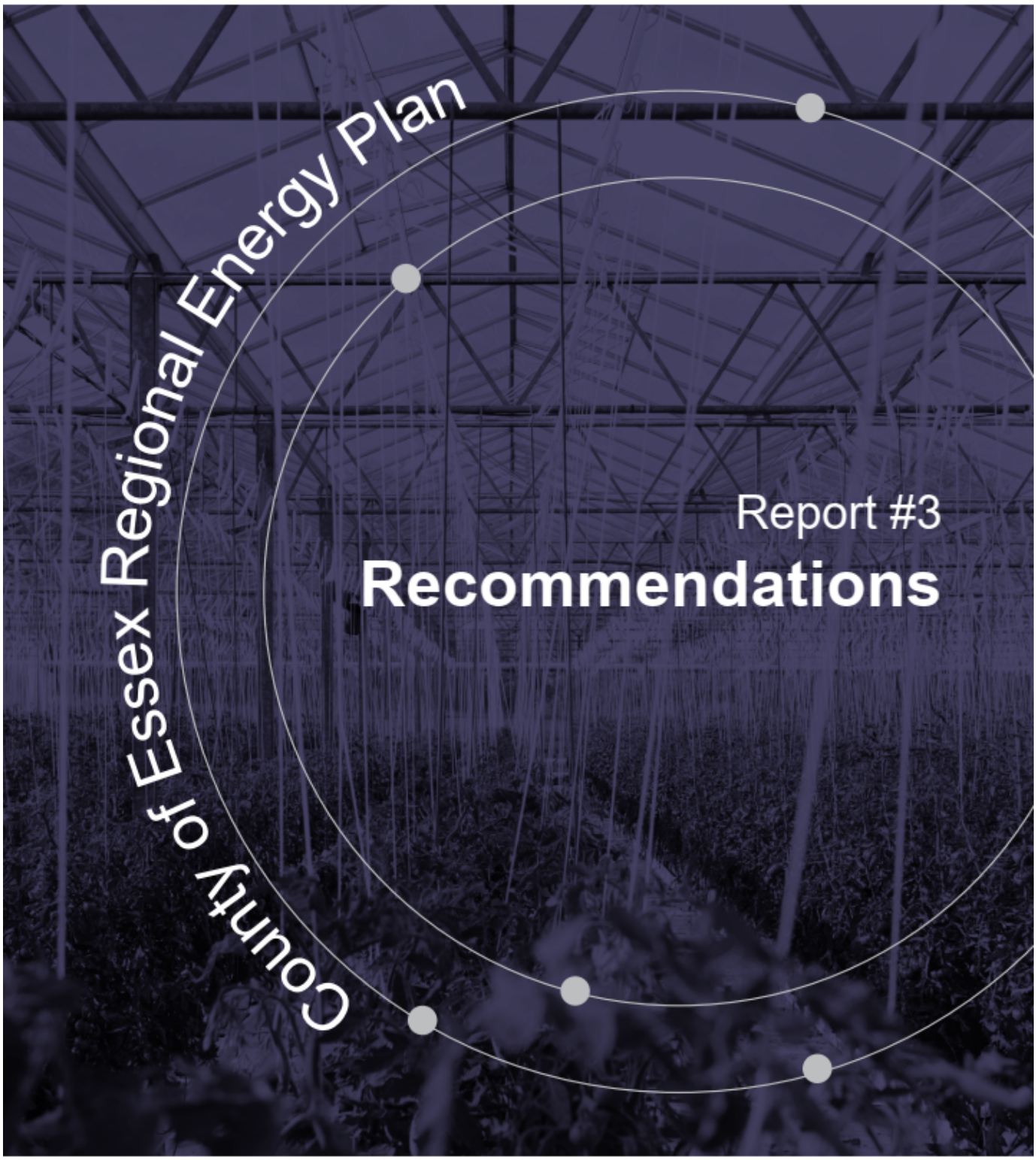
County of Essex

Windsor-Essex Climate Change Collaborative



County of Essex Regional Energy Plan

Report #3

Recommendations

2020 Project Working Team Recommendations Report

Essex County Regional Energy Plan

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1. Introduction

In 2020, Essex County launched the development of a Regional Energy Plan through cross-sector collaboration, drawing strength from the expertise and demonstrated leadership in Essex County and members of the Project Working Team (PWT) and Community Task Force (CTF).[1]

Planning began with collecting data to establish a baseline for energy use, energy-related emissions and energy costs for 2019 and to model energy use, energy-related emissions and energy costs in 2041, or the Base Case, should no action be taken. The regional energy system was visually modelled as a Sankey diagram.[2] Goals to reduce the predicted energy use, energy-related emissions and energy costs in 2041 were established:

- Increase community-wide energy efficiency by at least 50% by 2041 from 2019 levels recognizing selected efficiency measures would consider the entire system from supply through distribution to end-use.
- Enable transition to carbon neutrality by reducing GHG emissions by at least 60% by 2041 from 2019 levels.
- Increase municipal water efficiency by 20% by 2041 from 2019 levels.
- Reduce community-wide energy and water costs in the range of $13 to $18 billion through 2041.

Three efficiency simulations were evaluated. Based on the simulation results, the CTF approved a 2041 Efficiency Case for Essex County (see Appendix 1).

This report summarizes the PWT recommendations to the CTF in support of achieving the 2041 Efficiency Case.

2. Context

The Essex County regional energy planning process is designed for implementation and is comprised of a set of five documents:

1. **Rationale and Scope Report** summarizing for the community energy planning process
2. **Analytical Report** summarizing the evidence-based rationale supporting the community energy planning process
3. **Recommendations Report** summarizing the recommendations from the PWT based on the findings of the analytical process *(this report)*
4. **Essex County Strategy and Implementation Plan**
5. **Engagement Report** summarizing the engagement process that informed the development of the strategy.

Figure 1 describes the relationship between these reports and the PWT and CTF.

[1] See Report 1 of the Regional Energy Plan – *Rationale and Scope Report* – for the structure and composition of the PWT and CTF.
[2] See Report 2 of the Regional Energy Plan – *Analytical Report* – for details of the analytical results.

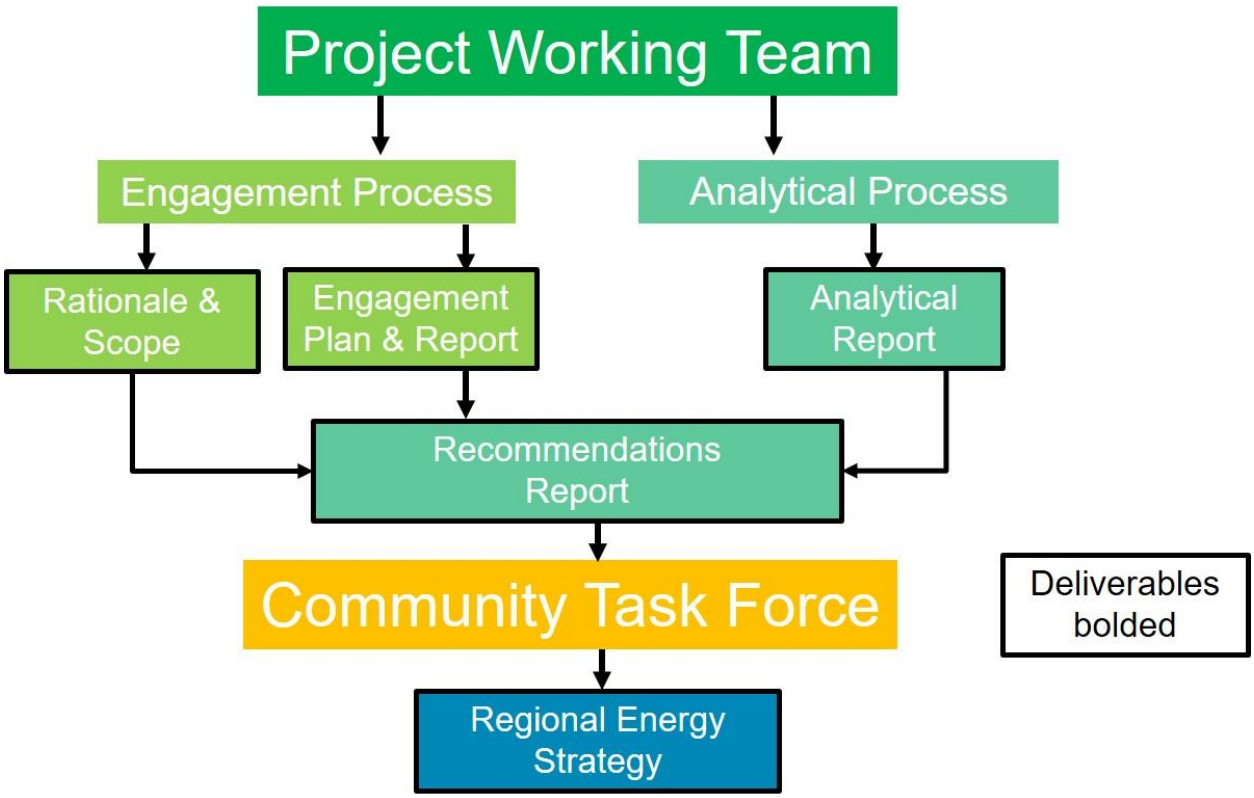

Figure 1: Schematic of project governance and deliverables (i.e., the five reports that comprise the documentation of the community energy planning process).

3. Summary of Recommendations

The following PWT recommendations support the 2041 Efficiency Case approved by the CTF. Recommendations are organized by seven strategic directions or themes:

1. Efficient homes & buildings
2. Efficient industry
3. Efficient greenhouses
4. Efficient transportation
5. Local supply & distribution
6. Smart community information and optimization
7. Community planning

Each recommendation will require detailed implementation plans that consider community and stakeholder engagement, institutional and governance delivery structures, marketing to change market norms, financing to support scale implementation and enabling municipal policies and guidelines.

3.1 Efficient homes & buildings

1. Retrofit most existing property to increase efficiency.
    a. Create a residential energy efficiency retrofit entity to offer quality-controlled standardized retrofits by property type and age.

    b. Create a non-residential energy efficiency retrofit entity to offer quality-controlled standardized retrofits by property type and age.
    c. Encourage energy performance labelling on all properties when sold or rented.
2. Ensure individual new properties meet the Ontario Building Code.
3. Ensure new area developments exceed the Ontario Building Code.
    a. Identify opportunities for net-zero community development.

3.2 Efficient greenhouses

4. Retrofit most existing greenhouses to increase efficiency.
    a. Create Grower's Co-operative Energy Solutions Entity
5. Ensure most new greenhouses are at least as efficient as prevailing industry norm and a growing share of new greenhouses are more efficient than prevailing industry norms.
    b. Create Grower's Energy Focus Group

3.3 Efficient industry

6. Proliferate best-practice efficiency to all local industry.
    a. Encourage Essex-Windsor Industrial Best Practice Networks

3.4 Efficient transportation

7. Reduce average trip lengths or eliminate trips through urban design and work-life changes.
8. Greatly increase the share of trips completed by bus, bike, e-bike and walking instead of individual vehicles.
9. Greatly increase the electric share of personal, commercial and transit vehicles.
    a. Develop an e-mobility strategy for a host community
10. Increase the efficiency of all vehicles over time in line with expected industry improvements.

3.5 Efficient supply and distribution

11. Implement municipal heating and cooling services in higher density areas and new developments supplied with CHP (combined heat and power) and other low-carbon heating and cooling sources
    a. Create a District Energy Company to supply heating and selected cooling services
12. Implement integrated heating and CO_2 services for a major portion of greenhouses supplied with CHP, high-efficiency boilers and fueled with a mix of network natural gas and locally produced biogas
    a. Encourage teaming between Grower's Co-operative Energy Solutions Entity and District Energy Company to offer targeted packages and services.
    b. Pursue an Essex Windsor Bio-energy Master Plan
13. Meet a significant portion of electricity demand with on-site solar PV
    a. Offer the installation of solar photovoltaic systems as an option in the standard efficiency retrofit.
14. Meet a significant portion of home and buildings heating, cooling and hot-water needs with on-site solar thermal generation and heat-pumps

a. Offer the installation of solar water heaters and heat pumps as an option in the standard efficiency retrofit.

3.6 Smart community information and optimization

15. Create a “Smart Energy Community”.[3]

3.7 Community Planning

16. Ensure municipal plans, policies and actions are aligned with the REP to lead by example and to provide an enabling policy environment for local community energy stakeholders and product and service providers in transitioning the new energy market.

[3] The development of the REP has been a data-informed process. Effective and efficient implementation will also be supported by data. See 4.6 for additional details.

4. Recommendation Details

This section provides additional detail on the PWT recommendations.

4.1 Home and Building Efficiency

Energy efficiency is recognized as the first fuel of a sustainable global energy system.[4] The built environment is the third largest emitting sector in Canada.[5] Consequently, this sector continues to be a priority of federal, provincial, and territorial governments.

Recommendation 1: Retrofit most existing buildings to increase efficiency

Overall Rationale: Most existing homes and commercial and institutional buildings will still be in operation in 30 years.[6]

Recommendation 1a: Create a residential energy efficiency retrofit entity to offer quality-controlled standardized retrofits by property type and age.

2041 outcome: 58,000 existing homes (approximately 80% of 2019 building stock) retrofitted with an approximate 35% efficiency gain.

Rationale: The existing residential sector in Essex County accounted for 22% of energy consumption, 15% of emissions and 27% of energy and water costs in 2019. Energy use per household in Essex County is higher than national and provincial averages and approximately half as efficient as global benchmarks indicating a technical potential for reducing energy consumption, emissions, and costs.

Notwithstanding the technical potential for energy and emission reductions in the residential sector, there are many barriers to achieving them. The current energy efficiency retrofit market for home and building owners and contractors is relatively unattractive. Historically, market uptake of retrofit programs has been low. From the perspective of the contractor, the effort to prepare customized proposals is high, and the closing rate is low. Low volumes and the fact that every project is specific to each household means that material costs are expensive and performance guarantees are risky. From the home and building owners' perspective, obtaining understandable bids from various contractors is burdensome. They are responsible for finding their own sources of funding based on their individual credit rating. Finally, the low volumes result in retrofit costs that typically exceed the value of the energy saving, even over many years.

To address these challenges, the PWT recommends offering standardized energy retrofits to homes and commercial and institutional buildings at high volumes. Contractors benefit from increased project predictability, improved margins, and vastly higher project volumes. Home and building owners benefit from a simplified transaction, guaranteed pricing, lower cost pre-financed retrofits and a simple billing and payment mechanism.

[4] Reference: https://www.iea.org/topics/energyefficiency/
[5] Source: Natural Resources Canada
[6] Source: Natural Resources Canada

In addition, property-assessed financing has the distinct advantage of tying the efficiency investment to the property, mitigating the risk of the home and building owner that their payback period is longer than the time they remain (or intend to remain) in the home or building.[7] Attractive interest rates and borrowing terms can be achieved for home and building owners while reducing or eliminating their up-front capital costs. Third-party financing would be attracted to underwrite the program.

Benefits: increased property value, reduced energy costs, higher contractor margins, local employment (approximately 800 jobs) and provides an efficient channel for implementing adaption measures.

Recommendation 1b: Create a non-residential energy efficiency retrofit entity to offer quality-controlled standardized retrofits by property type and age.

2041 outcome: 3 million m^2 (approximately 60% of 2019 building stock) retrofitted with an approximate 35% efficiency gain.

Rationale: See Recommendation 1a.

Benefits: like Recommendation 1a with estimated local employment approximately 200 jobs

Recommendation 1c: Encourage energy performance labelling on all properties when sold or rented.

2041 outcome: Energy performance labelling is a universal market norm for all homes and buildings.

Rationale: The International Energy Agency (IEA) recommends mandatory energy labelling of homes and buildings to promote efficiency. Disclosure of the energy performance of homes and buildings transforms the market for energy efficiency. European Union best practice includes emissions and source energy indicators.[8] Natural Resources Canada offers a voluntary home labelling program.

According to the Pembina Institute, the uptake of voluntary home labelling programs in Canada has been hampered by a lack of familiarity with the rating system and a shortage of comparator homes in the market.[9] Both barriers would be addressed through a mandatory or universally accepted program.

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[7] Provincial Local Improvement Charges (LIC) regulations were amended in 2012 to enable voluntary energy and water efficiency upgrades of private homes and buildings, allowing Ontario municipalities to provide long-term, low-cost financing for residential, commercial and industrial building energy and water conservation retrofits.

[8] Intelligent Energy Europe, "Improving Dwellings by Enhancing Actions on Labelling of the EPBD" (2011). Found at: https://ec.europa.eu/energy/intelligent/projects/en/projects/ideal-epbd

[9] Pembina Institute, "Home Energy Labelling Requirement at Point of Sale: Pilot Program Design" (2012). Found at: https://www.pembina.org/pub/home-energy-labelling-requirement-at-point-of-sale-pilot-program-design

Benefits: Raises customer awareness and expectations, creates a market for energy efficient homes and buildings, confirmed value for buyers and renters and a competitive edge for quality builders and contractors.

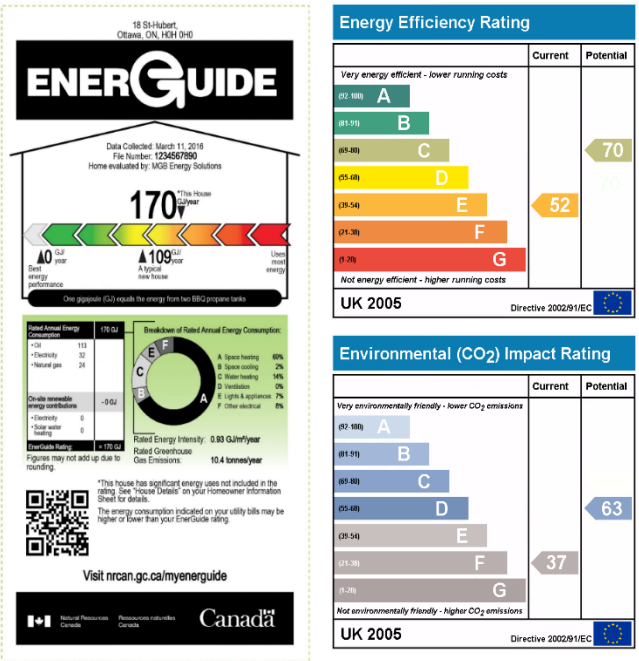

Figure 2: Examples of two energy performance labels including a Home EnerGuide label developed by Natural Resources Canada (left) and for the United Kingdom (right).

Recommendation 2: Ensure individual new properties meet the Ontario Building Code.

2041 outcome: Most new construction (70% of total) fully meets future Ontario Building Code energy performance ratings assuming a 10% efficiency gain in each of 2023 and 2033.

Rationale: The Ontario Building Code sets one of the highest energy performance standards in North America. However, research suggests that the delivered performance of new construction falls short of this energy performance standard.

Benefits: confirmed value for buyers and competitive edge for quality builders.

Recommendation 3: Ensure new area developments exceed the Ontario Building Code.

2041 outcome: Area developments (30% of total) are 30% more efficient than the Ontario Building Code.

Recommendation 3a: Identify opportunities for (near) net-zero community development.

Rationale: The Ontario Building Code establishes energy performance standards for individual buildings. Neighbourhood-scale Integrated Energy Master Plans (IEMPs) achieve a higher level of energy performance by addressing the entire energy value chain starting from end usage, through energy service distribution and conversion, back up to all forms of primary fuel used both on and off site. The IEMP includes recommendations that optimize investments and other measures between end-use efficiency, energy

distribution within the neighbourhood and energy supply choices, including fuel and renewable options.

Benefits: include confirmed value for buyers and competitive edge for quality builders.

4.2 Efficient greenhouses

Recommendation 4: Retrofit most existing greenhouses to increase efficiency.

2041 outcome: 7 million m^2 of existing greenhouses (approximately 60%) retrofitted with an approximate 35% efficiency gain.

Rationale: The greenhouse sector accounts for 38% of the energy consumed in Essex County underscoring their economic importance of this sector. The greenhouse sector accounts for 41% of emissions and 15% of energy and municipal water costs.

Recommendation 4a: Create Grower's Co-operative Energy Solutions Entity

Rationale: The agricultural sector has a long history of co-operative ventures. These have included cooperative regional and brand marketing, logistics, and procurement. In Canada, USA and Europe, growers have created energy co-ops to obtain competitive, reliable energy supplies. The EU has seen a rapid growth of energy-related co-ops serving the renewable energy, energy efficiency and energy supply needs of their members. This is an emerging movement driven by the competitive opportunity and wider social benefits of improving energy efficiency in the entire food chain. It is a cost-effective way for the growers to consolidate the energy efficiency and specific supply expertise needed for the greenhouse sector. The Netherland's experience supporting the national goal to be carbon-neutral will be a valuable resource in shaping the structure, skills and offerings facilitated by this cooperative.

Benefits: increased competitive edge, reduced energy costs, enhanced community engagement, higher contractor margins, local employment, efficient channel for energy solutions.

Recommendation 5: Ensure most new greenhouses are at least as efficient as prevailing industry norm and a growing share of new greenhouses are more efficient than prevailing industry norms.

2041 outcome: 70% of new greenhouses operate at prevailing norms of energy efficiency and 30% of new greenhouses are 30% more efficient than prevailing industry norms.

Recommendation 5a: Create Grower's Energy Focus Group

Rationale: In greenhouse energy efficiency, there is a long tradition of pioneering practice by a few players becoming the norm for the industry over time. Forming a structured Focus Group of growers, individuals, and institutions with a deep interest in moving the greenhouse sector to near-net zero emissions and very high levels of efficiency, will accelerate the adoption process. The Focus Group would be an advisory resource for new greenhouse development looking to push their efficiencies beyond the norms. The Focus Group would also act as a resource to pool global experiences from major players around the world.

Benefits: increased competitive edge, reduced energy costs, and enhanced community engagement.

4.3 Efficient industry

Recommendation 6: Proliferate best-practice efficiency to all local industry.

2041 outcome: 35% efficiency gain (1.5% per year efficiency gain)

Recommendation 6a: Encourage Essex-Windsor Industrial Best Practice Networks

Rationale: Industrial activity is most often regulated and guided by broader global best-practices and standards. They are driven to reduce their bottom line with continuous improvement in energy management. The industrial sector demonstrates higher energy performance relative to global best practices than other sectors in Essex County. There is an opportunity to share this energy management expertise within the community to promote world-class energy performance.

Benefits: industrial competitiveness, sustained and new employment, county reputation and inbound industrial investment.

4.4 Efficient transportation

Rationale: The transportation sector in Essex County accounted for 20% of energy consumption and almost a third of emissions in 2019.

Recommendation 7: Reduce average trip lengths or eliminate trips through urban design and work-life changes.

2041 outcome: Average trip length for light-duty vehicles reduced by 20%

Rationale: Land-use planning policies that promote mixed-use, compact design reduce or eliminate trips by supporting alternative forms of transportation to the personal automobile.

Benefits: increased local employment, attractive and liveable neighbourhoods and decarbonizing of transportation

Recommendation 8: Greatly increase the share of trips completed by bus, bike, e-bike and walking instead of individual vehicles.

2041 outcome: Share of passenger kilometers travelled for active transport is 5% and bus is 3%

Rationale: Active transportation, demand management and transit strategies and master plans identify opportunities to promote low or no-carbon forms of transportation in a community. Land-use planning policy that promotes more compact urban design also promotes active transportation and transit goals.

Benefits: attractive, livable neighbourhoods, reduced driving stress, improved health, and decarbonizing of transportation

Recommendation 9: Greatly increase the electric share of personal, commercial and transit vehicles.

2041 outcome: Electric vehicles represent 80% of light-duty vehicles and 10% of heavy-duty vehicles

Recommendation 9a: Develop an e-mobility strategy for a host community

Rationale: Electric vehicles are cheaper to operate and maintain, reduce greenhouse gas emissions, and deliver better performance.[10] The federal government has identified electrification as a key to decarbonizing the transportation sector and has set ambitious federal targets for zero-emission vehicles, including electric vehicles, reaching 10% of light-duty vehicles sales per year by 2025, 30% by 2030 and 100% by 2040. Access to localized and visible charging infrastructure is key to alleviating consumer concerns about where to charge their vehicle. There are also opportunities for municipal governments to lead by example by electrifying municipal fleet and transit, installing electric vehicle charging stations at public facilities and incentivize through convenient parking.

[10] Source: https://www.plugndrive.ca/electric-vehicle-benefits/

Benefits: decarbonization of transportation, reduced vehicle operating costs

Recommendation 10: Increase efficiency of all vehicles over time in line with expected industry improvements.

2041 outcome: Efficiency of gas/diesel and electric vehicles increased by 50% (2% per annum) and 22% (1% per annum), respectively

Rationale: While it is recognized that Essex County does not have direct control over increasing the efficiency of vehicles, there are opportunities to raise customer and fleet owner awareness of the benefits of increased fuel efficiency through comprehensive outreach and to lead by example, engaging vehicle dealers and manufacturers as champions for increased vehicle efficiency and advocating for changes in national and provincial policy.

Benefits: reduced vehicle emissions, reduced fuel operating costs and decarbonization of transportation

4.5 Efficient supply and distribution

Recommendation 11: Implement municipal heating and cooling services in higher density areas and new developments supplied with CHP and other low-carbon heating and cooling sources

2041 outcome: 70% of existing and 90% of new target commercial, institutional and apartments buildings in areas designated for densification or new growth are served by district energy.

Rationale: Modern district energy is an internationally recognized pathway to decarbonize urban heating and cooling.[11]

District energy (DE) systems supply thermal energy (heating and/or cooling) to multiple buildings from a central plant or from several interconnected but distributed plants; thermal energy is conveyed with water through a closed network of pre-insulated pipes to meet end users' need for cooling, heating and domestic hot water. Historically, steam networks have been used and are still used in some older systems. A DE system is comprised of three sub-systems which include the collection and/or generation of thermal energy, the distribution of that thermal energy from the plant(s) to end-users and the transfer of the thermal energy to the energy consumer.

Combined heat and power (CHP) systems produce electricity and thermal energy from a single fuel source (e.g. natural gas, biogas). When electricity is generated in large scale regional gas-fired power plants, as much as 60% of the energy value is lost (mostly as heat at the point of generation and the remainder during transmission). This systemic inefficiency can be addressed by generating electricity within the community and capturing the heat for use in a DE system.

Modern DE systems (Figure 3) facilitate creating a flexible portfolio of many kinds of low carbon heat sources. These include large solar-thermal, arrays, biofuel boilers and CHP, sewage waste heat recovery from multiple sources, geothermal arrays, and even boilers using renewable electricity. District energy enables the potential decarbonization of heating and cooling homes and buildings. None of these future heating and cooling supply possibilities to further reduce the GHG impacts of heating and cooling have been included in the current analysis and are possible upsides.

Benefits: competitive, reliable, comfortable thermal services, local employment, municipal dividends and investor returns, pathway to further emission reductions using bioenergy and other renewable heating & cooling sources, and business opportunity in other communities

[11] http://www.districtenergyinitiative.org/

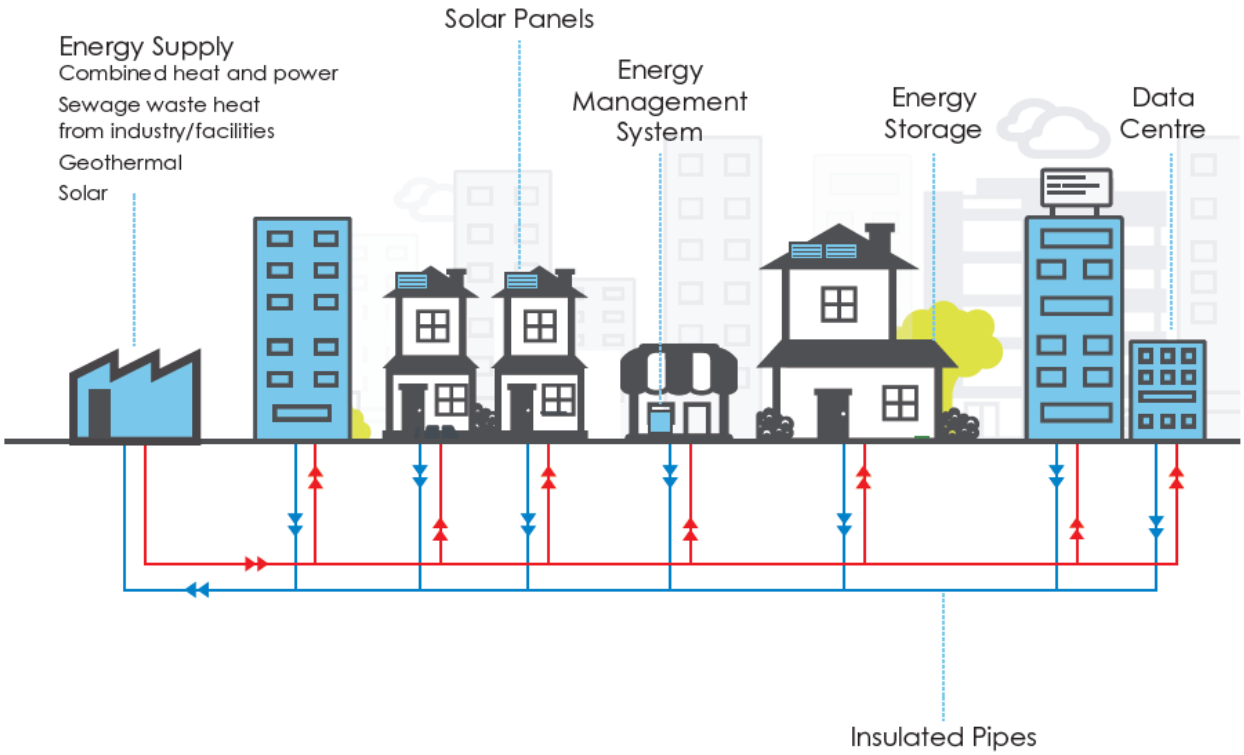

Figure 3: Modern district energy system

Recommendation 11a: Create District Energy Company to supply heating and selected cooling services

Rationale: DE services are typically run by a thermal utility by a company that operates the network, ensures service quality, and manages the metering and billing of the heating and cooling services. Thermal energy will be supplied by plants either owned and operated by the utility, or under long-term contracts with the utility. The network allows for economies of scale since the generation of heat in a few larger plants is more efficient than having thousands of boilers each heating their individual building. It also enables valuable energy currently wasted in electricity generation, industrial and other processes to be cheaply captured and delivered to other consumers.

Recommendation 12: Implement integrated heating and CO2 services for a major portion of greenhouses supplied with CHP, high-efficiency boilers and fueled with a mix of network natural gas and locally produced biogas

2041 outcome: Approximately 40% of greenhouses are supplied with an on-site or near-site integrated energy supply, including combined heat and power, local biogas and recovered carbon dioxide injection.

Recommendation 12a: Teaming between Grower's Co-operative Energy Solutions Entity and District Energy Company to offer targeted packages and services.

Rationale: An on-site energy supply for greenhouses consisting of CHP and high-efficiency boilers is a cost effective and reliable way to provide the heating and much of the power needs for the growers. In addition, the CO_2 needed for crop growth can be recovered from the CHP and boiler exhausts. Depending on the location of the greenhouses, the energy supply could be shared between neighbouring greenhouse clusters. The on-site or near-site energy facilities would typically be owned and operated by a third-party services provider. Also, depending on the location of the greenhouses relative to municipal DE networks, there will be the possibility to optimize the thermal services between the grower and neighbouring community. This allows both to optimize the use of their thermal assets between their differing seasonal and diurnal needs. See also Recommendation 11.

Benefits: increased competitive edge, reduced energy and CO_2 costs, enhanced community engagement, enhanced reliability, and reduced grid investments

Recommendation 12b: Pursue an Essex Windsor Bio-energy Master Plan

Rationale: The region has thousands of tonnes of biosolids from municipal solid waste, water treatment residues, general agricultural animal, and other residues, and from greenhouse vines and crop residues. While a small amount is processed to create biogas and compost, the vast majority is destined for the Essex Landfill. This breaks down over time creating landfill gas (methane) which is currently flared to mitigate its high global warming potential, but with no useful energy recovery.

The combination of the biosolids and landfill gas has a substantial energy potential which is currently not realized. Creating a comprehensive, large scale economically viable plan to use this energy potential will require extensive collaboration between many public and private entities. The first step will for these entities to develop an in-depth Bio-Energy Master Plan.

Benefits: It is a high probability that the Master Plan will create a pathway to of cost-effective low-carbon energy in the form of both biogas and heat for a wide range of potential end-users, including both growers and municipalities. It will also greatly reduce the quantities of bio-solids being landfilled and avoid associated methane leakage. Many other parts of Canada will have similar bio-energy potential, and a region-wide plan, successfully implemented, would be both a national role model and a business opportunity for the region.

Recommendation 13: Meet a significant portion of electricity demand with on-site solar PV

2041 outcome: 15% of electricity is provided by solar power.

Recommendation 13a: Offer the installation of solar photovoltaic systems as an option in the standard efficiency retrofit.

Rationale: Solar photovoltaic systems are a predictable and proven renewable energy technology. The proposed residential, commercial, institutional and greenhouse retrofit programs offer a channel for promoting the uptake of renewable electricity.

Benefits: attractive investment for consumers, avoided investment for power utility, extended opportunity for contractors, local employment and contributes to decarbonizing electricity

Recommendation 14: Meet a significant portion of home and buildings heating, cooling and hot-water needs with on-site solar thermal generation and heat-pumps

2041 outcome: Hot water and heating needs of 10% of homes not served by district energy are supplied from solar and/or environmental thermal energy sources.

Recommendation 14a: Offer the installation of solar water heaters and heat pumps as an option in the standard efficiency retrofit.

Rationale: Solar water heaters and heat pumps are a predictable and proven renewable energy technology. The proposed residential, commercial, and institutional retrofit programs offer a channel for promoting the uptake of renewable energy.

A heat pump is an electrical device that extracts heat from one place and transfers it to another. The heat pump is not a new technology; it has been used in Canada and around the world for decades. Refrigerators and air conditioners are both common examples of this technology. The heat pump cycle is fully reversible, and heat pumps can provide year-round climate control for the home – heating in winter and cooling and dehumidifying in summer. Since the ground and air outside always contain some heat, a heat pump can supply heat to a house even on cold winter days. In fact, air at –18°C contains about 85 percent of the heat it contained at 21°C. An air-source heat pump absorbs heat from the outdoor air in winter and rejects heat into outdoor air in summer. It is the most common type of heat pump found in Canadian homes at this time. However, ground-source (also called earth-energy, geothermal, geo-exchange) heat pumps, which draw heat from the ground or groundwater, are becoming more widely used, particularly in British Columbia, the Prairies and Central Canada.[12] Their application in practice is highly situational and may not always be the right solution for a home or building.

Benefits: attractive investment for consumers, new opportunity for contractors, local employment and contributes to decarbonizing electricity

[12] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about-energy-star-canada/energy-star-announcements/publications/heating-cooling-heat-pump/what-heat-pump-and-how-does-it-work/6827

4.6 Smart community information and optimization

Recommendation 15: Create a Smart Energy Community.

2041 outcome: Essex County has the tools and systems to sustain energy system optimization.

Rationale: The development of the REP has been a data-informed process. Effective and efficient implementation will also be supported by data. The following opportunities are suggested:

- Team with the City of Windsor
- Implement interoperable smart metering for gas, electricity, heating, cooling, and water
- Implement comprehensive traffic count and vehicle activity metering systems
- Create interoperable protocols to enable neighbourhood level building automation
- Implement an integrated “Smart Energy Community” analysis and reporting platform
- Ensure “Smart Energy Community” measures align with wider “Smart County” goals

Benefits: engagement of community through the availability of County’s performance, ease of implementing continuous improvement, ease of making mid-course adjustments, ease of setting and tracking more aggressive goals and ease of selectively implementing new technologies or processes, enhances community’s wider reputation through each of detailed performance reporting to national and global groupings of climate leading communities (e.g., the Federation of Canadian Municipalities Partners for Climate Protection program, Global Covenant of Mayors for Climate and Energy).

4.7 Community Planning

Recommendation 16: Ensure municipal policies and actions are aligned with the REP to lead by example and provide an enabling policy environment for local community energy stakeholders and product and service providers in transitioning the new energy market.

2041 outcome: Essex County municipalities are recognized for leading by example and a partner in the energy transition.

Rationale: International Energy Association research confirms that successful community energy planning is only possible if energy is integrated with the entire land-use planning process. However, in many countries, including Canada, consideration of energy issues is missing in land-use planning processes. A natural connection should exist between land-use and energy planning, but a legacy of independent land-use and energy system planning is a barrier to a coordinated transition to low carbon and climate resilient communities. This transition is essential for Canada to meet its climate change commitments, as communities, directly and indirectly, influence approximately 60 percent of greenhouse gas emissions.

Community energy planning has emerged as a standardized and structured approach to achieving transformative community greenhouse gas reductions and enhancing the resilience of energy systems across Canada. Given their planning and regulatory roles in communities, municipal governments have a critical role in creating and operationalizing an enabling policy environment to support the implementation of CEPs.

While the contribution of municipal operations to regional energy consumption and emissions is 1.1% and 0.4% respectively, municipal government has an important role to lead by example. Their relationship with the community offers opportunities to continue to convene and facilitate implementation, as appropriate, support economic development activities related to the energy transition and promote energy and climate literacy within the community.

Benefits: measurable impact on climate change, co-ordinated energy transition, rural sustainability

5. Results

The recommendations will reduce total energy consumption per capita from 270 to 150 GJ in 2050 (Figure 4). While energy efficiency will increase by 43% by 2041, the REP goal of 50% is not met.

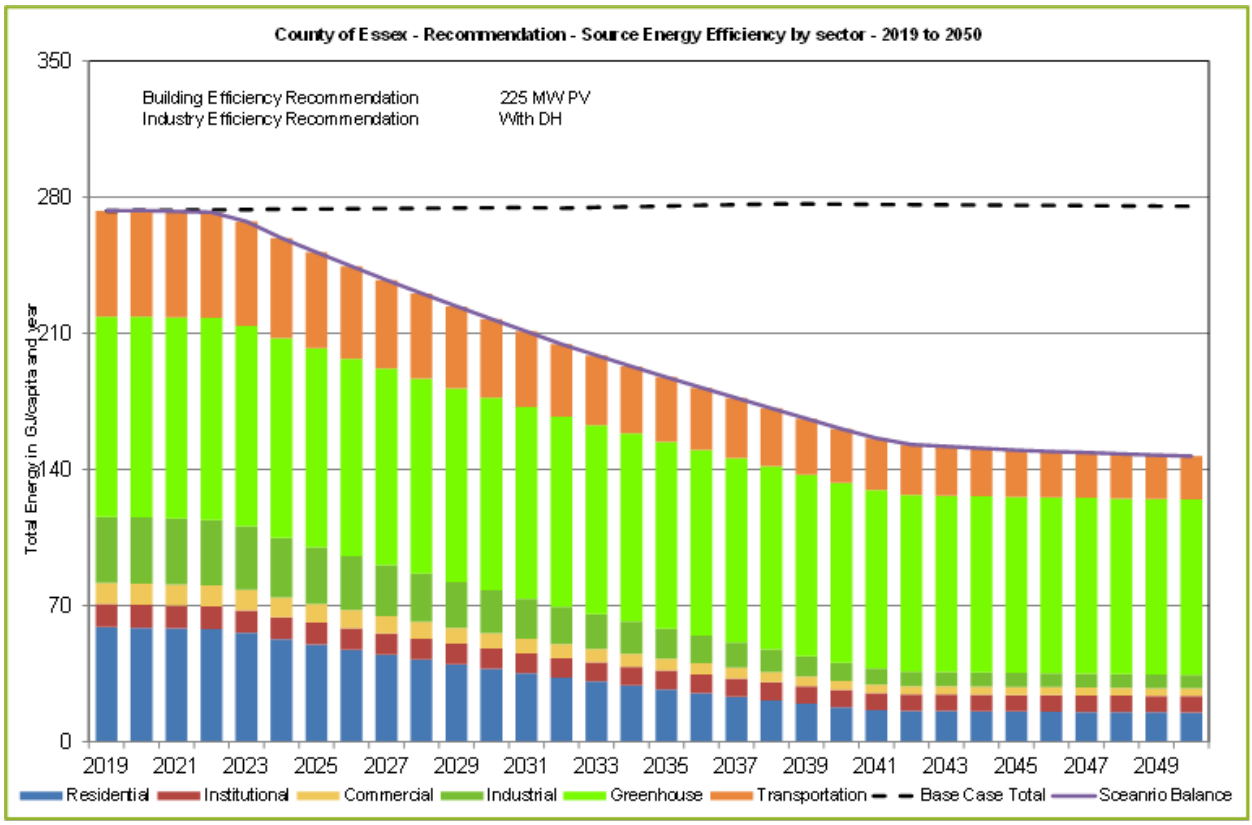

Figure 4: Reduction in total source energy (GJ) annual consumption per capita from 2019 to 2050 in Essex County

Figure 5 shows the contribution of different measure groups to total source energy per capita reductions from 2019 to 2050. Measure groups include:

- Efficiency only (no solar PV)
- Efficiency with DE (no solar PV)
- Efficiency with DE and solar PV
- Transportation efficiency only

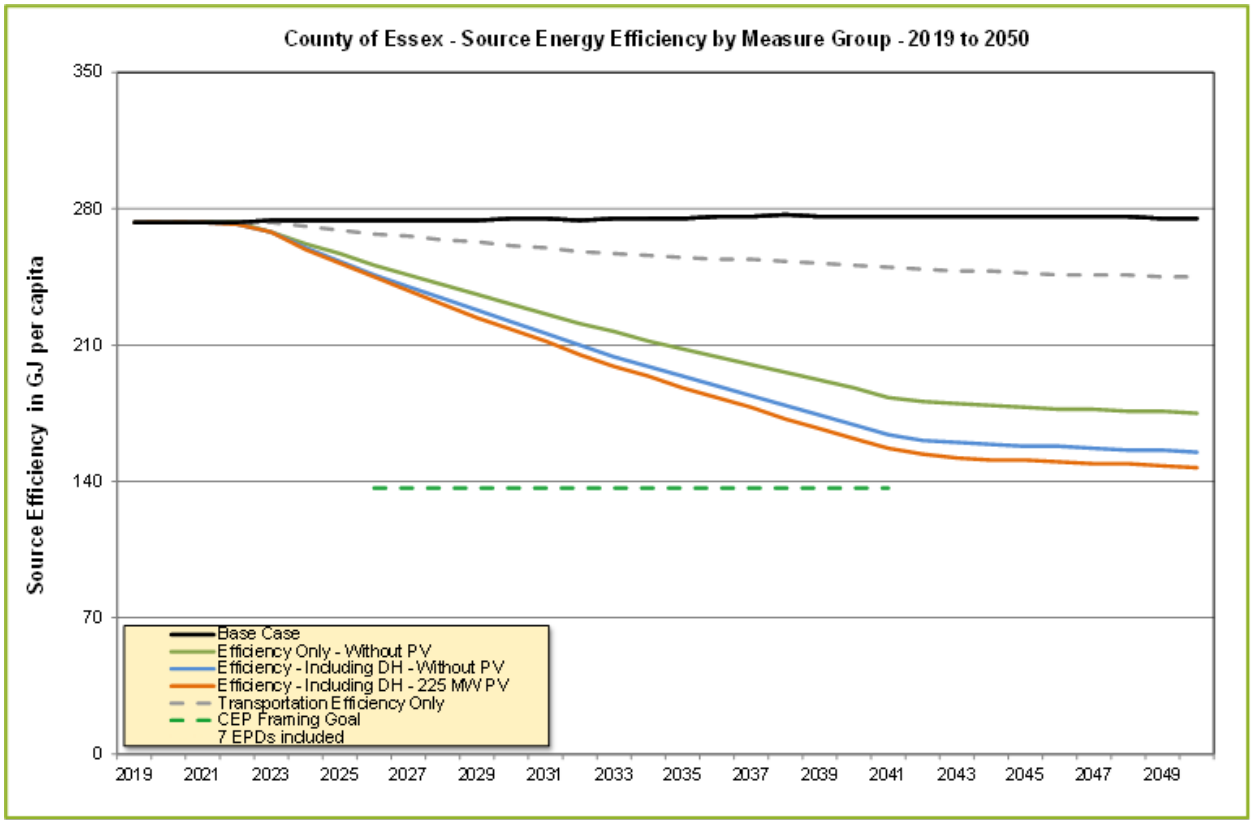

Figure 5: Contribution by measure group to reduce total source energy consumption per capita from 2019 to 2050 in Essex County

The recommendations will reduce annual greenhouse gas emissions from 2,212,00 metric tons to 587,000 metric tons by 2050 (Figure 6), which meets the 2041 REP goal of a 60% reduction. Emission in 2050 are anticipated to be two times higher than the Federal and Ontario Climate Action Plan (OCAP) targets (Figure 7).

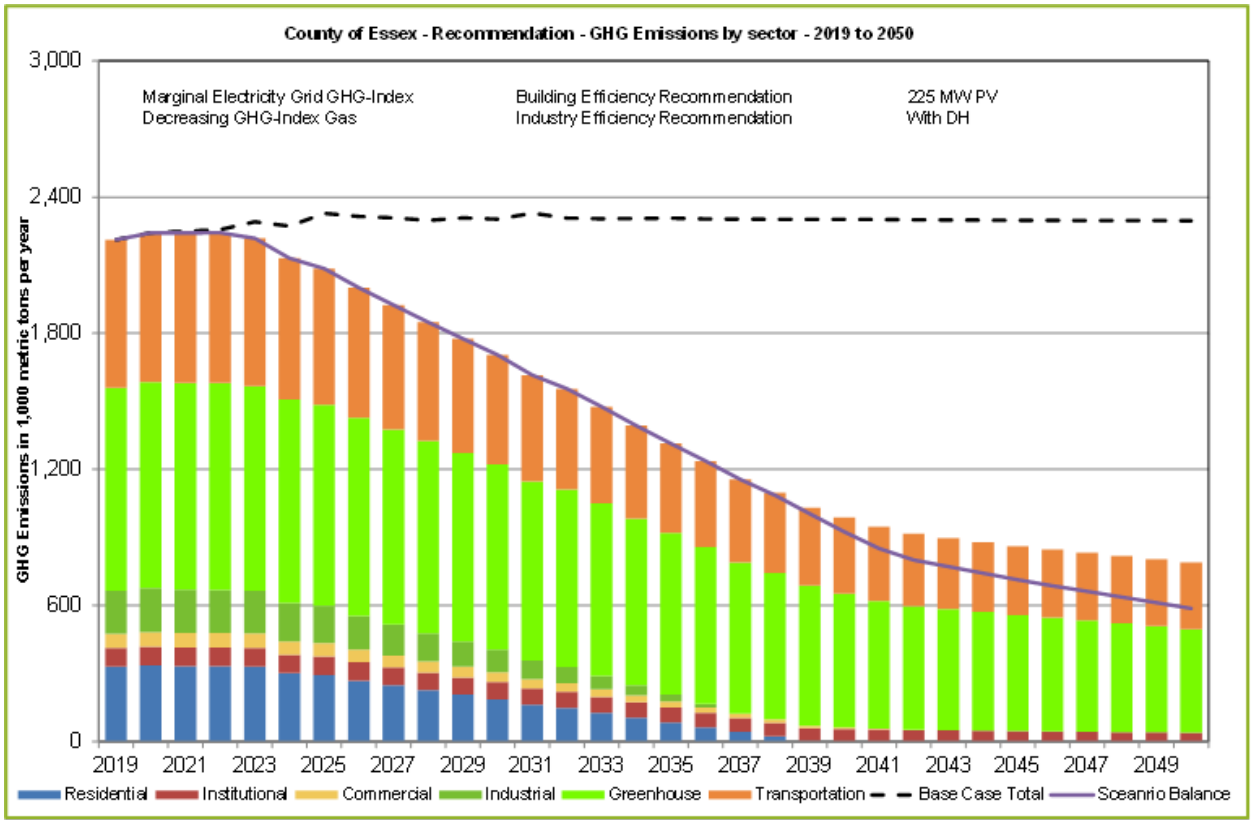

Figure 6: Reduction in annual greenhouse gas emissions (metric tons) by sector from 2019 to 2050 in Essex County

Figure 7 shows the contribution of different measure groups to greenhouse gas emissions reductions from 2019 to 2050. Measure groups include:

- Efficiency only (no solar PV)
- Efficiency with DE (no solar PV)
- Efficiency with DE and solar PV
- Transportation efficiency only

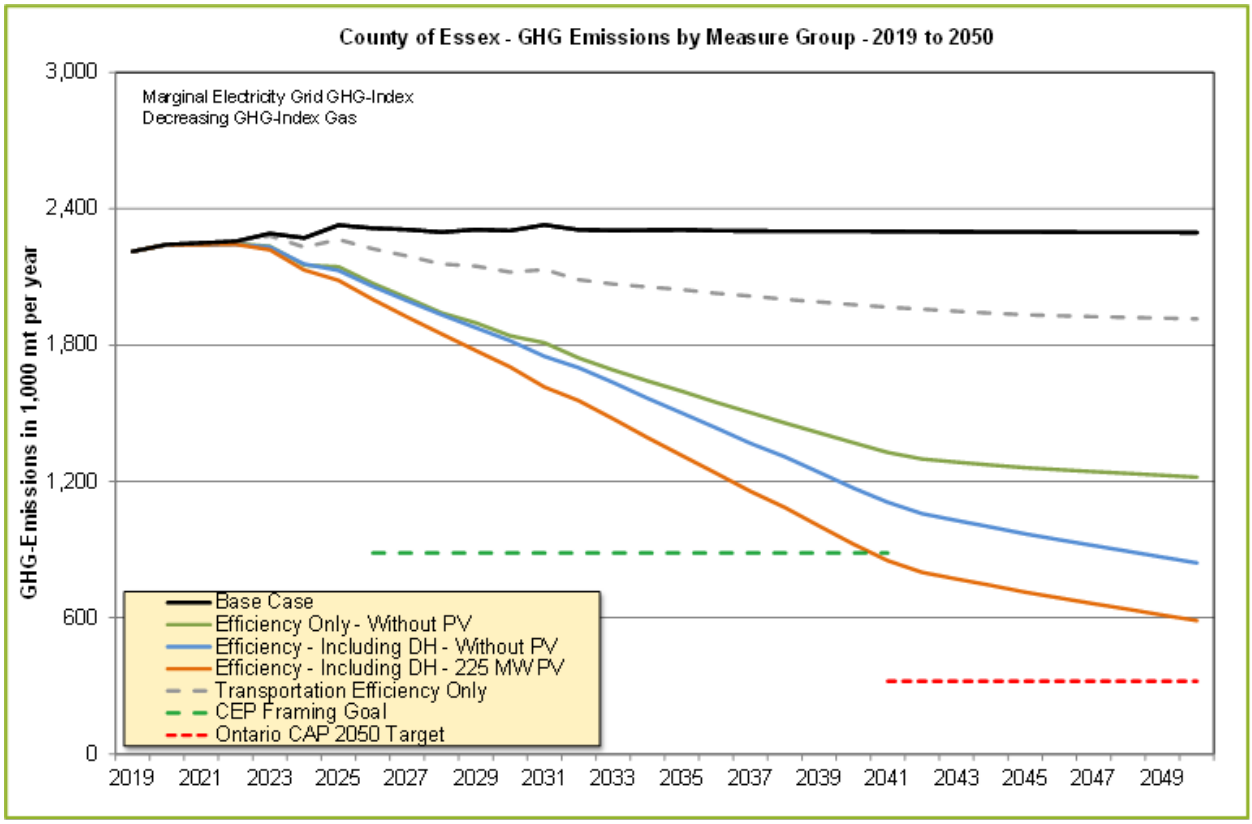

Figure 7: Contribution by measure group to greenhouse gas emissions from 2019 to 2050 in Essex County

Energy costs decline from $820 million per annum to $500 million per annum from 2019 to 2050 in the low-cost scenario (Figure 8). Energy costs slightly increase from $820 million per annum to $1 billion per annum from 2019 to 2050 in the high-cost scenario.

The recommendations will avoid between $28 billion (Figure 8) and $48 billion (Figure 9) energy costs between 2018 and 2050 based on low and high cost projections (respectively).

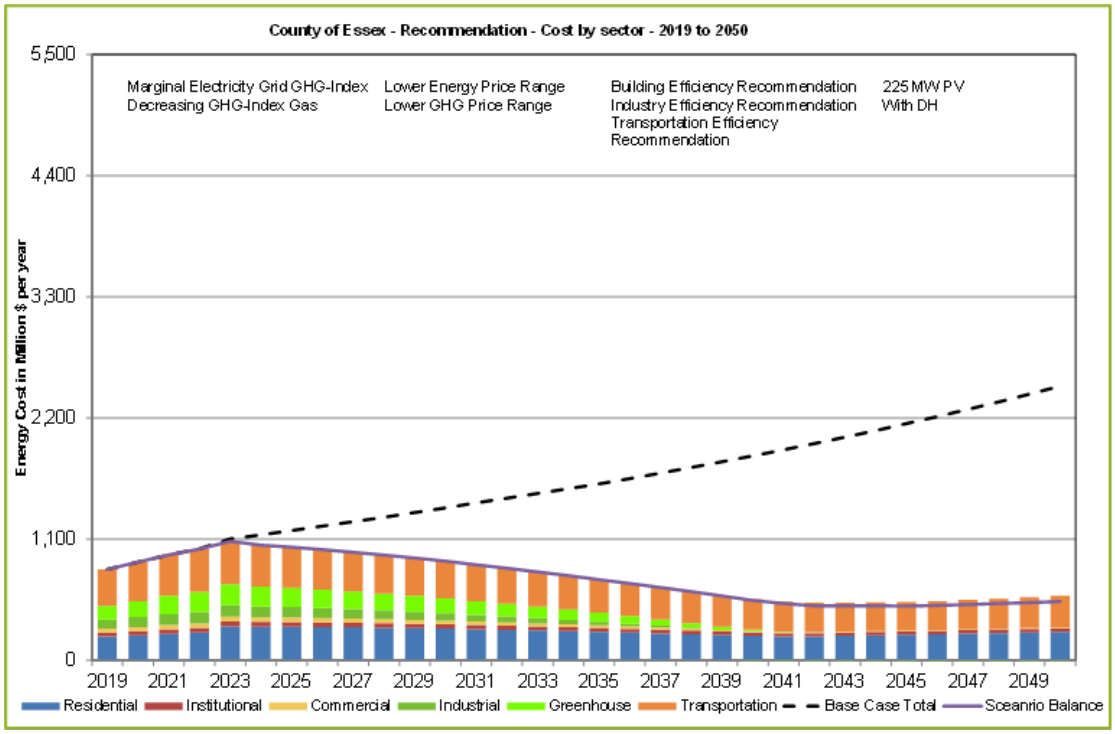

Figure 8: Projected annual energy costs (million $) from 2019 to 2050 in Essex County using a low-cost scenario.

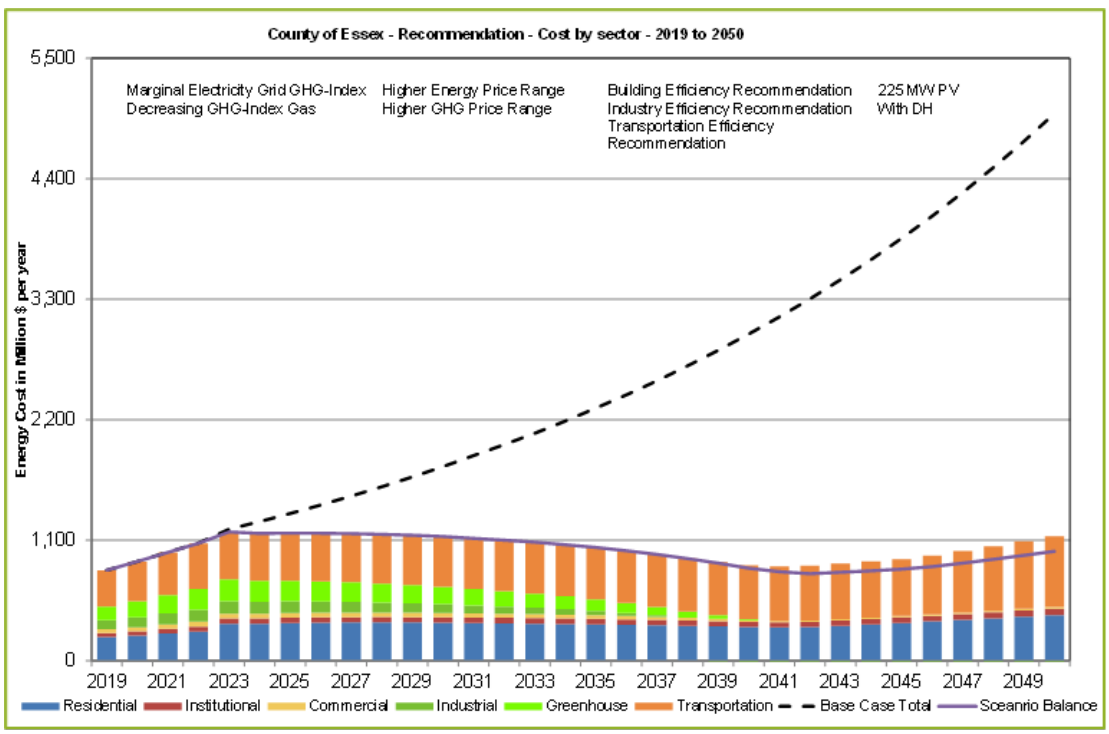

Figure 9: Projected annual energy costs (million $) from 2019 to 2050 in Essex County using a high-cost scenario.

Other benefits of implementing the REP recommendations include:

- Creates substantial local employment
- Delivers predictable operational and technical risks
- Enhances neighbourhood growth plans,
- Enhances County as an investment destination
- Ensures a globally competitive greenhouse industry
- Provides a pathway to more aggressive implementation to meet Federal emissions goal

Appendix 1: Regional Energy Plan Efficiency Case

Table 1 summarizes the Efficiency Case for the County of Essex Regional Energy Plan.

Table 1: Summary of the Efficiency Case for the County of Essex Regional Energy Plan

Strategic Direction	Strategic Objective	Metric	2041 Outcome
Efficient homes & buildings	Reduce energy use in existing homes through energy retrofitting	Homes retrofitted	80% or 58,000 homes
	Reduce energy use in existing buildings through energy retrofitting	Buildings retrofitted	60% or 3 million m^2
	Include heat pumps in home and building retrofits outside District Energy areas	Share of retrofits	30%
	Reduce future energy use by ensuring most new homes and buildings meet current and future Ontario Building Codes through performance transparency	Home and Build Energy Performance Label program	All homes and buildings have energy performance labels
	Reduce future energy use by ensuring area developments of new homes and buildings exceed future Ontario Building Codes through energy and climate overlay planning	New construction above code	30%
	Include heat pumps in new homes and buildings outside District Energy areas	Share of new construction	50%
Efficient industry	Reduce energy used by industry by proliferating global best-practice industrial energy management	Year on year improvement	1.5%
Efficient greenhouse sector	Reduce energy use in existing commercial greenhouses through extensive energy retrofitting	Greenhouses retrofitted	60%
	Reduce future energy use by all newly constructed greenhouses by ensuring they meet or exceed global best practice energy efficiency	Greenhouses exceeding industry norms	30%
Efficient transportation	Reduce transportation energy impacts through reducing average trip length for Light-Duty Vehicles	Reduction average trip length	20%
	Reduce transportation energy impacts by increasing the walking and cycling share of passenger kilometers travelled (PKT)	Increase active transportation	5%
	Reduce transportation energy impacts through increasing bus share of passenger kilometers travelled (PKT)	Increase bus share	3%
	Reduce transportation energy impacts through increased use of electric and other higher efficiency vehicles	Electric share of light duty vehicles	80%
		Electric share of transit vehicles	80%
		Electric share of heavy-duty vehicles	10%

Strategic Direction	Strategic Objective	Metric	2041 Outcome
		Year on year improvement of electric vehicle efficiency	1%
		Year on year improvement of gasoline/diesel vehicle efficiency	2%
	Reduce impacts from electricity use through the installation of solar power installed on rooftops and ground locations	Share of electricity supply	15%
	Decrease energy impacts from heating and hot water use through the installation of solar thermal heating installed on homes and buildings	Heating and hot water needs in non-district energy areas	10%
	Decrease energy impacts of heating and cooling homes and buildings through implementing district energy services in higher density areas	New homes and buildings served in high density areas	90%
		Existing homes and buildings served in high density areas	70%
	Reduce energy and climate impacts from commercial greenhouses through the implementation of dedicated integrated energy supply solutions, including CHP and CO_2 injection	Combined heat and power	40%
		Local biogas	10%
		CO2 avoidance	15%