



A&WMA Ontario Decarbonization Conference

FINANCIAL IMPLICATIONS AND
APPROACHES TO DECARBONIZATION

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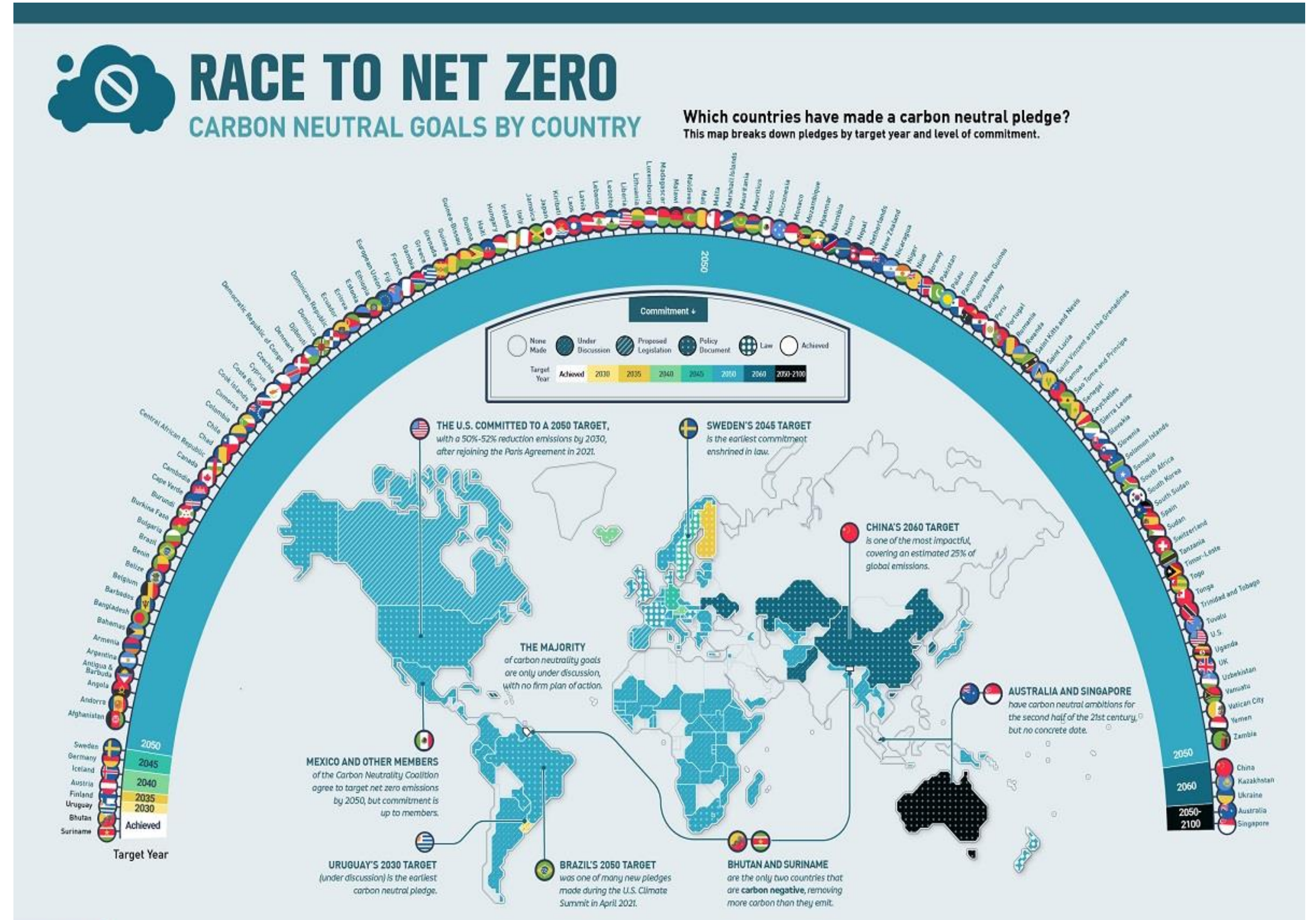


Decarbonization

State of the Industry

Who is Pursuing Net Zero In Ontario?

- Canada has proposed legislation to be NET Zero by 2050.
- Most projects that are underway in 2023, are significantly funded or incentivized, such as Municipal or Social Housing Buildings.
- Green initiative leaders in the private sector are starting to pursue GHG reduction without applicable funding
- Rising carbon taxes will raise the price of operating on Natural Gas or propane over time and will push industry to transition.



Net-Zero : Industry Perspectives, Common Questions & Approaches

The Net Zero Challenge

Minimum requirements: Net-Zero by 2050 or earlier

- Preliminary Net-Zero plan within 12 months, comprehensive with 24 months
- At least two interim targets consistent with the 2050 goal
- Annual progress reporting, climate-related financial disclosure

Three Participation Streams:

- Stream 1: Scope 1,2 and encourage to include relevant Scope 3 emissions
- Stream 2: Scope 1, 2 and 15 Scope 3 emission categories
- Stream 3: Scope 1, 2 and most relevant Scope 3 emission
 - Small and medium enterprises (SME) encouraged to include relevant Scope 3 categories

Participation Growth:

March 2023: 51 participants, including eight (8) large Industry

September 2023: 121 participants, nine (9) large industry

Common Questions & Current Approaches

A small sampling of industry not currently Participating in the Net-Zero Challenge

- All survey participants have active GHG reduction initiatives or identified projects
- On the topic of Net-Zero about half have some level of corporate commitment
- None of the survey participants have a fully developed roadmap toward achieving Net-Zero
- There is a common concern regarding just how to achieve Net-Zero:
 - Drastic change from the current status quo
 - How to stay competitive, financial costs of implementing measures
 - Availability of internal resources to develop Net-Zero plans, and reduction initiatives (mixed)





Run A Better Building

The Decarbonization Process

Roadmap to NET Zero

Municipal and Social Housing Net Zero Strategy.

Municipalities are funded under multiple funding streams targeting decarbonization. This funding has a specific multi-step process to analyze buildings and produce a roadmap to NET Zero.

The roadmap identifies the steps that are required, and when those steps need to be made to achieve your targets and timelines. In this way, we can successfully navigate a balance between cost savings and investment to achieve your sustainability goals.

The Decarbonization Process

Roadmap to NET Zero

Industrial Approach to NET Zero

Industry does not have access to the same funding as municipal or social housing, and so often, the first step of completing the study is a capital expenditure.

Most industrial or private sector projects are driven by an internal initiative to become net Zero and decarbonize.

Few are eligible for the competitive funding that is slowly being allocated by the Canadian Government through programs like the Green Industrial Facilities and Manufacturing Program.

Other measures target end of life equipment or processes that are in need of significant retrofit.

Future Outlook

As the Carbon Tax Rises....

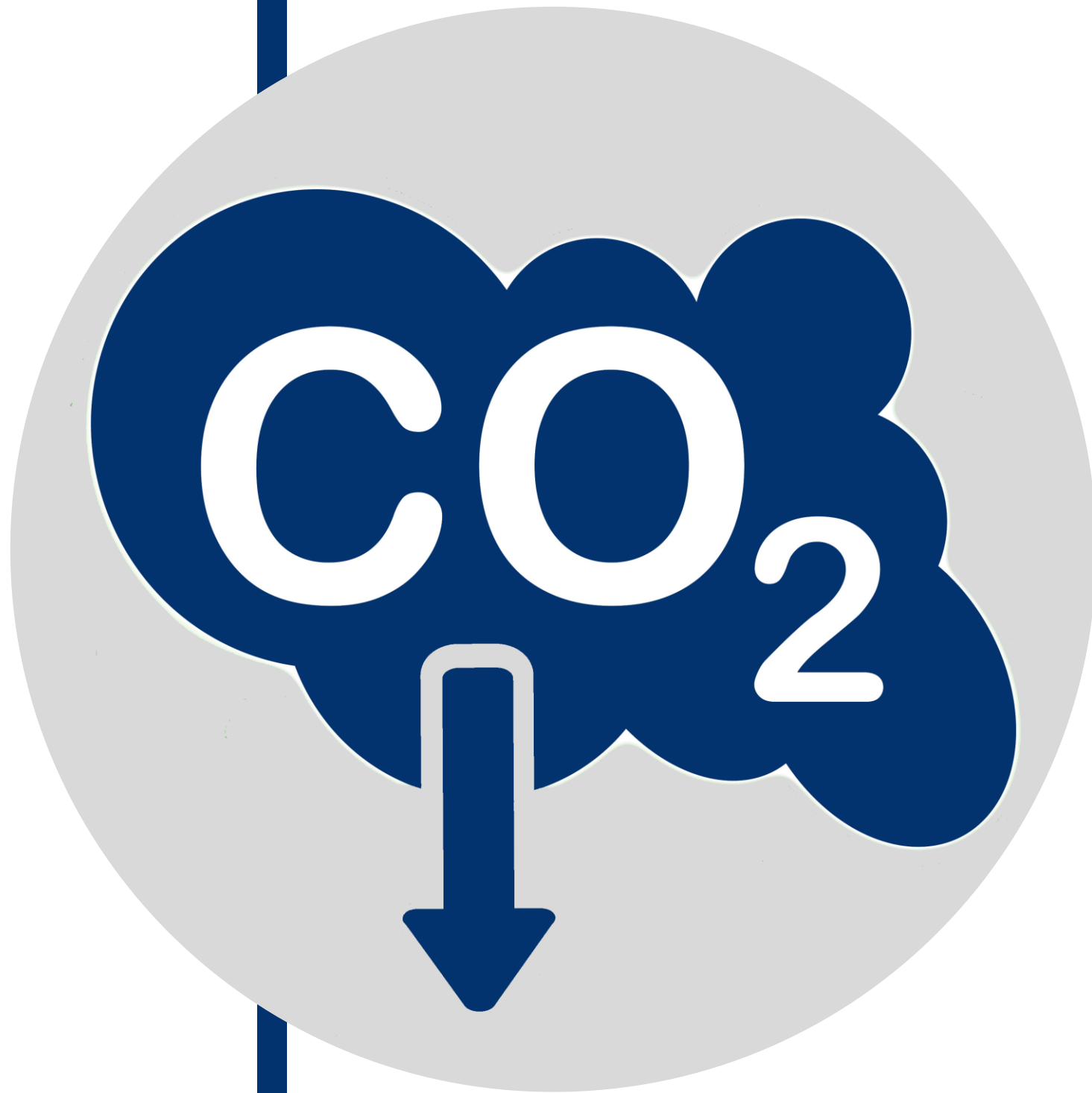


As New Incentives Arrive....



Financial Implications of Decarbonization

Decarbonization does not need to happen all at once, but it will eventually happen.



- NET Zero is often NOT cost effective.
- Decarbonization does not need to be NET Zero.

Industry can target incremental adoption such as replacing equipment that is nearing end of life or target for partial reduction rather than 100% Reduction.

Project Example: GHG Reduction of an Arena

TABLE 1.2.2: SUMMARY OF ENERGY SAVINGS MEASURES

Opp. #	Opportunity	Demand (kW)	Electricity (kWh)	Nat Gas (m ³)	Water (m ³)	GHG Emissions (tCO ₂ e)	Annual Savings	Project Costs	Incentives	Simple Payback	Capital Payback	NPV	IRR
1	Install Low-Flow Water Fixtures	0	0	5,878	1,169	11.2	\$6,378	\$14,978	\$0	2.3	2.2	\$75,998	47.8%
2	Drywall Windows Directly Over Ice Pads	0	150,293	0	0	7.5	\$16,367	\$256,997	\$0	15.7	11.3	\$10,478	7.7%
3	Implement Cold Water Flooding and Remove Booster Heater	0	38,887	15,576	0	31.5	\$9,891	\$94,322	\$0	9.5	7.6	\$65,603	13.9%
4	Install 900kW Solar PV System	5,220	731,745	0	0	36.6	\$128,337	\$2,430,000	\$0	18.9	12.8	(\$270,298)	6.1%
5	Install Ground Source Heat Pump Loop	-2,506	-522,639	134,397	0	229.1	-\$31,471	\$7,401,319	\$1,250,000	-235.2	N/A	(\$6,710,323)	N/A
Total		2,714	398,287	155,850	1,169	315.9	\$129,501	\$10,197,616	\$1,250,000	78.7	N/A	(\$6,828,541)	N/A

Funding is Intermittent, Competitive and Significant

LOW CARBON ECONOMY FUND: CHAMPIONS 2022

Intake Results

The Champions Stream of the Low Carbon Economy Challenge is a competitive program that supports a wide range of applicants in deploying proven, market-available technologies that result in material, incremental and cost-effective greenhouse gas (GHG) emissions reductions.

Under the Champions 2022 intake:

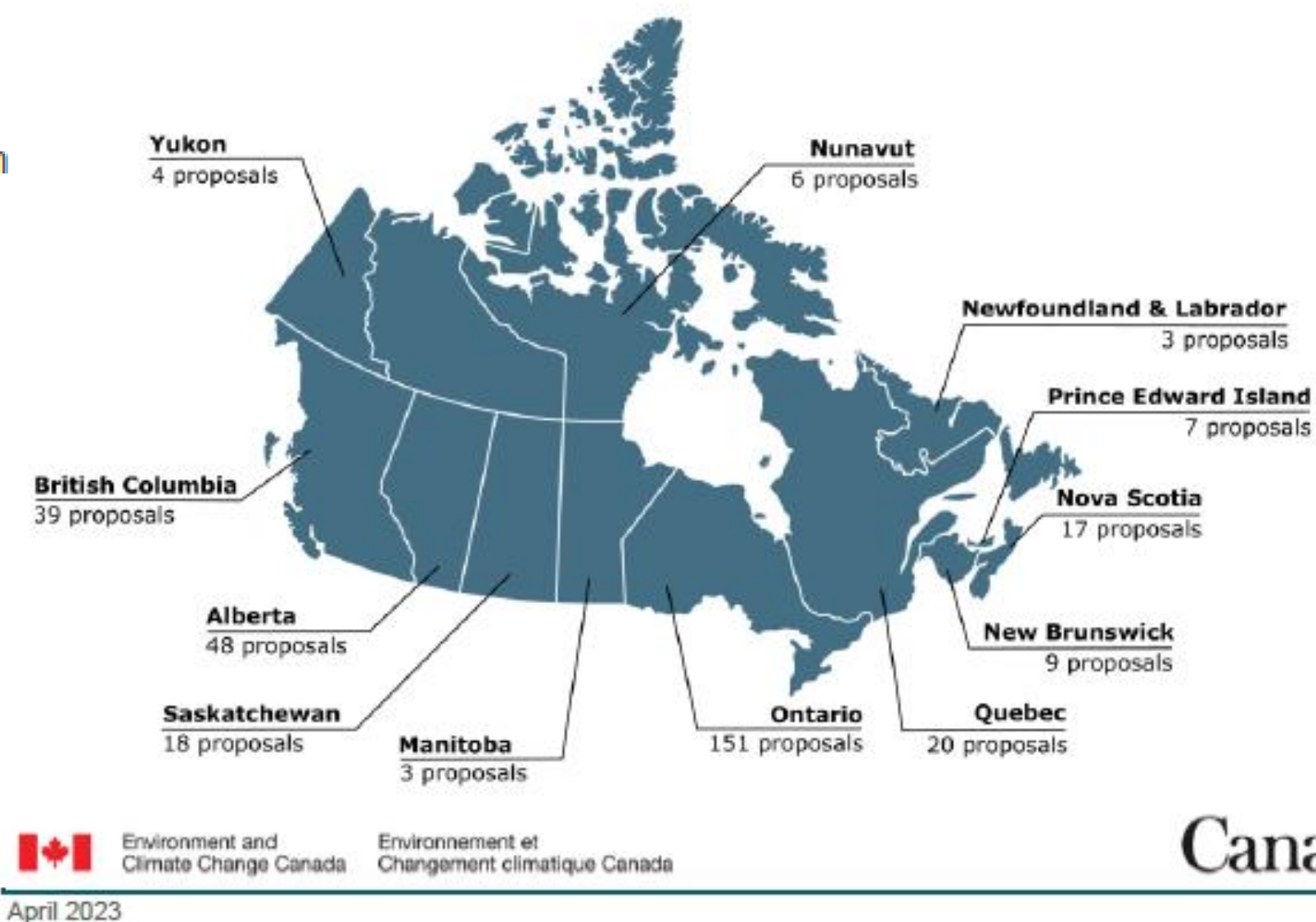
- The program **received 325 proposals** requesting over \$1.6 billion in funding.
- From these, **45 proposals were selected** to receive funding, representing a federal investment of approximately **\$249 million** that is set to contribute to an estimated reduction of **1.0 megatonne of carbon dioxide equivalent (MtCO_{2e})** GHG emissions in the year 2030.

The map below illustrates the **number of proposals received from each province and territory**. Champions 2022 received proposals from all jurisdictions except the Northwest Territories.

Closed July 31st and expected again in early 2024.

Green Industrial Facilities and Manufacturing Program

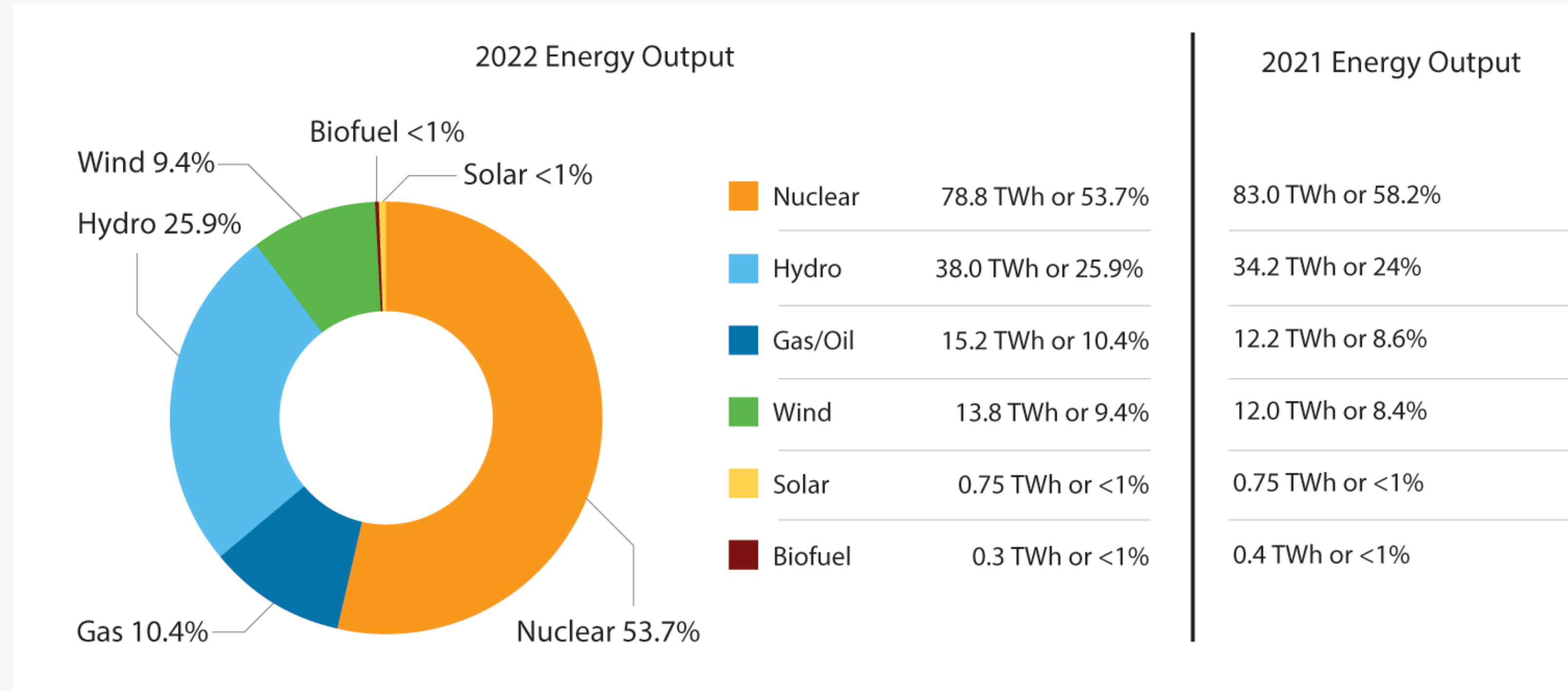
“The Industrial Facility track offers cost-shared financial assistance of up to 50% of eligible implementation costs to a **maximum of \$10 million per proposal**; the minimum contribution is \$40,000 per proposal.”



Ontario's Electrical Mix and CO2 Emissions

With approximately 90% of Ontario's electricity being emissions-free in 2022, Ontario has the lowest amount of CO2 emitted for every unit of electricity generated when compared to neighbouring Great Lakes states.

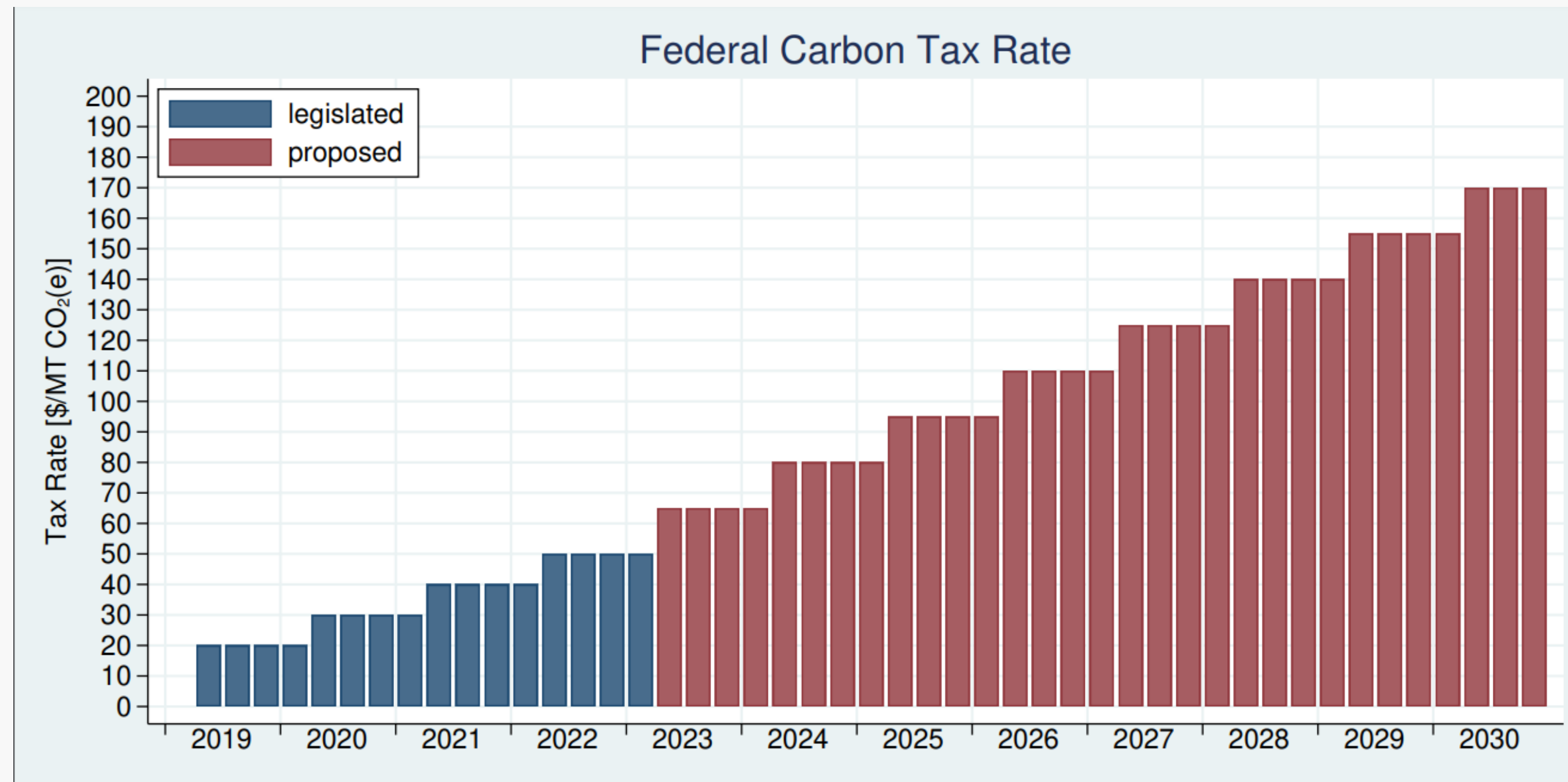
CO ₂ e (g/kWh)	2020
Ontario	22
New York	189
Pennsylvania	312
Illinois	248
Michigan	458
Ohio	570
Wisconsin	542
Indiana	701



The Carbon Tax

The federal Carbon Tax was initiated in 2019 at a rate of \$20/TCO₂e and was escalated at a rate of \$10 per year until 2022. In 2023 the rate of escalation was increased to \$15 per year.

By 2030 the Carbon Tax will be \$170/TCO₂e.



1m³ of natural gas = 1.9 kg CO₂

Therefore, we should expect a tax of \$0.32/m³ of Natural Gas by 2030.

Escalating from around \$0.12/m³ where it is today, The carbon Tax is expected to almost double the total cost of gas usage by 2030.

Continued escalation beyond 2030 is anticipated to increase at an even faster rate to facilitate Canada's commitment to NET Zero by 2050.

Energy Outlook

As fuel switching becomes more widespread, either due to incentives or taxes, we will begin to put higher demand on our electrical infrastructure.

There is limited capacity existing and so there will need to be imposed future restrictions on consumption or increased electrical costs due to demand.

An added consideration when decarbonizing is that we must utilize the most energy efficient options available to ensure that operating costs remain manageable.



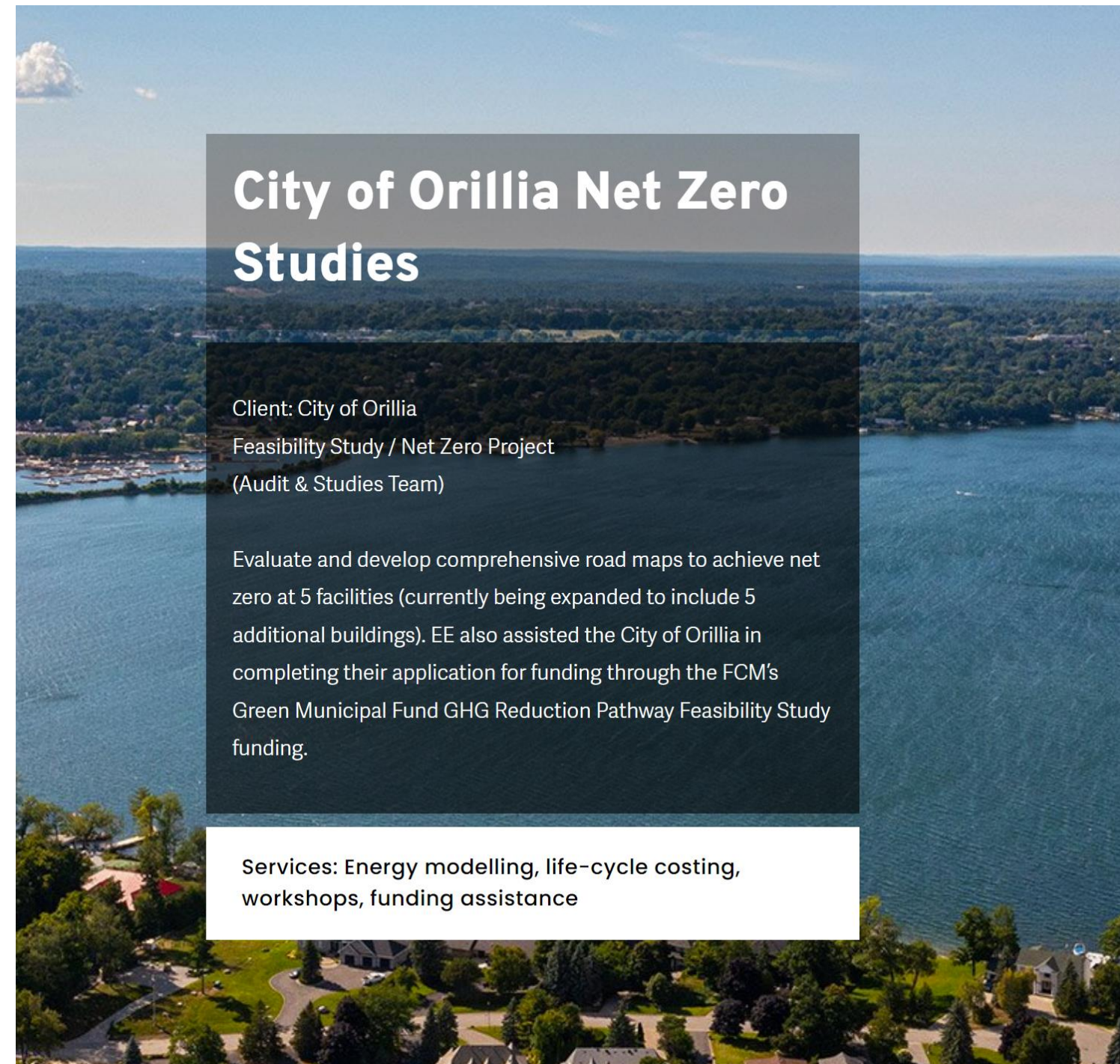
Highlighted Municipal Projects



177 Church Street Bradford

Deep Energy Retrofit study at an unused elementary school being converted to a Community Centre. Our study helped to secure more than \$5.3 million in Federal funding to support the project. We continued to support this project after the initial study by providing detailed mechanical and electrical design in addition to construction administration duties.

Run A Better Building



City of Orillia Net Zero Studies

EE finalized the retrofit eQUEST models for each facility and completed full-building RETScreen models for each facility, in addition to the eQUEST models, to meet eligibility for FCM project funding. EE then created a summary table of the best measures from each facility to apply for the first round of implementation funding through FCM.



City of Mississauga Net Zero Studies

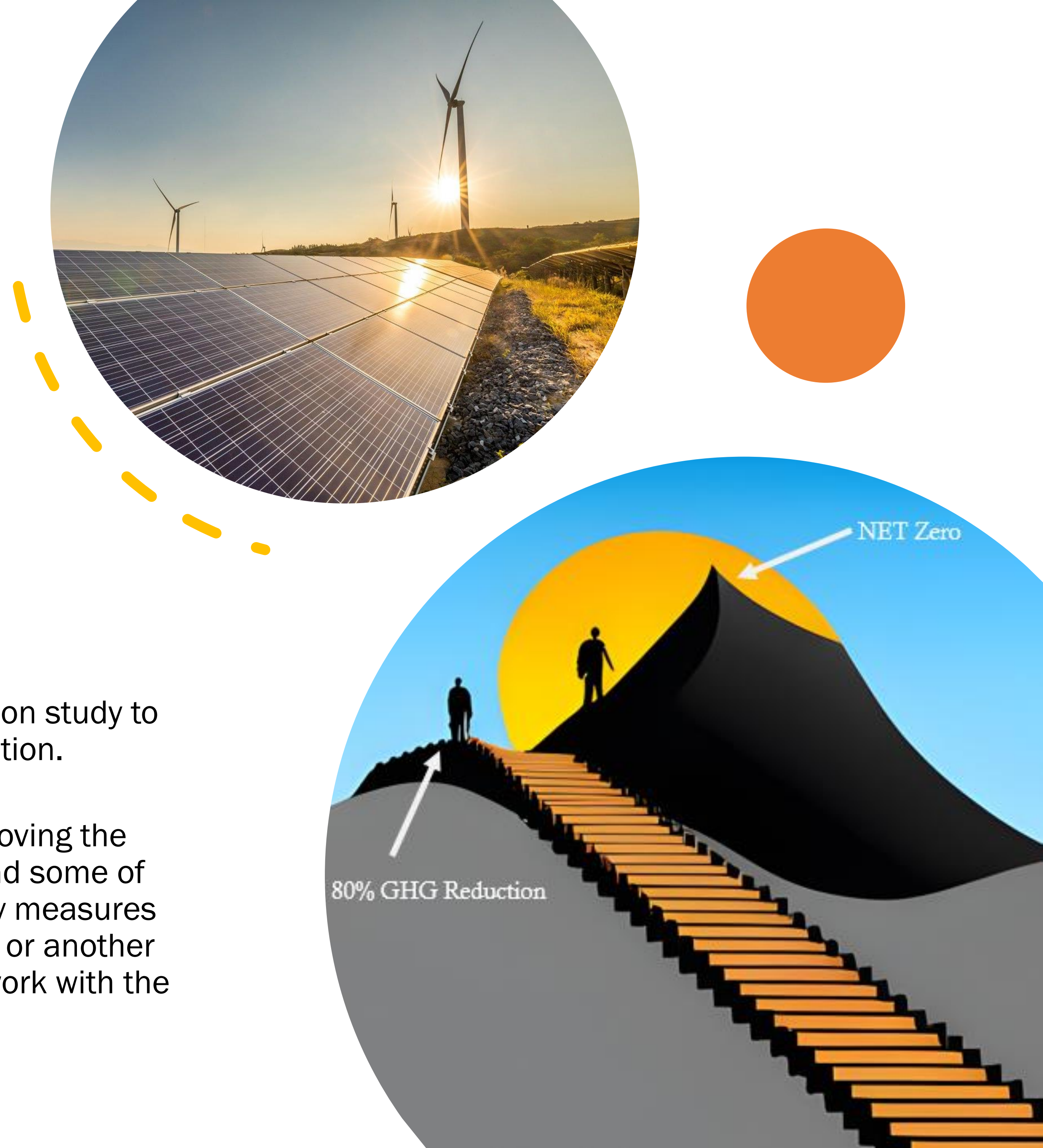
Creation of four decarbonization pathways for 59 buildings within the City's portfolio. Calculation of utility costs/savings and GHG reductions for each measure within each pathway.



Lessons Learned From Municipal and Social Housing Projects that can be applied to Industry:

- Projects will follow the funding, and due to current funding criteria, onsite Power Generation is often overlooked due to implementation costs. This speaks more to the way the funding is structured rather than the measure itself.
- For industry the funding structure will also dictate the path forward in most scenarios.

- Preparing a Roadmap or a Decarbonization study to partially decarbonize often has clear direction.
- Complete NET Zero requires greatly improving the overall energy efficiency of the building and some of these measures may require extraordinary measures such as on site sewer water heat recovery or another creative or design intensive approach to work with the existing use case of the building.



How to Initiate & Implement Decarbonization

What works for Municipal and Social Housing Projects and how that can be applied to Industry?

- The first step in a successful carbon reduction strategy is to understand how your buildings currently perform.
- To understand how to decarbonize we need to understand how energy is used in the building and through process so that the best strategy can be identified.
- Funding is critical to a successful project and In 2023 the most significant funding available to industry was highly competitive.
- Having a clear strategy in place is often the best first step to ensuring you have a competitive advantage.

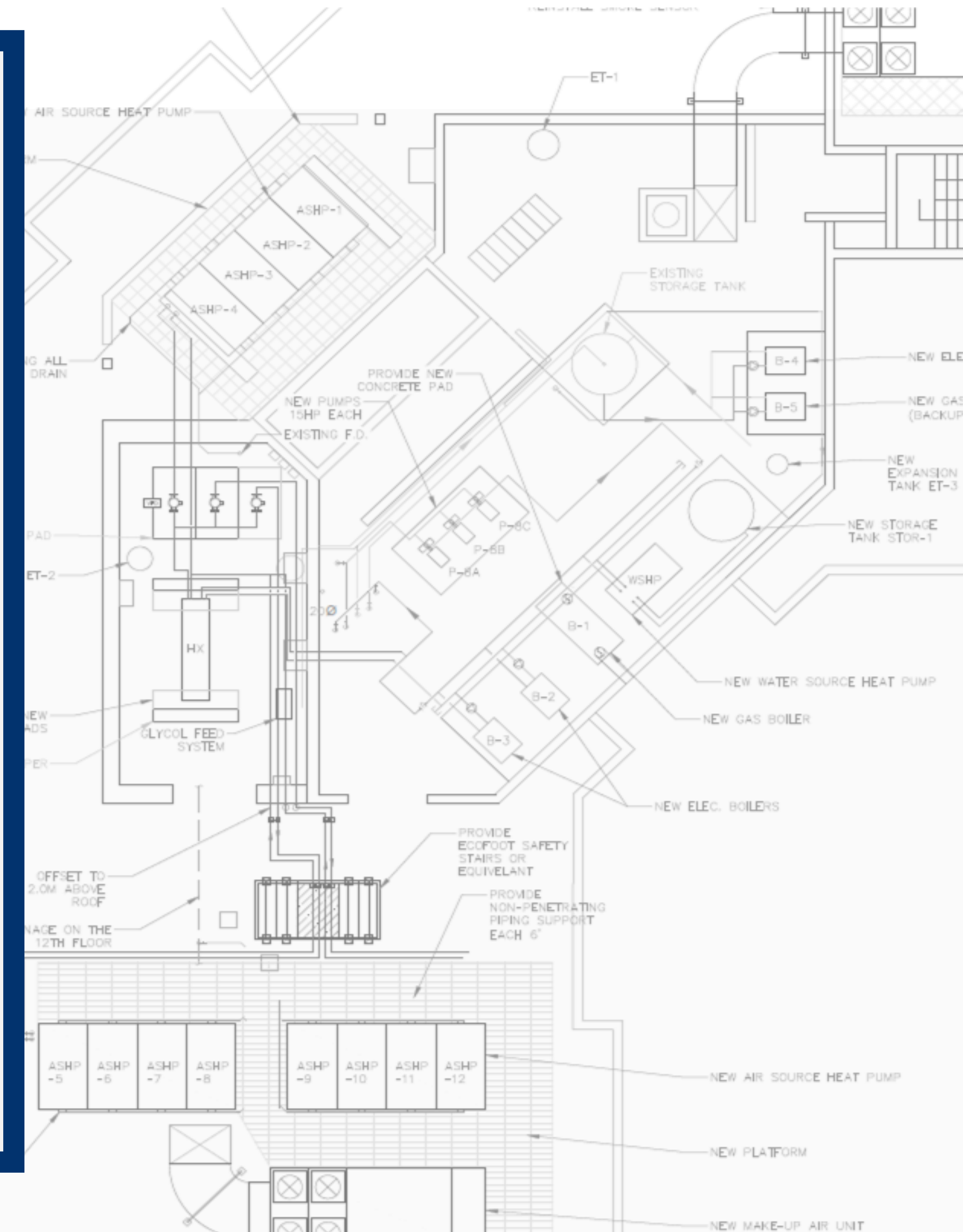


Incremental Adoption

Heat Reclaim and Air Source Heat Pumps are great options to provide highly efficient heat with significantly reduced energy inputs. However, in order to meet the demands of our cold winters, backup heat is often required.

Given Ontario's electrical infrastructure, Electrical resistance backup heat is a simple method to achieve around 90% GHG reduction. But electrical resistance heating is expensive to operate, and often requires a substantially more expensive power upgrade for the building.

Using gas as backup heat allows for partial decarbonization, the benefits of using highly efficient heating in the shoulder season and on temperate winter days with the reliable capacity of gas heat for the extremely cold weather days.

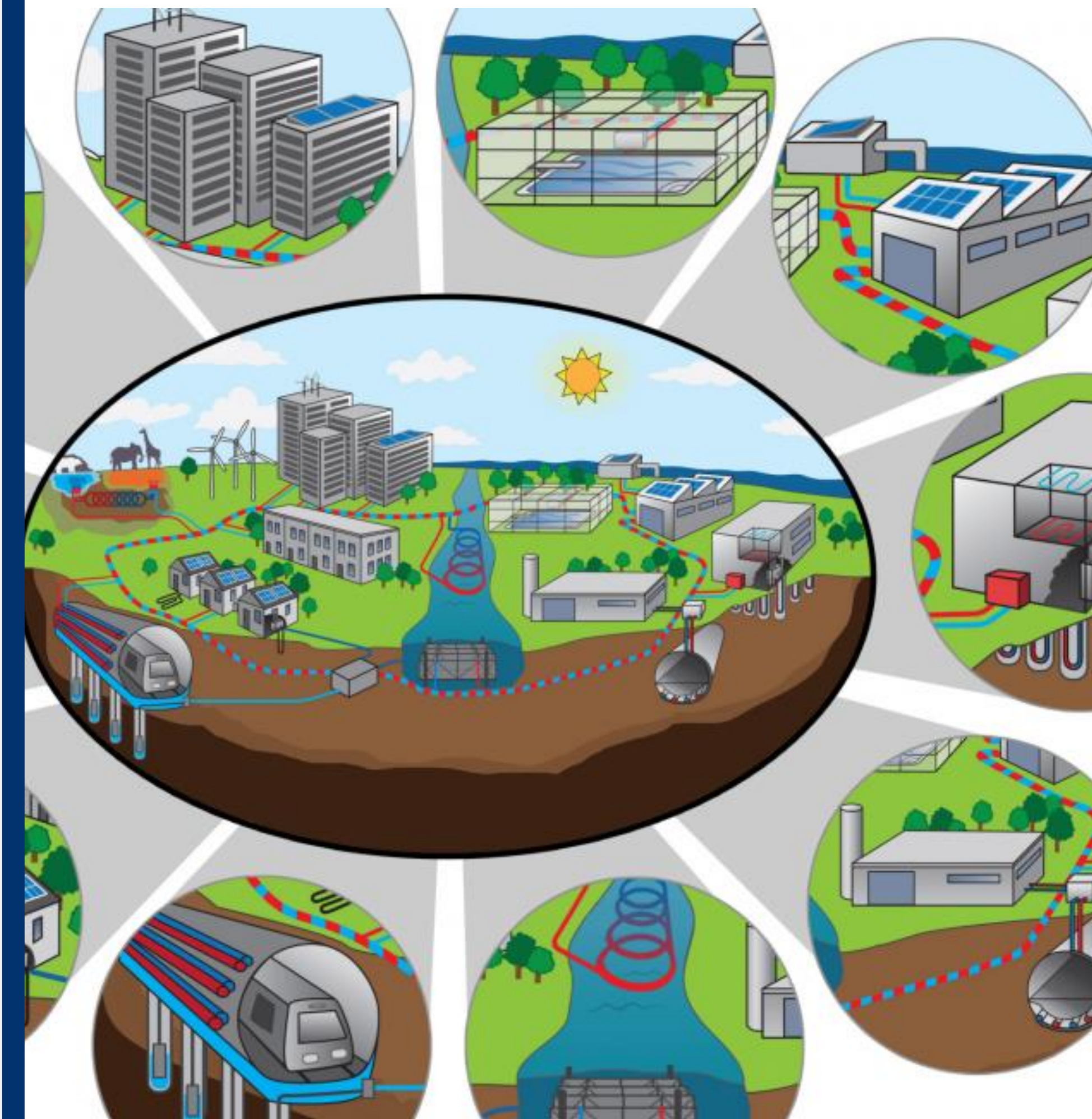


Maximize GHG Reduction

Electricity typically costs more than 3-times more than natural gas per unit of energy.

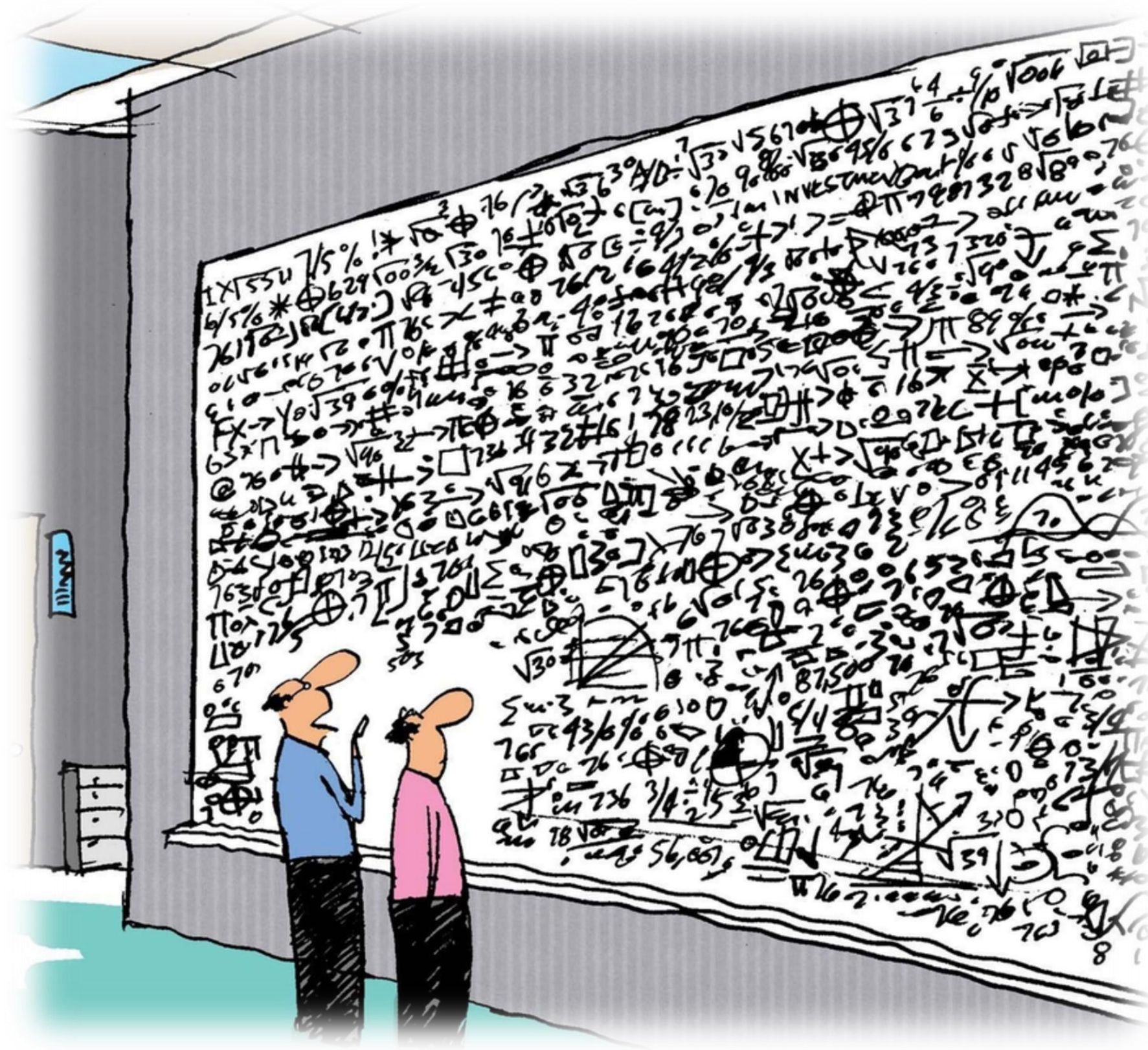
Therefore, optimizing energy use when fuel switching is essential to ensure that the operating costs do not increase drastically due to fuel switching.

Complete heat exchange is ideal and significant exchange may be feasible depending on the application. This may be accomplished through a district energy system or geothermal heat exchange system. While the upfront costs of these systems may be significant, the GHG reduction potential and operational efficiencies are maximized.



Challenges Unique to Industry

Complexity and Scale



- Industrial buildings often have highly energy intensive process that utilizes unique equipment with no direct replacement.
- Existing electrical infrastructure may have already been upgraded and is consumed by process, limiting the availability for additional power upgrades.
- Scale may require significant capital investment.

Opportunity Unique to Industry

- Industrial buildings often have large flat footprints which may offer increased potential for significant solar PV projects.
- Industry often has Incredibly High Energy use both in terms of heating and cooling requirements.
- Heat reclaim and energy storage potential can be significant, unlocking new potential that is not applicable in Municipal buildings.



Questions & Comments

NET ZERO EMISSION