



Setting 100% Renewable Energy Targets in Municipalities - Synthesis

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Introduction

Background

A number of local governments around the world are adopting targets to shift one or more sectors of energy use away from fossil fuels and towards 100% renewable energy (RE). Some cities, including Burlington and Reykjavik have already achieved 100% renewable energy in the electricity or heating and cooling sectors. However, for most cities, an energy transition target remains a work in progress.

Municipalities are structuring these 100% RE goals and implementation plans in a myriad of ways. For example, while some jurisdictions have legislated a 100% renewable energy target for only municipal buildings and/or fleets, others are aiming to move the entire community off fossil fuels, encompassing the electricity, heating and cooling, and transportation sectors.

Local governments are striving to meet these targets through a combination of local renewable energy production within city limits; drawing from regional energy resources in surrounding areas; or through the import of renewable energies and fuels. In order to do so, these municipalities are implementing various policies, such as regulations and incentives, or making infrastructure decisions that reduce overall energy use and shift production towards renewable energy sources.

While municipalities are setting 100% renewable energy targets in a wide range of configurations, and given there is no single authority to adjudicate these energy transition goals, there is an emerging consensus as to the considerations and best practices in setting the goal.

Purpose

The purpose of this document is to highlight the mechanics of setting a municipal 100% renewable energy target. For example, it outlines different approaches and considerations that municipal policy-makers might consider when undertaking ambitious renewable energy target-setting. For example, to which scope of energy use, community or corporate operations, should the legislation apply? Which sectors of energy end use, electricity, heating and cooling, and/or transportation, can legislation be applied to? How can the degree of legal bindingness be strengthened?

This document is a synthesis of a body of knowledge developed by non-governmental and governmental actors including Global 100%RE and the World Future Council, ICLEI - Local Governments for Sustainability (ICLEI), the International Renewable Energy Agency (IRENA),

the Renewable Energy Policy Network for the 21st Century (REN21), and others. It also draws upon information provided by local government officials through interviews and at dialogue workshops hosted by Renewable Cities and its partners.

The ideas presented here represent an evolving framework for understanding the mechanics of urban renewable energy target-setting. It is hoped that this information will guide local government policy-makers in adopting and implementing an energy transition target. It will be periodically updated as new publications from relevant actors are released.

Part I: Renewable Energy Target Fundamentals

A. Motivators for Increasing the use of Renewable Energy

Local governments are seeking to increase the share of renewable energy produced or consumed in their boundaries for a number of reasons. While there are varying opinions as to how governments perceive certain drivers or benefits, the literature reviewed for this survey cites a number of rationales for advancing renewable energy targets.¹ Some of these rationales include:

Economic

- Facilitating local economic development and diversifying the local economy²
- Promoting job creation, skills diversification, and involving local stakeholders
- Reducing financial risks associated with fossil fuel price and supply volatility³

Energy, Political, and Social

- Asserting local governance over energy decisions
- Ensuring energy supply security, including creating access to energy services
- Inciting awareness and political will for energy conservation measures
- Increasing local energy production
- Reducing energy costs

¹ 2016, World Future Council:

https://www.worldfuturecouncil.org/file/2016/08/WFC_2016_Renewable-Energy-and-Sustainable-Development.pdf

² 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

³ 2015, Renewable Cities:

<https://www.youtube.com/watch?v=2i4SCcg2GI0&index=3&list=PLn7s4fNQ3RWUhc25eaJgnvE3g1zi3JXvw>

- Responding to state or national policies⁴⁵

Environmental

- Enhancing “livability” through positive urban health outcomes, including through improved air quality and increased participation in active transportation
- Increasing resilience in the face of climate impacts⁶
- Promoting sustainable urban development⁷
- Reducing greenhouse gas emissions, possibly in response to inertia at more senior levels of government⁸
- Reducing physical and environmental risks and impacts associated with nuclear and fossil fuel energy generation and/or transportation⁹

B. Political and Planning Considerations

Purpose of Setting a Renewable Energy Target

For many jurisdictions, setting a formal political target is the first step in increasing the share of renewables in the energy mix.¹⁰ In contrast to enacting discrete energy policies across different sectors (ie: district energy, lighting in public buildings), an overarching energy transition target sets the direction for the future of energy in a community and creates a framework for enabling policies to follow suit.

From a perspective of political will, a target can demonstrate community support for the shift to renewables and builds awareness among stakeholders and businesses.¹¹ In this way, it can

⁴ 2014, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

⁵ 2013, REN21: http://www.ren21.net/Portals/0/documents/activities/gfr/REN21_GFR_2013.pdf

⁶ 2016, SFU ACT: http://act-adapt.org/wp-content/uploads/2016/06/low_carbon_resilience.pdf

⁷ 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

⁸ 2010, World Future Council:

http://digital.library.unt.edu/ark:/67531/metadc13721/m2/1/high_res_d/100__renewable_energy_for_citys-for_web.pdf

⁹ 2016, World Future Council:

https://www.worldfuturecouncil.org/file/2016/08/WFC_2016_Renewable-Energy-and-Sustainable-Development.pdf

¹⁰ 2014, World Future Council:

http://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Policy_Handbook_How_to_achieve_100_Renewable_Energy.pdf

¹¹ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

help bring the community along towards a common goal and cement an enduring political direction for a policy and investment decisions to come.

What is a Renewable Energy Target?

In its 2014 Global Status Report, REN21 defined a renewable energy target as, “An official commitment, plan, or goal set by a government (at the local, state, national, or regional level) to achieve a certain amount of renewable energy by a future date.”¹² IRENA characterizes a renewable energy target as a numerical goal for renewables production and/or consumption, which can be applied to the electricity, heating and cooling, and/or transportation sectors.¹³ Both REN21 and IRENA stipulate that a renewable energy target should be both time-bound and measurable.

According to Global 100%RE, a 100% renewable energy target is achieved when, “the amount of energy generated from renewable energy sources in the territory (or brought into it) equals or exceeds 100% of the annual energy consumed within that territory”.¹⁴

Planning and Implementing a Renewable Energy Target

With a renewable energy target in place, local government technical and administrative resources can be appropriately deployed towards reaching that goal.¹⁵ Furthermore, a renewable energy target sends a signal to the market, including to the private sector and energy producers. Once enshrined in legislation, the a 100% RE goal creates a pathway for public and private infrastructure and investment decisions made in a community.¹⁶ This includes both decisions that should be made (to support the goal) and those that should be avoided, such as “locking in” to fossil fuel infrastructure.

¹² 2014, REN21:

http://www.ren21.net/Portals/0/documents/Resources/GSR/2014/GSR2014_full%20report_low%20res.pdf

¹³ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

¹⁴ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

¹⁵ 2014, World Future Council:

http://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Policy_Handbook_How_to_achieve_100_Renewable_Energy.pdf

¹⁶ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

Part II: Considerations for Setting a Renewable Energy Target

There are a range of considerations to take into account when setting a municipal 100% renewable energy target. Figure 1 below presents a conceptual framework, which captures some of the primary factors involved in setting the goal.

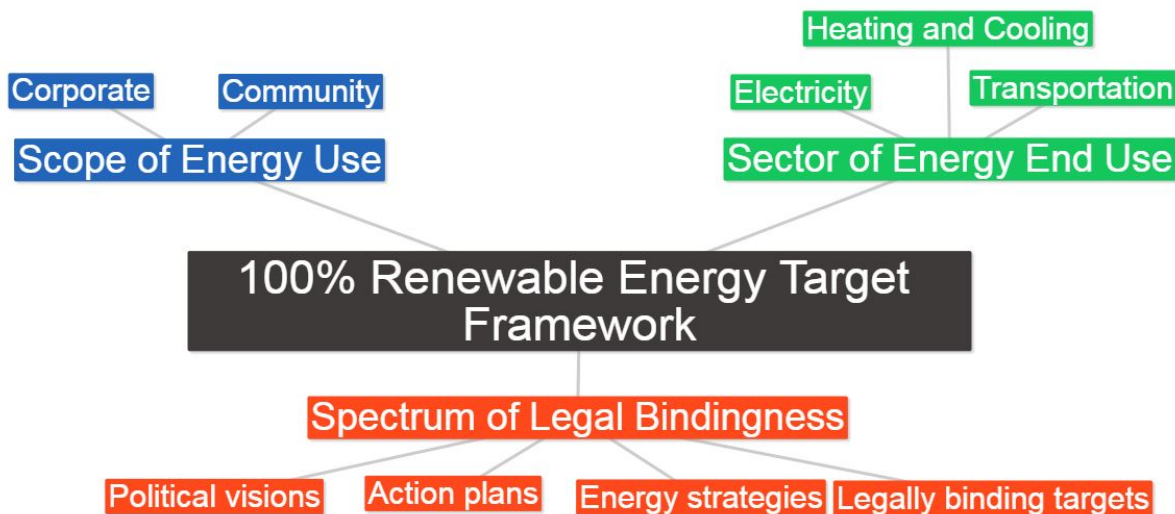


Figure 1: 100% Renewable Energy Target Framework

A. Scope of Energy Use

The scope of energy use is an important consideration in setting a renewable energy target. Typically, governments have set targets for either the corporate (“municipal operations”) or community (“city-wide”) scope.¹⁷

For the purposes of administering a city and providing services, municipalities possess and deploy energy-consuming assets, including vehicles and buildings. Some jurisdictions have set renewable energy targets that apply only to only these municipal operations, such as the City of Las Vegas, which has a corporate 100% renewable electricity target. Local governments can also set targets for specific elements of their corporate portfolios; for example, a goal can apply to only municipal buildings, fleets, and/or public transit.^{18,19}

¹⁷ 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

¹⁸ 2013, REN21: http://www.ren21.net/Portals/0/documents/activities/gfr/REN21_GFR_2013.pdf

More comprehensively, some cities have set renewable energy targets for the entire community, which encompasses all energy used within the municipal boundaries. These targets include both corporate (or “municipal operations”) and residential, private sector, and industrial energy use. Examples of such targets can be found in Oxford County in Ontario and Sønderborg, Denmark.

It goes without saying that establishing and implementing a target for the entire community is a much more ambitious and challenging endeavour than setting one solely for municipal or corporate operations.

B. Sector of Energy End Use

Typically, a renewable energy target will specify which sector of energy end use the goal applies to. Depending on their urban form, local resource endowments, and legislative jurisdiction and powers, municipalities are establishing 100% RE targets to apply to one or more of the electricity, heating/cooling, and/or transportation sectors.²⁰²¹²²

For example, municipalities such as Vancouver and Frankfurt aim to use only renewable energy in the electricity, heating and cooling, and transportation sectors by 2050, whereas the City of San Diego has legislated 100% renewable energy by 2050 for its electricity sector only.

In some cases, municipalities are planning to achieve 100% renewable energy on a sector by sector basis, with different target years for each of the electricity, heating and cooling, and transport sectors.

Renewable Energy Technology Carve-outs

A technology carve-out stipulates that a specific amount of renewable energy capacity or output must be reached by through a particular technology, such as through wind, solar, or biomass sources, for example.

¹⁹ 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

²⁰ 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

²¹ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

²² 2010, World Future Council:

http://digital.library.unt.edu/ark:/67531/metadc13721/m2/1/high_res_d/100__renewable_energy_for_citys-for_web.pdf

While typically more relevant at the state, provincial, and national scales, and not integral to setting and achieving a 100% renewable energy target, a number of municipalities have set specific renewable energy technology carve-outs to guide their municipal policies. For example, the City of Austin has adopted a 35% renewable electricity by 2020 target, which it plans to meet in part with a technology carve-out calling for 200 megawatts of installed solar capacity.²³

These carve-outs can serve either as the primary vehicle for renewable energy policy in a jurisdiction or are used to augment a renewable energy portfolio standard, such as 100% RE.

C. Spectrum of Legal Bindingness

Renewable energy targets vary significantly in the degree to which they are legally binding and how specific the various implementation requirements are spelled out. Targets are most effective when they are politically and legally cemented—aspirational targets alone do not create the incentives that lead to proper implementation.²⁴ Given that aspirational RE targets in themselves are not enough to encourage action towards implementation, stable and institutionalized policies and regulation frameworks should be established to facilitate the development of enabling policies.²⁵

For example, while some jurisdictions have announced purely aspirational targets, other governments have adopted detailed implementation plans with strict monitoring, reporting, and verification measures, including penalties for non-compliance.

IRENA has developed a framework for understanding the spectrum of various renewable energy targets at the local, regional, provincial/state, to national scales (see Figure 2, below).²⁶ It highlights a range of theoretical target types that are increasingly specific, measurable, and binding.

²³ 2013, Austin Energy:

[https://austinenergy.com/wps/wcm/connect/c0ef5620-bbb0-42ba-aa8f-eb8fadf7eb05/GenerationResourcePlanloresF0214+\(2\).pdf?MOD=AJPERES](https://austinenergy.com/wps/wcm/connect/c0ef5620-bbb0-42ba-aa8f-eb8fadf7eb05/GenerationResourcePlanloresF0214+(2).pdf?MOD=AJPERES)

²⁴ 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

²⁵ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

²⁶ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

Spectrum of Renewable Energy Targets



Figure 2: Spectrum of Renewable Energy Targets (2015, IRENA)

While this framework is orientated towards the provincial, state and national governments, it is useful in highlighting a range of potential renewable energy targets. IRENA elaborates further on each of the spectrum’s components below, from least to most legally binding:

1. “Political announcements, vision statements or regional-level energy declarations or plans. “
2. “The second category of the spectrum includes electricity expansion plans and integrated resource plans. Such renewable energy targets can be embedded within energy planning tools, or underpin alternative scenarios and strategies, but remain at the planning stage and aspirational or indicative in nature.”
3. “In the third category of the spectrum, renewable energy targets become more specific and measurable, and are geared towards implementation. As such, they grow more sophisticated both in terms of alignment with broader economic and energy objectives and in terms of translation into specific actions plans and policy, regulatory, fiscal and financial instruments. This category includes NREAPs, technology-specific roadmaps, renewable energy programmes, etc.”
4. “The last tier of the spectrum corresponds to renewable energy targets that are clearly measurable and translated into specific policies and measures with clear compliance mechanisms to ensure their implementation. ”

Monitoring, Reporting, Verification, and Compliance Measures

Through stakeholder interviews conducted by Renewable Cities it has been suggested that adopting a binding 100% renewable energy target can be a longer term process for a number of jurisdictions.

The World Future Council suggests that the process begins with developing the political will to create an aspirational goal, which leads to a legal target with compliance and implementation

mechanisms. From here, implementation strategies can be developed, which are in turn informed and reinforced by monitoring and evaluation measures.²⁷

The literature surveyed for this synthesis makes it clear that monitoring, reporting, verification, (MRV) and compliance measures are crucial for the success any legally binding target.²⁸²⁹ IRENA suggests that MRV and compliance enforcement are important factors for separating the mandatory from the aspirational targets.

Further, while IRENA acknowledges that it is difficult to determine whether or not a renewable energy target is legally binding, establishing responsibility for implementation is essential in order to make a 100% RE goal binding.³⁰

Specifically, establishing responsibility for implementing a target entails identifying who is responsible for achieving the target: Is it a local government, public utility, private entities, other stakeholders; or a blend of the aforementioned actors?

IRENA suggests that the following questions could be asked to clarify the accountability of compliance and enforcement measures: Are there fines and penalties for non-compliance? Who is authorized to enforce the targets? Can utilities recoup fines through ratepayers?³¹

Thus, in order to establish a renewable energy target as legally-binding, the entities responsible for implementation must be identified with specific MRV measures assigned.

E. The Role of Energy Efficiency

Reducing overall energy consumption is often identified as an imperative and complementary component to reaching shifting to 100% renewable energy in one or more sectors.³²³³³⁴ For

²⁷ 2014, World Future Council:

http://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Policy_Handbook_How_to_achieve_100_Renewable_Energy.pdf

²⁸ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-International-Dialogue-on-100-Renewable-Energy.pdf>

²⁹ 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

³⁰ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

³¹ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

³² 2014, World Future Council:

http://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Policy_Handbook_How_to_achieve_100_Renewable_Energy.pdf

example, the City of Vancouver's Renewable City Strategy calls for a 50% reduction in community energy use across the electricity, heating and cooling, and transportation sectors by 2050, accounting for "business as usual" growth in energy demand.³⁵

While it is technically possible to meet a jurisdiction's energy needs with 100% renewable energy through fuel switching, that is to say without pursuing energy conservation measures, the literature identifies several problems with this approach.

Aside from potentially being prohibitively expensive or technically challenging, achieving 100% renewable energy while ignoring energy conservation can potentially leave some co-benefits behind. For example, while it is technically possible to shift to 100% renewable private transportation without addressing land-use patterns or active transportation mode shares, the health and economic benefits associated with such a shift would not be realized without pursuing an energy efficiency agenda.

Criteria for Renewable Energy Source, Type, and Sustainability

Definition of "Renewable Energy" and Sustainability

An important consideration of planning for renewables lies in defining the range of acceptable energy sources. The Intergovernmental Panel on Climate Change (IPCC) defines renewable energy as:

"... any form of energy from solar, geophysical or biological sources that is replenished by natural processes at a rate that equals or exceeds its rate of use. RE is obtained from the continuing or repetitive flows of energy occurring in the natural environment and includes resources such as biomass, solar energy, geothermal heat, hydropower, tide and waves, ocean thermal energy and wind energy. However, it is possible to utilize biomass at a greater rate than it can grow or to draw heat from a geothermal field at a faster rate than heat flows can replenish it. On the other hand, the rate of utilization of direct solar energy has no bearing on the rate at which it reaches the Earth. Fossil fuels (coal, oil, natural gas) do not fall under this definition, as they are not replenished within a time frame that is short relative to their rate of utilization."³⁶

³³ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-International-Dialogue-on-100-Renewable-Energy.pdf>

³⁴ 2015, Energy & Environmental Science:

<http://web.stanford.edu/group/efmh/jacobson/Articles/I/USStatesWWS.pdf>

³⁵ 2015, City of Vancouver: <http://vancouver.ca/files/cov/renewable-city-strategy-2015.pdf>

³⁶ 2012, IPCC: https://www.ipcc.ch/pdf/special-reports/srren/SRREN_FD_SPM_final.pdf

Experts and implementers who have participated in Renewable Cities dialogues or interviews have expressed that renewable energy feedstocks should be “sustainable” in all senses of the world, not just as it pertains to natural replenishment. For example, there are concerns around the sustainability of some biomass fuels and waste-to-energy systems. While these feedstocks and energy sources may technically satisfy the IPCC’s definition of renewable energy, in some cases their supply and operationalization can lead to adverse effects across other dimensions of environmental and health, such as through deforestation, forest degradation, misalignment with progressive waste management plans, or the generation of air pollution.

Source of Renewable Energy

Local governments with 100% renewable energy targets plan on using some combination of local renewable energy production; drawing from regional energy resources, such as in the urban periphery or surrounding municipalities; and/or through the import of renewable energy and fuels.

Given that densely populated cities have high energy requirements and suffer renewable resource endowment constraints posed by the compact urban land area, a number of cities are taking a regional or grid interconnection approach to meeting their goals. According to Global 100%RE, a 100% renewable energy target is achieved when, “the amount of energy generated from renewable energy sources in the territory (or brought into it) equals or exceeds 100% of the annual energy consumed within that territory.”³⁷

Using this standard, a city can be considered 100% renewable as long as the energy used within the municipal boundaries is sourced from renewable energy sources, regardless of where it is generated.

Some cities are offsetting their energy use either in part or in whole through the purchase of renewable energy certificates (RECs), such as the case of the City of Houston who, according to the US Environmental Protection Agency, uses a combination of local generation and certificates purchased from Reliant Energy to meet 100% renewable electricity requirements.³⁸ Given Global 100%RE’s stipulation that renewables need to be consumed within a jurisdiction’s boundaries, a municipality cannot use renewable energy certificates in order to achieve a 100% renewable energy goal.

Further, a number of cities are choosing to invest in, develop, and/or operate renewable energy generation projects outside of their municipal boundaries, which are not grid-connected to their respective communities.

³⁷ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

³⁸ 2016, US EPA: <https://www.epa.gov/greenpower/green-power-partnership-top-30-local-government>

For example, the City of Calgary invests directly in a nearby wind farm to generate renewable energy offsite to “power” the city’s “C-Train” light rail transit system with 100% renewable electricity.³⁹ The train does not run on the actual electrons generated by the wind farm; both the turbines and the train are connected to the Province of Alberta’s electrical grid.⁴⁰ The City of Munich’s utility, with its 100% renewable electricity by 2025 target, cannot generate enough renewable power in the region to meet the demand of the city; however, the utility undertakes the development of hydro, solar PV, biogas, geothermal, and wind resources in Germany and around Europe to produce the renewable energy the city would otherwise consume.⁴¹

Technically, these municipal power projects do not fulfill Global 100%RE’s criteria given that the energy is consumed outside of city limits.

E. Other Energy System Transition Frameworks

Zero Emissions, Carbon Neutrality, and Fossil Fuel Free Targets

In addition to legislating 100% renewable energy targets, some local governments are choosing to include an emissions reduction goal alongside their renewable energy targets.^{42,43,44,45} For example, Salt Lake City calls for 100% community-wide renewable electricity by 2050 and an 80% reduction in greenhouse gas emissions by 2040.⁴⁶

The website Track0, which follows emissions and energy targets for a range of jurisdictions, indicates that dozens of municipalities have adopted goals ranging from an 80% reduction in emissions to “carbon neutrality” to “zero-emissions” to “fossil fuel free”.⁴⁷ Depending on the local context and policy configuration, these ambitious goals could require 100% renewable energy in at least one sector.

In Vancouver’s case, the local government adopted a 100% renewable energy target and its Renewable City Strategy after having earlier committed to eliminating dependence on fossil

³⁹ 2002, Transport Association of Canada: <http://library.tac-atc.ca/proceedings/2002/calgary.pdf>

⁴⁰ 2015, Green Energy Futures: <http://www.greenenergyfutures.ca/episode/c-train-success-nenshi-calgary>

⁴¹ 2016, SWM: <https://www.swm.de/english/company/energy-generation/renewable-energies.html>

⁴² 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

⁴³ 2013, REN21: http://www.ren21.net/Portals/0/documents/activities/gfr/REN21_GFR_2013.pdf

⁴⁴ 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

⁴⁵ 2015, CDP: <https://www.cdp.net/Documents/Brochures/Unlocking-Ambition-brochure.pdf>

⁴⁶ 2016, SLGreen: <http://www.slgreen.com/climatepositive>

⁴⁷ 2016, Track0: <http://track0.org/cities-regions/>

fuels with the 2011 Greenest City Action Plan.⁴⁸ Stakeholders in the City of Vancouver have indicated that the 100% renewable energy target was subsequently adopted to help realize the City's aspirational target of becoming "fossil fuel free".

The City of Copenhagen strives to be "carbon neutral" by 2025, but according to its CPH 2025 Climate Plan, will still be burning fossil fuels—mostly for use in personal transportation—after 2025. However, the local government plans to offset this fossil fuel use by exporting locally produced renewable energy.⁴⁹

The point is that many local governments are planning their future energy systems in a way that mirrors the adoption and implementation of 100% renewable energy targets.

100% Renewable Energy Districts

Some cities are piloting the concept of 100% renewable energy or zero-emissions by adopting these frameworks for specific districts within their municipal boundaries.

According to REN21, local governments are experimenting with these districts for the purposes of testing policies and technologies, pollinating learnings, and gaining public acceptance. Some cities with 100% RE or zero-emissions districts include Copenhagen, Helsinki, Hamburg, Rotterdam, and London.⁵⁰ Malmö is one such city with a 100% renewable energy district. Its Western Harbour is a former industrial brownfield site that has been redeveloped as a mixed-use residential district, which is renewable energy-powered.⁵¹

These districts can offer a platform to advance 100% renewable energy in the context of the larger municipality by offering a testbed for learning.

Existing Municipal Plans and 100% Renewable Energy

Local governments have been active for decades in taking steps to reduce energy use and emissions and shrink the environmental footprints of cities.

Whether or not they have an explicit renewable energy target, cities numbering in at least the hundreds have been enacting policies with direct or indirect influence on renewable energy production and use. These policies are often embedded in "sustainability", "climate", or "clean

⁴⁸ 2012, FCM:

https://www.fcm.ca/Documents/case-studies/GMF/2012/SCAwards_2012_PLANNING_Vancouver_EN.pdf

⁴⁹ 2012, City of Copenhagen: http://kk.sites.itera.dk/apps/kk_pub2/pdf/983_jkP0ekKMyD.pdf

⁵⁰ 2013, REN21: http://www.ren21.net/Portals/0/documents/activities/gfr/REN21_GFR_2013.pdf

⁵¹ 2005, CMHC:

<https://www.cmhc-schl.gc.ca/en/inpr/bude/himu/inbu/upload/Bo01-Sustainable-Housing-Development.pdf>

transport” plans; a survey of 210 local governments conducted in 2011 yielded that 145 of the surveyed municipalities have some sort of energy or climate policy.⁵²

In many cases, these measures are being implemented without being part of a broader “renewable energy transition” plan. Despite this, existing energy initiatives, which are active across a number of city planning areas, can also be compatible with the onboarding of a municipal 100% RE target.

The City of Vancouver’s Renewable City Strategy, which was adopted in November 2015, incorporates, builds on, and/or scales up a number of existing city policies and plans, such as Transport 2040 and the Neighbourhood Energy Strategy. This suggests a comprehensive 100% target and plan can help to advance, extend the level of ambition of, or reframe existing city strategies.

To ensure the success of the legislation, ICLEI suggests that a 100% RE strategy should inform and guide other city policies and plans, such as a city’s wider development strategy or an official community plan.⁵³ In this way, energy planning can be mainstreamed across city departments with specific accountabilities spread across a range of local government actors, rather than siloed as part of an environmental scheme. These considerations closely align with monitoring, reporting, verification, and the assignment of compliance mechanisms to support the implementation of a target.

Local Government Jurisdiction

While local governments typically have significant direct and influence over energy production and consumption, especially through land-use and transportation planning, few local governments worldwide have direct jurisdiction over electrical utilities or hold all the policy levers necessary to achieve 100% renewable energy today.⁵⁴

Despite these limitations, some examples of policies, areas, and sectors where local governments can significantly impact energy production and consumption include through: subsidies, public investments, innovative financing, bulk procurement, green power purchasing, building codes, transport fuel mandates, utility regulation, municipal building renewable power, biofuelled municipal vehicles, and combined heat and power for district energy.⁵⁵⁶

⁵² 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

⁵³ 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

⁵⁴ 2011, REN21:

http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf

⁵⁵ 2013, REN21: http://www.ren21.net/Portals/0/documents/activities/gfr/REN21_GFR_2013.pdf



Where municipalities do not hold all of the legislative tools and resources, some local governments are still taking steps to adopt ambitious renewable energy targets with an eye to favourable policy environments in the future. In this respect, municipalities are seeking to influence more senior levels of government, taking an adaptive approach to planning, creating regional partnerships with utilities and municipal allies, and are taking action where they can.

⁵⁶ 2011, REN21:
http://www.ren21.net/Portals/0/documents/Resources/REN21_Local_Renewables_Policies_2011.pdf



Summary

Municipalities are taking a wide range of approaches to setting 100% renewable energy targets

When adopting this legislation, policy-makers need to consider whether the target should apply to municipal operations or the entire community. Further, the target can apply to one or more of the electricity, heating and cooling, or transportation sectors.

Setting an aspirational target can represent the first step of an energy transition for a particular jurisdiction, but the success of reaching the target will be dictated by the specific and legally-binding implementation measures. Importantly, energy efficiency goals play an important role in the 100% renewable energy plans of a number of prominent municipalities.

Other factors for policy-makers to consider include the acceptability and sustainability of a variety of available renewable energy sources; how the energy transition plan aligns with existing policies or broader GHG reduction plans; and how the policies deployed by more senior levels of government can accelerate or impede the adoption of renewable energy and energy efficiency.

The trend of municipalities adopting and implementing 100% renewable energy targets is a relatively recent one and represents an evolving practice. It will be updated as new information becomes available.

Notes

Contributors and comments are welcome. Email Keane Gruending at keane.gruending@renewablecities.ca for more information.

This synthesis has focused on reports by governmental and non-governmental actors with an emphasis on target-setting. On the implementation side, Go 100%RE and its partners, including Renewable Cities, have conducted research and hosted dialogues in support of local government work past adopting the 100% RE target. This information is available at <http://www.renewablecities.ca/dialogues-projects/kassel-international-dialogue-on-100-renewable-energy>



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Appendix

A. Best Practices for Setting 100% Renewable Energy Targets

Below are a selection of best practices towards target-setting that have been sourced from the literature reviewed from this synthesis.

Organization, Report	Best practices relevant to target-setting
IRENA, Renewable Energy Target Setting ⁵⁷	<ul style="list-style-type: none"> ● Goals should be SMART: specific, measureable, achievable, realistic, and time-bound ● Ensure the goal is transparent and information fully shared with all stakeholders, including accountabilities ● Set a baseline year with measurements and develop a “business as usual” case ● The time period for the goal must be “right” for a jurisdiction. There may be diminishing motivation for goals set too long into the future; use intermediate milestones to drive progress ● Strike the right balance between ambition and realism ● Effective targets should be backed by clear strategies, specific policies, and mandatory obligations ● Evaluate all costs and benefits and use spatial modelling tools, but avoid “paralysis by analysis” ● Have an adaptable plan as all future consequences cannot be known
ICLEI, Integrating Ambitious Renewable Energy Targets in City Planning ⁵⁸	<ul style="list-style-type: none"> ● Monitoring and attributing success towards renewable energy goals is very important ● Publicize progress towards metrics in a public and highly visible manner (Malmö has ‘environmental barometer’) ● Baseline first, set priorities, targets, and timelines and consult; an energy road map can be an important tool

⁵⁷ 2015, IRENA:

http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Target_Setting_2015.pdf

⁵⁸ 2012, ICLEI:

http://malmo.se/download/18.31ab534713cd4aa9213d20b/ICLEI_Case+study+on+Malm%C3%B6+renew+abke+energy+2012_7_Malmo.pdf

	<ul style="list-style-type: none"> ● Bring local utilities onboard early and include other relevant private sector stakeholders ● Link to other municipalities for interconnected strategy ● Ensure there is political backing and cross-departmental cooperation ● Involve multiple stakeholders (NGOs, universities, etc.) ● Understand local energy resources and potential
<p>World Future Council, How to Achieve 100% Renewable Energy⁵⁹</p>	<ul style="list-style-type: none"> ● Electrify the heating/cooling and transport sector ● Maximize opportunities for citizen participation and the development of new energy business models ● Educate and inform citizens and businesses ● Adopt an integrated approach to fiscal, economic, and energy policy ● Targets need to be credible and achievable, supported by stable policy and regulatory frameworks, and a clear roadmap with indicators and progress reporting
<p>Global 100%RE, Kassel International Dialogue on 100% Renewable Energy⁶⁰</p>	<ul style="list-style-type: none"> ● Create indicators that measure quality of life, monetary value of energy imports avoided, and value of poverty eradication ● Targets need to be data driven and specific
<p>Global 100% RE, Criteria for a Sustainable Transformation towards '100% Renewable Energy'⁶¹</p>	<ul style="list-style-type: none"> ● Support a target by adopting a long-term mission statement along with short and mid-term goals ● Targets alone are not enough. They need to be supported by stable and institutionalized policy and regulatory frameworks

⁵⁹ 2014, World Future Council:

http://www.worldfuturecouncil.org/wp-content/uploads/2016/01/WFC_2014_Policy_Handbook_How_to_achieve_100_Renewable_Energy.pdf

⁶⁰ 2015, Global 100%RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-International-Dialogue-on-100-Renewable-Energy.pdf>

⁶¹ 2015, Global 100% RE:

<http://www.renewablecities.ca/rc-wp/wp-content/uploads/Kassel-Dialogue-Criteria-Discussion-Paper.pdf>

B. Select 100% Renewable Energy Inventories and Plans

100% Renewable Energy Target Inventories

- Track0 Cities & Regions: <http://track0.org/cities-regions/>
- Global 100%RE Map: <http://www.go100re.net/map/>
- Go 100% Renewable Energy Map: <http://www.go100percent.org/cms/index.php?id=4>

Select energy transition plans and strategies from international municipalities (in English)

Municipality	Plans or Strategies
Copenhagen, Denmark	CPH 2025 Climate Plan: http://kk.sites.itera.dk/apps/kk_pub2/pdf/983_jkP0ekKMyD.pdf
Frederikshavn Municipality, Denmark	Master plan for Renewable Energy 2030: http://www.energy-cities.eu/db/Frederikshavn_MP-for-Renewable-Energy2030_2014_en.pdf
Malmö, Sweden	Comprehensive Plan for Malmö: Summary in English: http://malmo.se/download/18.1256e63814a61a1b34c1b34/1418996678792/%20OP_english_summary_hemsida.pdf
Oxford County, Canada	Draft 100% Renewable Energy Plan: http://www.oxfordcounty.ca/Portals/15/Documents/SpeakUpOxford/2016/100RE/OCDraft100REPlan20160622.pdf
San Diego, USA	Climate Action Plan: https://www.sandiego.gov/sites/default/files/final_july_2016_cap.pdf
Stockholm, Sweden	Roadmap for a fossil fuel-free Stockholm 2050: http://www.stockholm.se/PageFiles/463655/Roadmap%20for%20a%20fossil%20fuel-free%20Stockholm%202050.pdf
Sydney, Australia	Renewable Energy Master Plan: http://www.cityofsydney.nsw.gov.au/_data/assets/pdf_file/0003/153282/Renewable-Energy-Master-Plan.pdf
Vancouver, Canada	Renewable City Strategy: http://vancouver.ca/files/cov/renewable-city-strategy-2015.pdf