projects, awareness campaigns and training programmes. Clear definition of tasks and activities among the different local authorities in order to ensure the meeting of the interests of the whole region, as well as to align strategies. Regular meetings and public events (such as an annual regional climate summit) are organised with various partners and stakeholders.
Results: n/a for the region.

7. **Rheinland- Palatinate State (Germany)** (IRENA 2019, Under2Coalition 2020)

Target: achieve climate neutrality by 2050, or at least reduction in the GHG emissions of 90% in comparison with the total emissions for the year 1990 by 2050, with interim steps of 40% reduction by 2020, 100% RE electricity by 2030, climate neutral state government by 2030, climate-neutral building sector by 2050.
Renewable energy share: wind, solar.
Key strategies: aim at a regionally balanced, consumer-oriented and economically viable development of renewable energies in order to further improve the added value and acceptance in the regions of the state; establishment of favourable framework conditions for the further development of renewable energies and to remove obstacles, also via investments in the research and development sector and business sector; an Energy Agency was established to support local capacity building and best practices;
gradual phasing out of nuclear energy by 2022; Climate Protection law; part of the "Climate neutral state government in the Ministry for the Environment" pilot project; strategy regarding the adaptation to climate change with particular focus on local level and synergy with the climate protection strategy.
Results: 50% electricity production from renewable energy in 2018, some districts have already reached 100% renewable electricity including Cochem-Zell and Rhein-Hunsrück-Kreis. The latter produces more energy from RES than it consumes. Many state-owned buildings were retrofitted and equipped with solar PV panels or solar cogeneration units.

Iceland

8. **Iceland** (100%RE Energy Atlas 2020, Iceland CAP 2018, Renew Economy 2012)

Target: 100% community-wide electricity from RES (achieved), carbon neutrality by 2040, with interim target of cutting net emissions by 40% compared to 1990 emissions (National Determined Contribution to meet its Paris Agreement) by 2030.
Renewable energy share: geothermal, large-hydro.
Key strategies: The island´s vast geothermal capacity is also enabling regional cooperation with the UK, with the construction of an interconnector into the UK grid currently under discussion.
Iceland is part of the EU Emissions Trading Scheme, through its commitments under the European Economic Area agreement. The EU-ETS applies primarily to heavy industry and aviation. Discussions are under way between Iceland and Norway and the EU on joint fulfilment of a Paris Agreement target for 2030, by the way of the two countries adopting relevant EU climate regulation for 2020-2030.

The Action Plan consists of 34 Government measures, ranging from an increase in reforestation to a ban on new registration of fossil fuel cars by 2030. It will be put at public consultation and updated systematically.
There is also broad political support for the action plan, as was demonstrated by the fact that it was introduced by seven ministers. The main emphasis of the new plan is on two measures: 1) to phase out fossil fuels in transport, and 2) to increase carbon sequestration in land use, by restoration of woodlands and wetlands, revegetation and afforestation. Climate mitigation measures will get a substantial increase in funding – almost 7 billion Icelandic krónur in the period 2019-2023. A general carbon tax, already in place, will be gradually increased.
Note: Iceland is a volcanic island with plentiful geothermal heat. Energy projects have largely been developed as part of the Icelandic Clean Energy initiatives, a Research Fund, a Technology Development Fund and a Strategic Research Programme, which include the involvement of the Icelandic Ministry of Education, Science and Culture, Ministry of Finance and Economic Affairs and Ministry of Industry & Innovation.
Results: As of 2012: 100% electricity from RES (75% large hydro, 25% geothermal); 87% of heating sector from RES (mainly geothermal energy through an extensive district heating system); altogether, 81% of Iceland's primary energy requirements for electricity, heat, and transportation.

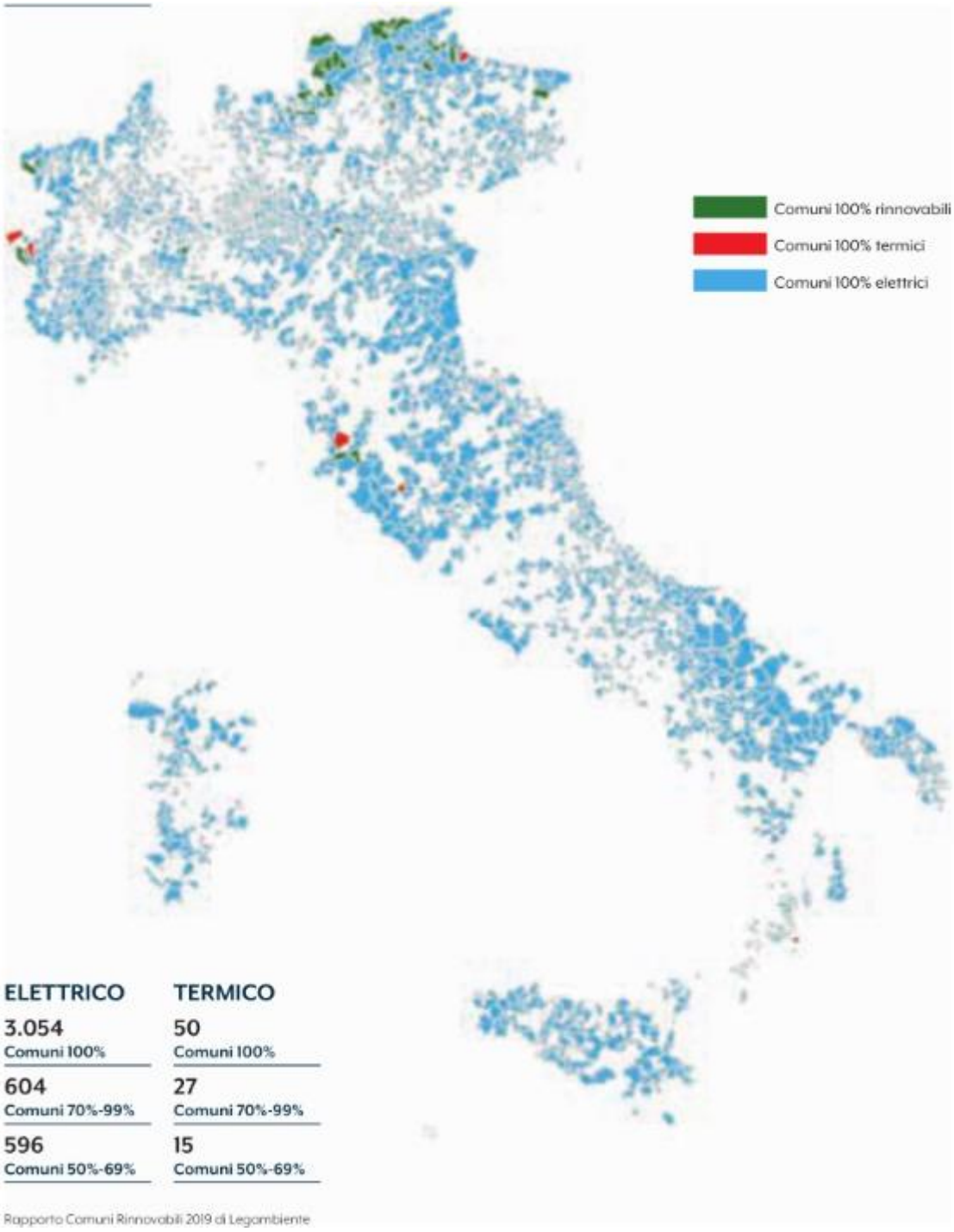
Italy

9. **List of "Renewable Municipalities" (Italy)** (Legambiente 2019).

Target: 100% community-wide RES target.
Renewable energy share: solar PV, hydro, biomass, geothermal.
Key strategies: RES sources have been mostly installed on rooftops and available surfaces, for single family production. District energy systems are widely used. RES diversification and integration. Cooperation with local cooperatives to exploit local resources such as biomass.
Note: As of April 2020, the municipalities are 42: Badia, Brunico, Cantalupo Ligure, Castelnuovo Scrivia, Cavalese, Cesana Torinese, Curon Venosta, Dobbiaco, Edolo, Fierozzo, Fondo, Glorenza, La Thuile, Laces, Lasa, Limena, Mezzano, Monguelfo-Tesido, Monterotondo Marittimo, Montieri, Morgex, Occimiano, Peio, Prato allo Stelvio, Pomarance, Prè-Saint-Didier, Primiero San Martino di Castrozza, Racines, Rasun-Anterselva, Santa Fiora, Sarnonico, Sellero, Silandro, Sondalo, Stelvio, Temu', Tirano, Val di Vizze, Valdaora, Varna, Vipiteno.

As shown in the picture below, another astonishing number of municipalities reached 100%RE targets on electricity or heating/cooling sectors.

Results: Achieved. In several Italian municipalities, 100%RE supply has been reached with an energy mix exceeding the electrical and thermal needs of the residents.



Source: 100%RE municipalities in Italy, divided by target in community-wide (all sectors), electrical or thermal sector (Legambiente 2019).

Norway

10. Norway (NER 2015, Norway 2020)

Target: carbon-neutral by 2030, if emissions cuts are made by other countries, or by 2050 regardless of international emission cuts. Commitment of reducing emissions by at least 40% by 2030, compared to the 1990 levels.
Renewable energy share: hydropower, emissions offsetting.
Key strategies: *"Norwegian climate policy is based on cost efficiency, meaning a significant portion of the cuts will likely be achieved through offsetting with emissions reductions abroad"*.
Note: *"The country's electricity and heating is largely covered by hydropower, leaving transport and oil and gas extraction and processing as the largest emitters"*.
Results: 98 percent of the electricity production comes from renewable energy sources.

Poland

11. Kisielice (Poland) (100%RE Energy Atlas 2020, World Future Council 2019)

Target: 100%RE community-wide.
Renewable energy share: wind, biomass (unused cereal straws from local farmers and corn), solar PV.
Key strategies: Pioneer on the energy transition for Poland, highly dependent on lignite and hard coal, the city developed a strategy aiming at stimulating the local economy, also thanks to a clear political leadership lasted 24 years. Kisielice changed its Spatial Development Plan in 1998 to ensure that the construction of wind turbines did not conflict with existing administrative regulations. The technology used is Three windfarms, a biomass CHP plant, a biogas power plant, and a district heating system. Technical assessments on technical challenges and economic results of the wind projects attracted investors. Strong community engagement measures with transparent participation from different stakeholders and the creation of a local value chain for agricultural scraps.
Results: target of self-sufficiency has been reached in 2014 and four neighbouring municipalities started to cooperate on RES systems, following the example of Kisielice.

Portugal

6. Portugal (ADENE 2018, IEA 2020, Renew Economy 2018)

Target: carbon neutral economy by 2050 with middle-step of 80% RE in electricity by 2030.
Renewable energy share: hydro, wind, solar.
Key strategies: The government needs to ensure that policies will support the development of effective markets to ensure decarbonisation goals are met in a cost effective manner. Alongside its regional partner Spain and the European Commission, Portugal pursues the development of a key transmission infrastructure, including interconnections with neighbouring countries, notably France, to foster electricity and gas markets integration, facilitate renewable energy integration and enhance security of supply.

Note: the role of the natural gas supply in the energy strategy is not clear. Results: Sources and other newsbytes publicise 100% RE target achieved, while sources in the same years report still oil and gas among the main energy sources of the country.

Spain

7. **Spain** (Euractiv 2018, IEA 2020)

Target: 100% RE electricity sector by 2050 and GHG emissions reduction of 90% compared to the 1990 levels; middle-step 70% and GHG emissions reduction of 20% compared to the 1990 levels, by 2030.
Renewable energy share: wind, solar, (nuclear).
Key strategies: Spain will divest from fossil fuels (stop issuing exploration licences, ban fracking and scrap new fossil fuel subsidies) and plans to invest at least 20% of the national budget for climate action.
Note: nuclear energy is included in the energy mix.
Results: 23% electricity from RES and 20% from nuclear energy. Current GHG emissions levels are 17% over the baseline 1990 levels, so the middle-term reduction actually translates into a 37% cut by 2020.

8. **El Hierro Island (Canary Islands, Spain)** (Brot für die Welt and World Future Council 2018, IRENA 2019, World Future Council 2014)

Target: 100% renewable electricity, electrify the transport sector.
Renewable energy share: mostly wind, hydro.
Key strategies: strategy developed considering the island's climate and geology; development of a combined pumped hydro-energy storage system to manage the variability of wind generation and to guarantee the security and the quality of the power supply. Strong political support at the local level, in synergy with regional and national governments, with an integrated vision for the entire archipelago consisting of 1) strengthening and diversifying the local economy; 2) providing energy security; 3) promoting energy efficiency and renewable energies; and 4) protecting the climate and the environment.
Note: target year is not given but the target is almost reached.
Results: The Gorona del Viento wind-pumped-hydro power station is operating since 2015, supplying 46.5% of the electricity needs of the island as of 2017. As of July 2018, 95,9% of the island's electricity was covered by RES, reaching 100% for short periods.

Sweden

12. **Sweden** (IRENA 2019, NER 2015, Sweden 2020)

Target: carbon-neutral with a target of net zero GHG emissions by 2045 and thereafter to achieve "negative emissions"; intermediate targets of 100 %RE electricity production by 2040, vehicle fleet independent from fossil fuel by 2030.
Renewable energy share: hydropower (mostly for electricity production) and bioenergy (for heating), plus wind power, bioenergy and solar.

Key strategies: Step-by-step phasing out from fossil fuels, middle term goals in 2020 and 2030, with strong limitation of growth in energy use over the last decades. The Climate Act policy was adopted by the Swedish government in collaboration with most of the political parties in Sweden and set the obligation for current and future governments to pursue a climate policy in line with goals, present a climate report every year and develop an action plan every 4 years to monitor the process, scrutinised by a politically autonomous Council.
Energy policies promoting RE use, mostly via carbon tax introduced in 1991, as well as green electricity certification, funds allocation to the Swedish solar cell market, investments in RE research (solar power, solar photovoltaics (PV) and solar fuels) through the Swedish Energy Agency and investments to support engagement of private, public and commercial actors.
Note: the country has little energy-intensive industry compared to other Nordic countries; 80% of electricity production in Sweden comes from nuclear and hydroelectric power.
Results: 2020 target of 50% of the country energy demand from RE was reached in 2012 (52.6% share of energy from RE in 2014).
The carbon tax has already affected many sectors such as heating and transport sectors, supporting the emissions to decline by 26%.

13. **City of Malmö (Sweden)** (Energy Cities 2017, Go100RE 2017, ICLEI 2020a, IRENA and ICLEI 2013)

Target: 100% RE of community energy use by 2030 (including electricity, heating and transport, achieved by halving the energy use compared to 2001 levels); climate neutrality with municipal operations run on 100% RE by 2030: with middle-steps of 100% RE district heating supply by 2020.
Renewable energy share: wind, solar, biogas and hydro.
Key strategies: Extremely ambitious vision and integrated strategy ("Energistrategi för Malmö"), even compared to the already ambitious Sweden, transforming the city from an industrial to a renewable capital. Committed local politicians, private investments in RE, strong cooperation with regional stakeholders and a thorough knowledge of the locally available RES enable the environment to reach the goals. The city removed legislative obstacles to wind power and reduced energy demand, increasing the production of local solar energy and cooperates with property owners to facilitate energy efficiency measures in buildings and districts thanks to different measures, including matchmaking between owners and energy suppliers and testing of new business models. Ambitious campaigns of revitalisation and development have been launched by the LG, enabling mixed-use, resource-efficient urban districts to become the norm.
Results: 100%RE supply for municipal operation reached in 2015 (94.5% from power procured by the municipality and 5.5% being self-produced, largely through wind power); 23% of total energy production from RE as of 2017; reduction both of the total as well as per capita energy consumption. One of the target was to reduce GHG by at least 40% by 2020 compared to 1990, and it was almost already reached by 2014.

14. Stockholm (Sweden) (IRENA 2019)
Target: 100%RE in public transport sector by 2030.
Renewable energy share: biogas from sewage sludge, biofuels (see chapter 3).
Key strategies: step-by- step informed long-term strategy, deploying different technology types for different transport objectives.
Notes: Biofuels are listed among the RES but several concerns are posed (see chapter 3)
Results: The size of the regional public transport system was sufficient for a national bus manufacturing company to develop new fuel systems and engine technologies for it.
As of 2018, a first part of public transport (all trains, subways and more than 2.300 buses) is operating on 100% RES.

15. Växjö (Sweden) (Brot für die Welt and World Future Council 2018, Go100RE 2017)
Target: fossil fuel-free city in order to eliminate climate impact and fossil fuel dependency, 100% RES by 2030.
Renewable energy share: local biomass, geothermal energy, district heating network.
Key strategies: high ambition and early pioneer in RE integration in the community; methodical process of monitoring and reporting performance.
Results: renewable energy use since 1980; 64% RE as of 2015 and 54% pro-capita greenhouse gas (GHG) emissions decrease compared to 1993 levels.

North America

1. **Hawaii (USA)** (IRENA 2019, Hawaii 2020, Sierra Club 2020)

Target: 100% of power sector on RES (become energy self-sustaining) by 2045, with middle-steps at 30% RE by 2010.
Renewable energy share: solar, wind, geothermal, hydro, ocean, biomass and biofuels.
Key strategies: The Hawaiian 21st Century energy agenda is based on the following five principles: (1) Diversifying the energy portfolio (2) Connecting and modernizing the grids (3) Balancing technical, economic, environmental and cultural considerations (4) Leveraging Hawaii's position as an innovation test bed (5) Creating an efficient marketplace that benefits producers and consumers.
First US state to set 100%RE target for the whole power sector; holistic approach in all kinds of energy policy making decisions made by the government, utilities and consumers; additional law measures that provide for community-based renewable energy farms and set net-zero energy goals for the University of Hawaii System.
The law Hawaii Clean Energy Initiative (HCEI) requires all utilities to generate 100% of their electricity from RES by 2045.
Note: Sierra Club reports the target as only referring to electricity sector, but both the other sources report the entire power sector.
Results: 26.6% of energy consumption from RES in 2016. The strategy supported the creation of a robust clean energy industry, accelerating innovation and stimulating economic growth. Clean transportation sector is particularly developed: there are over 5,000 Electric Vehicles (EVs) on Hawaii's roads, supported by over 530 publicly available

charging stations statewide as of 2020. Investment on smart infrastructures and next generation technologies have been made.

2. **San Francisco (California, USA)** (IRENA 2019, Sierra Club 2020, World Future Council 2014)

Target: 100% electricity use from RES by 2030.
Renewable energy share: hydro, solar PV, biogas from wastewater treatment plant
Key strategies: The strategy focuses on 3 components: improving energy efficiency; increasing distributed RE generation within the City; providing all San Francisco electricity customers with a 100% RE power purchasing option from new or existing electricity providers.
Note: Sources are not unanimous in sharing the commitment. Some mention 100%RE as intermediate step to achieve "GHG free electricity mix by 2030"
Results: While the primary focus of the strategy is on electricity, San Francisco has also undertaken a range of efforts in the transportation and heating sectors. Among the activities, a program called CleanPowerSF was launched to establish a Community Choice Aggregator (CCA), a new business model designed to provide all residential customers in San Francisco with a 100 % renewable energy supply option.

3. California (USA) (ICLEI 2020a, IRENA 2019, Sierra Club 2020)

Target: 100% clean electric power by 2045, with middle steps of 50% RE by 2026 and 60%RE by 2030 (see note below).
Renewable energy share: "eligible renewable energy resources" and "zero-carbon resources" are mentioned but not defined in the policy, yet they include nuclear power (see note below).
Key strategies: The policy Senate Bill 100 (also known as "The 100% Clean Energy Act of 2018") was adopted in 2018, requiring, among other things, that Public Utilities Commission, State Energy Resources Conservation and Development Commission and State Air Resources Board plan for 100% of total retail sales of electricity in California by 2045.
Note: nuclear power is currently allowed in the Policy as "clean energy", despite many stakeholders are advocating not to consider it for the remaining share of the target.
Results: 32% of retail energy sales were powered by RES in 2017; around 11 gigawatts (GW) renewable energy capacity from solar energy installed as of late 2018.

4. City of Aspen (Colorado, USA) (ICLEI 2020a, NREL 2015, Sierra Club 2020)

Target: 100%RE of municipally-owned utility (Aspen Electric) by 2015.
Renewable energy share: 53% wind, 46% hydro, solar and 1% landfill gas.
Key strategies: After a decade of continued investments in renewable energy, in August 2015, the municipally-owned electric utility achieved 100% RE by signing a contract with the Municipal Energy Agency of Nebraska, a wholesale electric energy provider. Over

6,000 customers in Aspen now receive renewable, clean energy while still paying some of the lowest electricity rates in the state of Colorado. This reduced the city carbon footprint and catalyzed renewable energy development in the western United States.
Note: It is not clear whether the utility provides the whole community.
Results: Through a combination of city-owned and operated hydroelectric projects and power purchase contracts, approximately three-quarters of Aspen's electricity were sourced from renewables by 2014. Sierra Club reports 100% achievement by 2015.

5. **State of New York (USA)** (New York 2020, Sierra Club 2020)

Target: 50% RES and GHG emissions reduced by 85% and 600 trillion Btu increase in statewide energy efficiency from 1990 levels economy-wide by 2050, with intermediate steps of 40% GHG emissions reduction by 2030, 100% carbon free electricity by 2040, 70% electricity from RES and 3000MW energy storage by 2030
Renewable energy share: off-shore wind, distributed solar, hydropower and biomass
Key strategies: On July 18, 2019, Governor Andrew Cuomo signed into law the Climate Leadership and Community Protection Act (CLCPA), to coordinate the Reforming the Energy Vision (REV).
REV aimes at "creating a stronger and healthier economy by stimulating a vibrant private sector market to provide clean energy solutions to communities and individual customers throughout New York".
The CLCPA mandates New York achieve the above mentioned targets; requires 35% of climate adaptation benefit frontline communities through efficiency, renewable energy, jobs programs and more; protects disadvantaged communities by requiring an air quality monitoring program and prohibits carbon offsets for the electric, transportation and building sectors.
Among others, the CLCPA requires all state agencies to identify alternatives or GHG mitigation measures to be requires in case permits, licences or other approvals are inconsistent or interfere with achieving the targets.
Energy storage, distributed solar and energy efficiency measures, as well as social consideration and investments favouring disadvantaged communities are considered in the strategy.
Results: 25% electricity from RES in 2014.
Several projects, initiatives policy and investments to support the energy transition have been developed in many sectors

List of 100%RE targets (United States of America)(Sierra Club, 2020)

Target: 100% community-wide RE targets
Renewable energy share: n/a
Key strategies: Numerous cities are committing through initiatives like the Global Covenant of Mayors (GCoM 2020) or "We are still in", or establishing their climate action

plans independently. A city commitment to 100% renewable energy is a mandate for action.

Note: Across the U.S. over 150 cities, more than ten counties and seven states, have already adopted some 100% RE energy goals. The list is reported below, as per reference on 28 April 2020.

From the cities and towns of the list, 32 commit to 100%RE target for all sectors and community-wide, 90 only for electricity sector, 34 for electricity, heating and transport sectors, 1 for building and transportation sectors only. 5 of the cities mention also the governmental operation energy demand to be met with RES and 1 mentions the need to ensure access to energy and includes social aspects in the commitment. Only one city (Norman, OK) includes energy efficiency measures in its target. None foresees consumption reductions measures.

Results: Six cities in the U.S.--Aspen, Burlington, Georgetown, Greensburg, Rock port, and Kodiak Island--have already hit their targets (see list at the next subchapter).

List of cities:

1. **Abita Springs**, LA is committed to transition 100% of the town's electricity to renewable energy sources by December 31, 2030.
2. **Alta**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
3. **Ambler Borough**, PA is committed to is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
4. **Amherst**, MA is committed to enabling a community-wide transition to 100% clean, renewable energy and is calling on the State of Massachusetts to adopt a statewide goal of 100% renewable energy.
5. **Angel Fire**, NM is committed to achieving 100% renewable electricity by 2030.
6. **Apex**, NC is committed to 100% clean, renewable energy by 2050.
7. **Arlington**, VA is committed to 100% renewable electricity community-wide by 2035, and for County government operations by 2025.
8. **Athens**, GA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050. .
9. **Atlanta**, GA is committed to achieving 100% renewable electricity by 2035.
10. **Augusta**, GA is committed to achieving 100% renewable electricity by 2050.
11. **Berkeley.** The City of Berkeley, CA is committed to transitioning to 100% clean, carbon-free energy by 2030, including electricity, transportation and buildings, by 2030.
12. **Blacksburg.** In December 2017, Blacksburg, VA City Council adopted a goal of transitioning to 100% renewable electricity community-wide by 2050.
13. **Bluffdale**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
14. **Boise**, ID is committed to 100% clean, renewable electricity community-wide by 2035 and adopted "Boise's Energy Future" plan as a roadmap toward its goal.
15. **Boulder.** In December of 2016, Boulder, CO, City Council made the commitment to 100% renewable electricity by 2030!

16. **Breckenridge**, CO is committed to powering municipal operations with 100% renewable energy by 2025, and a goal of 100% renewable electricity community-wide by 2035.
17. **Cambridge.** In April 2017, Cambridge, MA committed to transition 100% clean and renewable energy community-wide, including building energy use and transportation, by 2035.
18. **Castle Valley**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
19. **Chapel Hill**, NC is committed to 100% clean, renewable energy community-wide by 2050.
20. **Cheltenham Township**, PA is committed to 100% clean, renewable electricity by 2030 and 100% renewable energy for heat and transportation by 2050.
21. **Chicago**, IL is committed to transitioning to 100% clean, renewable electricity for all buildings by 2035 and to a 100% renewable, electric bus fleet by 2040.
22. **Chula Vista**, CA, is committed to 100% renewable electricity community-wide by 2035.
23. **Cincinnati**, OH is committed to transitioning to 100% renewable electricity community-wide by 2035.
24. **Clarkston**, GA is committed to a community-wide goal of transitioning to 100% renewable energy by 2050. .
25. **Cleveland**, OH is committed to 100% clean, renewable electricity by 2050.
26. **Coalville**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
27. **Columbia**, SC is committed to transitioning to 100% renewable electricity by 2036.
28. **Concord**, NH, commits to 100% renewable electricity by 2030 and for all energy sectors, including heat and transportation by 2050.
29. **Conshohocken Borough**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
30. **Cornish**, NH is committed to 100% renewable electricity by 2030, and 100% renewables for heat & transportation by 2050.
31. **Cottonwood Heights**, UT is committed to 100% clean, renewable energy for city operations by 2022 and community-wide by 2032.
32. **Culver City.** In 2019, when the LA County Community Choice Energy Program, Culver City, CA, residents and businesses will all be powered by 100% renewable energy.
33. **Del Mar**, CA is committed to achieving 50% renewable electricity by 2020, and 100% by 2035.
34. **Denton**, TX is committed to achieving 100% renewable electricity community-wide as early as 2020.
35. **Denver**, CO is committed to transitioning to 100% renewable electricity community-wide by 2030.
36. **Downingtown**, PA commits to 100% clean renewable energy by 2035 and 100% renewable energy for heat and transportation by 2050.
37. **Dunedin**, FL is committed to 100% clean, renewable energy by 2050.
38. **Durango**, CO is committed to 100% clean, renewable electricity by 2050.
39. **Eagle Nest**, NM is committed to achieving 100% renewable electricity by 2030.

40. **East Bradford**, PA is committed 100% clean, renewable electricity by 2035 and 100% renewable energy for heat and transportation by 2050.
41. **East Hampton**, NY is committed to achieving 100% renewable electricity by 2022 and 100% renewable heating, cooling and transportation by 2030.
42. **East Pikeland Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
43. **Eau Claire**, WI is committed to transitioning to 100% renewable energy by 2050.
44. **Edmonds**, WA, is committed to 100% renewable energy for the City's community electricity supply by 2025, and 100% renewable energy for municipal facilities by 2019.
45. **Emigration Canyon**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
46. **Encinitas**, CA adopted a comprehensive Climate Action Plan, with a goal to transition to 100% clean, renewable energy by 2030.
47. **Eureka.** The City of Eureka, CA is committed to transitioning to 100% renewable electricity community-wide by 2025.
48. **Evanston**, IL is committed to 100% clean, renewable electricity community-wide by 2030 and carbon neutrality across all sectors by 2050.
49. **Fayetteville,** AR is committed to powering all government operations with 100% clean, energy by 2030 and the entire community by 2050.
50. **Fort Collins**, CO is committed to 100% clean, renewable electricity community-wide by 2030.
51. **Francis**, UT is committed to 100% clean, renewable electricity by 2030.
52. **Fredericksburg**, VA is committed to 100% renewable electricity community-wide by 2050, and for municipal operations by 2035.
53. **Frisco**, CO is committed to 100% clean, renewable electricity community-wide by 2035.
54. **Gainesville**, FL is committed to 100% clean, renewable electricity and net zero greenhouse gas emissions community-wide by 2045.
55. **Golden**, CO is committed to 100% clean, renewable electricity community-wide by 2030 and 100% renewable energy for heating and transportation by 2050.
56. **Goleta**, California, is committed to 100% clean, renewable electricity for municipal facilities and community-wide supply by 2030.
57. **Hanover**, NH is committed to a community-wide goal of transitioning to 100% renewable electricity by 2030 and a 2050 goal of transitioning heating and transportation to run on clean, renewable sources of energy.
58. **Haverford Township**, PA is committed 100% clean, renewable electricity by 2035 and 100% renewable energy for heat and transportation by 2050.
59. **Helena**, MT is committed to 100% clean, renewable electricity community-wide by 2030.
60. **Hillsborough**, NC commits to transition to 100% clean, renewable energy for all sectors by December 31, 2050 or sooner and 80% clean, renewable energy by 2030.
61. **Holladay**, UT is committed to 100% clean, renewable electricity by 2030.
62. **Ivins**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
63. **Kamas**, UT is committed to 100% clean, renewable electricity by 2030.

64. **Kansas City**, MO is committed to 100% clean, renewable energy community-wide
65. **Kearns**, UT is committed to 100% clean, renewable electricity by 2030.
66. **Keene**, NH is committed to 100% clean, renewable electricity community-wide by 2030 and 100% renewable energy for heating and transportation by 2050.
67. **Kennett Township**, PA is committed to transition to 100% clean and renewable energy community-wide by 2035 and 100% renewable energy for heat and transportation by 2050 (note: the first commitment seems to be only electricity)
68. **La Crosse**, WI is committed to 100% clean, renewable energy community-wide by 2050.
69. **La Mesa**, CA is committed to transition to 100% renewable electricity by 2035.
70. **Lafayette**, CO is committed to transition to 100% renewable energy by 2030 (note: the commitment seems to be only electricity as the mayor further pledges for "community-wide transition to 100%RE).
71. **Lakewood**, OH is committed to 100% clean, renewable energy community-wide by 2035.
72. **Largo**, FL is committed to transition the community-wide energy supply to 100% clean and renewable energy for all, and to transition the municipal energy supply to 100% clean and renewable energy by 2035 with 50% by 2030.
73. **Longmont**, CO is committed to 100% clean, renewable electricity community-wide by 2030.
74. **Los Angeles**, CA is committed to 100% clean, renewable electricity community-wide by 2045 and 100% carbon reduction across all sectors by 2050.
75. **Louisville**, KY is committed to 100% clean, renewable energy community-wide by 2040.
76. **Lowell**, MA has committed to transitioning to 100% renewable energy by 2035.
77. **Madison**, WI has committed to transitioning to 100% renewable electricity community-wide by 2050.
78. **Menlo Park**, CA has committed to transitioning to 100% renewable electricity community-wide by 2030, and is setting the example today by already powering all municipal operations with 100% renewable energy.
79. **Middleton**, WI is committed to transitioning to 100% renewable electricity by 2040 and 100% renewable energy sources for all energy sectors by 2050.
80. **Millcreek**, UT is committed to 100% clean, renewable electricity by 2030.
81. **Milwaukie**, OR is committed to 100% clean, renewable energy community-wide by 2035 and carbon neutrality across all sectors by 2050.
82. **Minneapolis**, MN has committed to 100% renewable electricity for municipal facilities and operations by 2022, and 100% renewable electricity for community-wide by 2030.
83. **Missoula**, MT is committed to 100% clean, renewable electricity community-wide by 2030.
84. **Moab**, UT is committed to transitioning to 100% renewable electricity by 2032.
85. **Monona**, WI is committed to 100% clean, renewable electricity community-wide by 2040 and for all energy sectors, including heat and transportation, by 2050.
86. **Monterey**, CA is committed to transition to renewable electricity community-wide by 2040.

87. **Narberth Borough**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
88. **Nederland**, CO is committed to 100% clean, renewable electricity community-wide by 2025.
89. **Nevada City**, CA commits to transition to 100% renewable energy for its community electricity supply by 2030, and 100% renewable energy in all sectors including transportation and heating systems by 2050!
90. **New Brunswick**, NJ is committed to 100% clean, renewable electricity community-wide by 2035.
91. **Norman**, OK committed to 100% clean energy in the form of wind, solar, energy efficiency measures and other renewable sources within the electricity sector by 2035 and all energy-use sectors including heating and transportation by 2050.
92. **Norristown Borough**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
93. **Northampton**, MA is committed to enabling a community-wide transition to 100% clean, renewable energy and is calling on the State of Massachusetts to adopt a statewide goal of 100% renewable energy.
94. **Oakley**, UT is committed to 100% clean, renewable electricity by 2030.
95. **Ogden**, UT is committed to 100% clean, renewable electricity by 2030
96. **Ojai**, CA is committed to 100% clean, renewable electricity by 2019.
97. **Orem**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
98. **Orlando**, FL is committed to 100% clean, renewable energy by 2030 and community-wide 100% clean electricity by 2050.
99. **Oxnard**, CA is committed to 100% clean, renewable electricity by 2019 (note: it is not clear if the target has been reached).
100. **Palo Alto.** Since 2013, Palo Alto, CA's electricity is 100% carbon neutral (note: this city seems to be placed in the wrong list, it should rather go in the achieved target).
101. **Park City**, UT is committed to transition to 100% renewable electricity by 2032.
102. **Petoskey**, MI is committed to 100% clean, renewable electricity community-wide by 2040.
103. **Philadelphia**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
104. **Phoenixville**, PA commits to transition to 100% clean and renewable electricity by 2035 and 100% renewable energy for heat and transportation by 2050.
105. **Plainfield**, New Hampshire is committed to 100% renewable electricity by 2030, and 100% renewable energy for heat & transportation by 2050.
106. **Plymouth Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.

107. **Portland**, Oregon is committed to transition to 100% renewable electricity community-wide by 2035, and to meet all energy needs, including transportation, heating and cooling, and electricity, with 100% renewable energy by 2050.
108. **Portola Valley**, CA is committed to 100% clean, renewable electricity by 2019. (note: it is not clear if the target has been reached)
109. **Pueblo**, CO is committed to transitioning to a healthy, affordable 100% RE system with greater community control and equitable access by 2035.
110. **Questa** is committed to achieving 100% renewable electricity by 2030.
111. **Radnor Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
112. **Reading**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
113. **Red River** is committed to achieving 100% renewable electricity by 2030.
114. **Rolling Hills Estates**, CA is committed to 100% clean, renewable electricity by 2019 (note: it is not clear if the target has been reached).
115. **Safety Harbor**, FL is committed to 100% clean, renewable energy community-wide by 2050.
116. **Salt Lake City**, Utah is committed to achieving 100% renewable energy for community electricity supply by 2032 and 50% renewable electricity for municipal operations by 2020
117. **San Buenaventura (Ventura)**, CA is committed to 100% clean, renewable electricity by 2019. (note: it is not clear if the target has been reached)
118. **San Diego** is committed to 100% renewable electricity by 2035.
119. **San Francisco** is committed to achieving 100% renewable electricity by 2030.
120. **San Jose**, CA is committed to achieving 100% renewable electricity by 2050.
121. **San Luis Obispo** is committed to 100% carbon-free, clean electricity by 2035.
122. **Santa Barbara.** The City Council approved a measure that establishes a community-wide goal of transitioning to 100 percent renewable electricity by 2030. The resolution also commits the city to transition all municipal buildings and operations to 50 percent clean electricity by 2020.
123. **Santa Monica**, CA is committed to 100% clean, renewable energy by 2019 (note: the commitment seems to be only electricity as the mayor further pledges for "community-wide transition to 100%RE; it is not clear if the target has been reached).
124. **Sarasota**, FL is committed to achieving 100% zero-emission, renewable electricity by 2045.
125. **Satellite Beach**, FL is committed to 100% clean, renewable electricity community-wide by 2050.
126. **Schuylkill Township**, PA is committed to is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
127. **Silverthorne**, CO is committed to 100% clean, renewable electricity community-wide by 2035.
128. **Solana Beach** has committed to transition to 100% renewable electricity community-wide by 2035.

129. **South Lake Tahoe** is committed to transitioning entirely to renewable sources of electricity by 2032.
130. **South Miami** , Florida is committed to 100% clean, renewable energy community-wide by 2040 (note: the commitment seems to be only electricity as the mayor further pledges for "community-wide transition to 100%RE)
131. **South Pasadena**, CA is committed to 100% clean, renewable electricity by 2019.
132. **Southampton** the town has committed to meet 100% of the community-wide electricity consumption needs through renewable energy sources by the year 2025.
133. **Spokane**, WA is committed to transitioning 100% clean, renewable energy for the City's community electricity supply by 2030.
134. **Springdale**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
135. **Springfield Township** in Montgomery County, PA is committed to 100% clean, renewable electricity by 2035.
136. **St. Louis**, Missouri, commits to transition to 100% clean energy in the form of wind and solar and energy efficiency measures within the electricity sector by 2035.
137. **St. Louis Park**, MN is committed to transitioning to 100% renewable electricity by 2030.
138. **St. Paul**, MN is committed to 100% renewable electricity community-wide by 2030.
139. **St. Petersburg** is committed to transitioning to 100% renewable electricity.
140. **State College**, PA is committed to 100% clean, renewable energy community-wide by 2050.
141. **Tallahassee**, FL is committed to 100% clean, renewable energy community-wide by 2050 and for all city operations by 2035.
142. **Taos**, NM is committed to transitioning its electricity to 100% renewable energy by 2030.
143. **Taos Ski Valley** is committed to achieving 100% renewable electricity by 2030.
144. **Thousand Oaks**, CA is committed to 100% clean, renewable electricity by 2019.
145. **Traverse City** , MI is committed to 100% clean, renewable electricity by 2040.
146. **Treddyffrin Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
147. **Truckee, CA.** The Townis committed to achieve 100% renewable electricity for municipal facilities by 2020, 100% renewable electricity town wide by 2030, as well as all energy sources by 2050 (note: there seem to be a typo for the long-term commitment – it seems to be for all energy sectors rather than sources).
148. **Upper Merion Township**, PA is committed to 100% clean, renewable electricity community-wide by 2030 and 100% renewable energy for heating and transportation by 2040.
149. **Uwchlan Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.

150. **West Chester**, Pennsylvania, is committed to transition community-wide to 100% clean renewable electricity by 2035 and 100% renewable energy for heat and transportation by 2050
151. **West Hollywood**, CA is committed to 100% clean, renewable electricity by 2019.
152. **West Jordan**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
153. **West Valley City**, UT is committed to 100% clean, renewable electricity community-wide by 2030.
154. **West Vincent**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and for heating and transportation by 2050.
155. **Whitemarsh Township**, PA is committed to 100% clean, renewable electricity community-wide by 2035 and 100% renewable energy for heating and transportation by 2050.
156. **Windsor, MA.** The town has committed to 100% renewable electricity community-wide.

List of 100%RE achievements (United States of America)(Sierra Club, 2020)

Target: 100% community-wide RE targets
Renewable energy share: n/a
Key strategies: Numerous cities are committing through initiatives like the Global Covenant of Mayors (GCoM 2020) or "We are still in", or establishing their climate action plans independently. A city commitment to 100% renewable energy is a mandate for action.
Note: The list is reported below, as per reference on 28 April 2020. The communication for these cities mentions "100% energy use community-wide from clean, non-polluting and renewable sources", while they all achieved only 100%RES in electricity sector and the sustainability and environmental impact is not clear: the type of RES used has not been assessed.
Results: Six cities in the U.S.--Aspen, Burlington, Georgetown, Greensburg, Rock port, and Kodiak Island--have already hit their targets. These six cities now generate 100% of the electricity used community-wide from renewable sources.
List of cities:

1. **Aspen, CO.** As of 2015, Aspen, CO is powered by 100% renewable electricity - a mix of approximately 50% wind, 45% hydropower, and the remaining 5% from solar and landfill gas.
2. **Burlington, VT** As of 2014, Burlington, VT is powered by 100% renewable electricity.
3. **Georgetown, TX** As of 2018, Georgetown, TX is powered by 100% renewable electricity.
4. **Greensburg, KS** As of 2013, Greensburg, KS is powered with 100% renewable electricity.
5. **Kodiak Island, AK.** Since 2012, Kodiak Island, AK is powered by 100% renewable electricity.

6. **Rock Port, MO** is powered by 100% wind energy (note: it seems to be only referring to electricity sector).

List of counties with 100%RE target (United States of America)(Sierra Club, 2020)

Target: 100% RE targets (various types)
Renewable energy share: n/a
Key strategies: Numerous cities are committing through initiatives like the Global Covenant of Mayors (GCoM 2020) or "We are still in", or establishing their climate action plans independently. A city commitment to 100% renewable energy is a mandate for action.
From the counties of the list, 7 commit to 100%RE target for electricity sector, 6 for all sectors. None includes energy efficiency or consumption reductions measures in its target.
Note: The list is reported below, as per reference on 28 April 2020.
List of counties:

1. **Buncombe County**, North Carolina, commits to the goal of 100% clean, renewable energy for municipal operations by 2030, and for the larger community and county by 2042.
2. **Floyd County**, VA adopted a commitment to 100% clean, renewable energy on October 24, 2017.
3. **Grand County**, UT is committed to 100% clean, renewable electricity by 2030.
4. **Multnomah County**, OR is committed to transition to 100% renewable electricity community-wide by 2035, and to meet all energy needs, including transportation, heating and cooling, and electricity, with 100% renewable energy by 2050.
5. **Orange County**, NC. Board of Commissioners passed a resolution committing the County, the State, and the United States to a 100% clean renewable energy for all energy sectors-based economy, by January 1, 2050 or sooner.
6. **Pueblo County**, CO is committed to 100% renewable electricity county-wide by 2035.
7. **Salt Lake County**, UT is committed to 100% clean, renewable electricity by 2030.
8. **Summit County**, CO adopts a resolution for 100% clean, renewable energy community-wide by 2035.
9. **Summit County**, Utah, is committed to transition to net-100% renewable electricity across the county by 2030.
10. **Taos County** is committed to achieving 100% renewable electricity by 2030.
11. **Ventura County**, CA has committed to 100% clean, renewable electricity by 2019 through community choice aggregation for all unincorporated areas of the county.
12. **Wake County**, NC has committed to 100% clean, renewable energy across all energy sectors by 2050.
13. **Whatcom County**, WA adopted an ordinance that commits the County to transition County Operations and the larger Whatcom County community to 100% renewable electricity.

List of states, districts and territories with 100%RE target (United States of America)(Sierra Club, 2020)

Target: 100% RE targets (various types)
Renewable energy share: n/a
Key strategies: Numerous cities are committing through initiatives like the Global Covenant of Mayors (GCoM 2020) or "We are still in", or establishing their climate action plans independently. A city commitment to 100% renewable energy is a mandate for action.
From the states, districts and territories of the list, 6 commit to 100%RE target for electricity sector, 4 for electricity, heating and transport sectors. Only one (State of New York) includes energy efficiency or consumption reductions measures in its target.
Note: The list is reported below, as per reference on 28 April 2020.
List of states, districts and territories:

1. **California** is the second state in the U.S. to set a state-wide goal of 100% renewable electricity by 2045 (see focus above under "North America").
2. **Hawaii** is the first state in the U.S. to set a state-wide goal of 100% renewable electricity by 2045 (see focus above under "North America – note: Hawaii committed to 100% community-wide energy use, not only electricity sector).
3. **Maine.** In June 2019, Maine adopted a new Renewable Portfolio Standard (LD 1494), committing the state to 80 % renewable energy by 2030 and 100 % by 2050.
4. **Nevada**. SB358 was passed unanimously by both the Senate and Assembly in 2019, setting the goal of 50% renewable electricity statewide by 2030, & 100% clean energy by 2050.
5. **New Mexico.** In March 2019, New Mexico adopted the Energy Transition Act (SB 489), which requires electricity generation in the state to be 80% renewable by 2040, and 100% carbon-free by 2045.
6. **New York.** On July 18, 2019, Governor Andrew Cuomo signed into law the Climate Leadership and Community Protection Act, which mandates New York reduce 85% greenhouse gas emissions economy-wide by 2050; sources 70% of electricity from renewables, like wind and solar, by 2030; achieves a 100% carbon-free electric sector by 2040; requires 35% of climate adaptation benefit frontline communities through efficiency, renewable energy, jobs programs and more; protects disadvantaged communities by requiring an air quality monitoring program and prohibits carbon offsets for the electric, transportation and building sectors (see focus above under "North America).
7. **Puerto Rico.** The Puerto Rico Energy Public Policy Act, adopted in 2019, established a territory-wide goal of 100% clean, renewable electricity by 2050. The Puerto Rico Energy Diversification Public Policy Act, adopted in 2019, establishes the goal of obtaining 100% of electricity from clean and renewable sources.
8. **Virginia.** On March 6, 2020, Virginia's Clean Economy Act passed, mandating the state's utilities transition to 100% clean, renewable energy no later than 2050. The bill promises to make the state a leader in offshore wind and energy storage and

includes provisions to cap energy bills for low-income households, alleviating energy burden.

9. **Washington** In 2019, the Washington State legislature passed Senate Bill 5116, which mandates an equitable transition to 100 percent clean electricity generation for the entire state by 2045.
10. **Washington D.C..** As part of the the Clean Energy D.C. Omnibus Act of 2018 -- Washington, DC is committed to achieve 100% clean, renewable electricity supply across the district, including the White House, by 2032.

Oceania

Australia

1. **Australian Capital Territory (ACT) (Australia)** (ACT 2020, ICLEI 2020a, Go100RE 2017)

Target: 100%RE on electricity sector by 2020; zero emissions government operations by 2040; GHG emissions reduction of 100% on 1990 levels by 2045, with interim targets of 40% by 2020, 50-60% by 2025, 65-75% by 2030, 90-95% by 2040 (see note below).
Renewable energy share: community solar, wind power and energy from waste.
Key strategies: ACT uses a series of innovative large-scale reverse auctions to deliver RE to the territory at the lowest possible cost. By providing a fixed price of energy for the next 20 years to renewable energy project developers, ACT was able to unlock private sector investments in renewable energy. New investments in research, education and local business development are also diversifying the economy.
Note: In the ACT Climate Change Strategy 2019-2025, there seems to be a miscommunication on the 2040 target: rather than "net zero emissions" as it is communicated, the text of the strategy seems to commit to the achievement of a reduction of 100% compared to the 1990 emissions level; also in the communication on Canberra's target (ACT 2016) the title implies a comprehensive target while it is only on electricity sector.
Results: 18.5% RE on electricity as of 2014-15; 23% emissions reduction on 1990 levels per 2016-2017 GHG emissions inventory.

2. **Byron Shire Council (Australia)** (Byron Shire Council 2020, Go100RE 2017, ICLEI 2020)

Target: 100% total installed capacity of renewable energy by 2025 at the community scale for the sectors of energy, waste, buildings, land use and transport.
Renewable energy share: biomass, hydro, solar.
Key strategies: strong institutional arrangements to support 100% RE strategy development and implementation, with the creation of sectoral working groups on energy, waste, buildings, land use and transport and involvement of the community; energy efficiency and emissions reduction strategy.
Note: the target is given in installed capacity in some sources, while the resolution is reported as carbon neutral in the official website – in doubt, the most conservative approach has been reported.
Results: Zero Emissions Byron (ZEB) project runs to support the strategy; community-owned clean energy generator focusing on solar photovoltaic.

3. **South Australia (Australia)** (IRENA 2019, Renewables SA 2020)

Target: net-zero emissions by 2050.

Renewable energy share: wind, solar, biomass.

Key strategies: The State provides incentives for investors on wind energy, including wind resource data, electricity network information, initial access to government-owned land, streamlined and coordinated processes of approval and licensing and financial support through the federal government's renewable energy certificate scheme. The state commissioned to a third party the analysis of the bioenergy potential and developed an bioenergy biomass, planning to provide incentives on research, industry discussions and funding for the development of bioenergy projects. A further "Hydrogen Roadmap for SA" is not accessible in the government's website.

Areas of focus include:

- large-scale renewable energy generation and storage, such as wind, solar thermal, solar PV, bioenergy, battery, pumped hydro and thermal storage
- demand-side energy such as rooftop solar, bioenergy, distributed storage, energy efficiency and demand management
- hydrogen production, use and export
- uptake of zero emission vehicles and investment in charging and refueling infrastructure
- supply-chain development of low carbon technologies
- research and industry partnerships in low carbon technologies.

Note: the strong focus on large size plants, biomass and hydrogen use should be further explored.

Results: all targets set on RES generation were reached earlier than expected, the last being 50% of electricity generation from RES in 2017. Considering the committed and potential RES developments, the Australian Energy Market Operator (AEMO) expects the achievement of a share of 73% renewable electricity by 2021 and the equivalent of 100% by 2025.

The rapid growth of variable renewable energy (VRE) occurred without a strategic plan for large-scale grid integration and caused a whole-state blackout to happen following a number of events occurring at the same time, which led to the implementation of alternative technical solutions (including fossil fuel based backup system and storage systems) as well as improvements in forecasting in order to avoid the same to happen again. A nation's integrated system plan is now available.

4. **Sydney (Australia)** (World Future Council 2014, Sydney 2020)

Target: 100% RES community-wide (electricity, heating and cooling) by 2030.

Renewable energy share: bioenergy (biomass, biogas as well as waste from forestry and agriculture), solar PV, wind.

Key strategies: strong emphasis on bioenergy and tri-generation technologies (integrated production of heating, electricity and cooling). The City identified 13 enabling actions to

implement the strategy, developing a detailed mapping analysis of the city to ensure robust and data-driven measures.
Results: After the city declared the state of climate emergency, in July 2020 a new agreement with innovative renewable energy company Flow Power will ensure that all City of Sydney operations, including pools, sports fields, depots and buildings, including the historic Sydney Town Hall, will be powered by 100% RES.

Indonesia

5. **Sumba Island (Indonesia)** (100%RE Energy Atlas 2020, Brot für die Welt and World Future Council 2018, Sumba Iconic Island 2020, World Future Council 2014)

Target: 100% RES community-wide and electrification of 95% of the island by 2025.
Renewable energy share: solar PV, biogas, mini-hydro.
Key strategies: The 100% RE strategy is part of a broader strategy to empower local residents, spur economic development and support public services such as electrification. The Indonesian Ministry of Energy has taken responsibility for the implementation of the strategy and efforts are now underway to increase both domestic as well as foreign investments. Both the Asian Development Bank as well as the Dutch and Norwegian governments have financially contributed to support the initiative. Partnership with a Dutch global energy consultancy company to assess the RES potential and with Hivos, a local NGO, led a series of stakeholder engagement initiatives.
Results: 10% electricity from RES, 40% of the population has access to energy.

Philippines

6. **Palauan (Philippines)** (100%RE Energy Atlas 2020, Go 100 Percent 2020)

Target: 100% RES community-wide by 2025.
Renewable energy share: mainly hydro, geothermal and biomass.
Key strategies: promote access to electricity, increase reliability and local jobs, protect the island's environment and lower energy costs. Palawan aims at attracting renewable energy investors to help funding the costs of installation by easing planning processes and providing incentives such as tax breaks.
Results: In 2011, 40.6% of the primary energy mix in the Philippines came from renewable resources, according to a Department of Energy report.

Cook Island

7. **Cook Islands** (100%RE Energy Atlas 2020, IRENA 2019)

Target: 100% renewable electricity by 2020, with intermediate target of 50% by 2015.
Renewable energy share: mainly solar PV.
Key strategies: government's commitment to mitigate the Cook Islands' carbon footprint by following a pathway of low-carbon development and increased climate resilience. The Cook Islands Renewable Energy Chart restructured part of the institutional and policy framework, including revising existing legislation, regulation and electricity tariff

structures. A net metering policy was introduced to encourage customers to generate their own electricity from RES and subsidies for RES production were established.
Note: according to a takeaway of the Asian Development Bank's "Cook Islands: renewable energy sector" project, one key constraint for integrating RES into the energy mix is that the country's grid is not technically advanced enough to allow for more energy generation whilst maintaining reliability. One source report the target as "carbon neutrality by 2020". The role of diesel in hybrid systems with solar in the strategy should be further investigated.
Results: installed RE capacity rose from 0,61 MW in 2013 to 3,25 MW in 2017. Almost the whole electricity generation is produced with hybrid systems of solar PV and diesel, equipped with storage systems, with a small fraction solely with diesel. In the Northern Group of islands, though, the goal of 100% RES electricity supply has been reached already.

South America

1. **Uruguay (South America)** (IRENA Uruguay 2015, IRENA Uruguay 2019, Evwind 2019, SEforAll 2011)

Target: 50% community-wide primary energy consumption from RES by 2015.
Renewable energy share: wind, biomass, mini-hydro, solar.
Key strategies: the National Energy Policy 2005-2030 sets a target of 50% primary energy from RES by 2015, following the overall objective of diversifying the energy mix, reducing dependency from fossil fuels, improving energy efficiency and increasing the use of endogenous resources, mostly renewables. The plan includes renewable energy for electricity generation, industrial and domestic heat and transport. Auctions have been the main instrument for promoting RES in the electricity sector, followed by feed-in tariffs for biomass sources and net-metering systems. Regulations for self-consumption from wind-power for industrial consumers allowed for the generation both in-site and off-site, as well as for groups of industries to develop one wind power project. Solar thermal mandate was established by a law requiring new constructions and refurbishments of public buildings, hotels, health and sports facilities where hot water is expected to account for over 20% of the building's energy consumption, to obtain at least 50% of water heating energy from solar thermal energy. Mandates for biofuel blending in the transport sector were legislated, requiring locally produced biofuels to be included in fuel blends.
Note: 100% electricity from RES target is reported but commitment results are unclear. Sources are not aligned also regarding the current share of RES in the energy mix or electricity supply, the latter ranging from 50 to 98% results. There is no other longer-term target year than 2015. The objective of using "endogenous resources, mostly renewables" should be further explored, as well as the sustainability impact of biomass and large hydro projects included in the strategy.
Results: part of generated electricity came from renewables, including solar and large hydro. The participation of RES in the energy mix was 44% in 2011.

2. **Paraguay (South America)** (IRENA Paraguay 2015, Paraguay 2020)

Target: 100% electricity from RES (achieved).
Renewable energy share: hydro, biomass.
Key strategies: Blending mandates for biofuels; fiscal incentives on RES in transport.
Results: 99% electricity use from RES (large binational hydropower with Brazil and Argentina).

United Kingdom

1. **Scotland (UK)** (100% RE Atlas 2020, Scotland 2020)

Target: net-zero emissions by 2045, with intermediate steps of 100%RE in electricity sector by 2020, 50% by 2015, heating and energy efficiency targets (11% and 12% improvement respectively), 50% of total energy consumption from renewable sources by 2030; GHG emissions reduction by: 56% reduction by 2020, 75% reduction by 2030, 90% reduction by 2040
Renewable energy share: wind, hydro, ocean.
Key strategies: The strategy is very ambitious, developed in the framework of economic development, green jobs and opportunities for research and development. Community and Renewable Energy Scheme (CARES) was launched to maximize public involvement and community benefits. ARES facilitates funding application for projects, and offers advice and support to develop community-owned projects.
Note: the base years for heating and energy efficiency target, as well as for GHG emissions reduction are not clear.
Results: 40% gross annual consumption of electricity from RES in 2012, 69% in 2017 (15% increase from 2016).

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