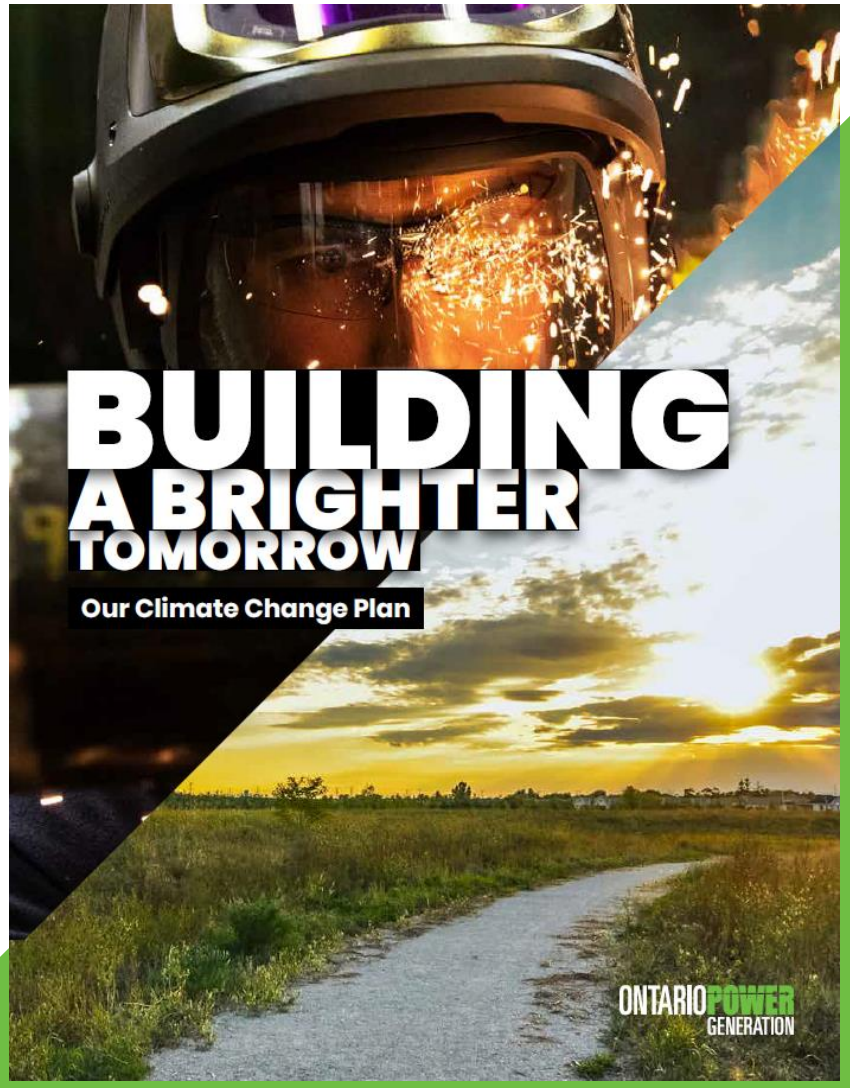

OUR
CLIMATE
CHANGE
PLAN
Our Power is Changing the World
ONTARIO POWER GENERATION
Where a brighter tomorrow begins.

thank you for joining the official release of our Climate Change Plan



who we are

We are Ontario's largest clean power generator and clean technology innovator.

100% owned by the Province

$59.8 billion in assets

More than 9,000 employees across Ontario

Leading producer of nuclear isotopes

our assets

We have one of the most diverse generating portfolios in North America.

18,876 MW generating capacity

66 hydro stations on 24 river systems

2 nuclear stations

2 leased nuclear stations (Bruce Power)

1 bio-mass station

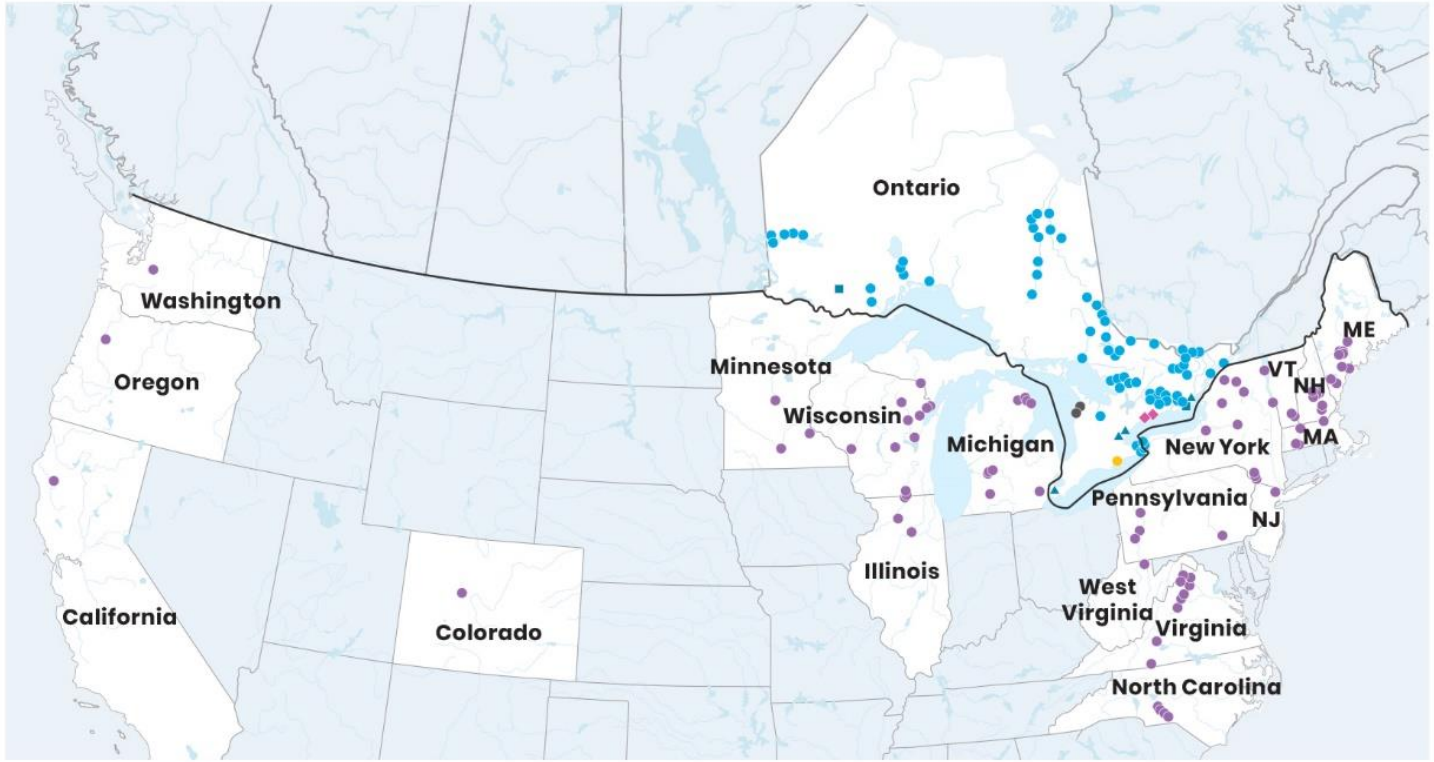
1 dual-fueled oil and gas station

4 gas stations (Atura Power)

1 solar facility

85 US hydro stations

our assets



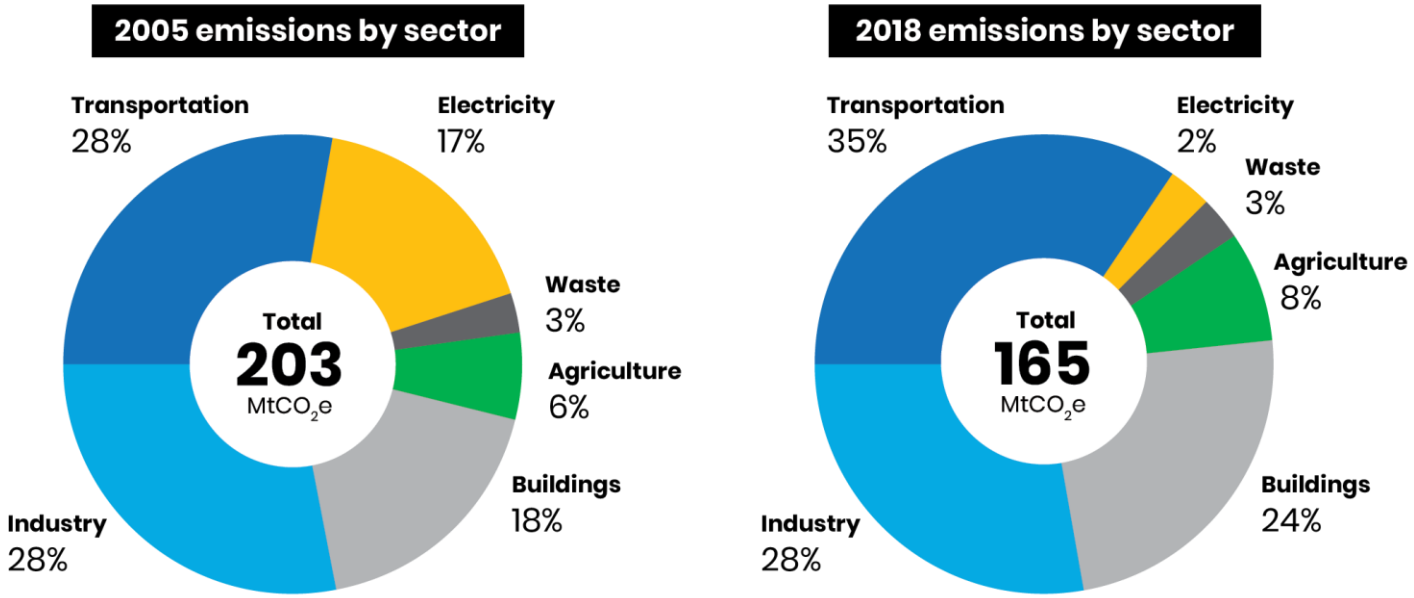
2	2	2	1	66	85	4
Nuclear Stations	Leased **Nuclear** Stations	**Thermal** Stations	**Solar** Facility	**Canada Hydroelectric** Stations	**US Hydroelectric** Stations	**Atura Power Gas-Fired** Stations

positioned to lead

Before we closed coal, the electricity sector accounted for 17% of the province's emissions.

After we closed coal, it accounted for only 2%.

Ontario CO_2 emissions by sector

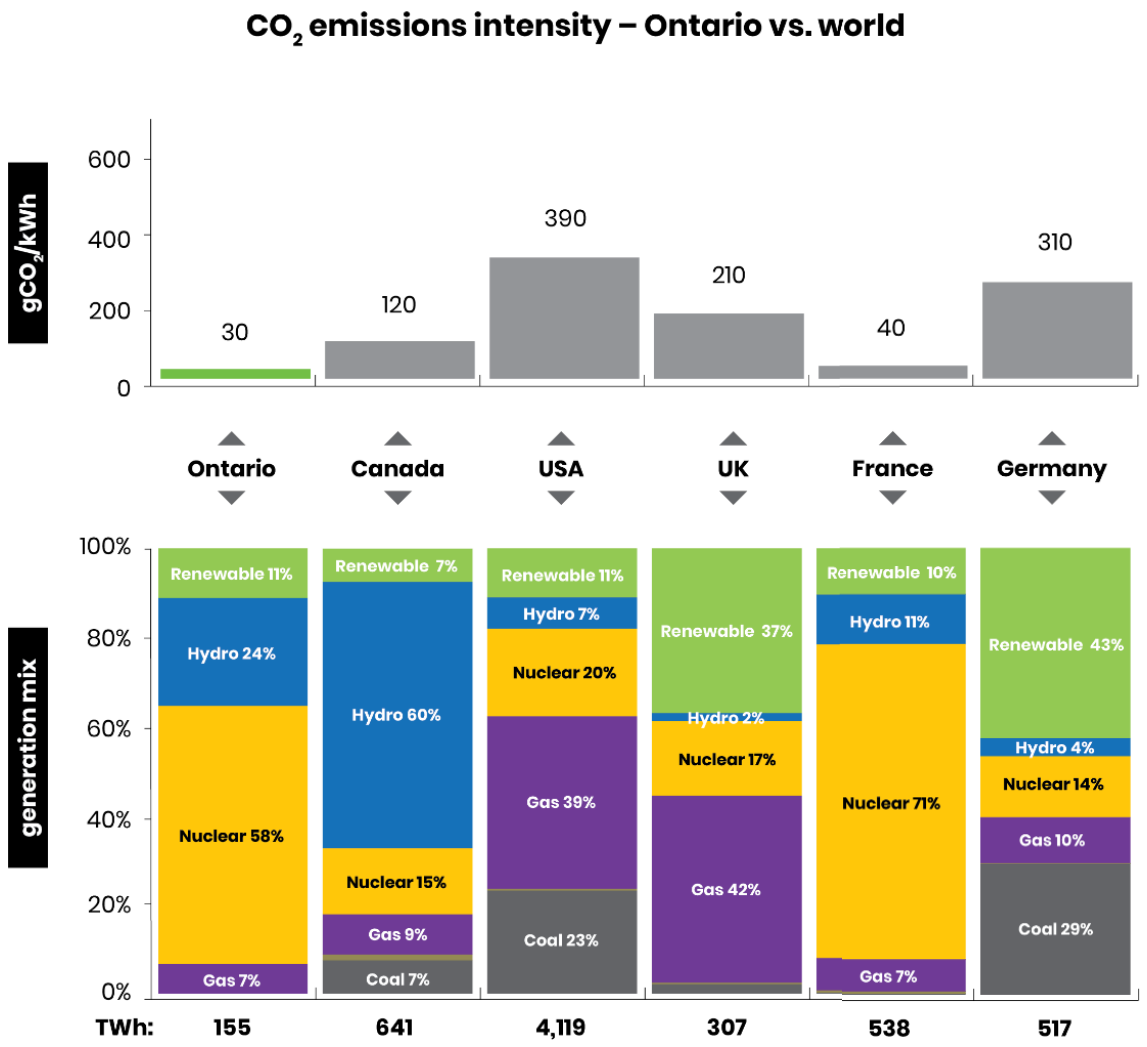


Sources:

- Greenhouse Gas Progress Report of the Environmental Commissioner of Ontario
- 2018 Canada's Official Greenhouse Gas Inventory

setting a global example

Globally, Ontario's electricity sector ranks among the best from a carbon intensity perspective when compared to other progressive jurisdictions.



Notes:

- Based on actual 2019 generation for Ontario, USA, UK, France & Germany, and 2018 generation for Canada.
- CO_2 emissions intensity estimates are for in-region generation only; CO_2 from imports and life-cycle emissions are not included.
- Renewable excludes hydro and includes wind, solar, biofuels and geothermal; small brown portion is oil.
- CO_2 emissions intensity estimates calculated assuming emissions of 450 gCO_2e/kWh for gas, 800 gCO_2/kWh for oil and 900 g/KWh for coal .

OUR GOALS

our climate goals

A net-zero carbon company by 2040

Having delivered the world's single largest climate action to date by closing our coal stations, OPG will continue to be a climate leader by investing in and implementing CO_2 reductions and offsets to achieve net-zero carbon emissions by 2040.

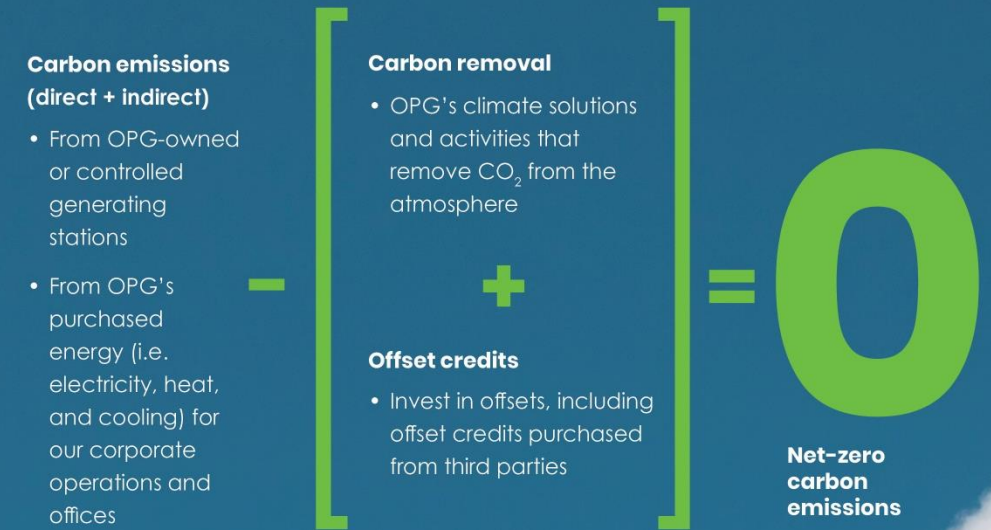
A catalyst for a net-zero carbon economy by 2050

OPG will be a leading energy innovation company, advancing clean technologies and solutions to help the markets where we operate achieve net-zero carbon economies by 2050.

DEFINING NET-ZERO

defining net-zero

‘Net-zero’ refers to achieving an overall balance between direct carbon emissions produced and carbon emissions taken out of the atmosphere.



OUR GUIDING PRINCIPLES

our guiding principles

We will **evolve.**

We will **be transparent.**

We will **follow evidence.**

We will **respect customers' interests.**

We will **engage Indigenous communities.**

We will **be accountable.**

We will **be bold.**

OUR CLIMATE ACTIONS

we commit to take climate change action in these four areas

mitigate.

We will reduce carbon emissions from our operations, and help the markets where we operate do the same.

adapt.

We will ensure our operations are resilient to the impacts of a changing climate and our host communities are safe.

innovate.

We will develop and deploy new technologies to speed Ontario's energy transformation.

lead.

We will work with others to lead the decarbonization of Ontario's economy, and share our province's lessons with the world.

OUR KEY INITIATIVES

key initiatives

Development of small modular reactors.

Advancing electrification initiatives in the province.

Darlington Nuclear Refurbishment.

Continued investment in our hydroelectric generation.

Focus on adaptation and resiliency of our assets.

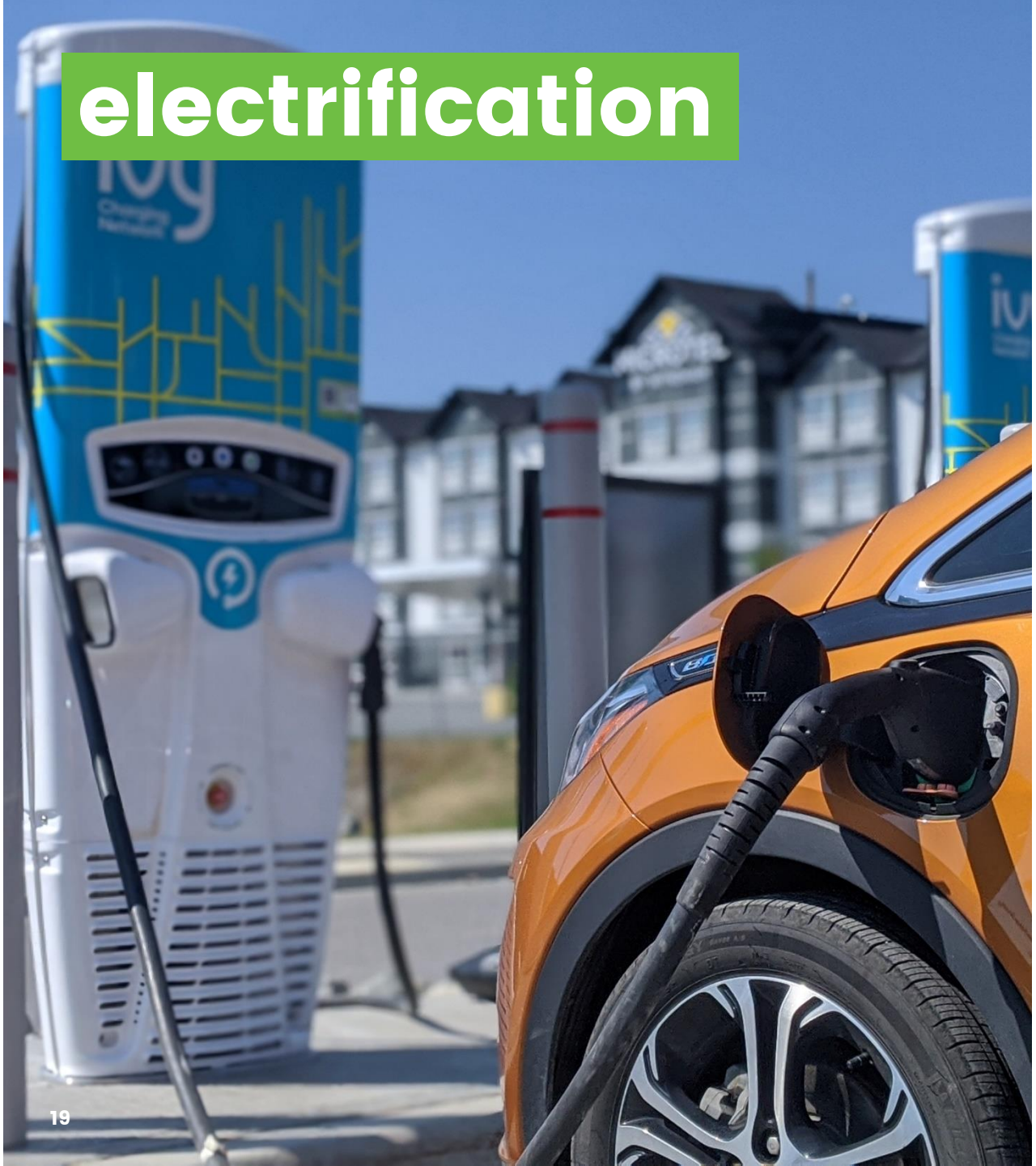
Exploring opportunities in non-hydro renewables and energy storage.

Investing in negative emissions technologies.

Supporting nature-based solutions and biodiversity initiatives.

small modular reactors

- **Smaller than traditional reactors.**
  - Range from community scale (<1 MW) to on-grid scale (~300 MW).
- **First utility with ownership stake in a Micro Modular Reactor™.**
  - Joint venture with Global First Power and Ultra Safe Nuclear Corporation for SMR at Chalk River.
- **We're advancing engineering and design work with three grid-scale SMR developers.**
  - GE Hitachi, Terrestrial Energy and X-energy.
- **Planning for a new nuclear build to host a grid-size SMR at Darlington by as early as 2028.**
  - Pending regulatory approvals and licensing.



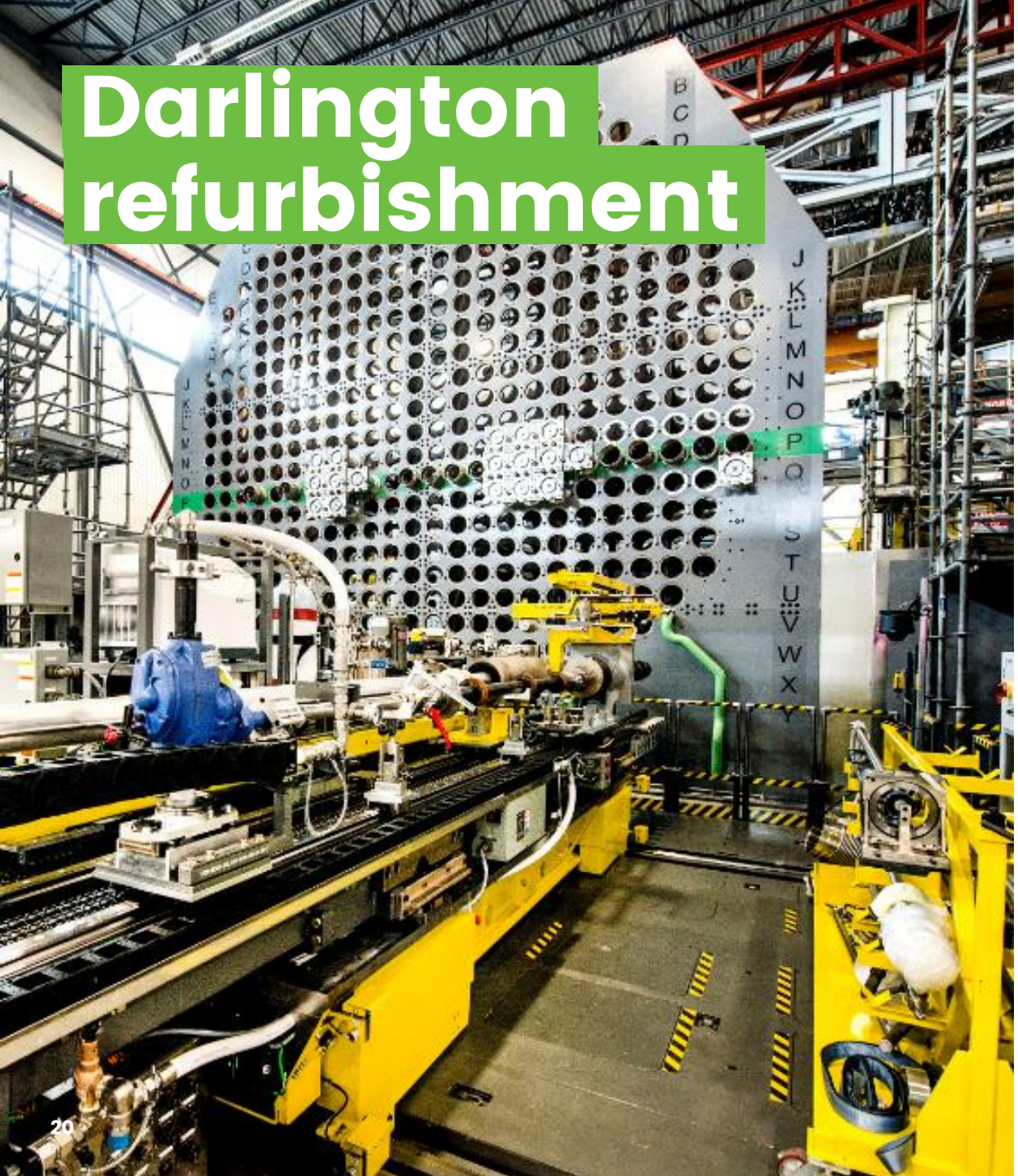
electrification

- **Decarbonizing other sectors through electrification makes the most economic sense and is the least costly.**

- **Transportation provides the best opportunities, including:**
  - Personal EV charging
  - Ferries
  - Transit

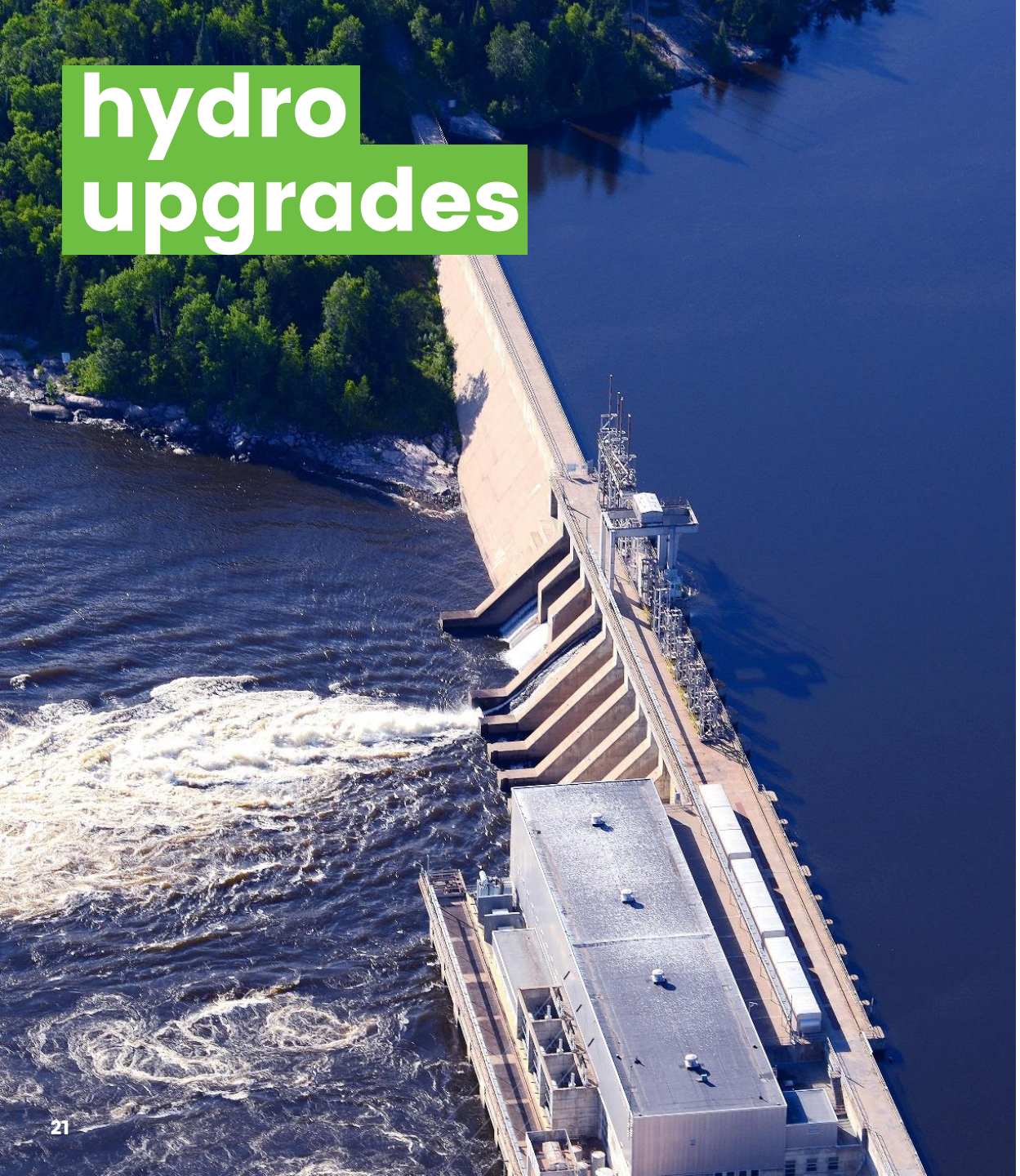
- **OPG partnered with Hydro One to build Ontario's largest, most connected EV fast-charger network, Ivy.**
  - Connecting north to south, east to west
  - 160 chargers
  - 70+ sites

- **Electrification also has the potential to lower electricity rates by spreading fixed system costs over greater energy volume.**



Darlington refurbishment

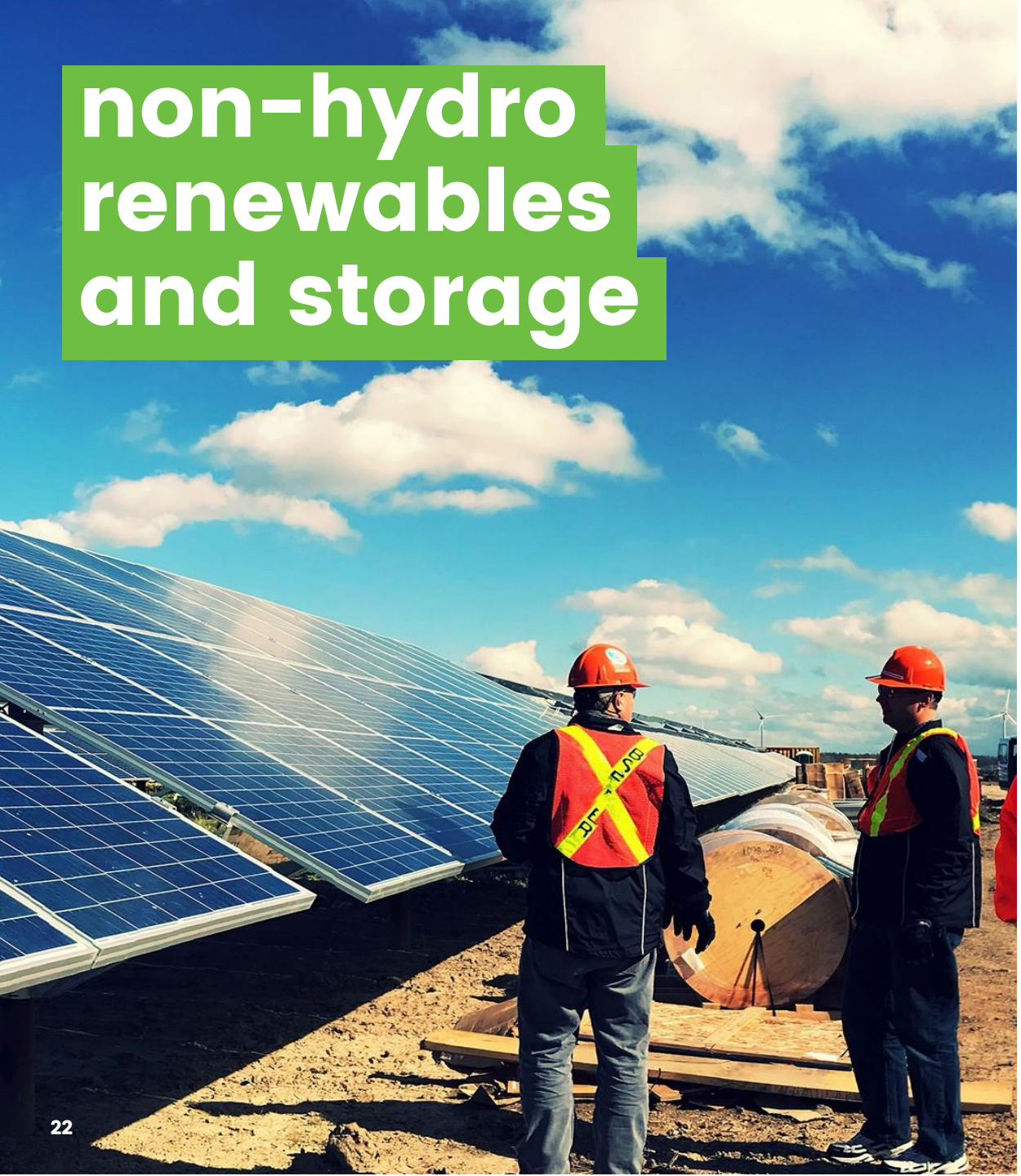
- **Darlington Nuclear Generation Station provides 20% of Ontario's power.**
- **The Darlington Refurbishment project is one of Canada's largest clean energy projects.**
- **The continued operation of the refurbished Darlington station will reduce carbon emissions by an estimated 297 million tonnes = the equivalent of removing 2 million cars per year from Ontario's roads.**
- **Will also provide a $89.9 billion boost to Ontario's GDP.**



hydro upgrades

- **Our 66 hydro stations in Ontario provide clean, renewable, reliable low-cost power.**
  - Our hydro fleet provides over 7,400 MW of capacity, includes baseload and peaking roles.
- **Produce over 30 billion kilowatt hours of power per year - more than one-third of OPG's electricity production.**
- **Investing in our hydro fleet to sustain and, where possible, increase generation is an important part of our plan.**

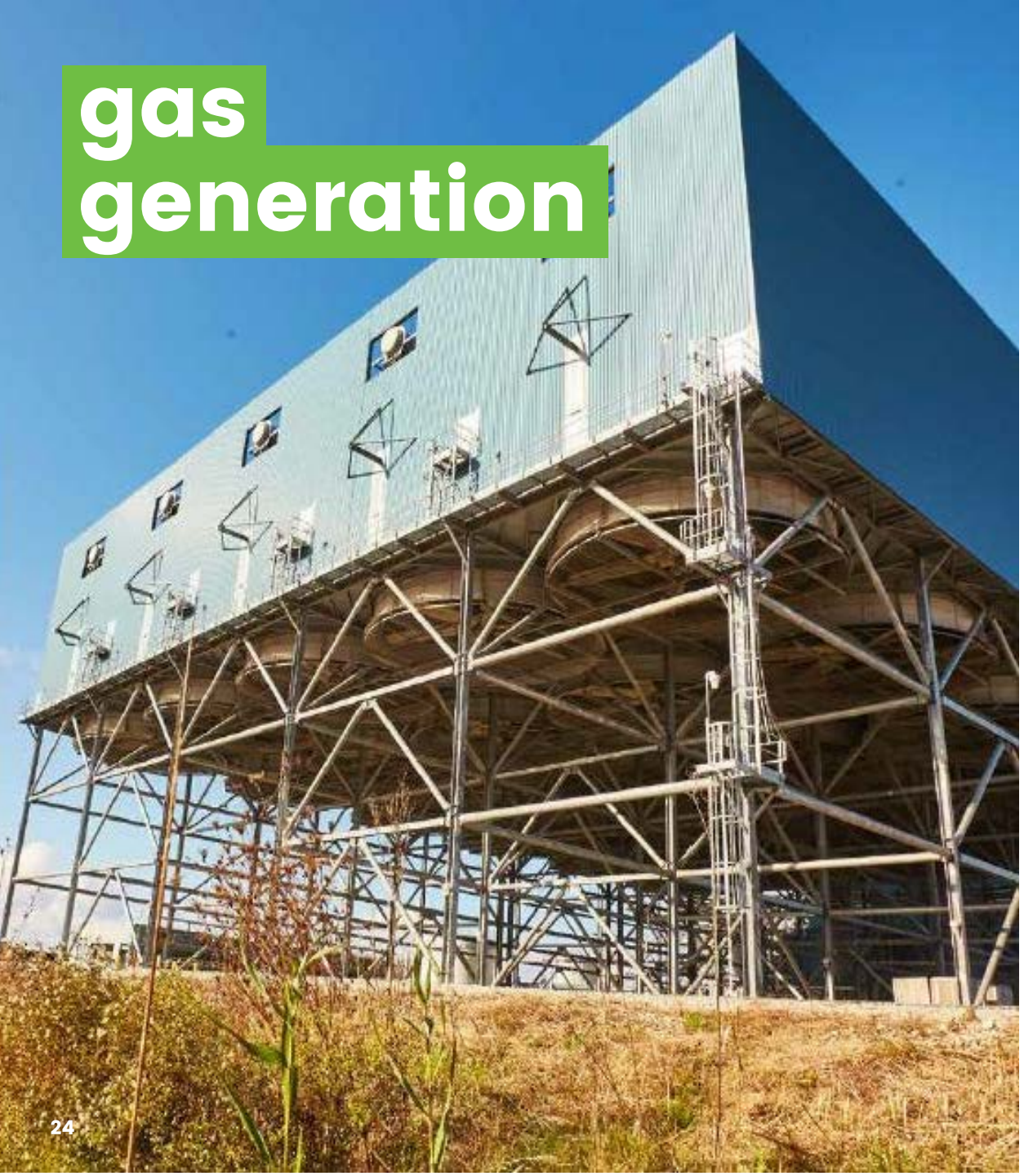
non-hydro renewables and storage



- **OPG has expertise in solar and storage development.**
- **Recently converted the coal-fired Nanticoke Generating Station site into a 44 MW solar facility in partnership with Six Nations of the Grand River and the Mississaugas of the Credit First Nation.**
- **Helped develop an off-grid solar and storage micro grid for the Gull Bay First Nation community.**
- **Developed two other energy storage facilities that manage industrial companies' peak energy consumption.**

negative emissions technologies

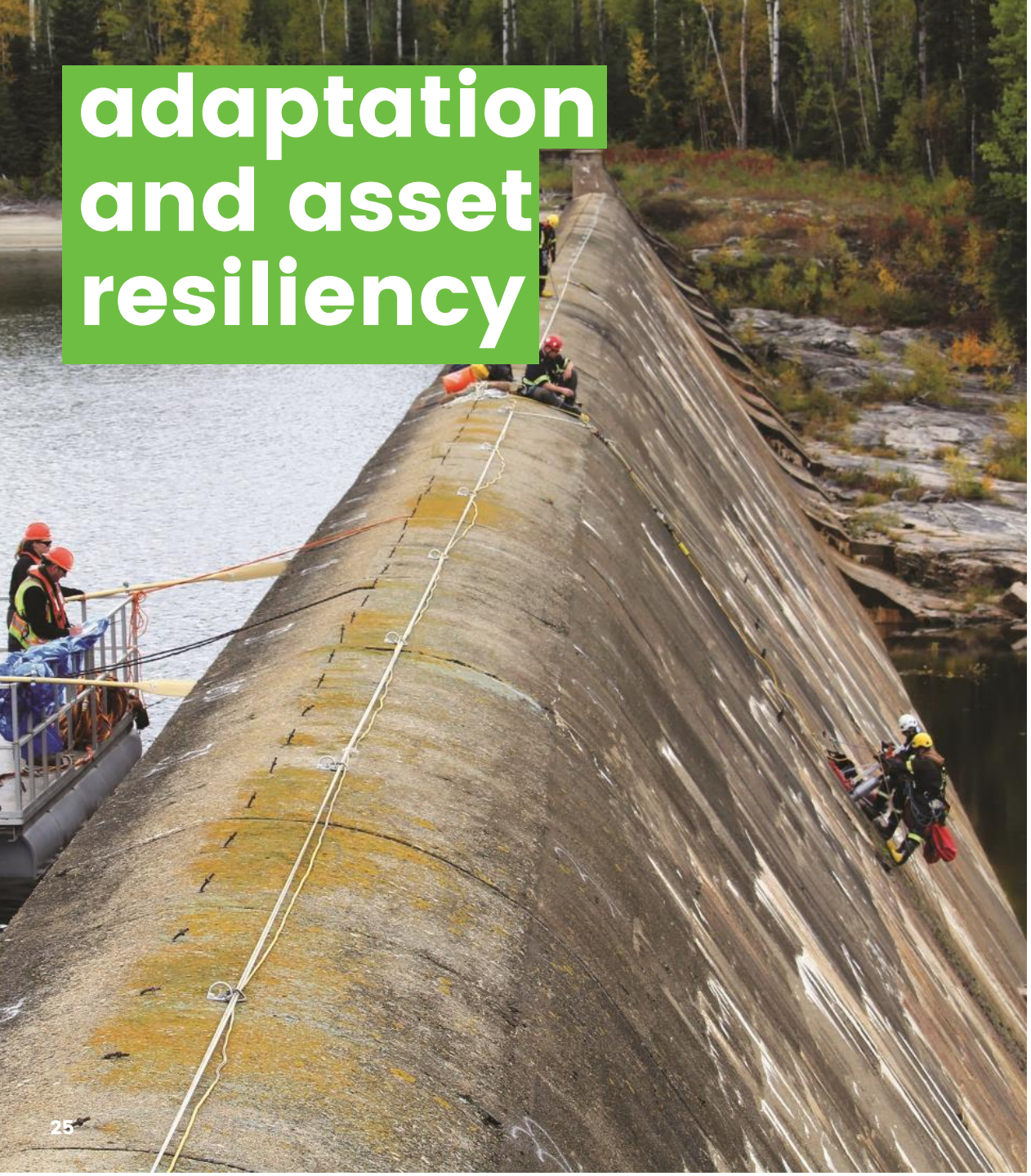
- We believe technologies that remove and sequester carbon from the environment will be a key part of overall climate solution.
- Includes Carbon Capture and Storage (CCS) – capturing emissions at source and storing underground in suitable geological formations.
- Partnership with the MaRS Discovery District provides us access to emerging clean technology companies for collaboration.
- In the future, we may apply CCS at our gas generating stations when it becomes technically and economically viable.



gas generation

- **Natural gas generation is critical to our electricity system where supply and demand must be balanced every moment.**
- **Renewable sources of energy like wind and solar are intermittent and therefore not reliable.**
- **Flexible natural gas generating stations fill this gap.**
  - They're ready whenever they're needed to meet demand.
- **In the future, breakthroughs in energy storage may reduce the need for a natural gas backup to renewable energy.**

adaptation and asset resiliency



- **Adaptation starts with strengthening our assets and operations against climate related impacts.**
- **Also reduce the impacts on our host communities across the province.**
- **Currently exploring nature-based protection measures at our sites.**
  - Like building wetlands to mitigate extreme events like flooding and wildfires.
- **Also integrating climate science and modelling into our investment decision and engineering processes.**
- **Getting ahead of Ontario's climate risks will strengthen the electricity grid's resiliency.**

our assumptions

5 Mt CO_2

We assume that following the closure of Pickering Nuclear that the system will need to rely more on natural gas as SMRs and other generating capacity is being developed, and that our emissions will be approximately 5 Mt CO_2 /year.

policies & legislation

We assume that policies and legislation will be developed to support the decarbonization of the economy by 2050.

increased demand

We assume that increased electrification will result in additional demand for electricity, which will require deployment of new clean generation such as additional hydro power and SMRs.

technological advancements

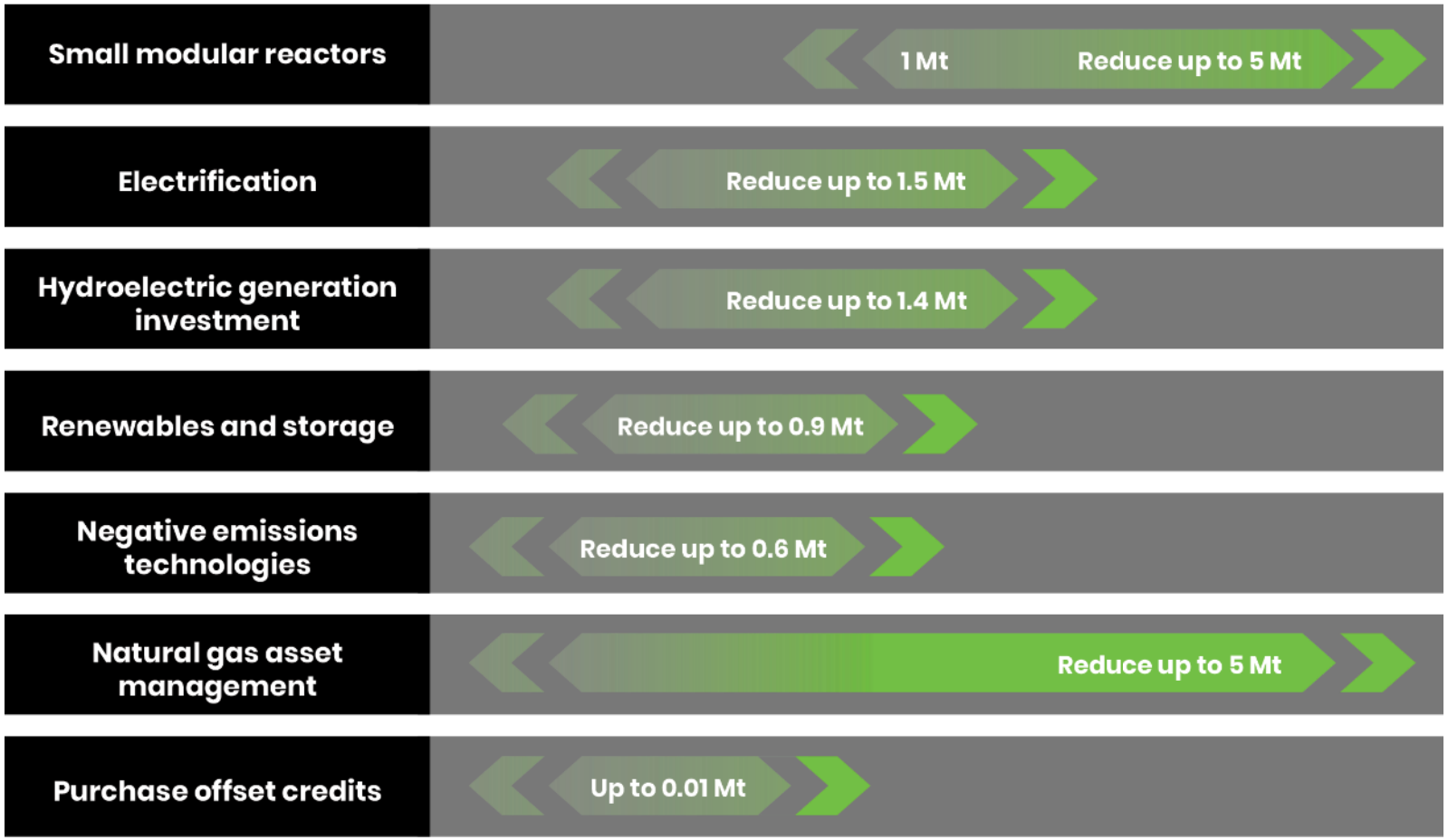
We assume that substantial advancements will be made in the area of negative emissions technologies. Carbon Capture and Storage (CCS) technology will be commercially available by 2040.

offset credit market

Finally, we assume that an offset credit market will be available in 2040 to meet the balance of OPG's carbon commitments not met by direct actions.

our levers to achieve targets

The potential range of annual carbon reduction achievable to reach our goals using today's available measures (Mt, million tonnes)



OUR ACTION PLAN

mitigate

We will reduce carbon emissions from our operations, and help the markets where we operate do the same.

By 2025

- Through the Ivy Charging Network, install over 100 on-the-go fast-charger sites for electric vehicles (EVs) throughout Ontario to help enable the mass adoption of EVs, with 70+ sites scheduled for completion by the end of 2021.
- Add 10 new MW of clean hydro capacity at Ranney Falls and new internal sluice capacity to respond to water management issues.
- Complete the Sir Adam Beck G1 & G2 conversion, adding an additional 125 MW of clean hydropower.
- Complete the refurbishment of Darlington's Unit 3 (2024), Unit 1 (2025) and Unit 4 (2026), to solidify Ontario's low-cost, carbon-free, baseload power generation for 30+ years.
- Reduce our environmental footprint and support green warehousing by consolidating warehouses and using industrial vending machines. Look to use vertical/horizontal carousels, and implement electrification of material handling equipment.
- Complete the Calabogie GS redevelopment, adding ~11 MW of clean hydropower.
- Complete the Coniston GS redevelopment, adding 4 MW of incremental capacity of hydropower.
- Deploy a systematic approach for extending the life of existing hydroelectric assets and redevelop at least 2 additional hydroelectric generating stations (2025).
- Reclaim portions of Nanticoke & Thunder Bay GS industrial sites with naturalized green space.
- Work with 3rd Party Logistics (3PL) providers on delivery route optimization, consolidation of orders, bulk purchasing, etc. Also implement widespread use of reusable/recyclable packaging.
- Build a state of the art Corporate Headquarters Campus that is designed, built and operated with low carbon and sustainable principles (2025).
- Continue to invest in nature based solutions to mitigate the impact of a changing climate by planting 10 million trees (including those planted since 2000), and creating/restoring 500 acres of grasslands (including projects completed since 2014). Also aim to create/restore 250 acres of wetlands.
- Carbon pricing assumptions will be built into established business processes from the beginning to enhance project decision-making.
- Safely optimize the life of Pickering Nuclear GS to sequentially bring units 1 and 4 down in 2024, and pending regulatory approval by the Canadian Nuclear Safety Commission, bring units 5-8 down in 2025. Pickering optimization would avoid approximately 17 million tonnes of carbon emissions.

By 2040

OPG is net-zero carbon

- As part of the EV100 initiative, convert our fleet of corporate vehicles, where technically feasible, to electric (approximately 400 vehicles) by 2030, and install over 40 level 2 EV charging units across our offices and sites for staff and fleet vehicles.
- Continue to advance and promote the adoption of EVs through investments in charging infrastructure, helping bring one million EVs to Ontario's roads.
- Pair energy storage with hydroelectric facilities to allow water to be used more efficiently and enhance the ability to provide grid services.
- Deploy Ontario's first on-grid Small Modular Reactor at the Darlington site, pending regulatory approvals and licensing.
- Apply OPG's SMR technology to build and deploy in other Canadian jurisdictions reliant on coal and fossil-fuel power to reduce national carbon emissions.
- Test clean hydrogen, renewable natural gas or carbon capture/utilization and storage at one gas-fired asset in Ontario, to evaluate emission reduction options.
- Complete hydro turbine generator overhauls across the fleet to maintain reliability of these renewable assets.
- Implement online flow and enhanced performance testing and monitoring to improve the efficiency of hydro power plants.
- Increase energy market flexibility by enhancing pump storage capability in Ontario.
- Redevelop additional 3-8 hydroelectric generating stations to continue to provide clean, renewable power.
- Create, leverage and deploy innovative new technologies and processes to help sustainably manage the decommissioning of the Pickering Nuclear station, responsibly reducing the environmental footprint of the project (from carbon emissions to byproduct volume and waste).
- Continue investing in nature-based mitigation efforts by planting 17.5 million trees by 2040 (including those planted since 2000), while also striving to create/restore 1,250 acres of grasslands (including projects completed since 2014), and 1,000 acres of wetlands.

By 2050

The economy is net-zero carbon

- Continue to advance and promote the adoption of EVs through investments in charging infrastructure, helping bring two million EVs to Ontario's roads.
- Continue investing in nature-based mitigation efforts by planting 35 million trees by 2050, while also creating 3,000 acres of wetlands and 3,000 acres of grasslands.
- Continued operation of Darlington Nuclear to 2055 will take the equivalent of two million cars off Ontario's roads per year, while helping to support the continued electrification of the economy with clean, carbon-free power.
- Implement clean hydrogen, renewable natural gas or carbon capture/utilization and storage at gas-fired assets in Ontario to reduce emissions.

adapt

We will ensure our operations are resilient to the impacts of a changing climate and our host communities are safe.

By 2025

- Climate change considerations will be embedded into established business process to ensure resilience is a priority in the maintenance of our generating fleet and the operations of our business.
- Complete upgrades on the Little Long Generating Station's Adam's Creek spillway improving discharge capacity on the Mattagami River.
- Continue to invest in nuclear asset resiliency through upgrades that support operations such as lake algae bloom mitigation Advanced Algae Warning System, bubble curtains, etc.
- Deploy a new hydro prediction and modelling system to improve water management due to adverse weather events caused by a changing climate.
- Continue to engage in government and inter-sector adaptation teams to increase the resilience of all infrastructure.
- Explore the feasibility of nature-based climate adaptation solutions that use nature to help protect our assets and operations, such as building wetlands to help regulate water flow upstream of hydro dams.
- Add new internal sluice at Ranney Falls to respond to water management issues.

By 2040

OPG is net-zero carbon

- Evaluate full-scale, nature-based solutions to reduce the effects of climate change, where appropriate.
- Implement optimization decisions and support systems to aid in responding to changing climatic conditions.

By 2050

The economy is net-zero carbon

- Address all generating asset-based climate vulnerabilities to ensure the continued production of clean, reliable power.

innovate

We will develop and deploy new technologies to speed up Ontario's energy transformation.

By 2025

- By the end of 2021, identify the SMR technology we wish to deploy in Ontario, which will be the first of its kind for SMR pan-Canadian deployment.
- Aim to have the Ontario SMR project construction at the Darlington site well-underway (given all required licences and approvals are granted), leveraging our world-class workforce and innovative project management and construction processes and technologies to deliver the project on time and on budget.
- Establish the Centre for Canadian Nuclear Sustainability, and innovation hub focused on developing and using innovative technologies and processes for the sustainable decommissioning of nuclear facilities (2020).
- Aggregate thousands of EVs and chargers into a resource pool which provides 10 MW demand response and operating reserve for Ontario to meet changing electricity demand.
- Develop and deploy nature-based solutions that can reduce the environmental footprint of our office buildings.
- Begin feasibility assessments of nature-based solutions as an innovative means for increasing hydro generation.
- Deploy equipment monitoring, reliability and software tools to report on and understand condition of assets to reduce maintenance and better predict remaining life of assets.
- Continue to support the issuance of innovative financial instruments in line with climate change goals, such as Green Bonds.
- Continue to support innovative projects that reimagine the applications of transportation electrification, such as vehicle-to-grid initiatives using EVs and electric school buses.
- Continue to build a portfolio of energy storage facilities at customer sites to reduce the grid need for gas-fired generation at peak times.
- Deploy energy storage to meet future grid capacity and reliability needs.

By 2040

OPG is net-zero carbon

- Deploy new renewable generation to meet future energy needs.
- Increase our aggregate resource pool (DERs, EVs and chargers) to provide 100 MW of demand response and operating reserve.
- Optimize maintenance through the transition to condition-based maintenance, helping to reduce our carbon footprint by minimizing work.
- Use artificial intelligence to operate a fleet of distributed energy resources (e.g. electric vehicles, solar, energy storage, flexible load), creating a Virtual Power Plant.
- Develop and deploy a 100 MW clean hydrogen facility.

By 2050

The economy is net-zero carbon

- Increase our aggregate resource pool (DERs, EVs and chargers) to provide 1,000 MW of demand response and operating reserve.

lead

We will work with others to lead the decarbonization of Ontario's economy, and share our province's lessons with the world.

By 2025

- Continue to be a global leader in SMR development and continue to lead the CEO SMR Forum and the CANDU Owners Group (COG) SMR Technology Forum.
- Lead the implementation of SMR deployment feasibility work coming out of the Premiers' MOU on SMR Collaboration to bring this climate change fighting technology to market.
- Be the first to deploy a very small modular reactor at the Chalk River site as part of Canadian Nuclear Labs' SMR siting program, as a commercial demonstration to support off-grid energy needs (remote communities, mines) reducing dependency on fossil fuels.
- Enhance our leadership position in sustainable nuclear decommissioning by developing the Centre for Canadian Nuclear Sustainability, which will be a world-class centre of excellence that will help manage the full nuclear lifecycle.
- Continue to be a leader in fleet electrification by providing our world-class electrification expertise to help enable the transition of municipal and large corporate fleet vehicles.
- Continue to be a leader in mass transit transportation electrification, by executing projects in the marine transportation sector, as well as eBus transit spaces.
- By 2025, lead the electrification of the trucking sector by developing and deploying critical charging infrastructure.
- Continue to participate in industry leading climate change adaptation research with Ouranos to better inform our business decisions and processes (since 2007).
- Continue to lead energy storage industry development through leadership positions in organizations such as Energy Storage Canada.
- As Canada's largest corporate Green Bond issuer after our 2020 issuance, continue to expand the issuance of Green Bonds to raise awareness and profile of clean energy projects.
- Lead the completion of taxonomy to define the technologies that can advance the transition to a net-zero carbon economy.
- Incorporate environmentally friendly policies, processes and metrics in existing sourcing and procurement practices, partnering with Tier 1 suppliers to develop a mandate of "Carbon Neutral" sub-supplier selection process.

By 2040

OPG is net-zero carbon

- Help Saskatchewan and other jurisdictions with SMR deployment.
- Promote world-wide deployment of SMR technology to help global jurisdictions decarbonize their electricity sectors.
- Be a global leader in economy-scale electrification, bringing our expertise in consumer transport, trucking, fleet and mass transit electrification to other national and global markets.
- Be a market leader with fully established practices and robust processes to select, partner and sustain environmentally conscious supplier relationships.
- Be a leader in nature-based climate solutions in the utility space, using the power of nature to build resilience of our assets and to help mitigate the effects of climate change.

By 2050

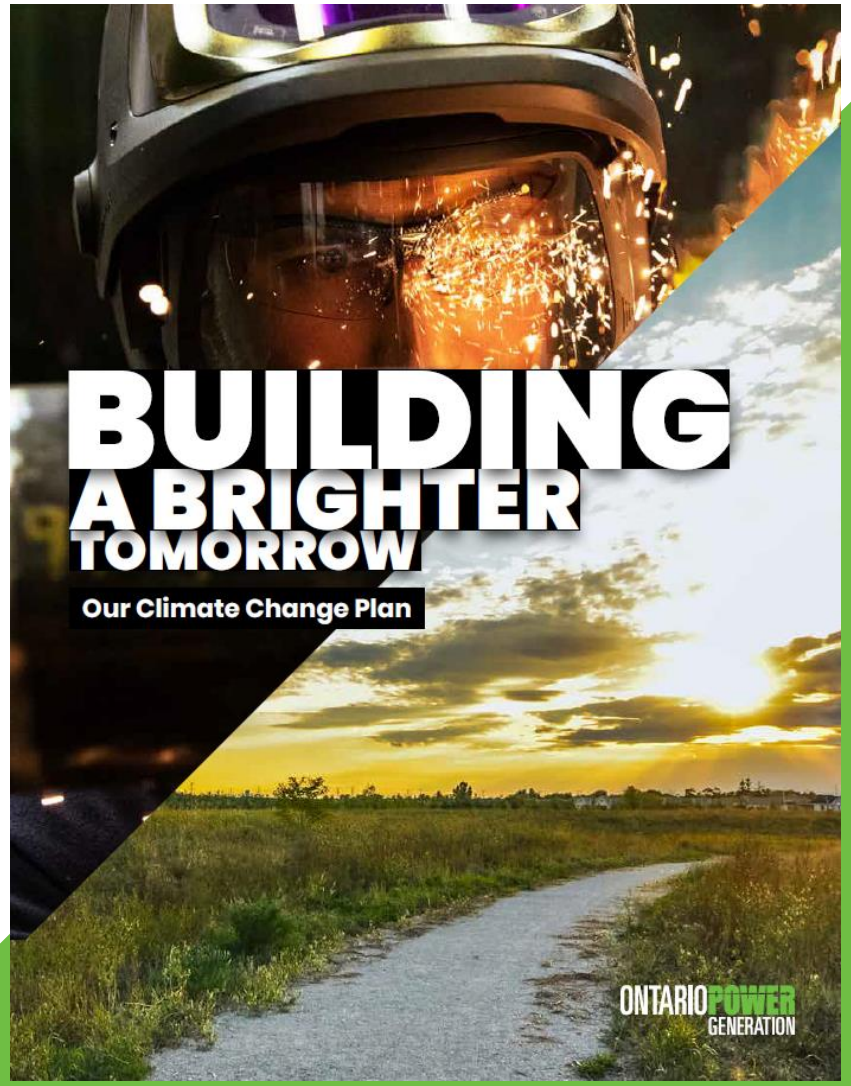
The economy is net-zero carbon

- Share our expertise to help decarbonize local and global economies using SMR and hydro development, electrification infrastructure, and sustainably-focused operational/project excellence.

watch our video

visit opg.com/climatechange

to download and read the full plan.




THANK
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ONTARIO POWER GENERATION
Our Climate Change Plan

ONTARIO POWER GENERATION

Where a brighter tomorrow begins.