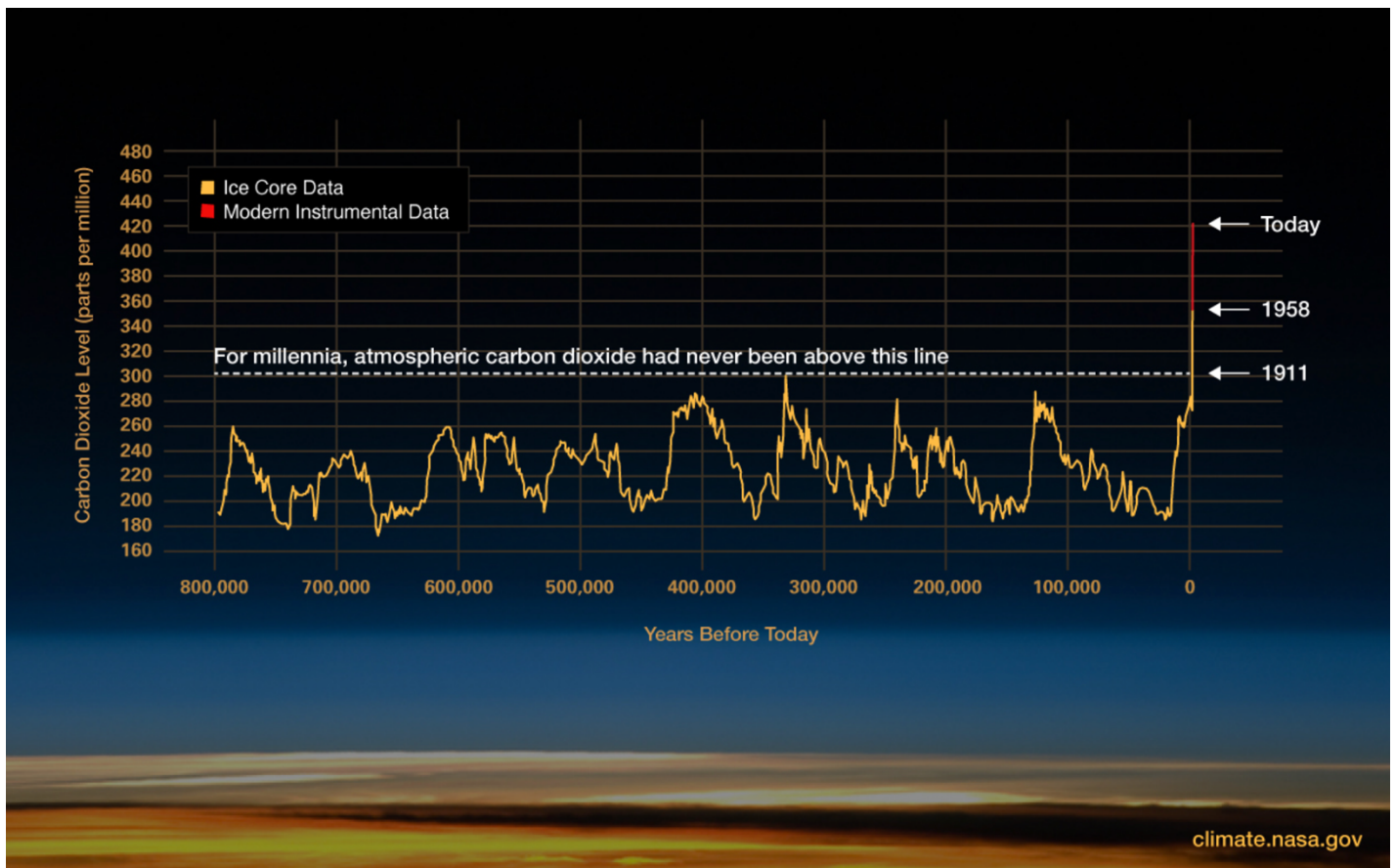


MODULE 2 GUIDANCE NOTE: SUPPORTING CLIMATE NEUTRALITY THROUGH VLRS

What is climate neutrality and why is it important?

Climate neutrality is a term used to describe no net greenhouse gas (GHG) emissions by a community, organization, or country. The Carbon Neutrality Toolkit of the UN Economic Commission for Europe emphasizes that current actions to reduce GHG emissions are falling short of delivering carbon neutrality and limiting global warming to under 2 degrees Celsius ([UNECE, n.d.](#)). We are reminded that “actions must start now to maximize the use of all low- and zero carbon technologies to achieve carbon neutrality by 2050”.

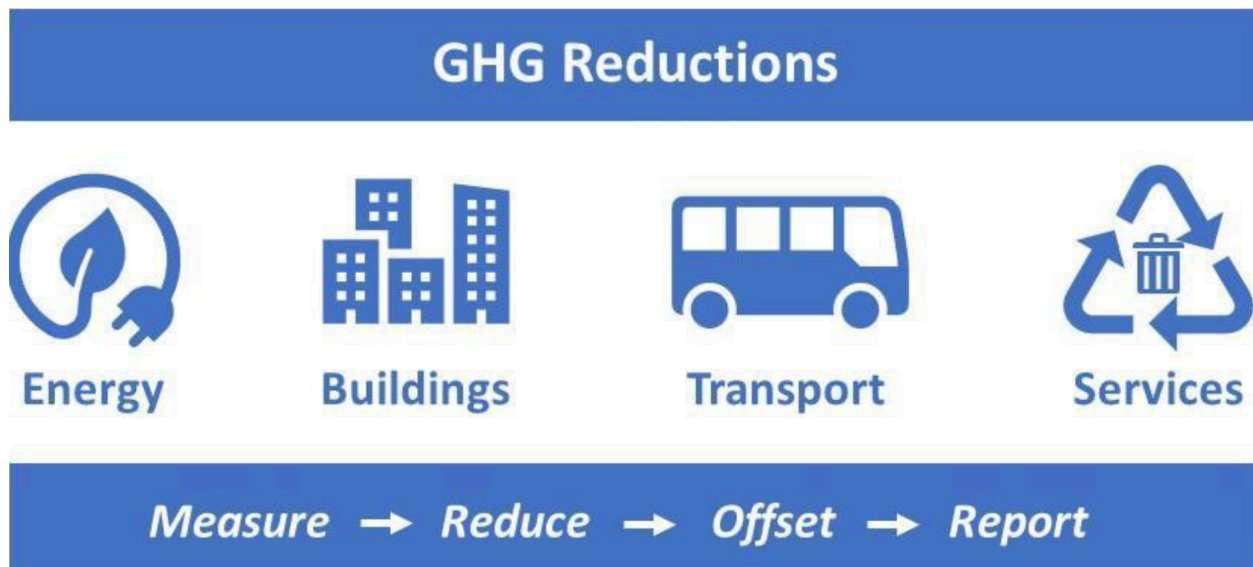
And to further illustrate the imperative for achieving carbon neutrality, consider a historical view of atmospheric carbon dioxide concentrations as reported by the United States National Atmospheric and Space Administration (NASA). The Figure below shows that, while the concentration of carbon dioxide in the atmosphere has varied naturally over hundreds of thousands of years from between 180 parts per million (ppm) to an upper level of 300 ppm, since 1950 the concentration of carbon dioxide has surpassed this upper level and is now 420 ppm and rising, due to GHG emissions caused by humans (NASA, n.d.). We are now, literally and figuratively, off the charts!



Source: ([Nasa.gov](https://www.nasa.gov))

How can local governments help achieve climate neutrality at the local level?

At the local level, UN-Habitat, together with the European Commission and ICLEI Local Governments for Sustainability, provide guidance on urban low emission development (LED) strategies focused on key areas including **energy, transport, buildings, and local government services** (i.e., operations, procurement, and land use) ([ICLEI and UN-Habitat, 2016](#)). These strategies are consistent with guides issued by national and subnational governments, local governments and authorities, and academic institutions for achieving carbon neutrality.¹ Furthermore, experience by local governments show that there are four practical steps to achieving carbon neutrality: (1) **measure** carbon emissions; (2) **reduce emissions** where possible; (3) **offset remaining emissions** through carbon offset credits and/or local investment; and (4) **report** to the public on progress and actions taken.²



How can a VLR help?

A Voluntary Local Review (VLR) can play a crucial role in helping a community achieve climate neutrality by providing information that is relevant for local government planning & policy, budgeting & finance, and reporting & assessment. A VLR can also help mainstream and catalyze efforts within local government toward measuring local GHG emissions, reducing and offsetting carbon, and reporting on climate neutrality. More insight into how VLRs can help achieve climate neutrality at the local level is provided at the end of this document.

The first step, as officials preparing a VLR or experts providing assistance, is for you to have a general understanding of all the potential leverage points for achieving climate neutrality at the local level. Such is the purpose of the sections that follow.

Promoting Clean Energy

Energy is key to achieving climate neutrality, according to the United Nations Issue-based Coalition (IBC) on Environment and Climate Change for Europe and Central Asia (IBC, 2022). The IBC's conclusion is evidence-based: over 70% of global GHG emissions comes from activities related to the energy sector ([Climate Watch, 2021](#)). Sources of GHG emissions from the energy sector include electricity and heat production, transport, heating of buildings and energy use in industries, as well as fugitive emissions in the form of methane (IBC, 2019).

Local Leverage Points

While centralized electricity supply often falls outside the purview of local governments, there are five key strategies that cities can develop and implement to help achieve climate neutrality through clean energy provision, including ([EC, 2010](#); [ICLEI and UN-Habitat, 2016](#); [TaRC, 2010](#)):

- **Local renewable energy generation:** Renewable energy options include solar power from photovoltaics, solar thermal to convert sunlight directly into heat, wind power, mini-hydroelectric power, and biomass heating.
- **District heating and cooling (DHC):** DHC consists of a network of pipes that supply heating and cooling from one or more sources directly to a group of connected buildings ([TaRC, 2010](#)). Among the DHC technology options are district heating boilers, district chillers, large-scale solar thermal, geothermal energy, thermal energy storage, waste heat, large-scale heat pumps, and waste-to-energy ([EC, 2010](#)).
- **Combined heat and power (CHP):** CHP systems simultaneously produce power and recover heat and deliver it in the form of steam or hot water for spatial heating and cooling systems (via chillers), water heating, and process heating and cooling applications. CHP systems are often delivered through district heating and cooling ([TaRC, 2010](#)).
- **Integrated community energy systems:** “A community can provide a sufficient economy of scale for infrastructure investment to support integrated resource recovery” ([TaRC, 2010](#)). This can be achieved by integrating the energy strategies above together with land use and transportation planning, management of solid and liquid waste, and potable water system in order to recover value from waste resource streams and provide a new net revenue source for the community.

Good practice example:

Carbon Neutral Targets and Strategies of the City of Jyväskylä, Finland

Finland has established a national-level goal to achieve carbon neutrality by 2035. Over 80 cities in the country participate in a network called “Towards Carbon-Neutral Cities” with a commitment to reduce GHG emissions by 80% by 2030 (from 2007 levels). For instance, the local government of Jyväskylä, a city with a population of approximately 140,000 citizens, has set the following targets and strategies to achieve their goal:

1. Targets:

- Carbon neutrality (80% GHG emission reduction from 2012) by 2030
- Carbon-neutral electricity and heat production by 2030
- The share of renewable energy sources has increased to at least 80% in local energy production in 2030
- Energy consumption has decreased by 10% from the 2012 level in 2030
- Fossil-free and carbon-neutral energy production by 2050
- Fossil-free and carbon-neutral transport by 2050

2. Strategies:

- Improved energy efficiency of buildings and public lighting
- Increased use of renewable energy sources
- Increase walking, cycling and use of public transport through densification, improvement of walking and cycling routes, incentives and campaigns to promote behavioral change
- Promote adoption of clean transport through improved biogas refueling and electric vehicle charging infrastructure, advice and public procurement criteria
- Increase use of renewable energy sources in local energy production;
- Increase use of solar energy in residential buildings; promote district cooling and waste heat recovery
-

Sources: Jyväskylä (2016) and Jyväskylä (2019), as cited in [Huovila et al., \(2022\)](#)

Promoting Green Buildings

The World Green Building Council states that buildings are responsible for 39% of global energy related carbon emissions, with 28% owing to energy needed to heat, cool and power buildings and 11% the results of materials and construction of buildings ([WGBC, 2019](#)). In cities like Sao Paulo in Brazil, water heating alone accounts for 40% of the city’s electricity consumption ([ICLEI](#)

[and UN-Habitat, 2016](#)). And similarly, in cities like Dubai, cooling represents 70% of electricity consumption, against the backdrop of growing demand for air conditioning in developing countries at 7% per year ([ICLEI and UN-Habitat, 2016](#)).

Local Leverage Points

There exist multiple leverage points for local governments to reduce GHG emissions from buildings, including ([EC, 2010](#); [ICLEI and UN-Habitat, 2016](#); [TaRC, 2010](#)):

- **Increasing energy efficiency and reduced demand:** This can be achieved through a combination of retrofitting, re-building, and upgrading of buildings as well as using energy efficient appliances and equipment. Nature-based solutions are also an important part of the toolkit, including green roofs and urban forestry to reduce cooling requirements.
- **Taking advantage of solar energy:** There are several means by which buildings can take advantage of solar energy, including augmenting electricity supply using photovoltaic systems, utilizing solar water and air heating systems, and passive solar design approaches ([TaRC, 2010](#)).
- **District heating and cooling (DHC):** See previous section on Promoting Clean Energy.
- **Using ground source heat pumps (GSHP):** GSHPs use natural temperature differentials between the ground and ambient building condition to deliver low carbon heat and cooling during winter and summer months ([TaRC, 2010](#)).
- **Using natural refrigerants:** Air conditioners and refrigerators already consume 20% of electricity globally; therefore, replacing traditional refrigerants containing ozone depleting HCFCs and HFCs with high global warming potentials with natural refrigerants such as carbon dioxide, ammonia and propane, can reduce overall GHG emissions and help achieve climate neutrality ([ICLEI and UN-Habitat, 2016](#)).
- **Using nature-based solutions:** Nature-based solutions, sometimes referred to as green or natural infrastructure, are increasingly understood as a cost-effective and efficient means of greening buildings. Such solutions include forests and trees, and green roofs and walls to provide shade and reduce stormwater runoff, as well as rainwater harvesting systems for non-potable water supplies, to name a few.

Good practice example:

Community-level Solar Water Heating in Betim, Brazil

The city of Betim in Brazil installed over 1300 solar water heaters in low-income housing units during the period 2004 to 2007. A survey conducted years later determined that for an average family of 3 to 4 members, electricity consumption was reduced by up to 20% and home electricity bills dropped by up to 57% owing to reduced consumption and qualifying tax exemptions for energy efficiency.

Sources: ([ICLEI and UN-Habitat, 2016](#)).

Advancing Sustainable Transport and Connectivity

The Secretary-General’s High-level Advisory Group defined sustainable transport as “the provision of services and infrastructure for the mobility of people and goods — advancing economic and social development to benefit today’s and future generations — in a manner that is safe, affordable, accessible, efficient, and resilient, while minimizing carbon and other emissions and environmental impacts” ([United Nations, n.d.](#)).

Local Leverage Points

In the European Union, cities can seek guidance on sustainable transport and connectivity through the European Green Deal, mainly through the Sustainable and Smart Mobility Strategy, but also from the Clean Vehicles Directive ([EC, 2010](#)).

Among the core strategies for advancing sustainable transport and connectivity in cities are the following:

- **Transit-oriented development (TOD):** TOD is described as “a type of urban development that clusters jobs, housing, services, and amenities around public transportation hubs” ([C40, 2019](#)). It is further characterized as compact, mixed-use, and pedestrian and cycle friendly, with multiple benefits including increased public transit use and revenues, reduced congestion and air pollution, increased job availability, convenience, and sense of community.
- **Public transport:** Modes of public transportation include conventional buses, light rail transit, bus rapid transit (combining bus and light rail), subway systems, and commuter rail lines. Such modes can provide mass transit for millions of residents while reducing GHG emissions.
- **Active mobility:** Modes of active transportation include walking, cycling, and increasingly of late, hybrid modes (i.e., scooters, e-scooters, hoverboards, e-bikes,

Segways). Important parameters for advancing active transportation modes include land use mix and density, connectivity, safety and length of travel network.

- **Shared mobility:** Use of carpool integration in the public transport system as well as autonomous electric bus connections between urban and peri-urban districts ([EC, 2010](#)).
- **Electric and fuel-efficient vehicles:** While not directed at reducing the number of vehicles used, a shift in vehicle technology to more fuel-efficient combustion engines (including with blended biomass fuels) and electric, hybrid electric, plug-in hybrid electric, and fuel cell vehicles for passenger, commercial and public vehicles have the potential to significantly reduce GHG emissions and improve air quality in cities.

Good practice example:

Tracking Progress Toward Transit Oriented Development

Many cities have created indicators and set targets to communicate their urban development plans to developers and citizens. For example:

- **Indicator: Percentage of population with access to public transport:** Cape Town's TOD Strategic Framework has set targets to improve access to transit by 12% by 2032, and to reduce passenger kilometres travelled by 23%.
- **Indicator: Percentage of new development within a certain radius of transit stations:** For example, in New York, upzoning under plaNYC aims for 95% of new housing to be built within half a mile of mass transit stations.
- **Indicator: Percentage of the population living in TOD zones:** Portland's TOD approach is framed around 'complete neighbourhoods.' Neighbourhoods are designed to accelerate the shift to active transportation modes and to provide residents with access to local amenities like schools, stores and parks within a 20-minute walk.

Source: ([C40, 2019](#)).

Reducing GHG Emissions in Local Government Services

Local governments are responsible for the delivery of many basic community services including water supply, solid and liquid waste management, recycling and composting, management of green spaces, and land use planning. There are opportunities for reducing GHG emissions across all of these corporate services. As well, local governments are large organizations in and of themselves, with additional opportunities for realizing GHG emission reductions through vehicle fleet management, sustainable procurement, and indirect GHG reductions through carbon sequestration and purchasing local carbon offsets.

Local Leverage Points

Given this broad range of corporate services delivered by local governments, there exist a range of strategies for reducing GHG emissions, including:

- **Water conservation and efficiency:** Engineering services can work to reduce the loss of water from the urban water supply system, including from leaky pipes which can be responsible for up to 50% of water loss and ruptures ([ICLEI and UN-Habitat, 2016](#)). Managing the demand for water and the energy efficiency of supply can be another key strategy for reducing GHG emissions because pump and lift stations can use significant amounts of electricity ([TaRC, 2010](#); [ICLEI, 2016](#)).
- **Wastewater management:** Sludge byproducts generated through anaerobic digestion by wastewater treatment plants presents a co-generation potential in that the biogas methane captured can be used for small-scale heat and electricity production, as fuel for vehicles, or purified as an injection in a natural gas grid ([ICLEI and UN-Habitat, 2016](#)).
- **Solid waste management:** There are a range of strategies to reduce GHG emissions from a community's solid waste management services, including waste incineration with energy recovery and landfill gas recovery for energy production ([ICLEI and UN-Habitat, 2016](#)).
- **Recycling and composting:** Increased sorting and recycling can also help to reduce GHG emissions locally (U.S. EPA, cited in [TaRC, 2010](#)). Diversion of organic waste from landfills is another leverage point, which can also produce co-benefits in the form of compost soil for fertilizer use and biogas for energy production ([TaRC, 2010](#)).
- **Stormwater management and nature-based solutions:** One key strategy is the separation of stormwater from wastewater so that it does not have to consume capacity and energy from the treatment plant and so that it can be used for more productive uses and not contribute to localized flooding ([ICLEI and UN-Habitat, 2016](#)). Nature-based solutions can play a big role in SUDS, in the form of retention ponds, engineered wetlands, bioswales, permeable pavements, green roofs, and urban forests.
- **Natural asset management and nature-based solutions:** Urban forests, green spaces, and green roofs sequester carbon while at the same time deliver other co-benefits including cooling, enhanced aesthetics (and property values), and improved mental and physical wellbeing ([TaRC, 2010](#)).
- **Land use planning:** Urban infill development is one type of strategy that can help reduce community GHG emissions by countering urban sprawl and creating a more compact built urban environment ([ICLEI and UN-Habitat, 2016](#)).

- **Sustainable public procurement (SPP):** In the European Union, public procurement by government at all levels accounts for about 20% of GDP (as cited in [ICLEI and UN-Habitat, 2016](#)). Given the volume of services that are procured by governments, this represents an important leverage point for local governments to help reduce their corporate GHG emissions.
- **Carbon sequestration and offsets:** Where desired corporate GHG emissions reductions cannot be achieved by directly local government, two strategies are potentially available to help realize reductions either directly through carbon capture and storage (CCS) or indirectly through the purchase of carbon offsets.

Good practice example:

Wastewater Sludge Biogas Capture and Cogeneration in Almada, Portugal

A wastewater treatment plant in Almada, Portugal, serving about 80,000 residents captured biogas from its anaerobic sludge digestion facility and built two cogeneration units to convert the biogas to electricity and vapour and hot water. The two cogeneration units generated together were able to meet 40% of the treatment plants energy needs, representing 550 MWh and 180 tonnes of carbon dioxide emissions reductions per year. Additionally, sludge from the treatment plant is used as an agriculture fertilizer and the treated water used for watering green spaces and for outdoor washing operations.

Source: ([ICLEI and UN-Habitat, 2016](#)).

Tips for Supporting Climate Neutrality through Strengthened VLRs

As an official of a local government or organization tasked with preparing a Voluntary Local Review (VLR), or as an expert assigned to assist a local official prepare a VLR, being aware of all the potential ways in which GHG emissions can be reduced in a community is the first and most important step in supporting local recovery and transitions that aspire to be climate neutral.

Your next steps are to find practical ways to use the content and process of a VLR to support local government planning, budgeting and reporting, and the means of local implementation, as well as to inform your country's Voluntary National Review (VNR) when it is submitted and presented to the United Nations High-level Political Forum. In this regard, below is a listing of the top strategies to use to enhance your VLR to support climate neutrality at the local level.

1. Informing local government and the means of implementation:

Planning & Policy

- Identify and communicate local success stories in achieving local climate neutrality
- Assess and identify missed local leverage points for achieving climate neutrality
- Make coherent policy recommendations for local governments to implement leverage points for achieving climate neutrality

Budgeting & Finance

- Assess public budget expenditures allocated to achieving climate neutrality and report key gaps
- Make coherent recommendations for addressing expenditure gaps, including all potential financing sources and instruments
- Identify and communicate local success stories in climate finance

Reporting & Assessment

- Provide data and stories relevant to key performance indicators (KPIs) reported by local government, including by asset managers
- Identify KPI gaps and make recommendations for additional indicators for local government to use

2. Informing your country's Voluntary National Review (VNR):

Content

- Align the structure of your VLR with that of your country's VNR, to the extent possible
- Include success stories, barriers to implementation, and lessons learned towards achieving local climate neutrality
- Include recommendations for how national governments can support local efforts toward climate neutrality
- Highlight innovative local sources and instruments of finance for climate neutrality
- Promote utilization of local data and provide disaggregated data, aligned with indicators reported in the VNR, to the degree possible

Process

- Time your VLR with the preparation cycle of the VNR
- Inform your intent to prepare a VLR to the national government's VNR staff
- Ask VNR preparers at the national level to review and comment on your VLR
- Volunteer to provide local content and indicators to ensure the VNR captures local efforts toward climate neutrality
- Volunteer to be part of the VNR presenter's panel at the UN High-level Political Forum.