Climate Mitigation

This guidance is intended to clarify how the Climate Mitigation Goal and Objectives of the Regional Policy Plan (RPP) are to be applied and interpreted in Cape Cod Commission Development of Regional Impact (DRI) project review. This technical bulletin presents non-exhaustive, non-exclusive methods by which a project can meet this goal and objectives.

Climate Mitigation Goal: To support, advance and contribute as a region to the Commonwealth's interim and long-term greenhouse gas reduction goals and initiatives, including a state-wide net zero carbon target by 2050.

- **Objective CM1** – *Promote low or no carbon transportation alternatives and technologies*
- **Objective CM2** – *Promote low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems*
- **Objective CM3** – *Promote carbon sequestration and other emissions removal practices and technologies as appropriate to context*
- **Objective CM4** – *Promote low or no carbon energy generation technologies as appropriate to context*

The applicability and materiality of the RPP goals and objectives to a project will be determined on a case-by-case basis considering a number of factors including the location, context (as defined by the Placetype of the location), scale, use, and other characteristics of a project.

THE ROLE OF CAPE COD PLACETYPES

The RPP incorporates *a framework for regional land use policies and regulations based on local form and context* as identified through categories of Placetypes found and desired on Cape Cod.

The Placetypes are determined in two ways: some are depicted on a map contained within the RPP Data Viewer located at www.capecodcommission.org/RPPDataViewer adopted by the Commission as part of the Technical Guidance for review of DRIs, which may be amended from time to time as land use patterns and regional land use priorities change, and the remainder are determined using the character descriptions set forth in Section 8 of the RPP and the Technical Guidance.

The project context, as defined by the Placetype of the location, provides the lens through which the Commission will review the project under the RPP. Additional detail can be found in the Cape Cod Placetypes section of the Technical Guidance.

Given the pervasive nature of climate change, which cuts across many land use issues, the stated methods set out in this Technical Bulletin are not associated with any particular Placetype. However, Placetypes are still significant considerations in the application of the Climate Mitigation goal, objectives and methods. For instance, proposed mitigation methods related to natural carbon sequestration may be more appropriate in Natural Areas or Rural Development Areas, whereas proposed methods that involve engineered, quasi-industrial technologies to remove carbon are more appropriate for Industrial Activity Centers. Further, the concept of directing certain growth and development to Community Activity Centers has many land use co-benefits, including with respect to climate change mitigation: denser, more walkable development in Community Activity Centers involves more compact development patterns and efficient buildings, fewer vehicles miles traveled (and thus fewer GHG emissions), etc.

TABLE OF CONTENTS

INTRODUCTION

Climate change is one of the most pressing global problems, though it also presents localized impacts especially pronounced in coastal communities like Cape Cod. However, there are actions that communities can take to help solve this global issue and its more localized impacts.

The Climate Mitigation goal and objectives deal with lowering greenhouse gas (GHG) emissions as climate change mitigation. This goal ties directly into the well-structured legal, policy and regulatory regime in the Commonwealth, originating with the Global Warming Solutions Act and related legislation, which seek to lower GHG emissions economy-wide from 1990 levels to net zero by 2050. Through the RPP Climate Mitigation goal, Cape Cod can contribute to the Commonwealth's goal in addressing the overarching, global problem.

A critical piece in lowering emissions and meeting state carbon targets is reducing the economy's reliance on fossil fuel use and transitioning to clean, renewable energy sources. On Cape Cod (based on the GHG inventory conducted by the Commission), the transportation and energy sectors are the primary contributors to GHG emissions, similar to the rest of Massachusetts. The Climate Mitigation objectives tie into these sectors expressly; further, the objective dealing with carbon removal and reduction recognizes that leveraging the natural carbon sequestration associated with forests, marshes, wetlands and other natural ecosystems can and will play a large part in mitigating the effects of climate change on Cape Cod.

As is the case with other RPP goals and objectives, but particularly with the Climate Mitigation goal and objectives where climate change concerns cut across so many land use issues, there is and there is intended to be overlap, coherence and consistency between all RPP goals and objectives in their application and interpretation during the Commission's project review. The Climate Mitigation goal and objectives speak directly to the problems associated with climate change and ways to mitigate the problem; there are other RPP goals and objectives that appropriately address climate change and climate change mitigation, though less directly. For instance, there is a particularly close affinity and interrelation between the Energy and Climate Mitigation RPP goals and objectives; one does not pre-empt or supplant another, but each is intended to supplement, inform and reinforce the other.

Methods primarily intended to satisfy other RPP goals and objectives may contribute to satisfying the Climate Mitigation goal and objectives, and vice versa.

SUMMARY OF METHODS

GOAL | CLIMATE MITIGATION

To support, advance and contribute as a region to the Commonwealth's interim and long-term greenhouse gas reduction goals and initiatives, including a state-wide net zero carbon target by 2050.

OBJECTIVE CM1 – Promote low or no carbon transportation alternatives and technologies

METHODS

- Project employs and quantifies the GHG-reduction benefit of the strategies to reduce vehicle miles traveled (see Transportation Technical Bulletin Objective TR-2 Methods)
- Project commits to work-from home policies
- Project provides safe and convenient access to the site for pedestrians, bicyclists, and transit users and quantifies the GHG-reduction benefit (see Transportation Technical Bulletin Objective TR2 Methods)
- Project provides bicycle sharing, racks, or storage (see Transportation Technical Bulletin Objective TR2 Methods)
- Project advances the accommodation of pedestrians, bicyclists, and transit users in the transportation system (see Transportation Technical Bulletin Objective TR2 Methods)
- Project provides sidewalks, and/or connections to multi-use paths (see Transportation Technical Bulletin Objective TR2 Methods)
- Project incorporates dedicated spaces for EVs
- Project incorporates EV charging stations within parking facilities (see Energy Technical Bulletin Objective EN3 Methods: Incorporate Site Design Elements)
- Project includes EVs or hybrid vehicles for fleet vehicles, or has EVs available for business use (see Energy Technical Bulletin Objective EN3 Methods: Incorporate Operational Elements)
- Project provides EVs for car sharing
- Project contributes to build out of regional EV charging network

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OBJECTIVE CM2 – Promote low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems

METHODS

- Development maximizes energy efficiency and conservation measures, including optimized building siting and design (see Energy Technical Bulletin Objective EN3 Methods: Net Zero Energy and Net Zero Energy Ready Buildings)
- Redevelopment includes deep retrofits of HVAC systems and retro-commissioning, moisture management, and/or energy efficient appliances
- Buildings include smart temperature controls
- Buildings include educational signage explaining the energy efficiency and conservation systems at work, "leading by example"
- Development includes ground or air source electric heat pumps, in place of fossil fuel HVAC systems
- Project includes site scale battery storage paired with renewable energy generation or emergency generators that use renewable fuels
- Project incorporates methods to reduce peak-demand electricity usage (see Energy Technical Bulletin, Objective EN2 Methods)

OBJECTIVE CM3 – Promote carbon sequestration and other emissions removal practices and technologies as appropriate to context

METHODS

- Buildings incorporate reuse of building materials or use of recycled building materials certified as low carbon
- Project proposes tree planting as part of landscaping plan and/or stormwater LID plan (see Wildlife and Plant Habitat Technical Bulletin Objective WPH1 Methods, and Community Design Technical Bulletin Objective CD1 Methods: Provide appropriate landscaping and pedestrian amenities)
- Project proposes planting or restoration with native vegetation, including trees in appropriate habitat settings (see Wildlife and Plant Habitat Technical Bulletin Objective WPH2 Methods)
- Project limits or avoids supplemental use of fertilizer
- Project permanently protects forest or other naturally vegetated area which sequester carbon (see Open Space Technical Bulletin Objective OS3 Methods)

- New and redevelopment of industrial buildings includes decarbonization of manufacturing systems, including use of scrubbers or engineered solutions, as appropriate
- Capped landfill projects incorporate methane gas capture and conversion technology

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OBJECTIVE CM4 – Promote low or no carbon energy generation technologies as appropriate to context

METHODS

- New buildings and redevelopment include installed green energy systems (solar or other renewable energy generation) on roofs, as solar car-ports, or on disturbed sites; new greenfield development for solar is discouraged (see Energy Technical Bulletin Objective EN1 Method: Incorporate on-site renewable energy)
- New buildings and redevelopment are EV and/or PV ready
- Project commits to purchase of renewable energy (see Energy Technical Bulletin Objective EN1 Method: Green Power Purchase)
- Project incorporates alternative renewable energy sources for onsite building development such as geothermal heating and cooling
- Project proposes, contributes to, or ties into a Microgrid

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CM1

Objective CM1 – *Promote low or no carbon transportation alternatives and technologies*

The purpose of Objective CM1 is to support and advance low or no carbon transportation alternatives and technologies towards a regional transition away from fossil fuels in the transportation system.

Detail on the methods for meeting Objective CM1 is provided below organized under the headings of reducing vehicle miles traveled, promoting transportation alternatives, and supporting electrification of the transportation system.

Reducing Vehicle Miles Traveled

Reducing vehicle miles traveled can be accomplished through a combination of strategies including implementation of Transportation Demand Management (TDM) strategies and provision of healthy transportation options.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation Demand Management (TDM) is a combination of strategies employed to reduce single-occupancy vehicle trips to and from a site. TDM best practices and guidance on developing site-specific TDM plans are detailed in the Transportation Technical Bulletin Objective TR2 Methods.

Adoption of a work-from-home policy that reduces employee trips can be an effective TDM strategy.

The effectiveness of any strategy, or combination of strategies, depends on the type of land use proposed, proximity to existing transit corridors, walking and bicycling characteristics of the area, and other factors. In all cases, applicants are encouraged to identify and evaluate strategies that are appropriate for the project. Where feasible, the GHG-reduction benefit of the strategies should be quantified. Sources of data should be identified, and methods used should be justified.

Promoting Transportation Alternatives

Supporting healthy transportation options involves decisions about the site and amenities on the site that support the individuals who wish to use healthy transportation modes to access the site.

As detailed in the Transportation Technical Bulletin Objective TR2 Methods, to the extent feasible, the following site design features and amenities should be included in all projects:

- Sidewalk connections to all buildings
- Safe crossing treatments at all driveway and parking lot crossings
- Conveniently located bicycle racks

Where feasible, the GHG-reduction benefit of the provided healthy transportation options should be quantified.

Supporting healthy transportation options also involves supporting and providing connections to and building out the region's pedestrian, bicycle, and transit networks. These networks on Cape Cod have been built out over time. Further development of these networks will require a cooperative, coordinated approach with both public and private partners.

Transportation Technical Bulletin Objective TR2 Methods details which improvements by the applicant would be appropriate and feasible based on the following factors:

- The location of the project;
- The nature and scale of the project;
- Any constraints to project implementation;
- The anticipated cost of the potential improvement; and
- The anticipated benefit of the potential improvement.

Promoting Electrification of the Transportation System

Promoting electrification of the transportation system involves consideration of electric vehicles (EVs) on the project site (see Energy Technical Bulletin Objective EN3 Methods: Incorporate Site Design Elements) as well as contributing to build out of the regional EV charging network.

DEDICATED SPACES FOR EVS

Even if the project does not propose electric vehicle charging infrastructure, dedicated parking spaces for EVs could be considered to promote the adoption of EVs. It may be appropriate to make the spaces EV ready (see Objective CM4 Methods) to allow for future provision of charging infrastructure.

In other instances, dedicated parking spaces for EVs may also be considered in addition to EV charging spaces.

EV CHARGING STATIONS WITHIN PARKING FACILITIES

The provision of Electric Vehicle Supply Equipment (EVSE), a collection of which is commonly referred to as an EV charging station, is appropriate for a variety of land uses. The appropriateness, type, and number of EVSE is based on the following factors:

- The location of the project, including relative to other on- or off-site EVSE;
- The nature and scale of the project;
- Any constraints to EVSE implementation;
- The anticipated cost of the potential improvement; and
- The anticipated benefit of the potential improvement.

The provision of ESVE is particularly desirable for residential and office settings as well as sites that serve the general public. The potential demand for EV charging can be estimated based on industry best practice and can be supplemented by the Cape Cod Commission Electric Vehicle Charging Station Siting Analysis Tool which maps the following site characteristics:

- Within Community Activity Centers;
- Proximate to a high concentration of community and/or business activity sites;
- Includes large parking lots; and
- Located in areas that currently lack publicly available charging stations.

Where an applicant proposes the provision of EVSE, best practices in terms of implementation should be followed. While best practices will continue to evolve, the following should be considered:

- Level 2 EVSE or higher should be considered for most land uses. Level 1 EVSE may be appropriate in limited applications.[1]
- To allow for the widest user base, connectors that allow for use by a variety of vehicle makes is encouraged.
- Appropriate signage and pavement markings should be provided. Signage should detail the ESVE voltage and amperage levels, safety information, contact information for reporting when the equipment is not operating or other problems, and, as applicable, any use limitation on use (i.e. patrons only), hour of operations, time limits, and usage fees.
- All EVSE placed and proposed shall be compliant with the Americans with Disabilities Act and with applicable Massachusetts Architectural Access Board rules and regulations.
- Where EVSE is provided or proposed within an adjacent pedestrian circulation area, such as a sidewalk or accessible route to the building entrance, the charging equipment must be located so as to not interfere with accessibility requirements.

EVS OR HYBRID VEHICLES FOR FLEET VEHICLES, BUSINESS USE, OR CAR SHARING

Many industries are beginning to use EVs or hybrid vehicles for fleet vehicles or making such vehicles available for business use on a reservation basis. Where practical, EVs are preferred for this application.

A car share is defined as a vehicle that is available by reservation on an hourly basis or in smaller intervals for a business or non-business use. They are often used in combination with TDM strategies that promote transportation to the site without use of a personal automobile. Where practical, EVs are preferred for this application.
A charger must be installed to support the EVs being proposed for fleet vehicles, for business use, or for ride sharing.

Guidance on incorporation of EV charging stations within parking facilities, provision of EVs for fleet vehicles, having EVs available for business use and ride sharing are detailed in Energy Technical Bulletin Objective EN3 Methods: Incorporate Site Design

[1] The terms Level 1 (often referred to as slow charging), Level 2 (often referred to as medium charging), and Direct Current Fast Charging are the most common charging levels used to refer to the electrical power and voltage of the EVSE.

Elements. Where EVs are currently impractical for these applications, hybrid vehicles should be considered.

BUILD OUT OF REGIONAL EV CHARGING NETWORK

The EV charging network on Cape Cod will be built out over time. Further development of this network will require a cooperative, coordinated approach with both public and private partners. The pace of EV adoption in the region will rely on investments in regional EV charging infrastructure at various levels. To the extent feasible, the project should contribute to build out of the regional EV charging network including but not limited to provision of EVSE available for use to the public. As the regional network is built out, we may see a variety of business or cost-recovery models to fund the construction and operation of EVSE, including end user fees for their use. Broad public access to and availability of EVSE is desirable, though it is recognized that use of EVSE may be restricted in certain cases to residents, employees, patrons, or other particular site users.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CM2

Objective CM2 – *Promote low or no carbon technologies for building energy use, including appliances, lighting, and heating, ventilation and cooling (HVAC) systems*

The purpose of Objective CM2 is to advance the use of energy efficient appliances and building heating and cooling systems that use alternatives to transition from fossil fuels, preferably powered by renewable energy sources. The following is a discussion of the methods that may be implemented to meet Objective CM2.

Optimized energy efficiency through site design

Project designers can find guidance on maximizing energy efficiency through design from several sources. Zero energy certifications have been developed by organizations such as the US Green Building Council (USGBC – LEED), Passive House Institute US (PHIUS), US Department of Energy (DOE), and Residential Energy Services Network (RESNET). Applicants can optimize energy conservation and efficiency through building orientation and taking advantage of topography and existing shade trees, among many design considerations. See Energy Technical Bulletin Objective EN3 Methods: Net Zero Energy and Net Zero Energy Ready Buildings.

HVAC system retrofits, retro-commissioning, moisture management, energy efficient appliances

Deep energy retrofits in existing structures are appropriate when a major overhaul of an existing building is planned, including upgrades to the HVAC system or building envelope, during a change of use in the building, or when a new owner takes control of the building or refinances the mortgage. A deep retrofit can result in significant savings in energy costs, but does require planning, engaging a consulting expert/ specialist, and a commitment to operational changes.

Some existing buildings can also be made more efficient through retro-commissioning. Retro-commissioning is a process of optimizing a building's systems through analysis and fine tuning. Often significant savings in energy and operational costs can be realized through replacement of poorly functioning parts, resetting thermostats and sensors, optimizing lighting usage, and other techniques.

According to the Department of Energy, "controlling moisture can make [a building] more energy-efficient, less costly to heat and cool, more comfortable, and prevent mold growth."

Energy efficient appliances save energy, reducing costs, and reducing energy demand. Energy Star® rated appliances help the consumer identify and compare the efficiency of different products.

Smart Temperature Controls

Installing programmable temperature controls, which allow setting building heating temperatures lower and cooling temperatures higher when the building is not in use (or at night in residences when occupants are sleeping), will save energy and money.

"Leading by Example"

For the purposes of DRI review, "leading by example" means designing buildings and the surrounding site environment with energy efficiency and conservation of resources in mind. An applicant may help lead the way toward a more fuel-conscious and efficient community by installing informational signage for visitors to the project site. The signage should be discreet, viewable at the pedestrian scale (not road signage), in keeping with local sign ordinances, and help inform the viewer of the types of efficiency and conservation measures that have been incorporated into the building and/or site design.

Utilizing Heat Pumps

Existing buildings can be retrofit to swap out fossil-fuel based heating and cooling systems with efficient air or ground-source heat pumps to reduce a building's reliance on fossil fuels. These systems use electricity for power, and when paired with an on-site renewable energy generation system, an older building can greatly reduce its fuel use. An HVAC retrofit should typically be paired with energy efficiency upgrades to reduce heating and cooling leakage through an older structure's building envelope.

Renewable Energy, Emergency Generators, and On-site Battery Storage

Applicants are encouraged to include on-site renewable energy paired with site scale battery storage to enhance the reliability and extend the usefulness of renewable energy generation. Where a generator is needed on-site, renewable fuel sources

should be used, whenever possible. Coupling generators with on-site battery storage will also extend the usefulness of the generator to times when the grid may be down or for other emergency needs. On-site or fleet EVs may also be connected to the building's energy system, providing back-up energy during times when renewable energy sources are unavailable (poor weather or at night).

Manage for peak-demand energy usage

See Energy Technical Bulletin, Objective EN2 Methods

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CM3

Objective CM3 – *Promote carbon sequestration and other emissions removal practices and technologies as appropriate to context*

The purpose of Objective CM3 is to advance the capture and storage of carbon through natural and technological processes to balance the impacts of development on the causes of climate change (greenhouse gases). The gases that contribute to climate change move through natural cycles from solid to gaseous states. On Cape Cod, the region's emissions of carbon dioxide from daily activities like driving and heating buildings far exceed the region's contributions of other climate-harming gases.

Fortunately, the carbon cycle can be harnessed to mitigate some of the impacts associated with human activities. Plants absorb carbon dioxide through photosynthesis and incorporate carbon into plant structures. Trees and other plants, as long as they are alive, store – or sequester – carbon in this way. Once plants are cut, decomposition releases carbon back into the atmosphere. Healthy soil processes will also store substantial amounts of carbon; however, inappropriate plant or landscape management, like excessive, unnecessary or non-sustainable fertilizer and pesticide use or practices can significantly alter soil's ability to store carbon.

Reuse building materials, or use recycled building materials certified as low carbon

Creating and transporting new building materials produces greenhouse gas emissions. Similarly, disposing of building materials as waste can increase emissions. Reusing existing building materials or using recycled building materials that reduce or eliminate the greenhouse gases associated with creating new building materials can reduce a project's greenhouse gas emissions. Additionally, using recycled building materials that are certified as low carbon can also reduce the greenhouse gas emissions associated with building construction.

Project proposes tree planting as part of landscaping plan and/or stormwater LID plan

See Wildlife and Plant Habitat Technical Bulletin Objective WPH1 Methods, and Community Design Technical Bulletin Objective CD1 Methods: Provide appropriate landscaping and pedestrian amenities

As noted above, trees and other vegetation store carbon within their structures, and will continue to absorb and store carbon as long as they are alive. Thus, tree planting, and plantings with other native vegetation can contribute to carbon sequestration. Revegetation, restoration, and/or site landscaping with native tree, shrub, and grass species is strongly encouraged for the multiple benefits that derive from maintaining and restoring native habitats (e.g., ecosystem services such as filtering of air and water pollutants, provision of habitats for wildlife and native pollinators, and the aesthetic benefits of naturally vegetated lands).

Trees are especially good at sequestering carbon due to their size, and tree planting is encouraged wherever suitable and appropriate to context. However, tree planting should not be prioritized maintaining the balance and diversity of native habitats on Cape Cod, such as sandplain grasslands, pine barrens, and shrub-dominated natural communities that provide important habitats for Cape Cod's native species. More urbanized areas, within community activity centers or villages, and within commercial developments, are appropriate areas to focus tree planting, especially where mature trees can enhance cooling, streetscape appearance, or buffering between land uses.

Restoration with native plant materials

See Wildlife and Plant Habitat Technical Bulletin Objective WPH2 Methods

Limit or avoid use of supplemental fertilizer

Judicious application of fertilizer is often essential to establishing new plantings in landscaped settings following significant disturbance of the native vegetation and soil structure. Targeted fertilization to address specific plant needs or inadequacies in the soil may also be appropriate at different times during the life of a plant, though it is noted that native plants generally require little to no supplemental fertilization especially after establishment. Appropriate fertilization is also sometimes required to maintain healthy plants, which among other things take up CO_2. However, generally speaking, fertilizer is commonly over-applied, with detrimental effects on soil processes, including the ability of soil to sequester carbon.

Applicants can make a commitment to limit or avoid use of fertilizer in their proposed landscapes, together with a corresponding commitment to support plant and soil health in more sustainable ways. Plants do need new sources of nutrients on an annual basis, often best served through the application of compost and mulch and other

sustainable landscape management practices. Additionally, a commitment to no fertilizer does not mean walking away from maintenance after the planting plan is installed; site landscaping should be tended to ensure plant health and the long-term success of the installation.

Permanent protection of native vegetation

See Open Space Technical Bulletin Objective OS3 Methods

Atmospheric Carbon Capture and Removal

Technology exists to "capture" carbon from the atmosphere, for use in certain industrial applications or for storage by underground injection. Known as direct air capture, this technology removes CO2 from the air using chemical solutions or solid filters. More common at this time is carbon capture from industrial processes. Few projects on Cape Cod will generate the volume of smokestack emissions to warrant the technology required to scrub the carbon dioxide from industrial processes, but this technology or similar approaches may be appropriate in certain circumstances as industries transition away from the use of fossil fuels and as these technologies mature. Alternately, applicants may propose to support off-site carbon capture and storage to mitigate the impacts of a project's on-site GHG emissions.

Capped landfill methane gas capture

Capped landfills generate the most potent type of harmful greenhouse gas, methane; however, landfill gases can be captured and converted to CO2, generating energy in the process. While CO2 is a climate-harming GHG, it is less powerful in affecting climate change processes than the methane that is emitted from capped landfills. Conversion of methane gas to CO2 through specialized technology can reduce the GHG emissions from landfills while also generating energy.

DETAILED DISCUSSION OF METHODS FOR MEETING OBJECTIVE CM4

Objective CM4 – *Promote low or no carbon energy generation technologies as appropriate to context*

The purpose of Objective CM4 is to encourage the generation of renewable energy on Cape Cod.

Green energy systems installed

See Energy Technical Bulletin Objective EN1 Method: Incorporate on-site renewable energy

EV and/or PV Ready

EV and/or PV ready construction incorporates the siting, design considerations, and infrastructure necessary for the future installation of such technologies after a building has been constructed and site developed. This can make future installations of EVSE or solar PV arrays more cost effective by reducing the need for site or structural upgrades when the time comes to install an EV charging station or a solar PV array.

For EVSE, this might include designating future EV parking spots, then installing the necessary electrical equipment and conduit to those parking spots for the installation of future EV charging stations, and sizing the site electric equipment to support the increased future electricity demand.

For rooftop solar PV arrays, this might include orienting the proposed building on the site to maximize rooftop sun exposure, reserving sufficient rooftop area free of HVAC or other building equipment for the location of the future PV array, designing the roof structure to accept the future weight load, and identifying where electrical conduit and connections may be needed.

Commitment to purchase of renewable energy

See Energy Technical Bulletin Objective EN1 Method: Green Power Purchase

Alternative Energy Sources

A project may include an alternative renewable energy source such as biomass or biofuels, geothermal technology, or hydrogen fuel cell technology. Biofuels are predominantly transportation fuels derived from plants or plant material such as

agricultural crops and byproducts. Geothermal technology uses heat below the Earth's surface in the form of steam or hot water for use in electricity generation, direct usage applications, or in heat pumps for building heating and cooling. Hydrogen fuel cells generate electricity that can be used in buildings, for backup power supply such as an emergency generator, or in transportation. There are many alternative energy sources and an applicant may propose an alternative energy source other than those listed here.

Microgrids

The United States Department of Energy Microgrid Exchange Group defines a microgrid as a group of interconnected loads and distributed energy resources (DERs) within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect and disconnect from the grid to enable it to operate in both connected or island-mode.

NOTE ON APPLICATION MATERIALS, DEFINITIONS, RESOURCES AND REFERENCES

Application Materials

GHG IMPACT ANALYSIS AND MITIGATION PLAN

An applicant shall provide a narrative analysis describing its anticipated contributions and impacts with respect to regional greenhouse gas (GHG) emissions from its proposed development, based on the categories of sources, as project-relevant, set out in the Barnstable County GHG Inventory (e.g., transportation, stationary energy, etc.). The applicant will lay out methods in the narrative by which it proposes to mitigate, minimize or avoid GHG emissions from its proposed development.

The majority of GHG emissions from Cape Cod is associated with the transportation and energy sectors (vehicle trip generation and energy consumption), 55% and 39% of total Cape Cod emissions, respectively.

Note that the Barnstable County GHG Inventory deals primarily with the most prevalent type of GHG, carbon dioxide (CO_2), which should similarly be the focus of the applicant's GHG Impact Analysis and Mitigation Plan. (Other GHG emissions may be significant in certain types of projects, and should be addressed in the analysis, as the case may be). There should be sufficient detail in plans and other information submitted with the DRI application to support the analysis and proposed mitigation approaches (e.g., construction plans/notes describing the building size, envelope attributes, operation schedule, building systems, occupancy, and other information necessary to describe the building relative to estimating energy consumption and calculating GHG emissions; transportation documents like TIAS, TDM plans, etc.)

In order to better frame a project's impacts and evidence the effectiveness of its proposed mitigation approaches, an applicant may submit a quantitative estimate of its GHG emissions under existing and proposed conditions, including different scenarios with or without proposed mitigation factored into the calculations. The Commission anticipates preparing further guidance in the near future on how to quantify GHG emissions for a proposed development under DRI review. In the meantime, an applicant who proposes to submit estimated GHG emissions calculations for DRI review can reference the MEPA GHG policy (which includes guidance on calculating emissions from development for purposes of MEPA review) as well as the Barnstable County GHG

Inventory. For DRI projects that were also subject to MEPA (and which prepared GHG calculations for MEPA review), an applicant can submit these calculations for the Commission to consider under DRI review. As part of this quantification, an applicant could estimate the anticipated building energy use of the building/s for the proposed project using energy modeling software, including all fuels proposed to be used on-site.

RESOURCES FOR GHG IMPACT ANALYSIS AND MITIGATION PLAN

World Resources Institute/World Business Council for Sustainable Development Greenhouse Gas Protocol Initiative (www.ghgprotocol.org)

Calculation Tool for Direct Emissions from Stationary Combustion Sources: "GHG Tool for Stationary Combustion" (https://ghgprotocol.org/calculation-tools#sector_specific_tools_id)

Emissions Factors and GWPs: MassDEP Emissions Factor Calculation "Calculation of 2017 GHG Emission Factors" (https://www.mass.gov/doc/calculation-of-2017-ghg-emission-factors/download), "GWPs & EFs" tab, located at Massachusetts Greenhouse Gas (GHG) Reporting Program Data (https://www.mass.gov/lists/massachusetts-greenhouse-gas-ghg-reporting-program-data)

"2017 ISO New England Electric Generator Air Emissions Report" (https://www.iso-ne.com/static-assets/documents/2019/04/2017_emissions_report.pdf)

U.S. Energy Information Administration Energy Conversion Calculators (https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php)

U.S. Energy Information Administration Carbon Dioxide Emissions Coefficients (https://www.eia.gov/environment/emissions/co2_vol_mass.php)

U.S. Department of Energy Building Energy Modeling (https://www.energy.gov/eere/buildings/building-energy-modeling)

"Revised MEPA Greenhouse Gas Emissions Policy and Protocol", effective date May 5, 2010 http://www.env.state.ma.us/mepa/downloads/GHG%20Policy%20FINAL.pdf .

REFERENCES AND RESOURCES

Passive House Institute US (PHIUS) (https://www.phius.org/home-page)

"Siting Electric Vehicle Charging Stations on Cape Cod" (https://capecodcommission.org/ev-siting-analysis)

Cape Cod Greenhouse Gas Emissions Inventory (https://capecodcommission.org/our-work/greenhouse-gas-emissions-inventory/)

Solar Screening Tool (https://www.capecodcommission.org/our-work/solar-screening-tool/)

U.S. Department of Energy National Renewable Energy Lab Solar Ready Planning (https://www.nrel.gov/state-local-tribal/blog/posts/solar-ready-building-design-a-summary-of-technical-considerations.html) and "Solar Ready Buildings Planning Guide", December 2009 (https://www.nrel.gov/docs/fy10osti/46078.pdf)