

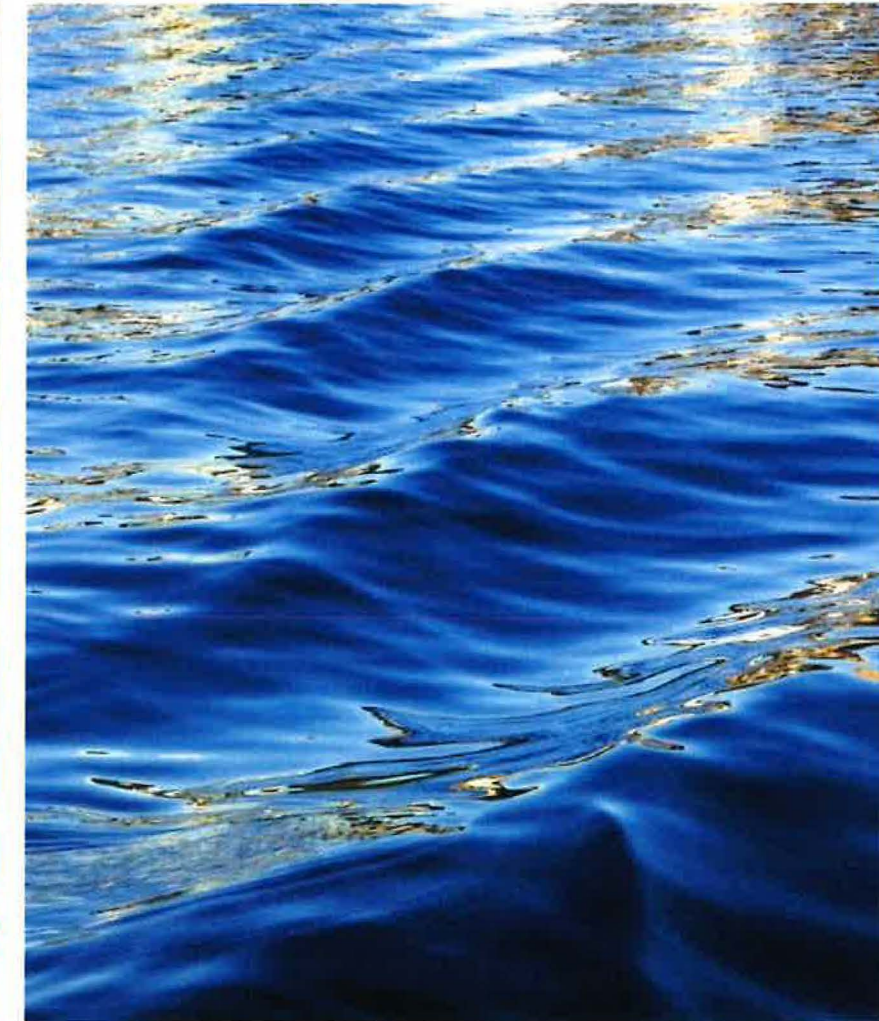
CITY OF CALGARY
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Distrib-Presentation
CITY CLERK'S DEPARTMENT



Funding Calgary's journey to a safe, cool future

The Climate Strategy as map & compass
for the 4-year Budget



Funding Calgary's Climate Journey

- 1. The Calgary Climate Strategy – the road ahead**
- 2. Packing the essentials – what is needed**
- 3. Additional resources**

Presented by:

- David Swann
- Bob Hawkesworth
- Michael Kerfoot
- Larry Mewhort
- Tom Kerwin
- Pierann Moon
- Sandy Aberdeen

Leadership that cares is honest about the road ahead

THANK YOU!!

November 15, 2021 Calgary City Council declared a climate emergency

July 6, 2022 City Council adopted the Calgary Climate Strategy



Calgary Climate Strategy

Pathways to 2050

June 2022

A hotter world is driving more extreme weather

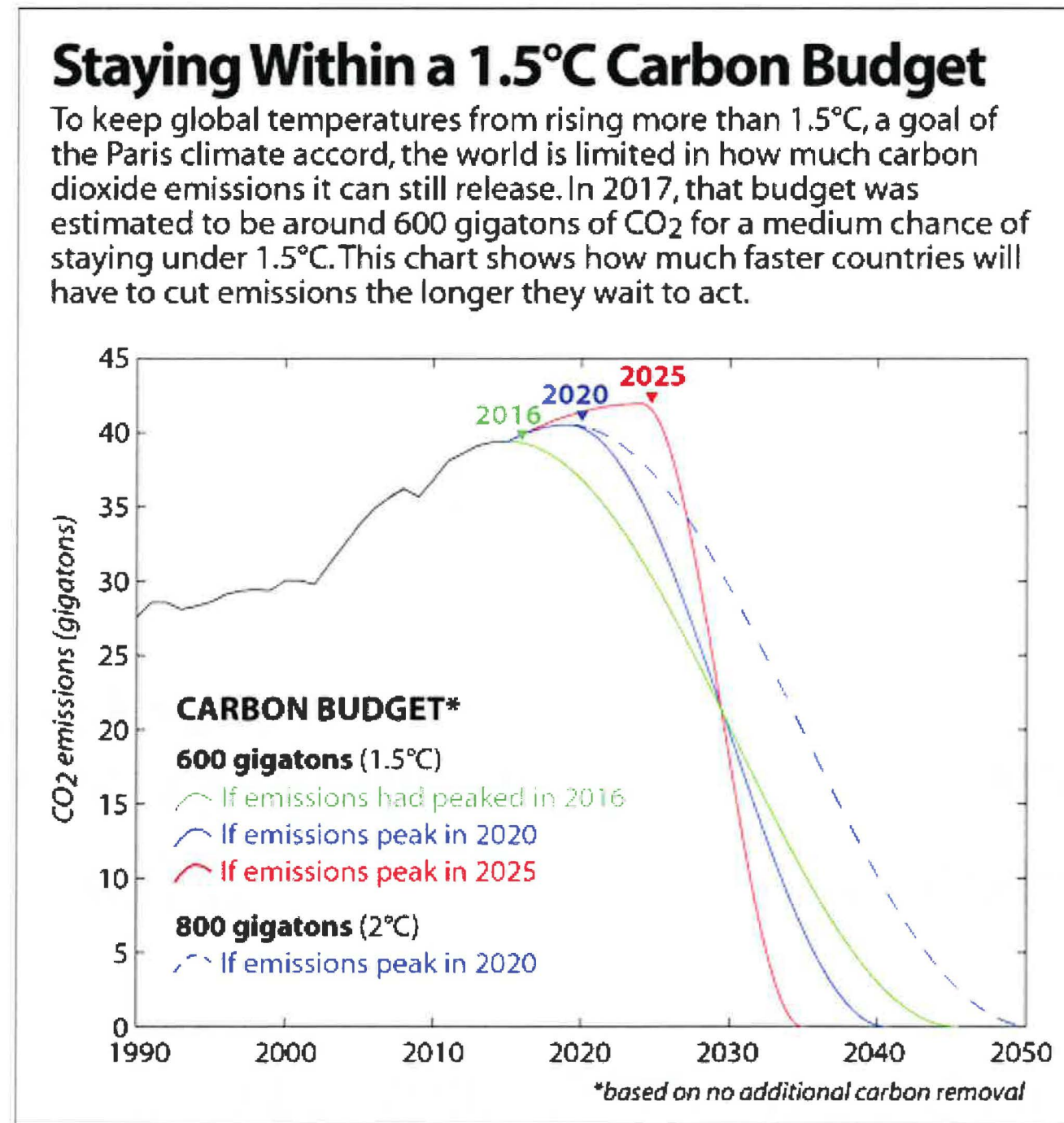
CAPITAL AND WEALTH IS BEING DESTROYED

- Natural Capital
- Physical Capital / Infrastructure
- Financial Capital

- = Environmental services gone
- = Livelihoods lost
- = Insurance costs skyrocket
- = Supply chains disrupted
- = Public risks & high response costs



Time is of the essence. Delay locks in a hot future.



SOURCE: Stefan Rahmstorf, 2017

InsideClimate News

The Calgary Climate Strategy has one destination

Calgary's 2030 Target

60% reduction of city-wide GHG emissions
below 2005 levels by 2030

Calgary's 2050 Target

Net Zero emissions





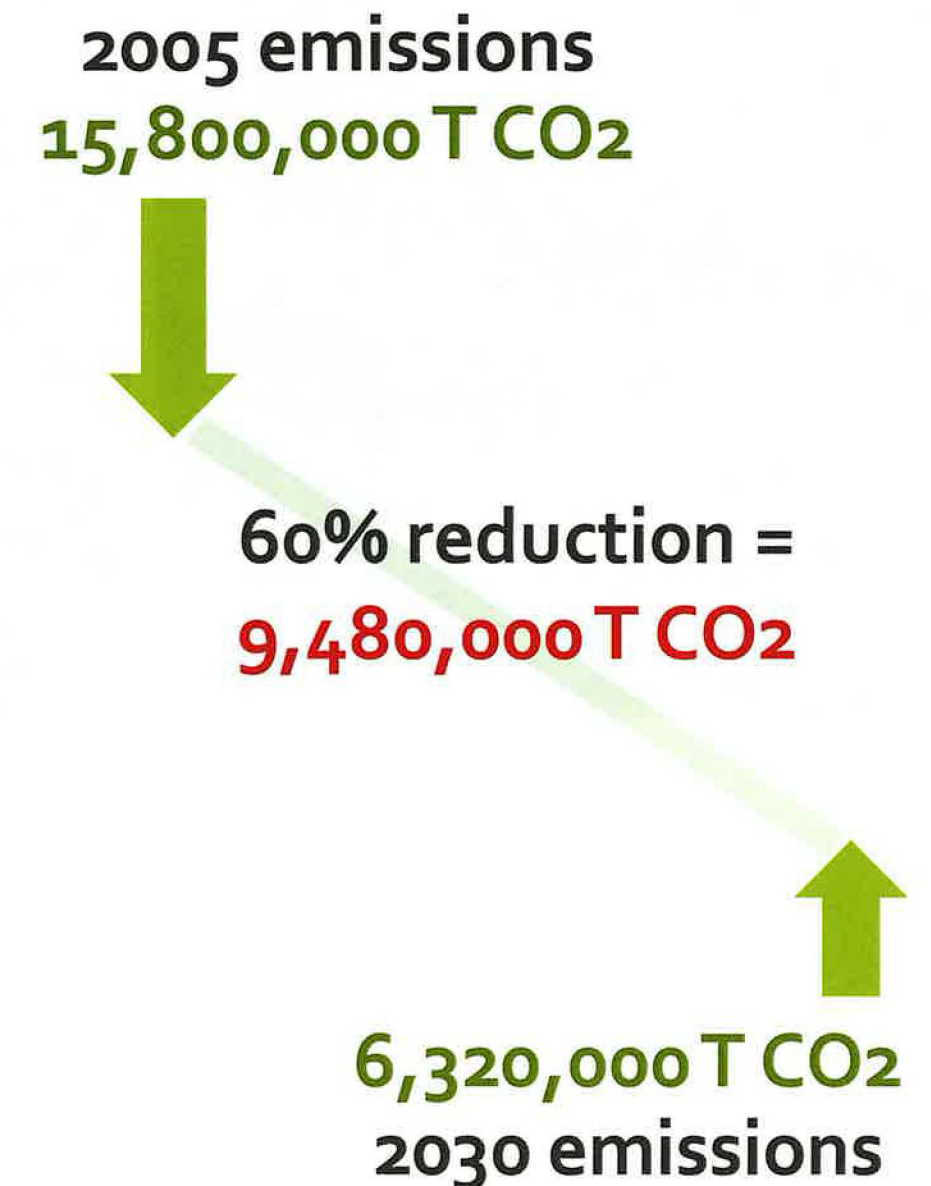
Reducing Calgary's 2005 Emissions 60% by 2030

(Our journey to a safe, cool, affordable future will be harder than anything we've ever done.)



In 2005 city-wide emissions were **15,800,000 T CO₂***

- A 60% reduction of 2005 emissions is **9,480,000 TCO₂***
- 2030 is 7 years away.
- City-wide emissions need to drop **1,350,000 TCO₂** in each of the next 7 years*
- Equivalent of **1 TCO₂** for each Calgarian every year for 7 years
- Equivalent of **2.7 TCO₂** annually for each of **502,000 households***



It costs money to emit CO₂



Volume

Cost*

435 litres of **gasoline** (at \$1.61/litre)

to emit 1 T CO₂ costs **\$700**

370 litres of **diesel** (at \$1.92/litre)

to emit 1 T CO₂ costs **\$710**

17.9 GJ of **natural gas** (at \$6.10/GJ)

to emit 1 T CO₂ costs **\$109**

1961 kWh of **electricity** (at 10¢/kWh)

to emit 1 T CO₂ costs **\$196**

Dropping our emissions will save us money

Fuel	Yearly Emissions Reductions Needed	Fuel Savings/ TCO ₂	Fuel Savings/Year*
Electricity – 37%	500,000 T CO ₂	\$196	\$98,000,000
Natural Gas - 28.2%	380,000 T CO ₂	\$109	\$41,400,000
Gasoline - 20.2%	273,000 T CO ₂	\$700	\$191,100,000
Diesel - 13.5%	182,000 T CO ₂	\$710	\$129,300,000
Totals	1,355,000 T CO₂		\$459,800,000

City Council will drive – or stall – the climate journey

Recommendation: Establish a City Council “2030 Committee”

MANDATE: Council oversight of Climate Strategy implementation

- Urgency required – delay will negate good intentions
- Implement a “City-wide & city-wide” carbon budget and accounting framework
- Improve annual GHG emissions tracking and reporting
- Locate City sustainability and climate accountability in City Manager’s Office



5 Essentials for Calgary's climate journey

- 1. Clean Alberta's electricity grid**
- 2. Transition to Zero Carbon Energy**
- 3. Build only "Net Zero"**
- 4. Develop Zero Carbon Neighbourhoods**
- 5. Remove Carbon Emissions**

Essential #1: Clean Alberta's electricity grid

Mobilize ENMAX to generate clean power

ENMAX facilities emit $\approx 20\%$ of Calgary's *total* CO₂ emissions

Recommendation:

- Put CO₂ emissions reductions into Unanimous Shareholder Agreement
- City Councillors return to ENMAX Board
- Criteria for Director appointment – proven leadership developing successful low carbon businesses
- Joint City/ENMAX task group to expedite micro-generation, renewable energy permitting



Essential #2: Transition to Zero Carbon Energy

Mobilize Calgarians to invest in rooftop solar energy

Solar on 15% of Calgary's 502,000 dwelling units = 75,000 rooftops

Solar on 15% of residential demand = 45,000 rooftops

6500 - 10,000+ installed solar sites/year by 2030

[AESO: confirms 9300 solar sites in Alberta as of August 2022](#)

Recommendations:

- Make installing on-site solar as easy as buying an appliance
- Streamline ENMAX permitting process



2030 Climate Strategy Measure	Baseline	Co-Benefits
15% of residential electricity demand is offset by rooftop solar installations.	"Residential demand" 2019 baseline ~ 3000 GWh* 15% = 450 GWh or Assume 15% of 500,000 dwelling units	<ul style="list-style-type: none"> ✓ 45,000 solar roofs (<u>7.74kW provides</u> ≈ 10,000 kWh/yr) ✓ 75,000 solar rooftops ✓ \$1000/year/home in savings ✓ Up to \$75,000,000/year savings city-wide ✓ Calgarians can choose to be power producers

Essential #2: Transition to Zero Carbon Energy

Mobilize City and community investments in zero carbon energy

Recommendations:

- Invest in community solar gardens; solar parking lot canopies
- Grow biofuel crops on land that would not otherwise generate tax revenue
- Solar, geo-exchange and district heating for City owned and sub-leased buildings
- Add 102.5 MW solar capacity every year



2030 Climate Strategy Measure

Baseline

Co-Benefits

10% of total electricity used in Calgary is generated within city boundaries from renewable sources

“Total electricity used” in 2019 = ~9270 GWh* ✓
 10% ≈ 927 GWh demand ✓
 717.5 MW solar capacity ✓

Land lease revenues for City of Calgary
Reduce City energy costs
Reduce Civic Partners' costs

Essential #3: Build only “Net Zero”

Mobilize City capital budget to only fund net zero projects

Recommendation:

City Green Building Policy: any project receiving City resources, must meet a net zero emissions energy performance standard

Record, monitor and report net zero building approvals and building permits.



Mohawk College Net Zero Building

2030 Climate Strategy Measure

All new buildings are built to a net zero standard.

Baseline

City does not monitor and report net zero building permits.

Co-Benefits

Net zero = net cost. Lower utility bills offset any higher mortgage costs
Better construction = less rework to fix deficiencies
Any building built today to less than a net zero emissions standard will need to be retrofitted before 2050 for Calgary to meet the 2050 net zero emissions target

Essential #3: Build only “Net Zero”

Mobilize City’s supply chain to reduce emissions

City of Calgary builds homes *and* infrastructure

Purchased materials embody CO₂ emissions: steel, cement, etc.



Recommendation:

- Require project bidders to disclose embodied emissions
- Give advantage to bids with sequestered/low carbon, recycled materials
- Rate bids: Lowest GHGs 12 pts; second lowest 6 pts; third 3 pts.
- Award contracts to lowest bids, including a criterion for embodied emissions
- City is a “venture customer” assisting low carbon market suppliers to emerge



2030 Climate Strategy Measure

New buildings contain 40% less embodied emissions from construction

Baseline

**“Embodied construction emissions”
baseline not provided**

Co-Benefits

- ✓ Reduces emissions throughout the supply chain
- ✓ City leads by example

Essential #3: Build only “Net Zero”

Mobilize owners to retrofit existing buildings

Emissions reductions needed from existing buildings: 877,000 TCO₂/yr
 By 2026, emissions reductions needed of 3,500,000 TCO₂/yr

Recommendation:

- Facilitate net zero retrofit of 15,000 – 19,000 homes/year
- Facilitate deep retrofit of 2200 non-residential structures by 2030
- City’s Clean Energy Incentive Program (CEIP) criteria: give priority to net zero retrofits; affordable/social housing units; non-redevelopment areas



2030 Climate Strategy Measure

Baseline

Co-Benefits

Achieve an annual conversion rate to net zero emission homes of 3% or 19,000 dwellings.

105,000 homes retro-fitted to net zero by 2030 (7 X .03 X 502,000); *or*
 133,000 homes (7X 19,000)

- ✓ Reduced utility costs
- ✓ No need to retrofit for 2050
- ✓ 2026 natural gas savings (987,000 TCO₂) est. \$107M
- ✓ 2026 electricity savings est. \$252M

Achieve an annual deep retrofit rate in the commercial and industrial sector of 5% or 317 structures.

Climate Strategy defines “Deep retrofit”: minimum 40% improvement in building energy performance. (*not* net-zero!)

Essential #3: Build only “Net Zero”

Mobilize City planners to expedite “net zero carbon” reviews

City of Calgary building and development regulations must scale and be fit for purpose

Build only net zero projects by 2030


Need to retrofit up to 133,000 homes; 2200 commercial and industrial structures

In 2023, unplug any bottleneck for net zero approvals

3 – 4 years to start building “net zero” will defeat the Climate Strategy

Recommendation:

- In 2023 amend permitting processes to expedite and prioritize reviews of net zero building and development applications

Calgary 

PROPOSED DEVELOPMENT

Tell Us What You Think

Submit comments to The City by December 22, 2017 at calgary.ca/development and refer to DP201x XXXX. When submitting comments please include your full name, address and the reasons for your position.

This application requests approval of a development permit at multiple properties (see map) for:

- A townhouse building;
- A maximum of 4 units;
- A maximum building height of 11 metres (about 3 storeys);
- The current Land Use allows for the type of development proposed.
- This application is subject to the Land Use Bylaw.

calgary.ca/development

Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgarians to adopt electric vehicles

Calgarians annually emit 5,372,000 TCO₂ from burning gasoline & diesel

Recommendation:

- In 2023, require all new homes to be built to EV-ready standard
- In 2023, require 10% of all non-residential buildings to be built to an EV-ready standard
- Taxi licensing to expedite adoption of zero emission vehicles



2030 Climate Strategy Measure

100% of new residential homes are built to an EV-ready standard;
 10% EV-ready requirement for new commercial construction, with 90% conduit/partial readiness
 100% of all new licensed taxi vehicles are zero-emissions vehicles.

Baseline

0.2% of emissions come from electricity for transportation

No baseline taxi licensing data provided

Co-Benefits

- ✓ Converting 100,000 gas to EVs would reduce **311,000 TCO₂** /year but increase emissions from electricity
- ✓ **Electric vehicles save \$1500 - \$2200/year to own and operate**

Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgary Transit to annually carry 140,000,000 riders

- Annual city-wide gasoline emissions reductions needed: **273,000 TCO₂**
- **332** transit trips avoid **1 T CO₂** in vehicle emissions*
- Calgary Transit carried **51M** riders in 2020*
- **90M** additional Calgary Transit riders would avoid **273,000 TCO₂** gasoline emissions
- **51M** Transit riders avoided **\$107,800,000 (2022e)** in gasoline costs
- **140M** Transit riders would avoid **≈\$294,000,000** in gasoline costs
- Calgary Transit related emissions not identified



2030 Climate Strategy Measure

40% of all trips are taken by walking, wheeling or transit.

45% of people live within 400 metres (m) of the primary transit network.

Baseline

% of all 2022 trips taken by sustainable transportation not provided*

% of people within 400 (m) of primary transit network in 2022 not provided*

Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgary Transit to annually carry 140,000,000 riders

Recommendation:

- Entice back Transit riders to make life more affordable
- Reduce fares & increase service frequency starting in 2023
- By 2030, expand the Primary Transit network (PTN) to bring it within 400 meters for 45% of all Calgarians
- Expedite transit-oriented development around transit stations to bring 45% of Calgarians within 400 meters of the PTN by 2030



2030 Climate Strategy Measure

40% of all trips are taken by walking, wheeling or transit.

45% of people live within 400 metres (m) of the primary transit network.

Baseline

% of all 2022 trips taken by sustainable transportation not provided*

% of people within 400 (m) of primary transit network in 2022 not provided*

Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgarians to walk and wheel

Recommendation:

- Complete “Always Available for All Ages & Abilities” (5A) pathway Network by 2030



2030 Climate Strategy Measure

40% of all trips are taken by walking, wheeling or transit

Baseline

% of all 2022 trips taken by sustainable transportation not provided*

Co-benefits

- ✓ Active transportation saves gasoline costs; reduces pollution
- ✓ Easiest Tonne of CO₂ to mitigate is the one not emitted

Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize developers to build only net zero communities

Calgary has to accommodate growth.
Absolute city-wide CO₂ emissions have to drop.
New suburbs must offer real net zero carbon choices.

Recommendation:

All new communities built in Calgary, will meet a net zero community standard by comprehensively implementing the measures in the Calgary Climate Strategy as design criteria.

(a list of design criteria is provided in the Appendix)



2030 Climate Strategy Measure

All new communities are built to a net zero community standard.

Baseline

of new communities being planned to net zero standard not provided

Co-Benefits

✓ Calgarians get a real choice to live an affordable zero-carbon lifestyle

Essential #5: Remove Carbon Emissions

Build Calgary's natural capital

Recommendation:

- Restore 20% of Calgary's open space to increase biodiversity by 2025
- Achieve 10% urban tree canopy coverage by 2030
- Prevent loss of Calgary's wetlands, floodways and floodplains
- Purchase and conserve key natural areas and wildlife corridors
- Protect Calgary's upstream watershed and potable water sources



2030 Climate Strategy Measures

- Restore 20% of Calgary's open space (in 2015) to increase biodiversity by 2025.
- Achieve 10% urban tree canopy coverage by 2030.
- Increase the habitat condition rating category for 20% of priority 1 and 2 natural environment parks to performing to their full ecological potential by 2035.

Baseline

Natural assets within The City of Calgary have a replacement cost of \$6.9 billion
Current investment in open space restoration*
Current tree canopy coverage*
Cost savings of avoided wastewater treatment not quantified

Co-Benefits

- ✓ Natural infrastructure has service value ≈ \$2.5 billion/year
- ✓ Clean drinking water
- ✓ Natural infrastructure can avoid costs of mechanical wastewater treatment
- ✓ Calgarians LOVE their parks and open spaces

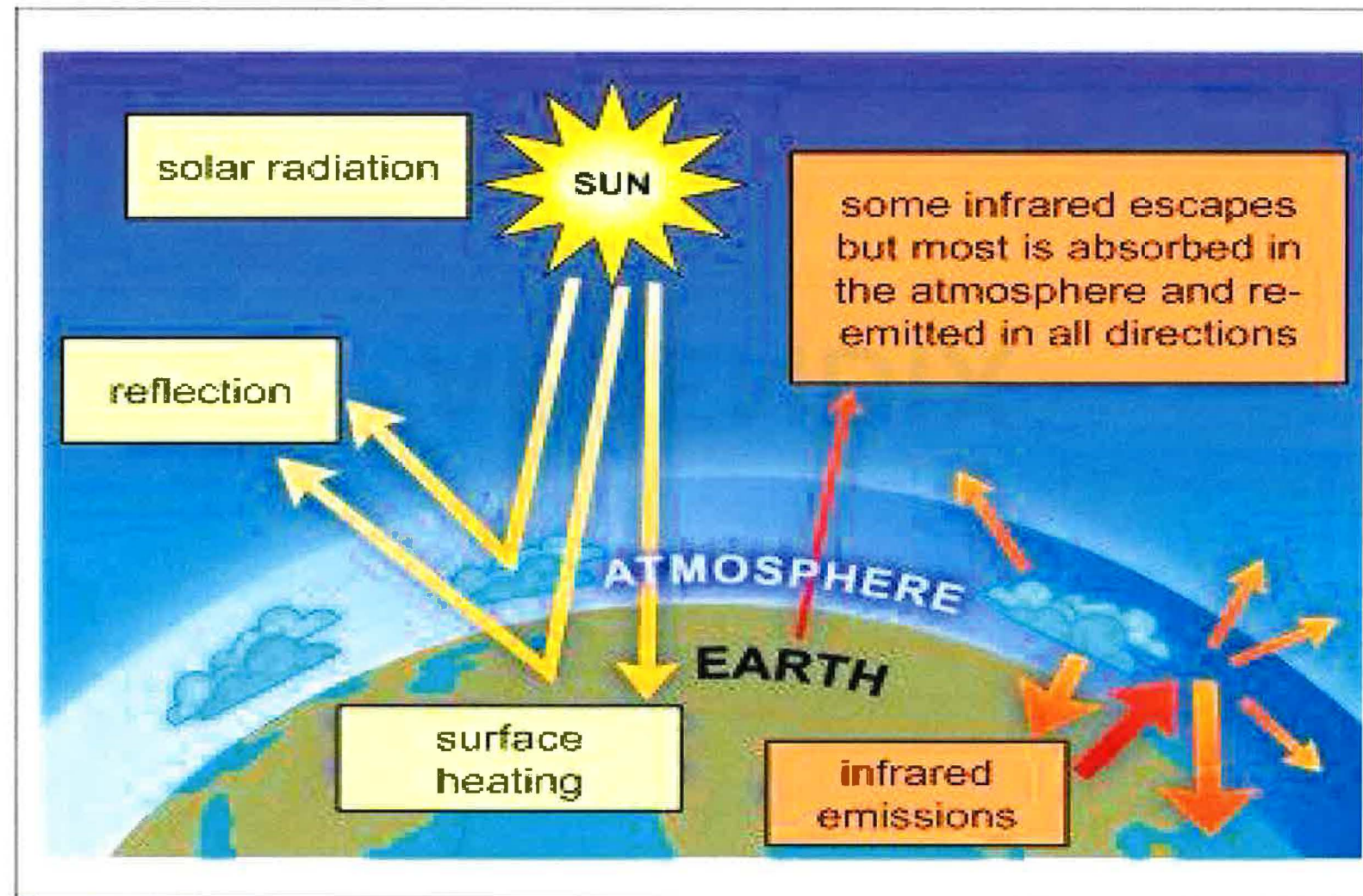
To arrive at 9,500,000 fewer TCO₂/yr by 2030, Council must mobilize:

- **Cross-department & cross-sector action, using CO₂ reductions to guide decisions**
- **Enmax to provide 100% clean energy**
- **Calgarians' investment in zero carbon power**
- **Owners to construct only net zero buildings**
- **Owners to retrofit 135,000 existing homes and buildings**
- **The City's supply chain to reduce embodied emissions**
- **Planners to expedite net zero planning reviews**
- **EV charging infrastructure in all new buildings**
- **Calgary Transit to annually carry a minimum 140,000,000 riders**
- **Primary Transit Network expansion to within 400 metres of ≥800,000 Calgarians**
- **Completion of the 5A Network**
- **Calgary Parks to build up Calgary's natural capital**

The journey of seven years starts with a single Budget week

APPENDIX

How atmospheric CO₂ warms our planet

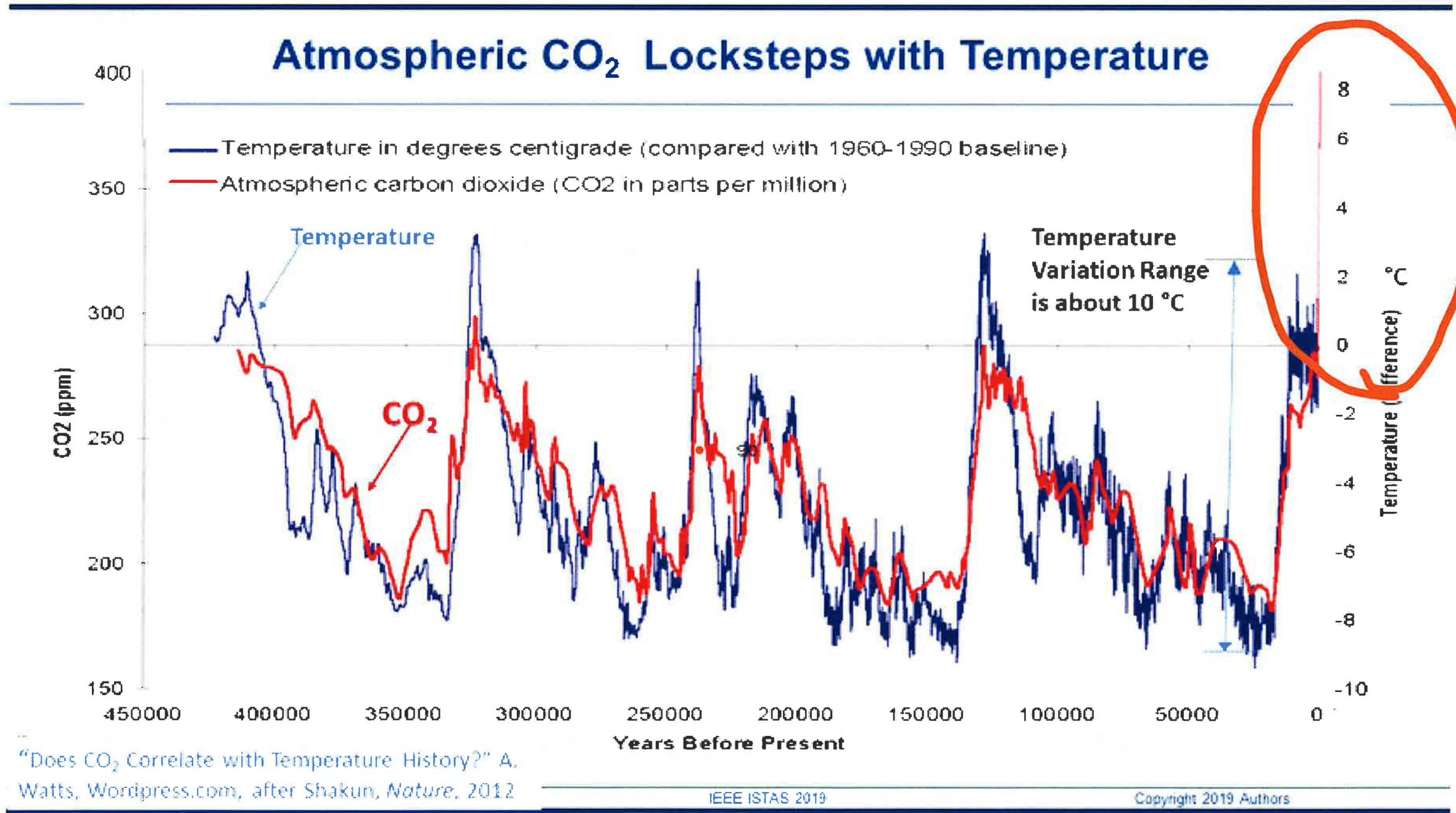


An idealised model of the natural greenhouse effect (IPCC Fourth Assessment Report, 2007)

Earth absorbs visible sunlight and radiates it as infrared (heat) energy. "Greenhouse" gases absorb that energy as it leaves Earth. When humans produce more greenhouse gases, energy leaves Earth more slowly - raising Earth's temperature.

CO₂ is a by-product of burning fuel for energy

THE WORLD IS RIDING A ROCKET



A safe destination requires CO₂ emissions to drop

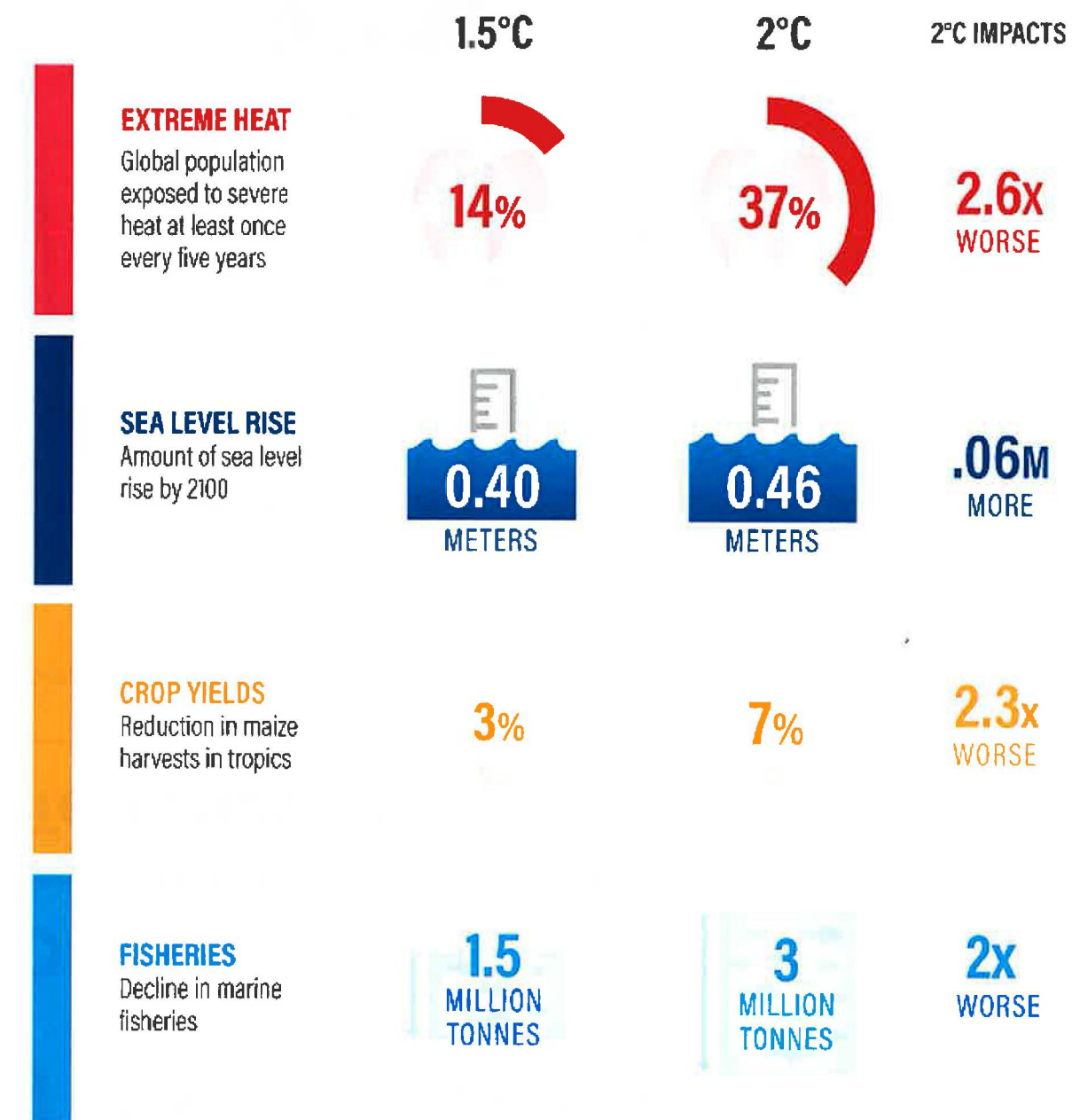
The global challenge:

Limit global average temperature rise to 1.5°C above pre-industrial levels;

→ Reduce CO₂ emissions from energy use

- Intergovernmental Panel on Climate Change (IPCC) expresses international government & science consensus: <https://www.ipcc.ch/sr15/chapter/spm/>
- Paris Climate Accord
- Government of Canada
- City of Calgary Climate Strategy

Half a Degree of Warming Makes a Big Difference



Source: IPCC, 2018.

WORLD RESOURCES INSTITUTE

Extreme weather is reducing food production

Lower yields are pushing up food prices

Hurricane Ian – devastated Florida
ORANGE crop. Lowest harvest since
1943

California Drought – **RICE** crop cut in half
\$1.3B economic loss.

California Drought – **TOMATOES** dried
on the vine. 2022 & 2023 highest ever
contract prices

Global heat waves & extreme storms –
US **WHEAT** harvest down 25%.

North American Drought Monitor

September 30, 2022
(Released Friday, Oct. 14, 2022)

Analysts:

Canada:

Trevor Hadwen
Alyssa Klein

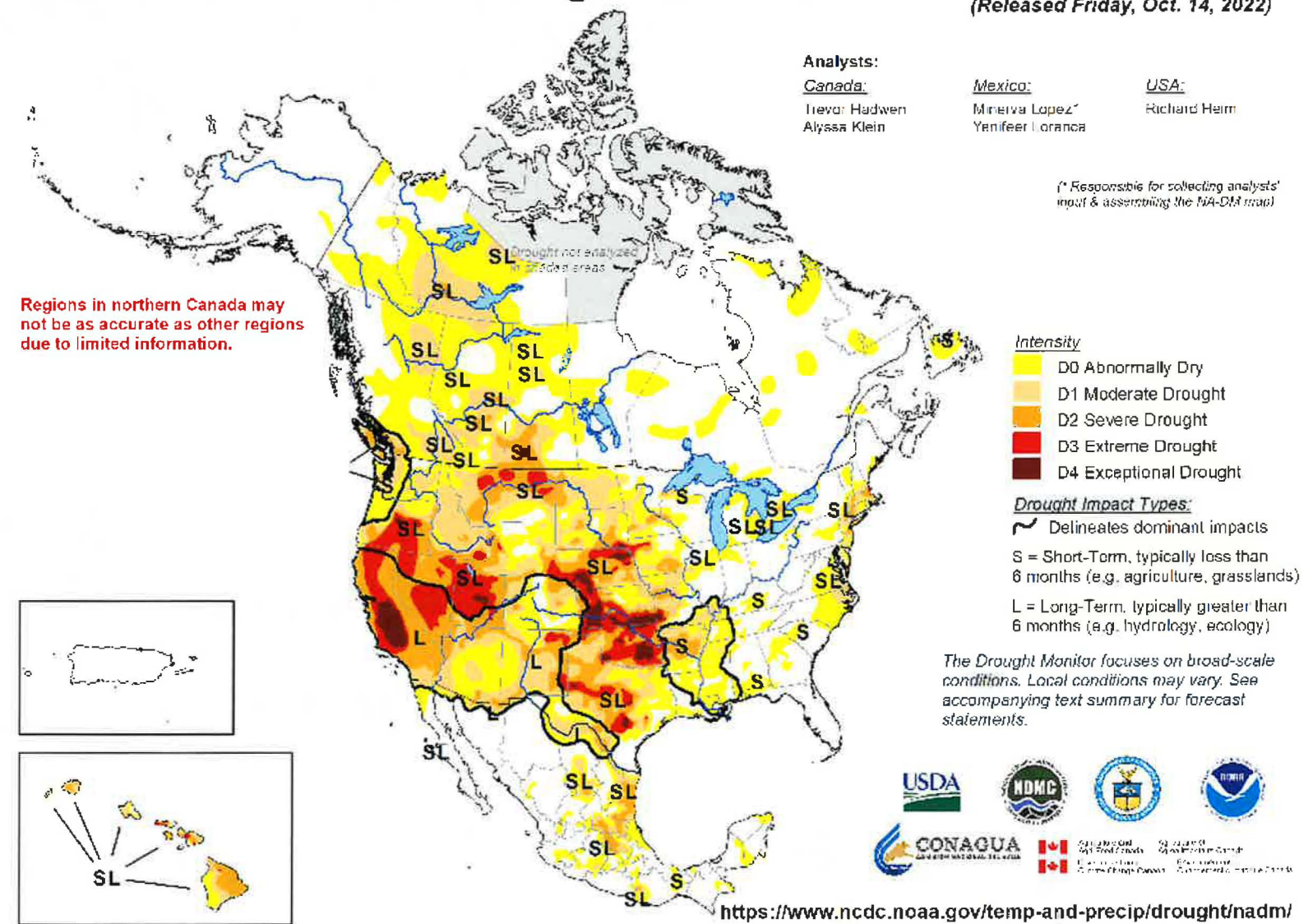
Mexico:

Mireiva Lopez
Yenifer Lloranca

USA:

Richard Heim

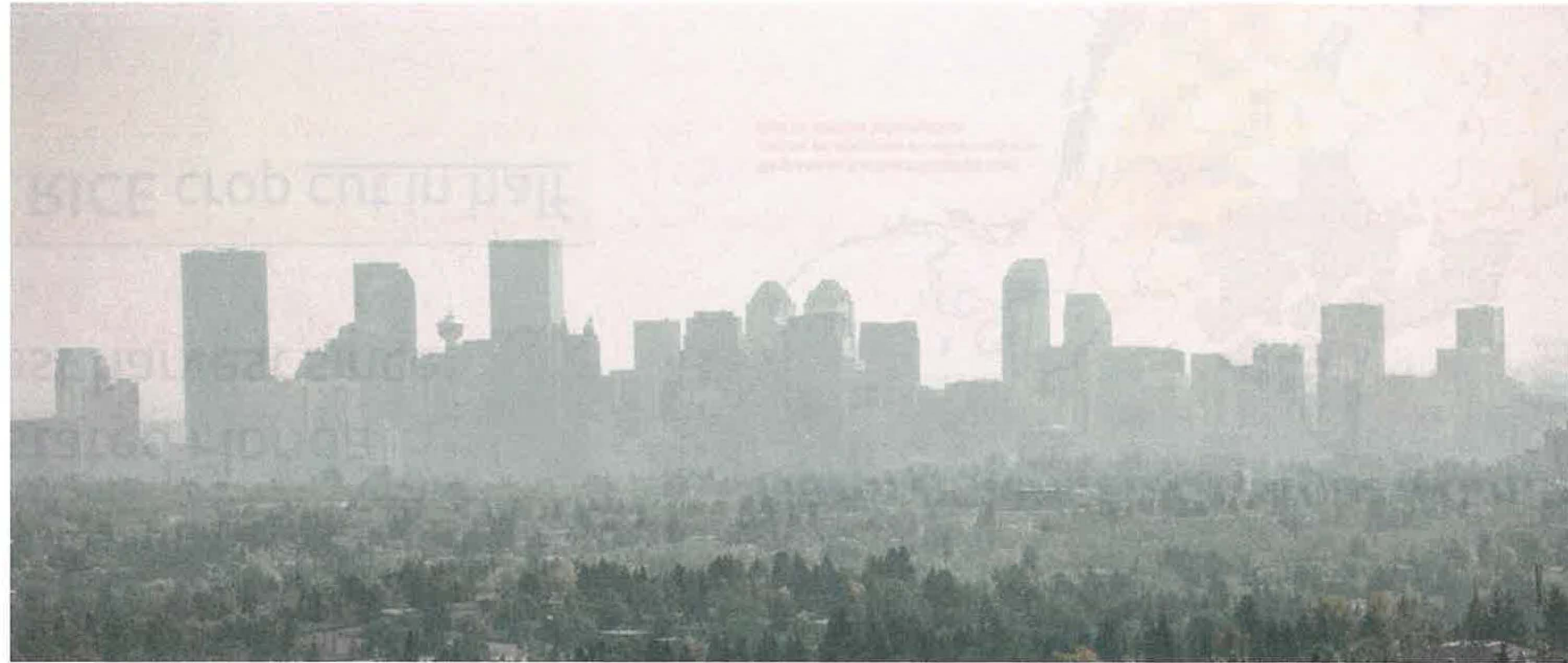
(* Responsible for collecting analysts' input & assembling the NA-DM map)



Calgary's climate challenge is the planet's climate challenge

CALGARY CLIMATE STRATEGY VISION

"Calgary recognizes the climate emergency and does its part to limit global warming to 1.5° C"



Every city, town, country; every government in the world is confronted by climate warming.

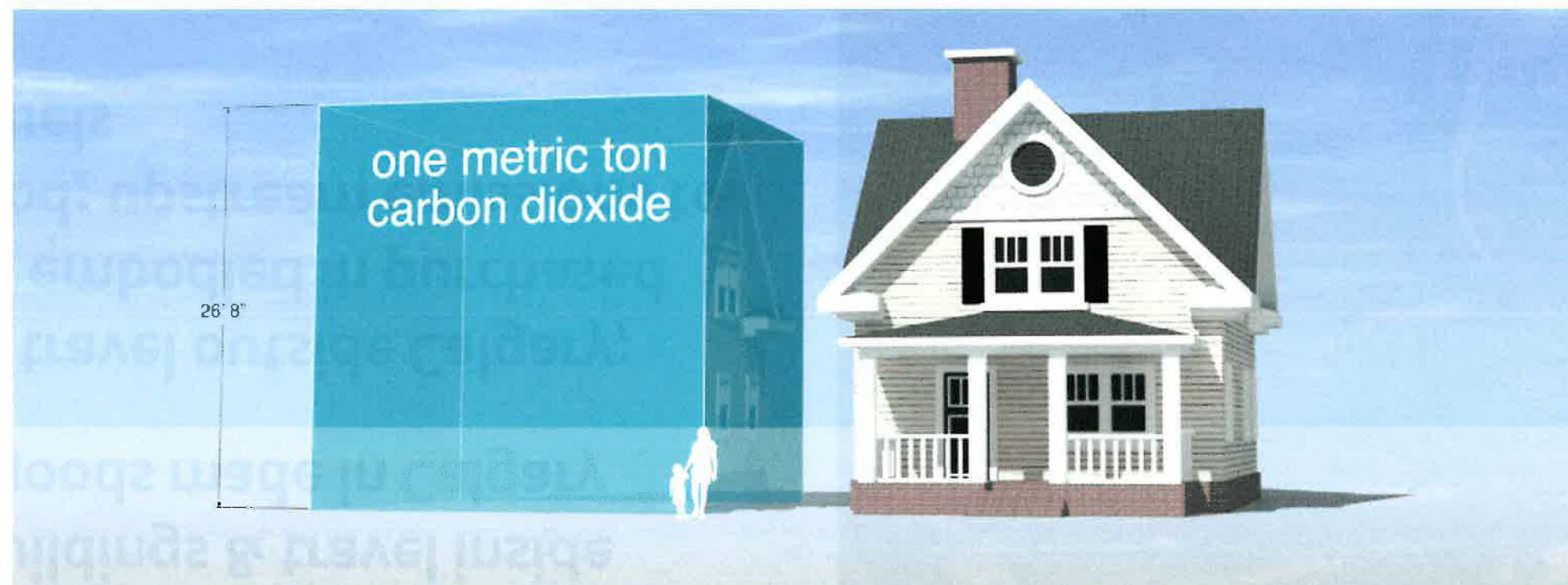
Every place has to do what Calgary has set out to do.

Calgary's city-wide 2005 emissions were 15,800,000 T CO₂ *

- Includes: energy purchased for homes, offices, buildings & travel inside Calgary; goods made in Calgary
- Excludes: travel outside Calgary; emissions embodied in purchased goods; food; upstream emissions to produce fuels



How much fuel emits 1 Tonne of CO₂ emissions?*



Energy Volumes

435 litres of gasoline driving the car emits **1 T CO₂**

370 litres of diesel driving the truck emits **1 T CO₂**

17.9 GJ of natural gas heating the home emits **1 T CO₂**

1961 kWh of electricity lighting and cooking emits **1 T CO₂**



Reducing city-wide emissions by sector

End Use	Annual Reductions Needed
Transportation - 34%	459,000 T CO ₂
Residential Buildings - 32%	432,000 T CO ₂
Non-residential Buildings - 25%	337,500 T CO ₂
Industrial Buildings - 8%	108,000 T CO ₂
Waste - 1%	13,500 T CO ₂

Essential #1: Clean Alberta's electricity grid

Mobilize ENMAX to reduce its emissions

- City of Calgary owns ENMAX – big advantage
- City Council directed ENMAX: “align with Canada’s proposed Clean Electricity Standard for 2035”
- In 2020:
 - Shepard Energy Centre emitted **2,394,000 tCO₂e***
 - Calgary Energy Centre emitted **770,600 tCO₂e***
 - Cavalier Energy Centre emitted **182,400 tCO₂e***

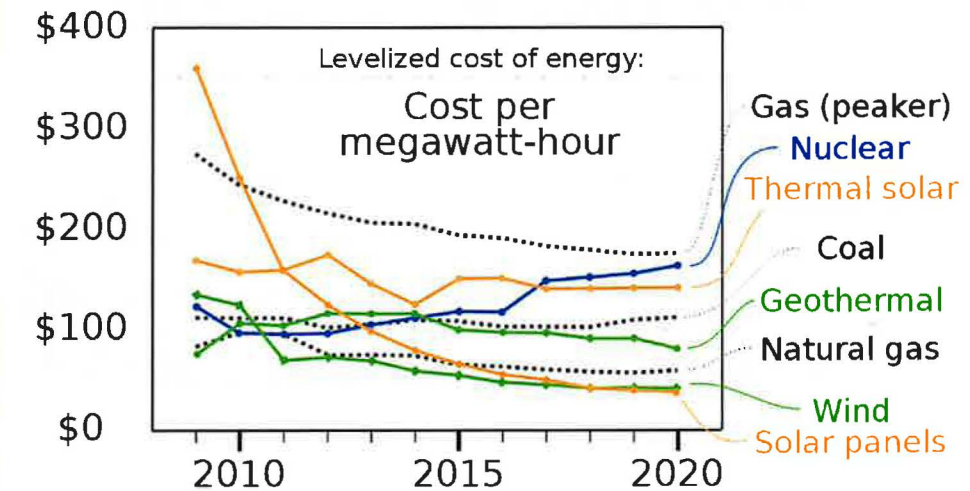


City-wide electricity emissions = 37% of total.
2023 electricity reductions needed of 500,000 T CO₂.
By 2026, emissions reductions of 2,000,000 T CO₂/yr.

Essential #1: Clean Alberta's electricity grid

Mobilize ENMAX to reduce its emissions

Program Pathway	Possible Enmax Reduction Options	Co-Benefits
Council Direction to Enmax: "Clean Power by 2035"	Carbon Capture & Storage of 90% emissions would reduce 3,000,000 TCO ₂ /yr*	<ul style="list-style-type: none"> ✓ Lays the foundation for carbon removal
	Install Renewable Generation to offset natural gas emissions*	<ul style="list-style-type: none"> ✓ Lowest cost power production
	Capture wasted thermal heat for District Energy Industrial park*	<ul style="list-style-type: none"> ✓ Builds out Shepard Research Park
	Capture wasted thermal heat and CO ₂ for District Energy Greenhouse Park*	<ul style="list-style-type: none"> ✓ Greater food security ✓ Grows Alberta agriculture sector ✓ Reduces food import emissions ✓ Offsets greenhouse grower emissions



Essential #1: Clean Alberta's electricity grid

Program Pathway	2030 Measure	Baseline	Co-Benefits
Provincial energy supply	<p>100% coal-generated electricity retired by 2024</p> <p>The Alberta grid emissions factor is less than 0.3 tCO₂/(MWh)</p>	<p>Annual city-wide electricity reductions needed: 500,000 T CO₂*</p> <p>Genesee 1, 2, and 3 set to convert to natural gas by the end of 2023*</p> <p>2022 grid emissions factor is .509 tCO₂/(MWh) *</p>	<p>✓ \$40,000,000 carbon cost savings (500,000 T CO₂ @ \$80/T CO₂ in 2024)*</p> <p>✓ Mobilize Alberta government to accelerate transition</p>



Essential #2: Build only “Net Zero”

Program Pathway	2030 Measure	Baseline	Co-Benefits
New Buildings	All new buildings are built to a net zero standard.	City does not monitor and report net zero building permits.	<ul style="list-style-type: none"> ✓ Reduced utility costs ✓ No need to retrofit for 2050
	New buildings contain 40% less embodied emissions from construction.	“Embodied construction emissions” baseline not provided	<ul style="list-style-type: none"> ✓ Will reduce emissions throughout the supply chain ✓ City leads by example
Existing Buildings	Achieve an annual conversion rate to net zero emission homes of 3% or 19,000 dwellings.	Assume <u>502,000</u> dwellings in Calgary	<ul style="list-style-type: none"> ✓ 133,000 homes retro-fitted to net zero by 2030 (7 X 19,000) ✓ City’s Clean Energy Incentive Program (CEIP) needs criteria: e.g. priority to net zero retrofits; affordable housing units; non-redevelopment areas
	Achieve an annual deep retrofit rate in the commercial and industrial sector of 5% or 317 structures.	Strategy defines “Deep retrofit”: minimum 40% improvement in building energy performance. That’s <i>not</i> net-zero!	
Energy Poverty	The number of Calgary households experiencing energy poverty is reduced by half (to 32,000 households).	64,000 households spend ≥6% of after-tax income on energy bills	

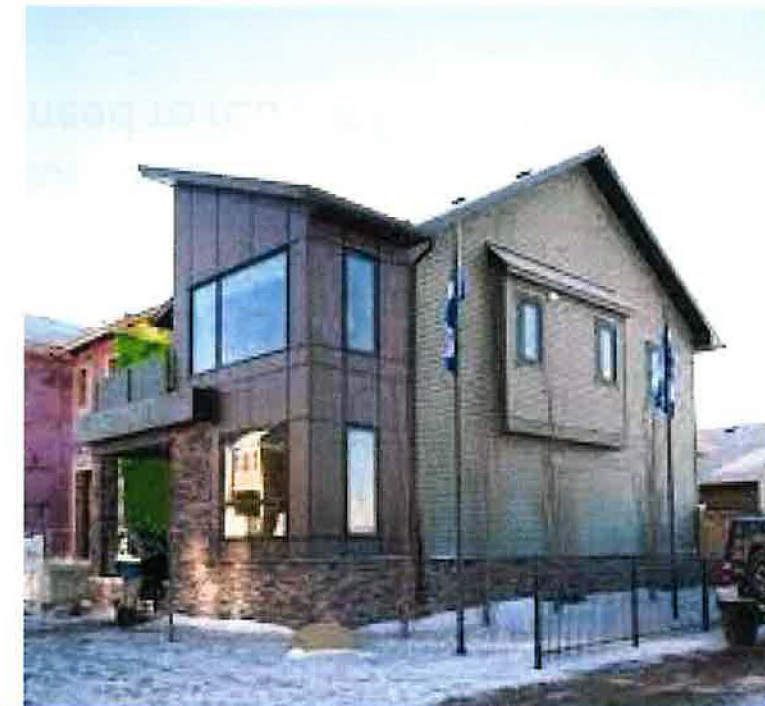
Essential #2: Build only “Net Zero”

Mobilize builders, home owners & planners

- Buildings emit 10,500,000 T CO₂/yr (≈2/3 of 15,800,000 T CO₂)
- Total emission reductions required as Calgary grows
- Emissions reductions needed from buildings: **877,000 TCO₂/yr**
- Reductions needed from Calgary’s **502,000** homes **.86 TCO₂/year**
- Net zero = net cost. Lower utility bills offset higher net zero building mortgage costs
- Better construction = less rework to fix deficiencies
- Any building built today to less than a net zero emissions standard will need to be retrofitted before 2050 for Calgary to meet the 2050 net zero emissions target
- *15,000 new homes built in **2021****
- *\$2 billion non-residential construction permits in **2021****



Mohawk College Net Zero Building



Essential #2: Build only “Net Zero”

Mobilize City capital budget and purchasing

- City of Calgary capital builds homes *and* infrastructure
- Materials embody CO₂ emissions: steel, cement, etc.
- Require project bidders to disclose embodied emissions
- Give advantage to bids with sequestered/low carbon, recycled materials
- Rate bids: Lowest GHGs 12 pts; second lowest 6 pts; third 3 pts.
- Award contracts to lowest bids, including a criterion for embodied emissions
- City becomes a “venture customer” assisting in the emergence of low carbon market suppliers



Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgarians to buy electric vehicles

Annual transportation emissions reductions needed: 459,000 T CO₂

Canada's average vehicle fuel efficiency rated 8.9 litres/100 km *

An average Calgary vehicle travels 4888 km to emit 1 T CO₂ *

Average distance 15,200 km travelled emits **3.11 T CO₂** *

Average distance 15,200 km/year = \$2200 in gasoline costs*

Electric vehicles save owners **\$11,000 - \$17,000** compared to gasoline vehicles*

459,000 TCO₂ emissions reduction/yr from transportation

1,006,000 vehicles registered in Calgary in 2021 *

The full cost of an EV and an equivalent gas car



Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize Calgary Transit to carry 140M riders yearly by 2024

Annual city-wide gasoline emissions reductions needed: **273,000 TCO₂**

Average Calgary Transit trip **14.7 km** *

332 transit trips displace 1 T CO₂ in vehicle emissions*

51.1M trips provided by Calgary Transit in 2020 *

51.1M trips avoided 154,000 T CO₂ of emissions*

Calgary Transit ridership in 2018 was 104M

- 102.2M Calgary Transit trips in 2023 would still leave 119,000 T CO₂ gasoline emissions-reduction shortfall*
- 39M additional Calgary Transit trips would avoid 119,000 TCO₂ gasoline emissions-reduction shortfall
- **51.1M Transit riders avoid \$107,800,000 in gasoline costs. 102M riders avoid ≈ \$215M**
- **140M Transit riders would avoid ≈ \$294,000,000 in gasoline costs**



Essential #4: Develop Zero Carbon Neighbourhoods

Mobilize developers to build only net zero communities

Design criteria for all new communities, using the Calgary Climate Strategy:

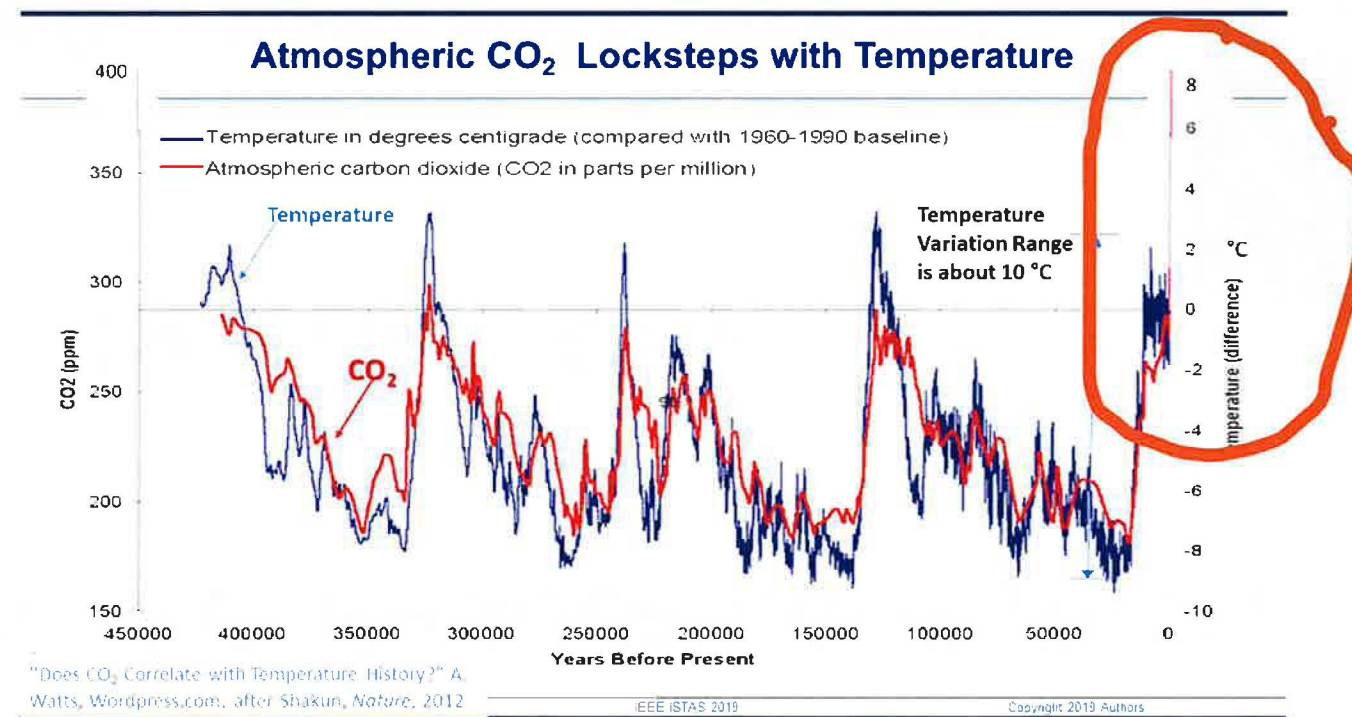
- 100% of residents living within 400 m of the Primary Transit Network
- 100% of residents living within 200 m of the 5A Network (to easily enable wheeling & walking)
- 100% of residents living in net zero homes
- No buildings are connected to a natural gas supply
- All energy services are electrical – supplied from a clean Alberta grid. Any grid electrical emissions are offset by on-site, zero carbon energy such as solar, geo exchange, district energy
- 100% of residents within easy wheeling or walking access to community commercial and retail services
- 100% of residents with home electrical vehicle charging facilities
- 10% urban tree canopy coverage
- Sufficient natural capital, such as wetlands, tree canopy, and open spaces, to sequester remaining community-wide emissions and/or to support carbon negative technologies

2030 Climate Strategy Measure	Baseline	Co-Benefits
All new communities are built to a net zero community standard.	# of new communities being planned to net zero standard not provided	✓ Calgarians get a real choice to live an affordable zero-carbon lifestyle

Essential #5: Remove Carbon Emissions

Mobilize Enmax to remove atmospheric carbon

Program Pathway	2030 Climate Strategy Measure	Baseline	Co-Benefits
Carbon negative technologies	None provided		<ul style="list-style-type: none"> ✓ Biofuels are made from non-food plant materials, such as corn stalks, grasses, wood chips ✓ Use under-utilized City lands e.g.: Refinery Park, transport corridors, to grow biofuel crops ✓ Switch power generation from natural gas to sustainably sourced biofuel ✓ Use Carbon Capture and Storage to permanently bury CO₂



Program Pathway: Reduce Consumption and Waste

Mobilize Waste and Recycling Services

- Methane from City of Calgary waste and wastewater facilities = 1% of Calgary's carbon emissions
- Does not count embodied emissions in garbage
- Prevent garbage in the first place
- Divert the rest from landfills
- Recycling is good for the environment but has minimal impact on carbon emissions
- Calgary has 35 years of landfill capacity



Program Pathway: Reduce Consumption and Waste

Mobilize Waste and Recycling Services

Program Pathway	2030 Measure	Baseline	Co-Benefits
Waste Reduction	Reduce 50% of food and other organic waste in the garbage, compared to 2019	Neither the % nor tonnage in 2019 is provided	✓ Supports a circular economy
Waste Diversion	70% of waste diverted from landfills by 2025.	The % in 2022 is not provided	