ICLEI Local Governments for Sustainability

100% RENEWABLES CITIES & REGIONS ROADMAP

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

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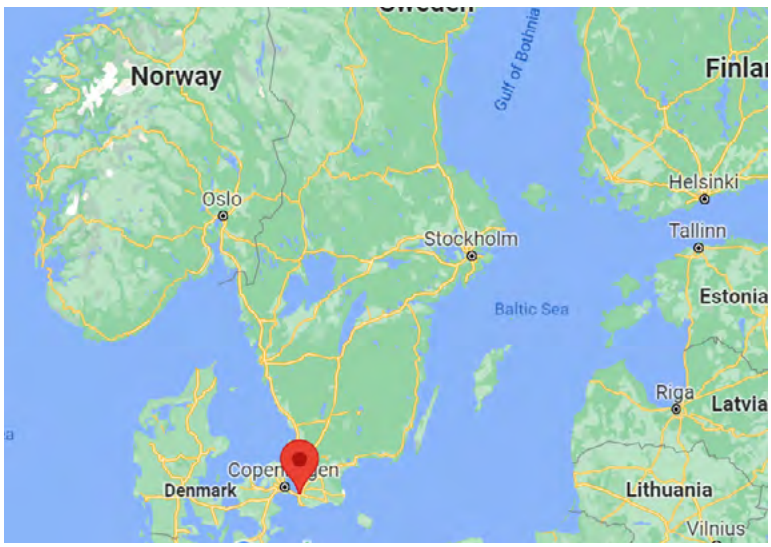
CITY OF MALMÖ

TRANSITION TOWARDS 100% RENEWABLES BUILDS UPON INNOVATIVE "RECYCLED" ENERGY FROM WASTE



City of Malmö, Sweden: Facts and figures

Population

347,949 (2020)

Total area

156.6 km² (2021)

Municipal Budget

21 659 mSEK (2021)

Figure 1: Map of City of Malmö, Scania, Sweden
Source: Google Maps, 2021

The city of Malmö is a leader in sustainable and innovative urban development strategies, offering its residents and industry climate-smart choices to support the renewable energy transition. This includes energy recovery and recycled energy from waste as key alternatives to generate energy while reducing waste streams and consumption of fossil fuels. Since recycled energy is a major part of the local energy system, the city is working towards overall emissions-free energy production to support the achievement of the 100 percent renewable energy goal.

Introduction

In line with the Paris Agreement and as a member of the European Union, Sweden is committed to become climate-neutral by 2050 (European Union, 2020). Like many other cities in Sweden and in the world, Malmö is also working towards achieving the UN's Sustainable Development Goals (SDGs) while improving the lives of their inhabitants and becoming a leading environmental and sustainable city (Malmö Stad, 2021a). Thus, the city is constantly seeking innovative, sustainable, and climate-smart strategies for its community while updating and enhancing the local commitments.

In 2021, Malmö established a target to reduce 70 percent of its carbon emissions in the whole city by 2030. Furthermore, in line with the country's ambition, the city also expects to become carbon-neutral in their governmental operations by 2030 (Malmö Stad, 2021a).

Malmö is also a frontrunner in the renewable energy space. It considers renewable energy transition as a central pillar in achieving net-zero emissions, moving away from fossil fuels, and replacing them with renewables will support the GHG emissions reduction while providing access to clean energy solutions to fulfil the community's energy needs. This will help cities to be more sustainable, resilient, and equitable (REN21, 2021).

Malmö has committed to its vision to become 100 percent powered by renewable and recycled energy by 2030 community-wide, a goal that exceeds the national ambition of Sweden to become 100 percent renewable by 2040 (Swedish Institute, 2021). The city already has the third-largest wind park in the world, powering 60,000 homes (Sustain Europe, 2020). As part of their sustainability strategies, Malmö also plans to not only use energy from renewable sources but utilize recycled energy that can be recovered from waste incineration, waste heat from industrial and commercial processes and heat extracted from wastewater treatment (Malmö Stad, 2021a).

In 2018, 50 percent of the energy supplied in Malmö came from fossil fuels, but E.ON - Malmö's largest energy producer and owner of the district heating grid - plans to supply energy that is 100 percent based on recycled energy and renewable fuels by 2025. In district heating, the 100 percent renewable energy goal is supported partly through the expansion of deep geothermal plants, and partly through heating plants running on biofuels (Malmö Stad, 2020)

Malmö's Energy strategy 2021 - 2030 establishes that the city would achieve the 100 percent renewable energy status when the produced and imported recycled energy or the energy derived from renewable sources equals the amount of the end-use energy in Malmö (Malmö Stad, 2020). Therefore, it aims to contribute to increasing local and regional renewable energy production while adapting and implementing storage systems and applying smart control.

The innovative, sustainable and circular city of Malmö

Malmö is a coastal city located in the Skane region at the south of Sweden. It lies at the eastern end of the Öresund Bridge which connects the city with Copenhagen, Denmark. With a population of 347,949 inhabitants by December 2020, Malmö is the third largest city of Sweden and one of the fastest growing metropolitan centers in the country (Malmö Stad, 2021b). Malmö's rapidly growing population expects 50,000 new residents by 2030 and half million inhabitants by 2050, which represent not only challenges but opportunities for the city sustainable and inclusive development (Malmö Stad, 2021a; Malmö Stad, 2021c).

Figure 2: Urban landscape in Malmö. Source: Sweden stock photo

The city of Malmö is working towards becoming a sustainable city, offering its residents and industry innovative, sustainable, and climate-smart choices in terms of commodities, services, mobility, and waste management, among others. A long track of innovative urban development initiatives made Malmö a pioneer on sustainability solutions for its community.

Since 2001, the Western Harbour - a post-industrial area - has been redesigned into a sustainable residential and working neighborhood to be supplied exclusively with renewable energy for 20,000 residents by 2030 (Malmö Stad, 2021d). According to ClimateAction (2013) and Northern Architecture (2021) the "Bo01 district" was planned to use and produce 100 percent locally renewable energy and satisfy its buildings energy demand with grid connected solar and wind energy technologies (2 MW wind turbine and 120 m^2 of Solar PVs).

In addition, 83 percent of the heating and cooling demand in the district is to be met through heat pumps that extract heat from a natural reservoir, facilitating seasonal storage of hot and cold water in underground strata, while 15 percent will be provided by 2000 m^2 of solar collectors (Northern Architecture, 2021). The remaining demand for heating and cooling is to be covered by energy from biogas derived from waste and sewage.

As part of the key sustainability strategies, Malmö also leads a circular economy where resources are used efficiently, waste is minimized, and waste products become resources instead of using new raw materials. This also applies to recycled energy, where, by 2019, 98.4 percent of waste was already being recovered as materials or energy (SYSAV, 2019). The "Shared Energy is Double Energy" project piloted in the Western Harbour area is an example of a strategy that seeks to unleash synergies between industry, the port and the city so that waste heat from industries can be integrated in the city's district heating system as a way to recycle energy (Delad energi är dubbel energi, n.d). Furthermore, the Western Harbour project also tested several waste separation systems which included a vacuum system

and waste shredders installed in all kitchens (smart kitchens) from where the food waste is stored in tanks and later transported for biogas production (ClimateAction, 2013).

Since 2014, Malmö has implemented a mandatory food waste recycling for all households, where waste is used for compost and biogas production. The biogas powers buses, garbage trucks and cars in the city. Of the City's transport fleet, a total of 851 passenger cars are driven on biogas or electricity, and approximately 200 buses in the geographical area are powered by biogas (Malmö Stad, 2021e). Currently, the City of Malmö municipal vehicle fleet runs about 92 percent on biogas and electricity (Persson, 2021).

The city focuses on renovating existing buildings to make them energy efficient and constructing new sustainable buildings in accordance with an environmental building code. The different eco-districts in the city offer their residents renewable energy based on solar panels coupled with a smart electricity grid. Furthermore, districts like Hyllie signed a climate contract in 2011 between the city, E.ON and the municipal authority to ensure that the district has integrated energy solutions for heating, cooling and power, using a smart grid system (Sustain Europe, 2020). The system includes photovoltaic panels on top of green rooftops and can adapt to weather conditions by storing surplus energy on sunny days to be used later.

The role of waste in Malmö's energy mix

Total energy supply in Malmö in 2019 accounted for 6,625 GWh (Malmö Stad, 2021g). According to the city's energy strategy 2021-2030 projections, a 15 percent increase in the electricity demand and eight percent in power demand is expected by 2030 (Malmö Stad, 2020). As of 2019, approximately one-third of the total energy consumed came from renewable and recycled sources (Malmö Stad, 2021f). The main energy consumption is attributed to the residential (29.3%) and transport sectors (26.8%) followed by other services (20.7%) as shown in figure 3. Moreover, the energy and transport sectors account for almost 80 percent of Malmö's GHG emissions (Malmö Stad, 2020).

Thus, the importance of the innovative actions and strategies targeting sustainable and climate-smart solutions for engaging the residents of Malmö besides strengthening the renewable energy supply and resource efficiency in the city.

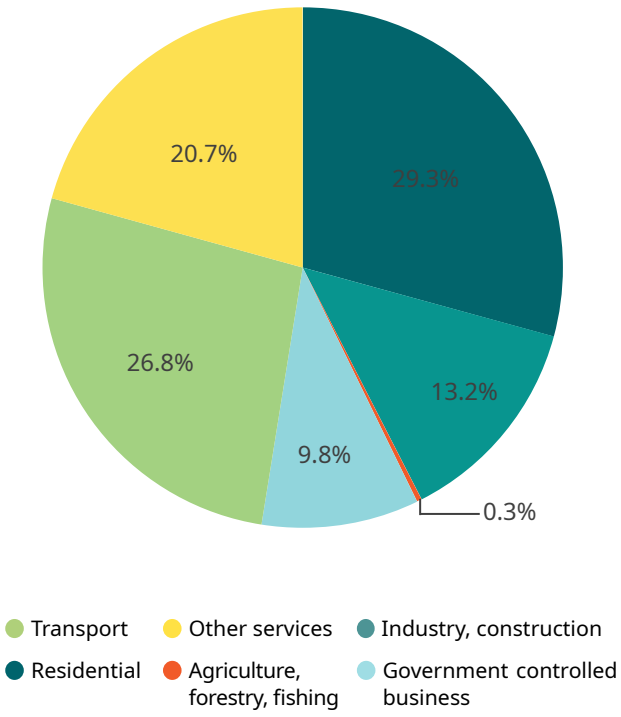


Figure 3. Malmö energy demand by sector. Source: Data from Malmö Stad (2021g)

The renewable and recycled energy share in the city energy matrix has not changed much in the last twelve years, and on average accounts for 2,200 GWh annually (Malmö Stad, 2021h). Currently, the renewable and recycled energy flows represent about 40 percent of the energy supply where around 1,500 GWh comes from renewable waste and waste as can be seen in figure 5 (Sustain Europe, 2020; Malmö Stad, 2021h).

Renewable waste refers to the food waste, which is converted and upgraded to biogas, and the biogenic fraction of the combustible waste, which is undergoing energy recovery through waste incineration. The fraction between fossil and renewable sources in the combustible municipal waste corresponded to 59.2 percent renewable in 2020 (Persson, 2021). It is important to highlight that municipal waste mix composition in Malmö includes a part of fossil materials that contribute to the GHG emissions when recovered by combustion. Thus, energy recovery from waste is not considered 100 percent renewable and hence is labeled as recycled, as it still is a benefit from a societal perspective increasing circularity.

Figure 4: Siemens substation at the Lillgrund Wind Farm, Sweden. Source: (link)

The additional sources that belong to Malmö's renewable and recycled energy mix correspond to wind, bioenergy, waste heat, heat pumps, and biogas, with photovoltaic and solar heat representing the smallest share.

E.ON owns Malmö's district heating network and electricity grid, while the gas grid is owned by Weum, part of Nordion Energi. Likewise, E.ON produces the energy within the city together with Vattenfall (Lillgrund wind farm) and Sysav (waste-to-energy plant), among others (Malmö Stad, 2020).

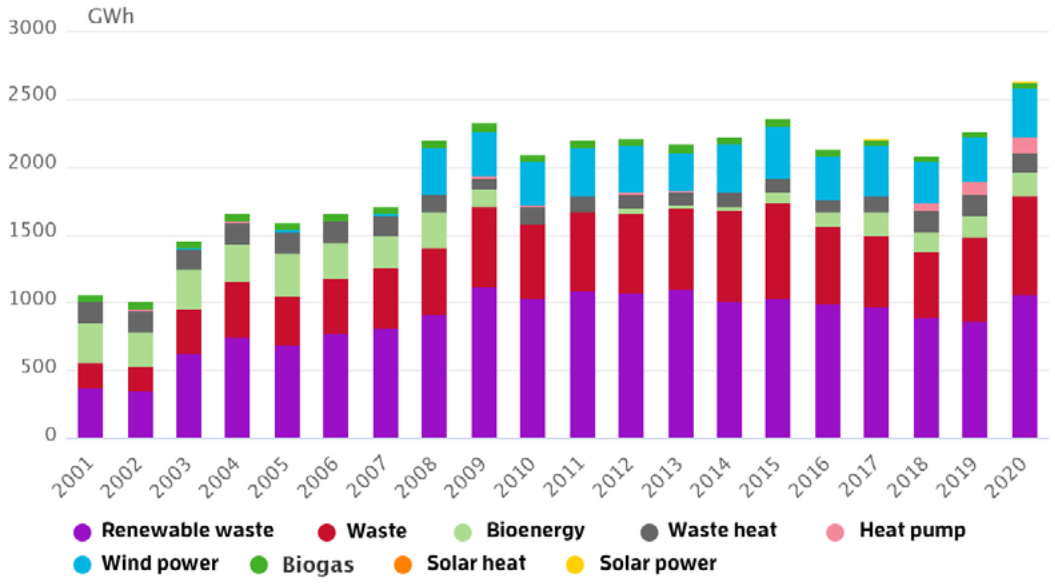


Figure 5. Renewable and recycled energy within Malmö's geographical area. Source: Malmö Stad (2021h)

Energy recovery from waste

Energy from waste represents a large portion of the locally produced energy in Malmö. According to the city's Recycling Plan 2021 – 2030, the goal is to reduce 30 percent of the waste by 2030; the first approach is to prevent waste and when not possible, recycle it (VA SYD, 2020). However, it is considered that there always will be residual waste or non-recyclable waste which can be used as a fuel.

Energy recovery refers to the conversion of non-recyclable waste into energy in the form of heat, electricity, or fuel (EPA, 2020). This constitutes an alternative for local governments to reduce waste streams while reducing fossil fuel consumption and thus GHG emissions.

The process of converting waste to energy is usually thermal or biological, where waste is either incinerated or treated with anaerobic digestion to produce biogas, including landfill gas recovery (Fluence, 2017).

Energy recovery from waste in Malmö is partly of fossil origin, and dates back to the 1960s, when the city incentivized the process of waste's thermal treatment as opposed to landfilling. By the 1970s, the city started the process of heat recovery from incineration, followed by the process of gas extraction from the landfill in the 1980s.

In the next decades further improvements followed, with the plant starting to recover both heat and electricity between 1990 and 2005, and biogas from the process of biodigestion of households' and restaurants' food waste from 2005 to 2010 (SYSAV, 2019).

From the overall household waste, 98 percent is reused or recycled into new material or energy either by biological treatment or by incineration (Malmö Stad, 2021e).

Figure 6: Garbage sorting in four-compartment bins.
Source: Andreas Offesson © Creative Commons Attribution-Share Alike License

Waste-to-energy by incineration

Currently, waste incineration in Malmö is operated by Sysav, but constitutes a public service. The Sysav waste-to-energy facility reduces waste volumes through incineration, producing energy in the form of power and district heating for Sysav's 14 owner municipalities, including Malmö. The company manages all sorts of businesses' ways of sorting out waste, ranging from recycling, biogas and green compost production from food waste and energy recovery through one of the most efficient waste incineration plants in Europe (SYSAV, 2013).

The energy recovery through waste incineration is directly fed into the local district heating grid in Malmö. The heat produced from waste recovery is the base load production in Malmö and constitutes up to 60 perent of the yearly heating demand.

According to Sysav (2020), each inhabitant of its owner municipalities produces 486 kg of waste including the recycled waste handed at a recycling center.

In 2020 the municipalities, including Malmö, collected 243 kg of household waste per person from which 172 kg constituted residual waste, achieving the recycling target that aimed at reducing residual waste volume from households to 175 kg by 2020. Sysav group incinerated a total of 598,717 tons of waste during the year 2021 and recovered energy from 57.8 percent of the waste received.

> *"District heating has an important role in the transition to a sustainable and resource-efficient society in Malmö. Partly by relieving the electricity grids and partly by utilizing residual waste, as part of the circular economy."*
>
> Jonas Persson, Climate Strategist at the City of Malmö

The remaining portion was recovered as material or sent to the landfill. The heat generated corresponds to 1,486 GWh and the electricity to 198 GWh (SYSAV, 2020).

Figure 7. Sysav's waste cogeneration plant, Malmö. Source: Andreas Offesson © All rights reserved

Biogas as a source of energy

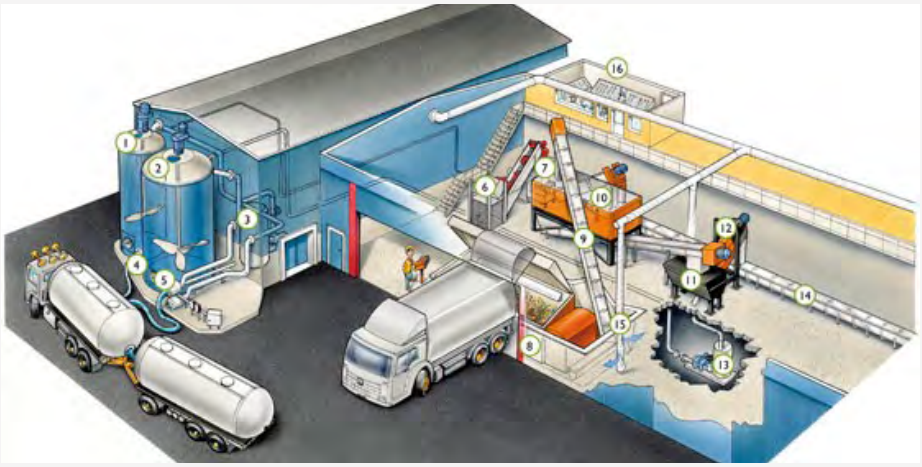
Most of the 42,308 tons per year (as of 2018) of organic waste of which Malmö's municipality provides for biological treatment is made up of food, residual waste, sludge, and garden waste,. (VA SYD, 2020). In 2020 Sysav received 64,272 tons of food waste from households, shops, and restaurants among others (SYSAV, 2020).

Despite waste-to-energy through incineration processes producing CO2 and other pollutants, this alternative results in less emissions than landfilled waste. However, the city acknowledges the importance of diversifying the energy matrix investing in renewable energy while using the resources efficiently in a circular economy. It also plans to guarantee a good infrastructure and gas network to handle increasing biogas production from food waste (Malmö Stad, 2021i). Biogas used in transportation can be promoted by procuring biogas solutions and vehicles, but requires a behavioral change of Malmö citizens to switch from natural gas to biogas. This would drive local biogas production, resulting in more jobs (Malmö Stad, 2020).

Malmö has introduced a mandatory food waste and residual collection which is usually done through a container system connected to the households (VA SYD, 2020). In some cases, waste is collected in special paper bags or in food waste disposers installed in kitchens. Food waste in the region is pre-treated into a slurry at Sysav's pretreatment facility located in Malmö and later transported to one of three biogas plants in Kristianstad, Bjuv or Laholm along with the grease trap sludge (VA SYD, 2020). In 2019, 50,600 tons of slurry were produced with the food waste and converted to the amount of biogas equivalent to 3.3 million liters of petrol (SYSAV, 2019). According to VA SYD (2020), the produced biogas is used as fuel for vehicles and the remaining sludge as biofertilizer.

Moreover, wastewater treatment sludge is usually digested to produce biogas to heat the sewage treatment plant and the garden waste is delivered to recycling centers where it is separated for composting or for combustion.

Figure 8: Diagram of Sysav's food waste pre- treatment plant in Malmö to produce slurry as biofertilizer or for bigas production. Source: link



Climate City Contracts to support waste management and energy recovery in Malmö

Malmö and eight other Swedish cities signed the first Climate City Contract 2030 worldwide in 2020 during the European Viable Cities Day. The cities committed to speeding up the transition to climate neutrality and increased sustainability by 2030. Together with the government agencies and other organizations from the industry, academy, and civil society sectors (Viable Cities, 2020).

The Swedish Climate City Contract 2030 is the first in Europe, and is expected to inspire other EU cities on the road towards climate neutrality while providing them the opportunity for cooperation and access to funds from the EU.

From the overall household waste, 98 percent is reused or recycled into new material or energy either by biological treatment or by incineration (Malmö Stad, 2021e).

"Around the world, cities are at the forefront of the green transition. Through the Climate City Contract, we are hooking arms with the state to gear up decades of successful work locally on the environment and climate, while at the same time focusing on creating an inclusive and equal Malmö. By taking advantage of the local power and the will of cities and the opportunity to drive change, we can achieve the goals of the Paris Agreement and the EU's Green Deal"

Katrin Stjernfeldt Jammeh (S), Mayor, City of Malmö (Viable Cities, 2020)

Climate contracts are not new in Malmö, and the city signed a contract in 2011 with the energy provider E.ON and others with the aim of providing some of the districts with 100 percent renewable and/or recycled energy by 2030. In the climate contract for the Hyllie area development, the energy company, the municipality (represented by the Municipal Department for Environmental Protection and VA SYD), and the academia co-developed the conceptual framework and a tool for estimation of current and future energy balance in the area (Saravia Schott, Aspegren, Bissmont, & Jansen, 2013).

Solid waste management, through biological treatment and incineration of residual waste with energy recovery, played a key role in the contract. The energy company and the municipality evaluated the trends of the renewable energy consumption in the Hyllie area, according to the future potential for waste-to-energy in the area (Fig. 10). This included an estimation of expected waste amounts, on-site separation of food waste and recyclables, and increased use of bioplastics (Saravia Schott, Aspegren, Bissmont, & Jansen, 2013). The process estimates the future energy consumption and the potential from waste considered three scenarios of food waste and recyclables (worst, realistic and best case), which resulted in a model for new urban developments.

Figure 9: The textile sorting plant Siptex in Malmö. Source: Andreas Offesson © Media Use License

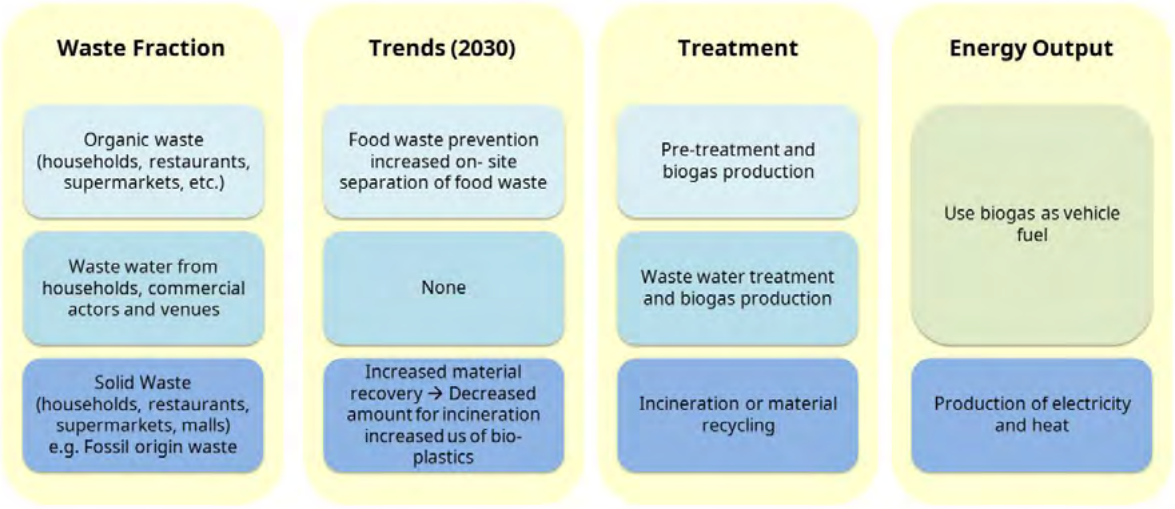


Figure 10: Waste treatment processes considered in the climate contract, presenting acknowledged trends, and used waste-to-energy processes. Waste of fossil origin is not included in the balance, and material recycling does not result in any energy recovery. Source: Saravia Schott, Aspegren, Bissmont, & Jansen, (2013).

Malmö's progress towards 100% renewables

The city of Malmö has taken a holistic approach to become a sustainable city. Political ambition and leadership are strong, with goals set at a high level, supporting the transition towards 100 percent renewables on the road to achieving carbon neutrality. The city departments cooperate with each other and with enterprises, universities, and organizations towards the achievement of these goals (ClimateAction, 2013).

The industry in Sweden is calling for the use of biogas to contribute to the achievement of the NDCs and SDGs. According to the National Biogas Strategy 2.0, the government should adopt a goal where at least 15,000 GWh of biogas should be used in Sweden by 2030 for transport and industry (Swedish Gas Association, 2018).

The Energy Strategy 2021-2030 establishes that Malmö has good capacity to meet the increase of biogas expected to achieve the national goal (Malmö Stad, 2020). In addition, Weum - the gas network owner - foresees an increase in gas demand based on the biogas availability and expects that this can be used for example as a solution for power generation at peak times (Malmö Stad, 2020). The role of liquid biogas and hydrogen would be important to decarbonize the transport sector.

Currently, there is still a large untapped potential for biogas production in the Skåne region considering a future increase in the demand. Thus, the Regional Development Board aims at Skåne to become Europe's leading biogas region by 2030, which will result in a strengthened energy system supporting the energy transition towards renewable sources in Malmö (Malmö Stad, 2020).

A predicted increase in the use of electric vehicles in Sweden indicates that by 2030 the country should have about half of all vehicles chargeable with electricity; thus,

the grid, power generation and charging infrastructure in the city are to be developed to support the future demand estimated at 7,500 GWh (Malmö Stad, 2020).

As of 2020, 24 out of 235 public buses in Malmö were electrified. The city expects to have all of them converted by 2027, in addition to 25 percent of the fleet of heavy goods vehicles electrified by 2030 (Malmö Stad, 2020). According to Persson (2021), the municipal fleet consists of 998 vehicles including passenger cars, LGV and minibuses from which 851 vehicles are already running on biogas and 73 with electricity.

Furthermore, the trend of production of renewables increased mostly between 2015 - 2020 due to a marked increase of wind energy and a consistent increase of solar and photovoltaic (Malmö Stad, 2021j). These positive trends in recent years made it possible to achieve the 100 percent renewables at the municipal operations, and energy consumption in the municipality properties has shown a decrease of 30 percent in comparison to the average use in 2021 – 2005 (Malmö Stad, 2020). The city only purchases origin-labelled electricity without fossil fuels. However, the energy cost reduction has not been sufficiently monitored, and there is a lack of evaluation of the previous energy strategy implementation (Malmö Stad, 2020). Therefore, the energy strategy for Malmö 2021 - 2030 proposes a more ambitious monitoring and evaluation plan to achieve the goals, including dedicated resources and a more systematic action plan with clear roles and responsibilities for its implementation.

As far as the city as a whole is concerned, in 2020 the share of recycled and renewable energy was around 40 percent of the overall energy mix, with the heating sector providing a share of fossil fuels due to the presence fossil fuel in of natural gas and waste (Malmö Stad, 2020). Therefore the 50 percent target of the energy mix coming from renewable energy by 2020 was not achieved.

Figure 11: Bales of imported waste for energy recovery.
Source: Andreas Offesson © Creative Commons Attribution-Share Alike License

However, E.ON plans to supply the city with 100% renewable energy by 2025. The company and the city are currently applying for a first pilot plant of deep geothermal energy production (EGS) through EU Innovation Fund (Persson, 2021). The Climate Contracts between the energy provider and the city are another instrument Malmö is using to ensure the provision of integrated energy solutions for heating, cooling, and power, using a smart grid system. The Climate City Contracts enable investments in climate action in cities through better coordination of governance, innovation, smart technologies, urban planning, and financial support besides providing a multilevel co-creative process (Swedish Energy Agency, 2020).

An upgrading of the waste-to-energy plant to produce both heat and power has increased the city's GHG savings by 30 percent in 1990 – 2005, by 25 percent in 2005 – 2010 due to the condensation of flue gas vapor and by 5 percent in the same period due to the production of biogas from food waste (Johnson, Poulsen, Hansen, & Lehmann, 2011). Nevertheless, waste is considered only partially renewable (Malmö Stad, 2021h), and energy recovery from waste is still a GHG- emitting source as opposed to renewable energy. Overreliance on energy recovery in the energy mix may therefore hinder the plan to achieve 100 percent renewables by 2030, or the aim to reach carbon neutrality in the future.

According to the city's environmental report and the Malmö council itself, the vision of achieving 100 percent renewables by 2030 seems difficult (Malmö Stad, 2019; Malmö Stad, 2021k). However, the city's recycled energy from the waste constitutes an important step towards a renewable energy future, minimizing landfilling of non-recycling waste, while producing electricity and heat.

"The 100%RE goal in the city can be reached in many different ways, but society as a whole needs to take care of its residual waste. Energy recovery from waste incineration enables us to benefit from the end of the material flows, when only deposition remains as a viable alternative."

Jonas Persson, Climate Strategist at the City of Malmö)

The fact that the Swedish parliament approved an incineration tax on waste, which came into force on 1 April 2020, may also play a further role in reducing the incidence of energy recovery through incineration upstream. However, the sorting of waste in recycling centers has not been affected by the tax. SOU (2017) established that it will not be possible to collect the waste incineration tax from the waste suppliers as the import would then cease. Despite this, it is possible to transfer the incineration tax to the waste suppliers in Sweden, as there have been clauses in existing contracts that any levies may be transferred.

Lessons learned

The City of Malmö has shown a strategy with an implementation mechanism on recycled energy, reducing energy recovery from incineration in favor of reusing and recycling waste. The city's achievements so far, although not enough, show the willingness and the potential to make further improvements and eventually achieve true climate neutrality and the vision of achieving 100 percent renewables by 2030.

Although recycled energy from waste currently plays a key role in Malmö's energy matrix, it may play a smaller role in the long future as the city promotes a circular economy and waste prevention. However, in the foreseeable future of 20 - 30 years, recycled energy will still be a major player in the local energy system. Thus, the city is working on GHG-free means of energy production through various upstream and downstream measures.

With time, the renewable portion of the energy mix is expected to increase with other technologies, while the energy consumption is to be reduced due to increasing circularity where energy customers would become producers, feeding surplus renewable energy into the grid. Since there would always be a fraction of residual or non-recyclable waste, energy recovery from waste incineration constitutes a solution to treat this waste, while minimizing the fossil fuels part in energy recovery from waste remains a challenge.

Considering waste as current important source of energy in Malmö, here are some key considerations and takeaways, for other cities and regions planning and /or implementing their 100 percent renewable energy roadmaps and considering using the recycled energy or waste-to-energy:

- Engaging local stakeholders and residents. Creating public awareness and support on circularity is crucial to harness the energy potential of waste. The city must build in-house competence for civic engagement and drive a behavior change in their citizens to switch from natural gas to biogas.
- Cooperation among city departments, enterprises, academia, and other stakeholders is an important aspect to achieve climate and sustainability targets with the development of smart solutions and innovative strategies.
- Establishing a robust waste management plan including reducing, reusing, recycling or incinerating waste before considering disposing it in a landfill. This should be focused mainly on reducing waste volumes, increasing recycling, and reducing environmental impacts on a road towards increasing circularity.
- Early integration of waste management in new project development and urban planning processes.
- Establishing a mandatory and systematic food waste and residual collection system with adequate infrastructure for waste recycling.
- Promoting use of biogas in transportation by procuring biogas solutions, and vehicles.
- Providing innovative solutions to optimize energy and heat consumption in the city and turn the residents into energy providers (e.g. eco-districts, waste separation).
- Executing climate city contracts between the energy providers, the city, and other key stakeholders to support innovative technologies and ensure the provision of integrated energy solutions for heating, cooling, and power, using a smart grid system.
- Guaranteeing a good infrastructure and gas network to handle increasing biogas and energy production from waste or other renewable sources. This includes storage systems for solar energy, among others.
- Measuring and tracking GHG emissions and energy targets. Tracking goals and targets would indicate if the actions are sufficient and if they are having the expected results. This would allow the identification of different paths for the local climate transition, with more clarity on the level of engagement required by the different public and private stakeholders to accomplish the commitments. Likewise, it will help to monitor if the energy strategy is well implemented.

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The 100% Renewables Cities and Regions Roadmap 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.

The 100% Renewables Cities and Regions Roadmap project is implemented by ICLEI – Local Governments for Sustainability and funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative (IKI).

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