GHG Planning:
You have set your target, now what?

Prism ENGINEERING

WEBINAR | Wednesday, June 22, 2022

Land acknowledgement

Introduction to your presenters

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Energy Engineer

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Climate Action Specialist

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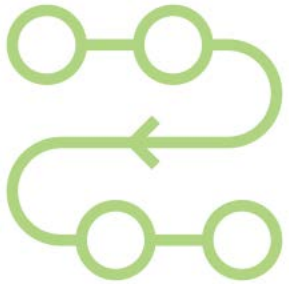
Principal, Branch Manager

Desired webinar outcomes

- Increase understanding of key GHG emission reduction planning steps and key considerations
- Learn from what other organizations have done
- Inspire you to act towards developing a robust GHG emissions reduction plan

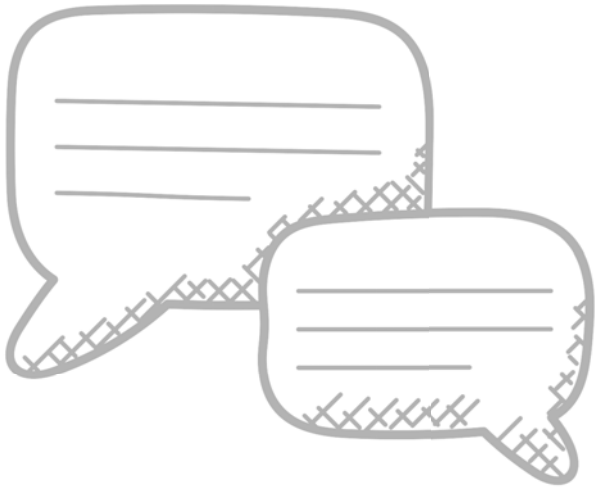


Agenda

1. Introduction
2. The Why – Setting the Context
3. The How – Planning and Engagement Process and Framework
4. Case Studies
5. Lessons Learned

Facilitated chat box

- Please enter your questions and comments throughout the presentation
- We will do our best to address them in Q&A sessions



Introduction

About Prism Engineering

Our Prism Team

BC's leader in helping organizations save energy.

From design to implementation,
we provide energy management, electrical and mechanical engineering, utility monitoring and sustainability consulting to help our clients create a greener, more energy efficient world.

Prism
ENGINEERING

What makes us different?

- **Depth and breadth** of experience and expertise
- **Diversity** of team members
- **Accuracy, quality** and **reputation** of work
- Unique **innovative** solutions

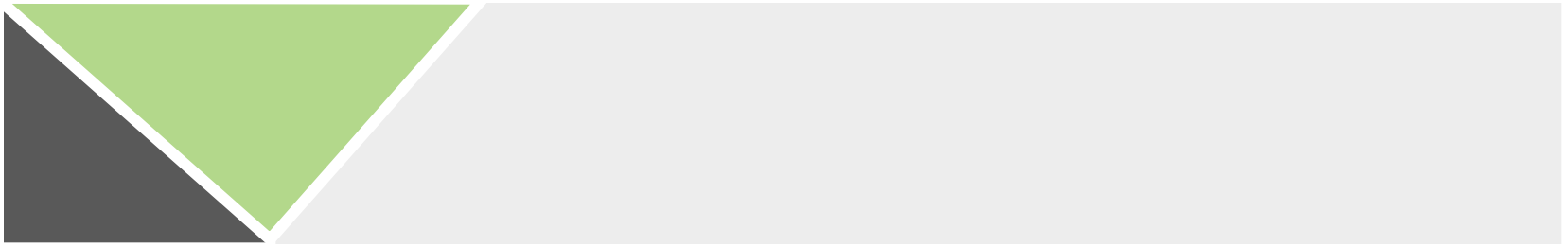
Previous sessions

View presentation slides in our Resource Library:
www.prismengineering.com/resources

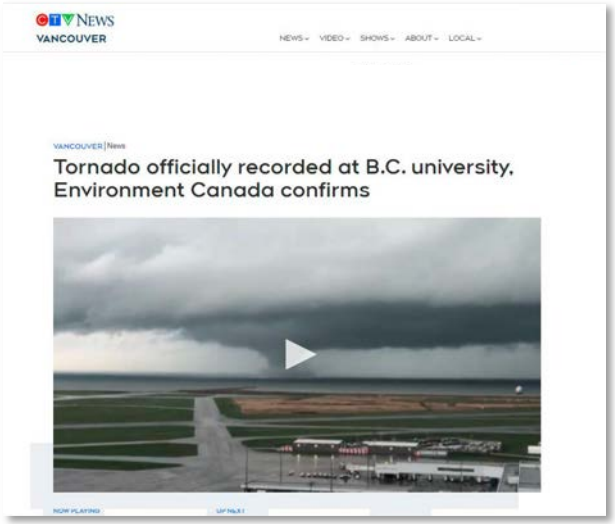
Part 1: The Why

Setting the context

CLIMATE CHANGE



The climate is changing



Growing recognition of the need for action

Source: Wikimedia Commons

Global commitment

COP21·CMP11
PARIS2015
UN CLIMATE CHANGE CONFERENCE

Keep global temperature increase to well below 2 degrees Celsius

GHG Emissions targets

- Canada
- BC
- Municipalities
- Corporations & Businesses

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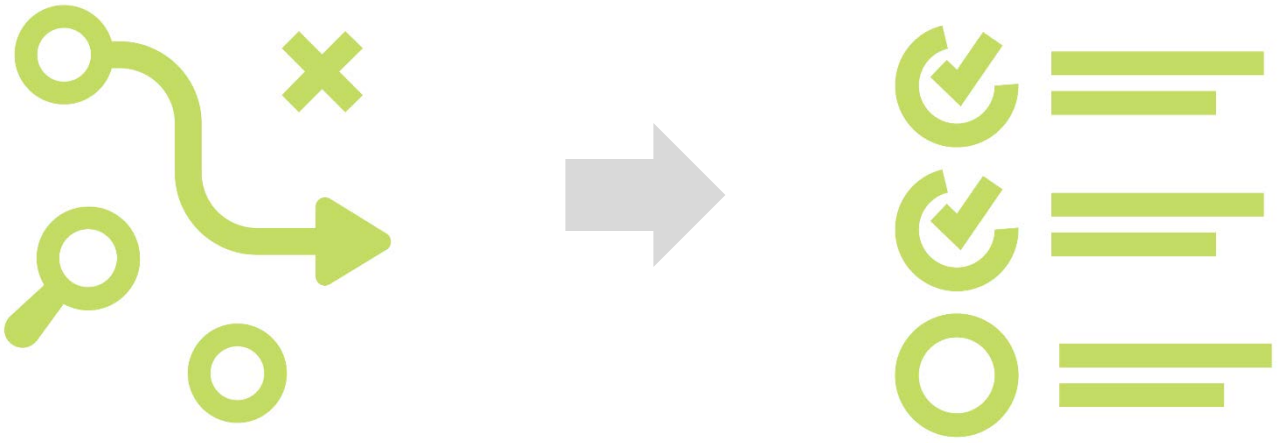
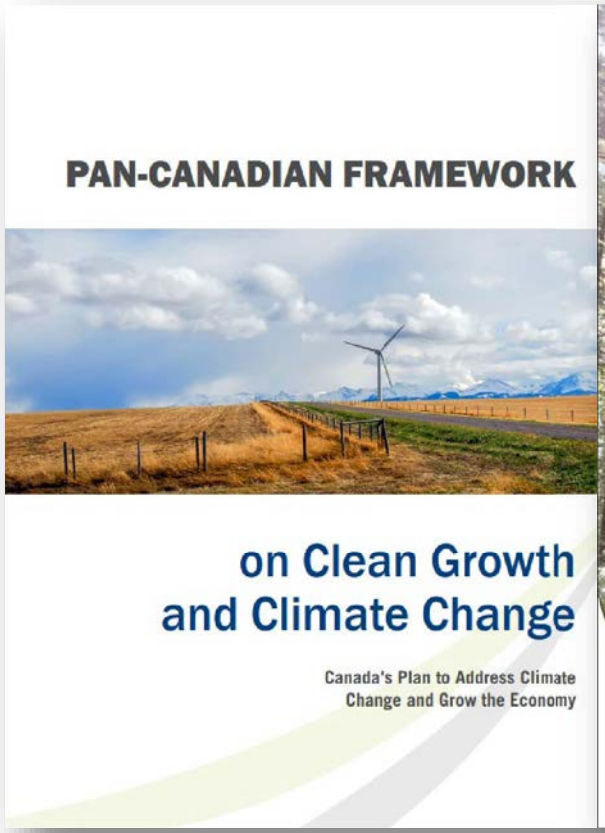
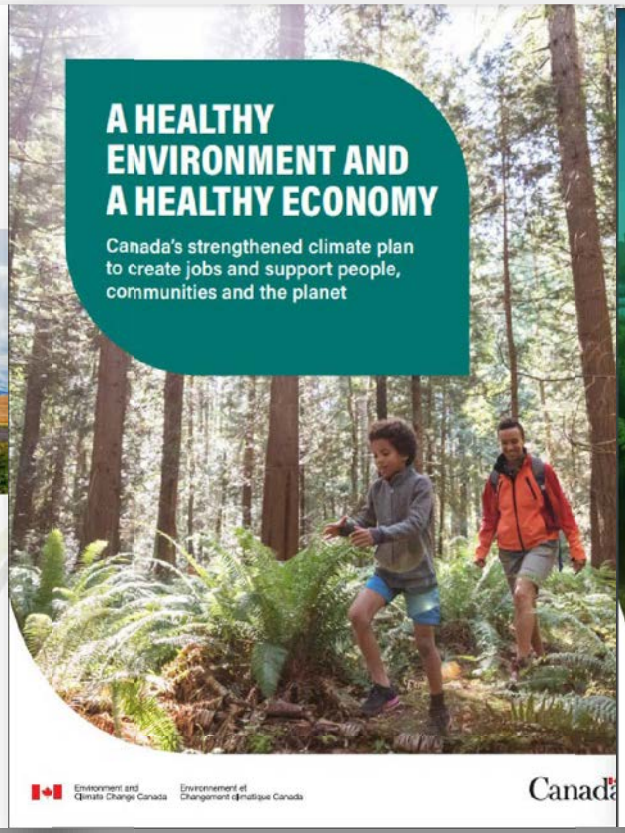
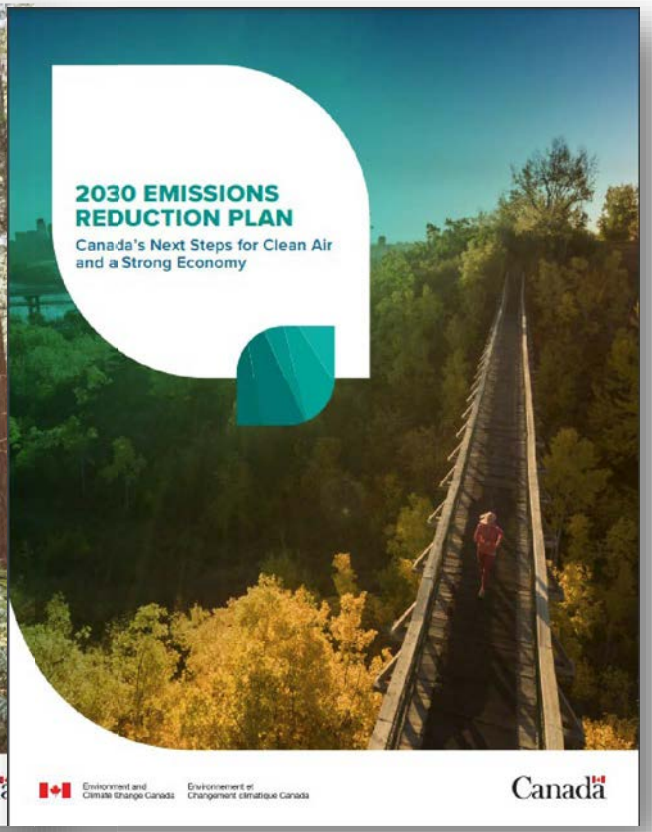
From targets to action



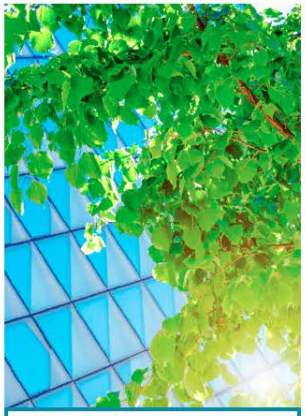
Canada's climate action plans







CleanBC Plan



Better Buildings

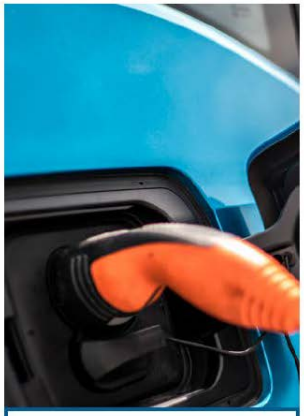
Helping you conserve energy and making your home healthier and more comfortable.

+

Reducing Pollution From Industry

Making B.C. industries the cleanest in the world to support good jobs, be more efficient, and use cleaner energy

+



Cleaner Transportation

Making electric cars more affordable, investing in charging stations, and shifting to renewable fuels.

+

Reducing Emissions From Waste

Diverting waste from landfills and reducing polluting emissions.

+

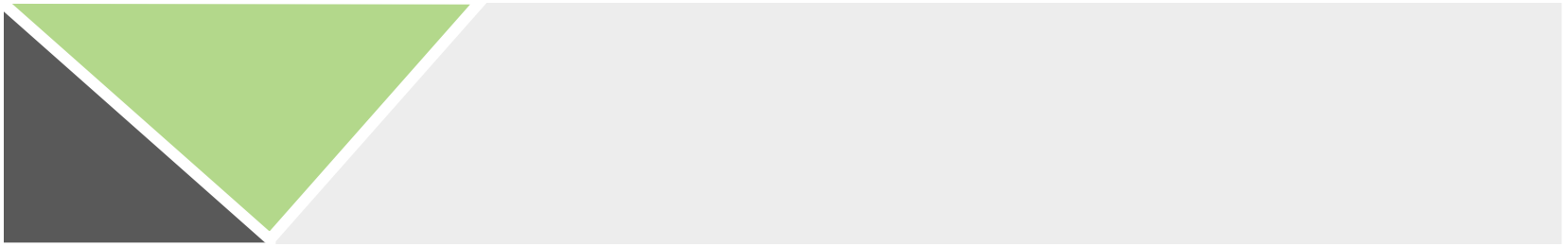
Clean Energy Jobs

Making B.C. cleaner will create good jobs that support families and sustain our communities.

+

https://blog.gov.bc.ca/app/uploads/sites/436/2019/02/CleanBC_Full_Report_Updated_Mar2019.pdf

BENEFITS AND RISKS



Benefit and risk categories

- Financial
- Operational & Social

Financial risks

- Price Increases
  - Utility
  - Fuel
- Carbon Tax
- Carbon Offsets (Public Sector)

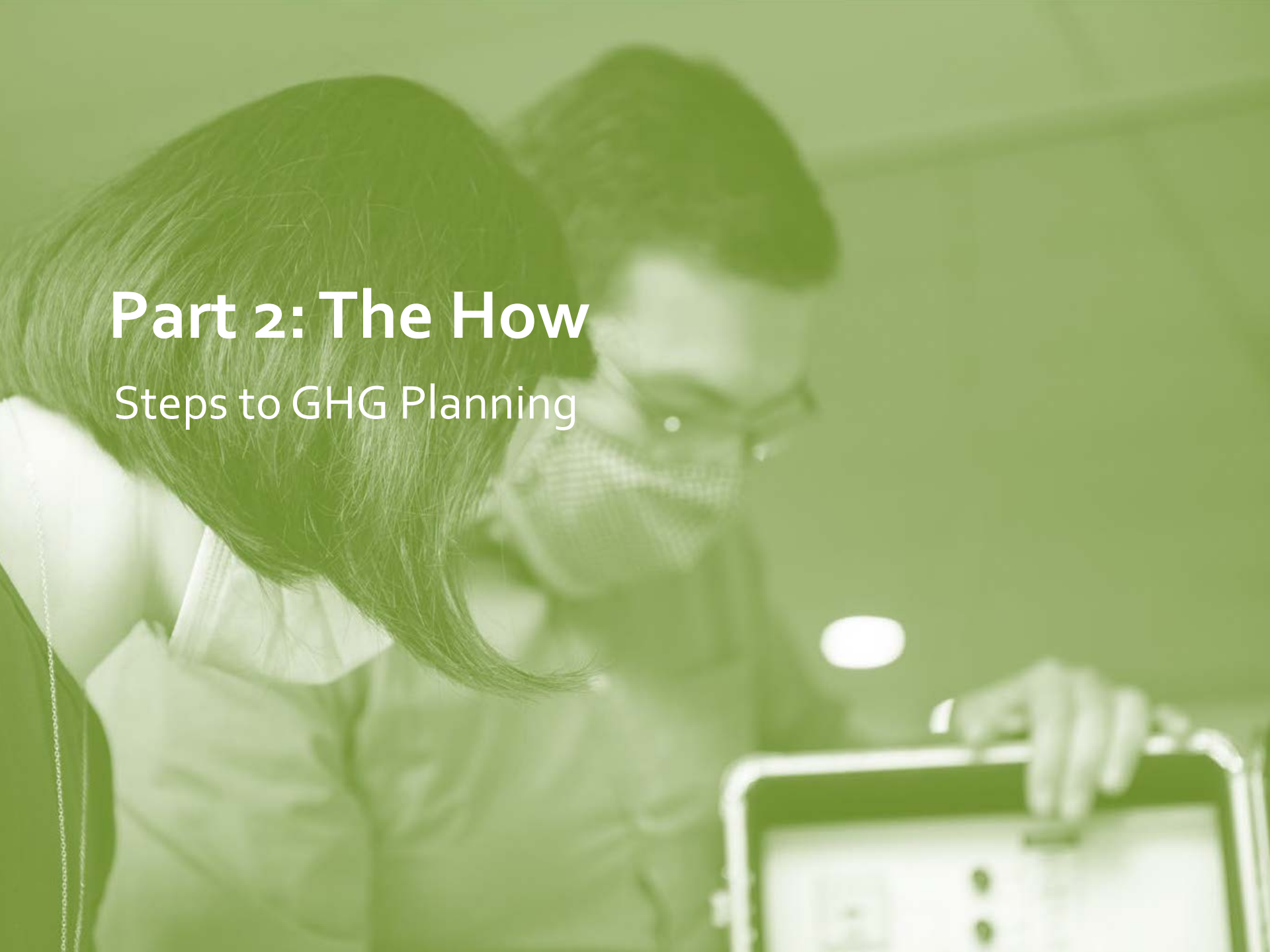
Operational & social risks

Financial benefits

- Decreased utility & fuel costs
- Carbon credit revenue
- Emission reduction funding
  - Rebates & grants

Operational & social benefits

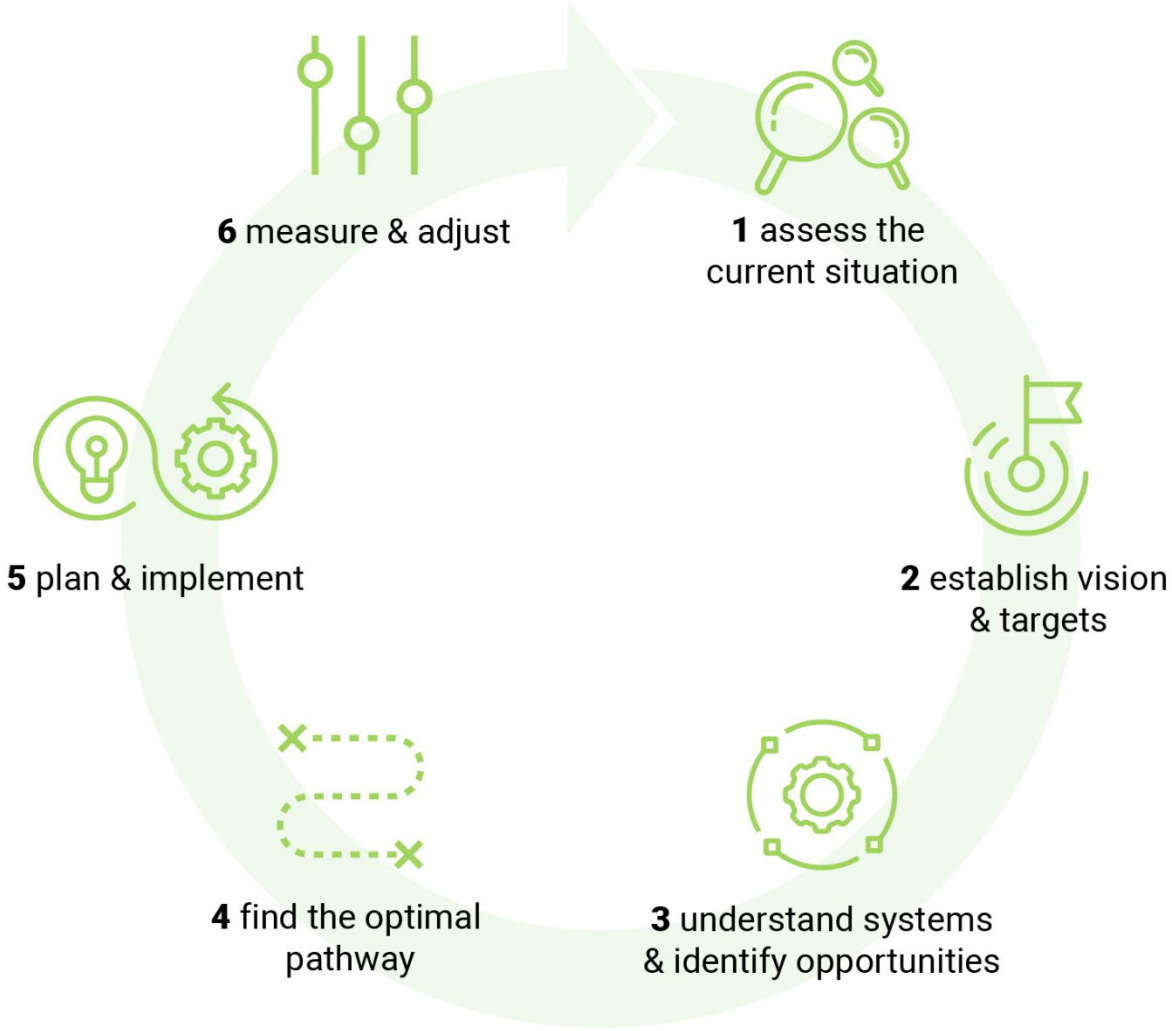
- Employee recruitment and retention
- Environmental and health benefits
- Equity – environmental social justice
- Brand impacts



Part 2: The How

Steps to GHG Planning

Steps to GHG Planning



1. Assess the current situation

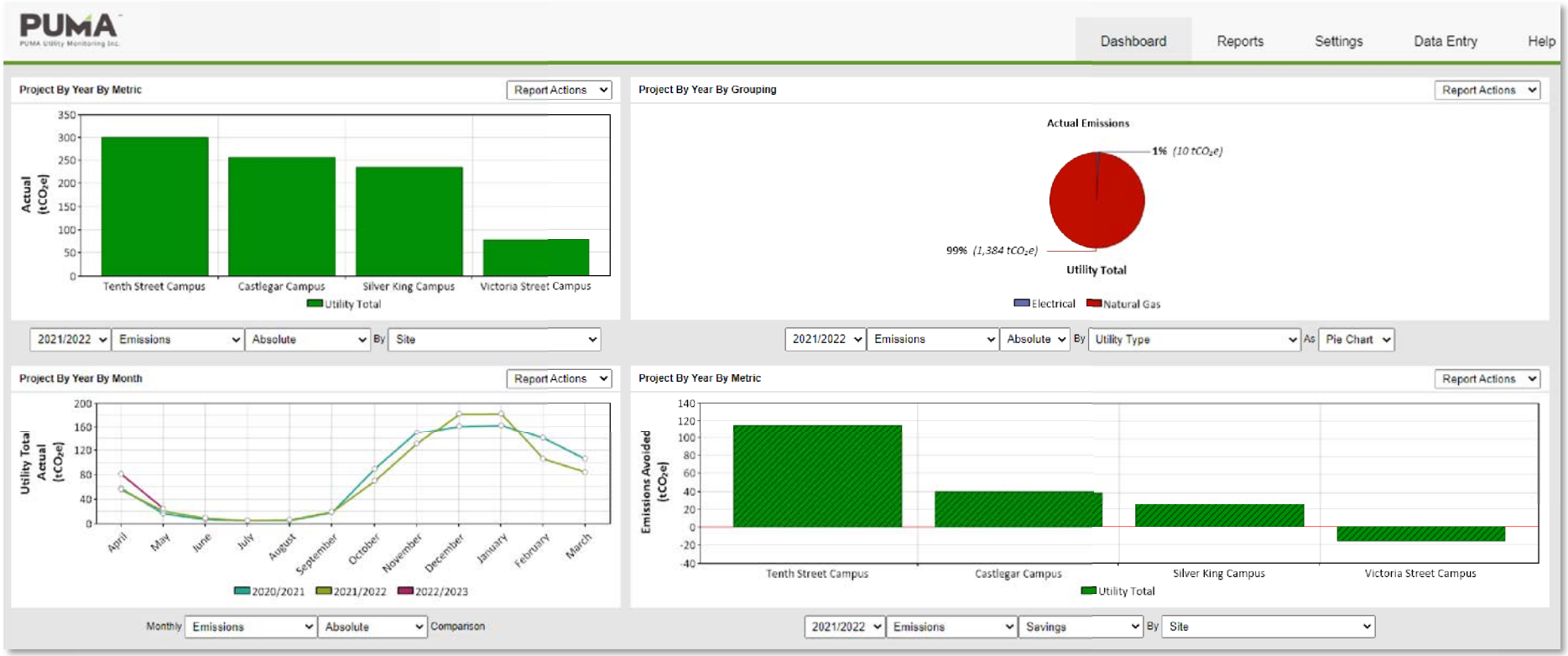
Where to begin?

A. Internal Review

B. External Scan

C. Engage People

Using the right data



2. Establish vision & targets

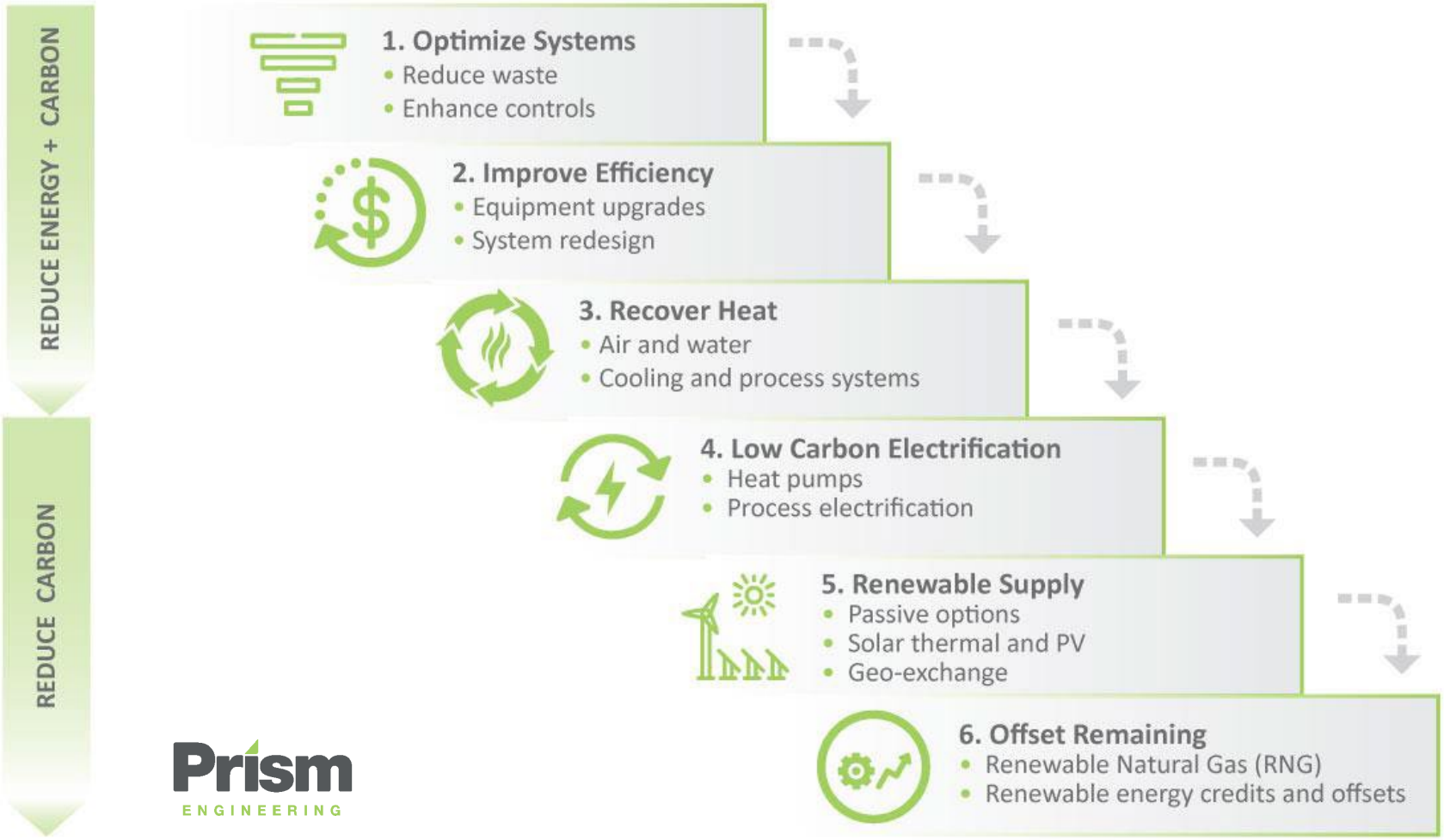
Visioning workshop

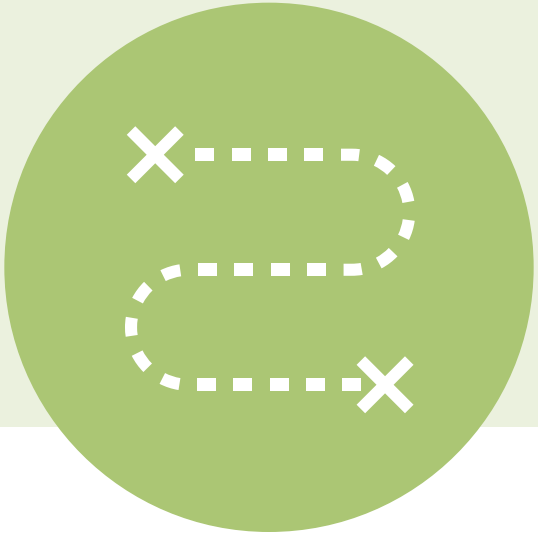
Approach to targets

- Top down
- Bottom up
- Both!

3. Understand systems & identify projects

Prism's pathway to net zero





4. Find the optimal pathway

Pathway Example

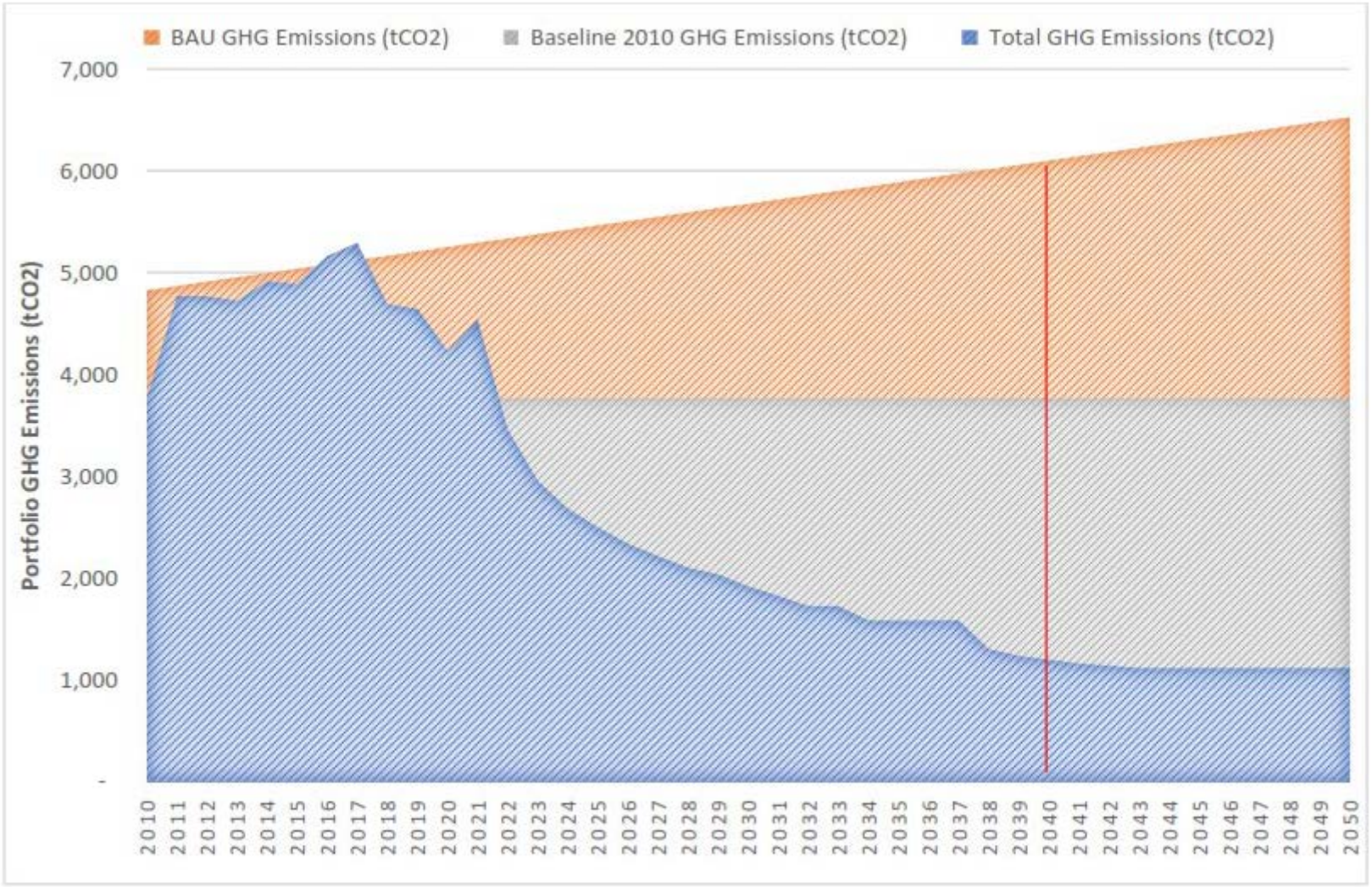


Figure 4: Carbon Pathway B: GHG Cost-Impact Basis

5. Plan & implement

Strategic approach to implementation

- Involve people, again!
- Planning
- Implementation considerations

6. Measure & adjust

Progress towards targets

5 Sites- 40% Reduction

PUMA™
PUMA Utility Monitoring Inc.

Targets | Trends

Project

Scenario type
GHG reduction

Site	Baseline: 04/18	Term 1: 04/19-04/20			Term 2: 04/20-04/21			Term 3: 04/21-04/22		
		Target	Actuals		Target	Actuals		Target	Actuals*	
Amberlea - Capital Region Housing										
Natural Gas Emissions		10%	8%	↑	15%	12%	↑	20%	17%	↑
Electricity		8%	9%	↓	12%	13%	↓	17%	13%	↑
Amberlea - Capital Region Housing										
Natural Gas Emissions		10%	8%	↑	15%	12%	↑	20%	17%	↑
Electricity		8%	9%	↓	12%	13%	↓	17%	13%	↑
Amberlea - Capital Region Housing										
Natural Gas Emissions		10%	8%	↑	15%	12%	↑	20%	17%	↑
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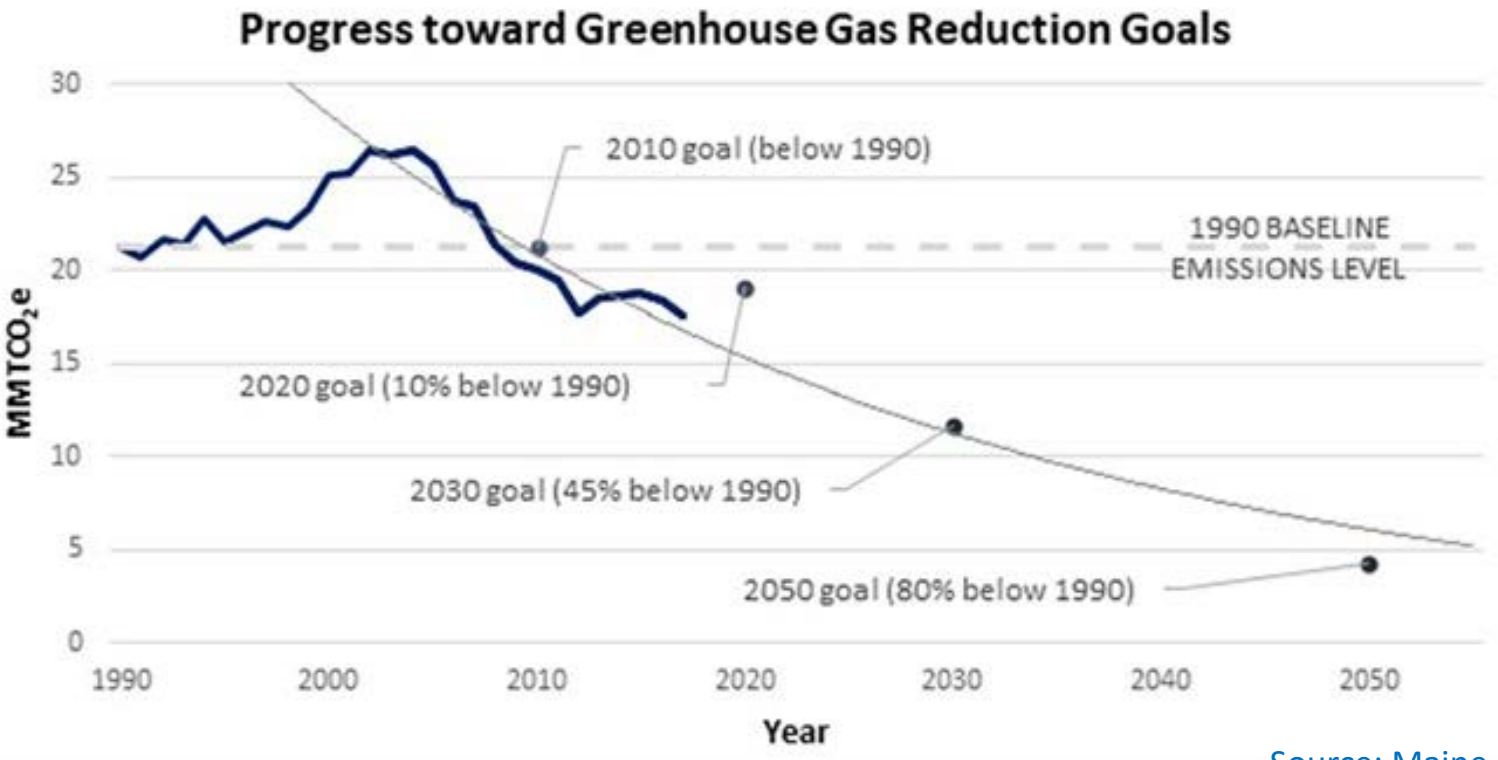
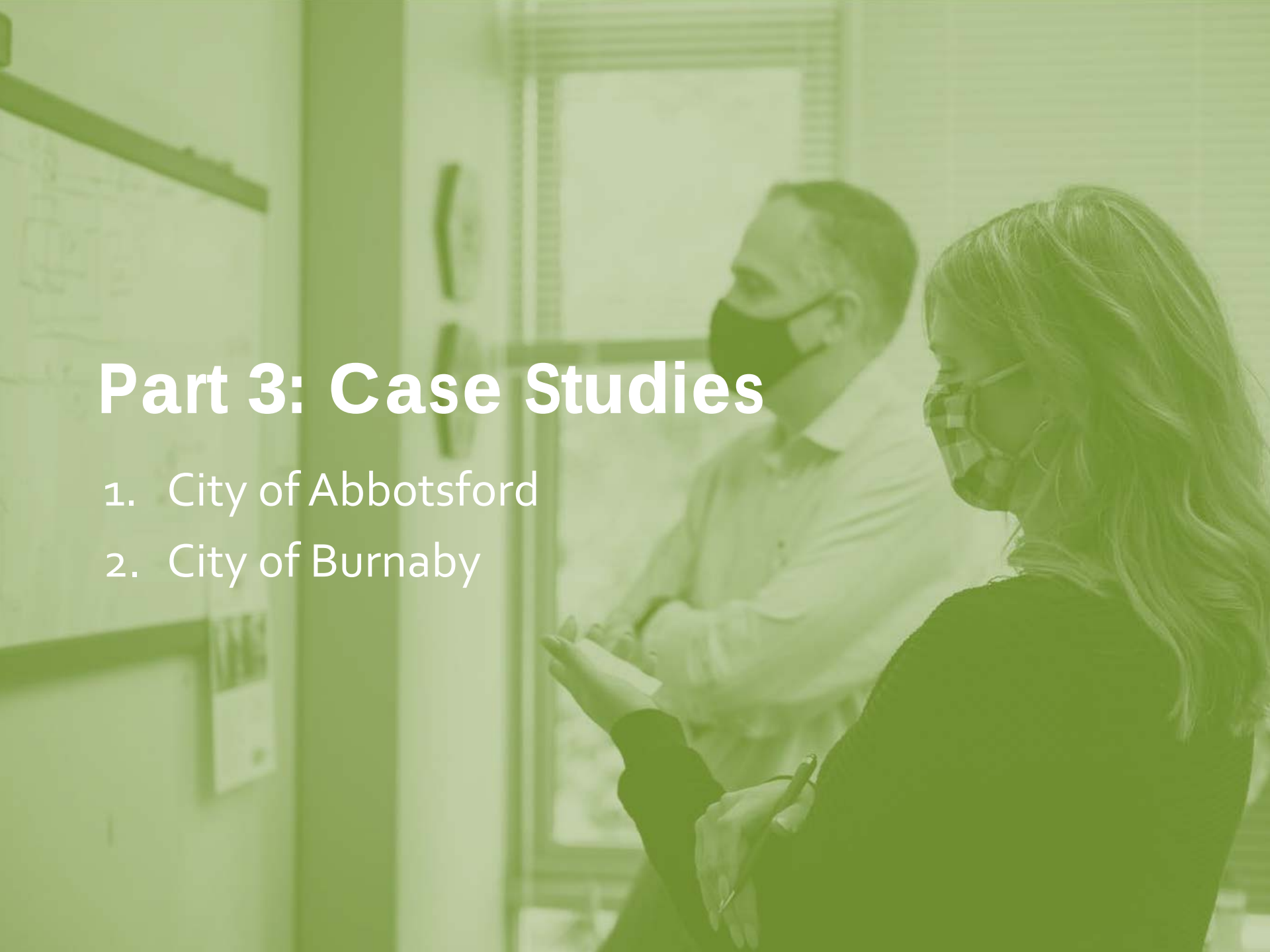
Progress towards targets



Source: Maine.gov

Q & A

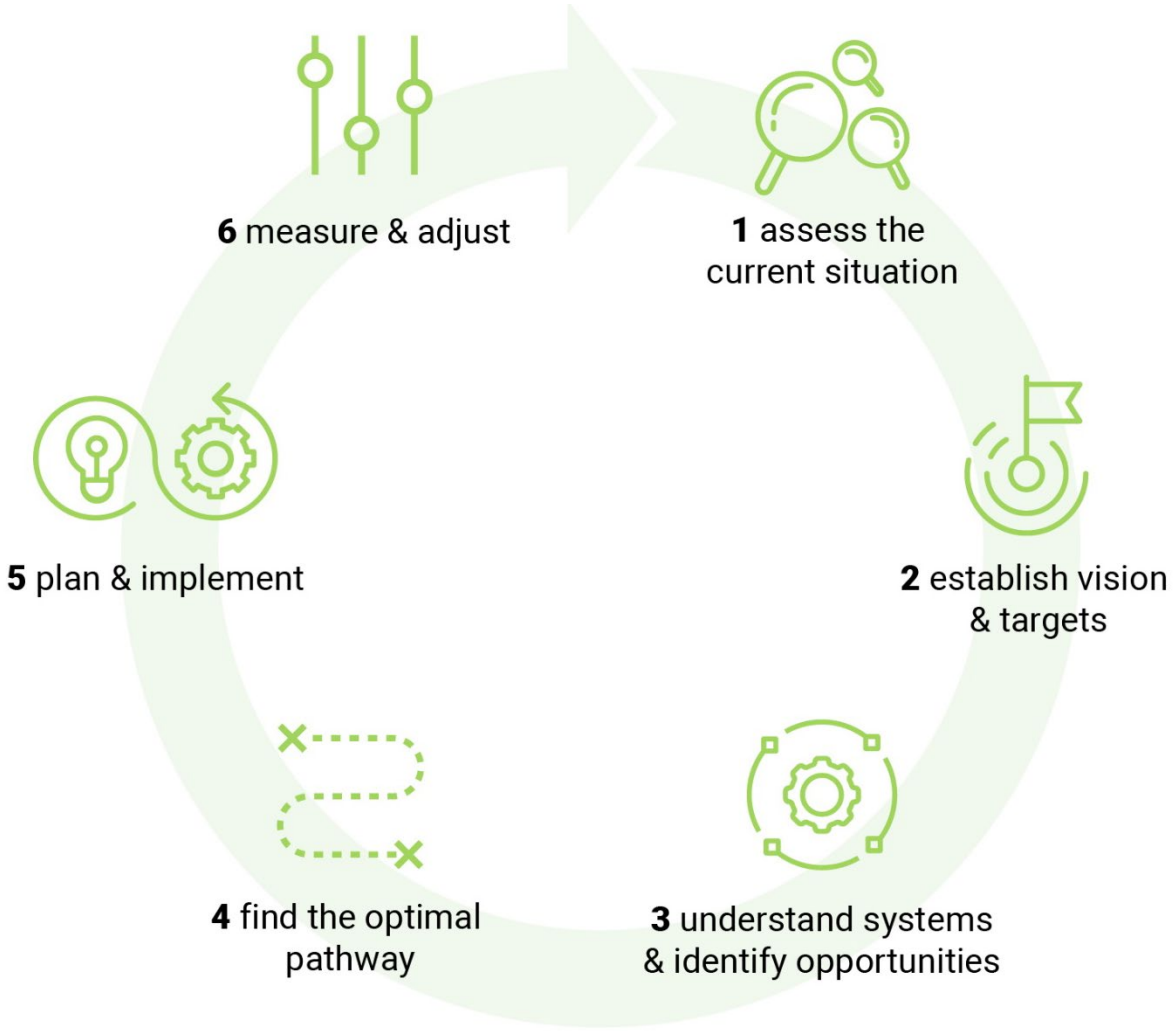


Part 3: Case Studies

1. City of Abbotsford
2. City of Burnaby

City of Abbotsford

Overview


6 measure & adjust
1 assess the current situation
5 plan & implement
2 establish vision & targets
4 find the optimal pathway
3 understand systems & identify opportunities

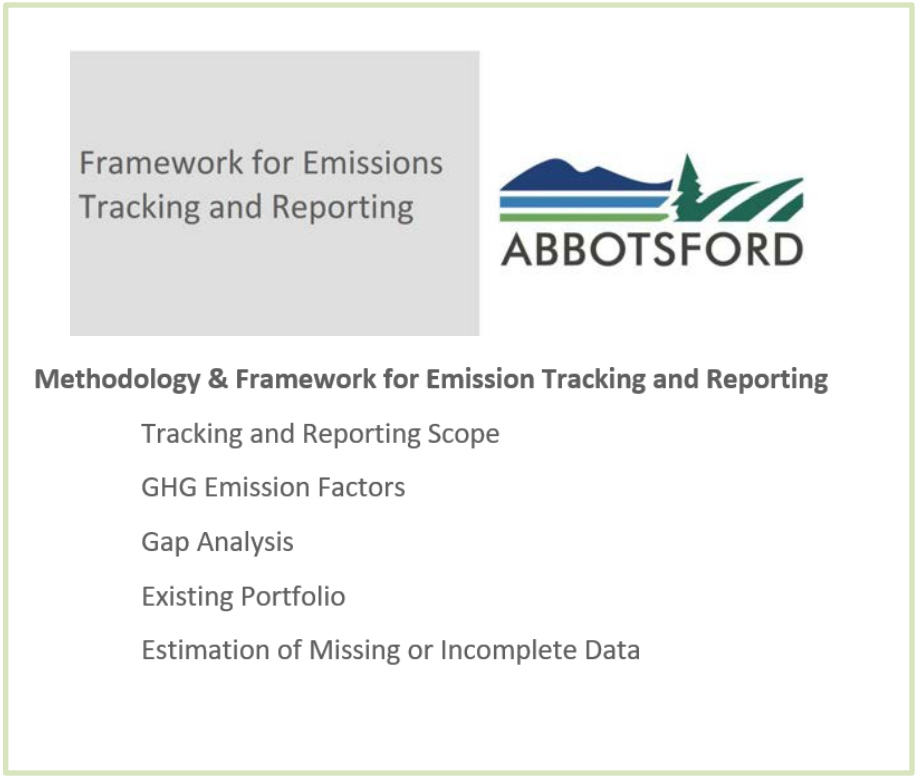
GHG Planning:
Establish Profile & Reporting Framework

1 assess the current situation

- Collection of present and historical baseline utility data using PUMA
- Estimation of historical data

Outcomes:

- Established 2007 baseline and 2020 emissions profile
- Developed City policy for reporting emissions post CARIP
- Identified emission reporting/accounting gaps

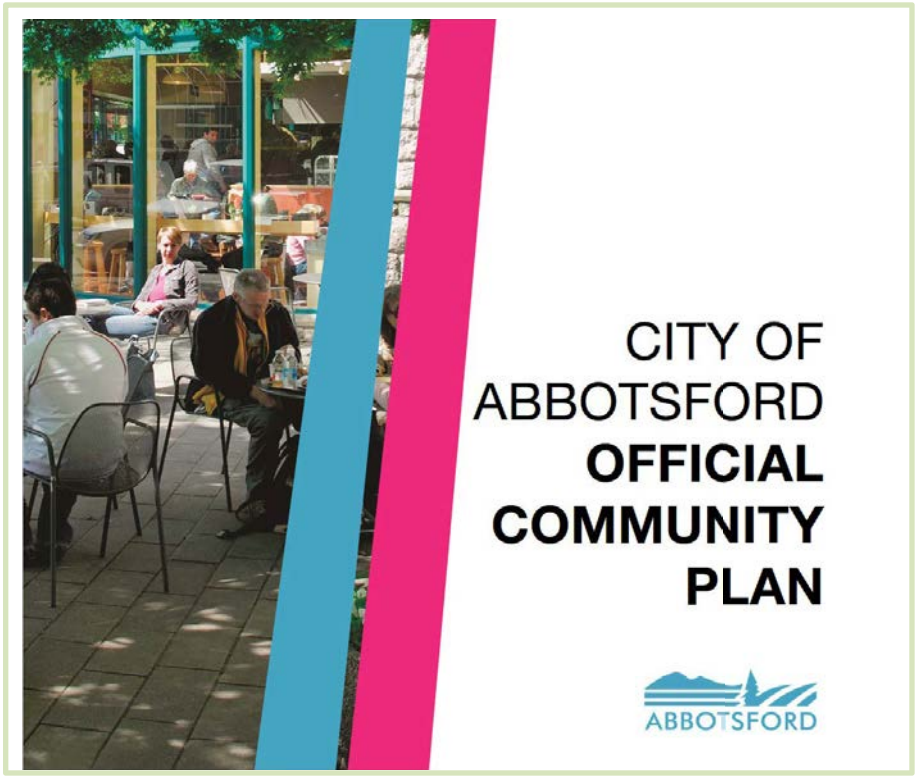


GHG Planning:
Official Community Plan

2 establish vision & targets

Greenhouse Gas Emission Reduction Target:

- 20% reduction by 2025
- 40% reduction by 2040
- below 2007 level



GHG Planning:
GHG Emissions Model

3 understand systems & identify projects

4 find the optimal pathway

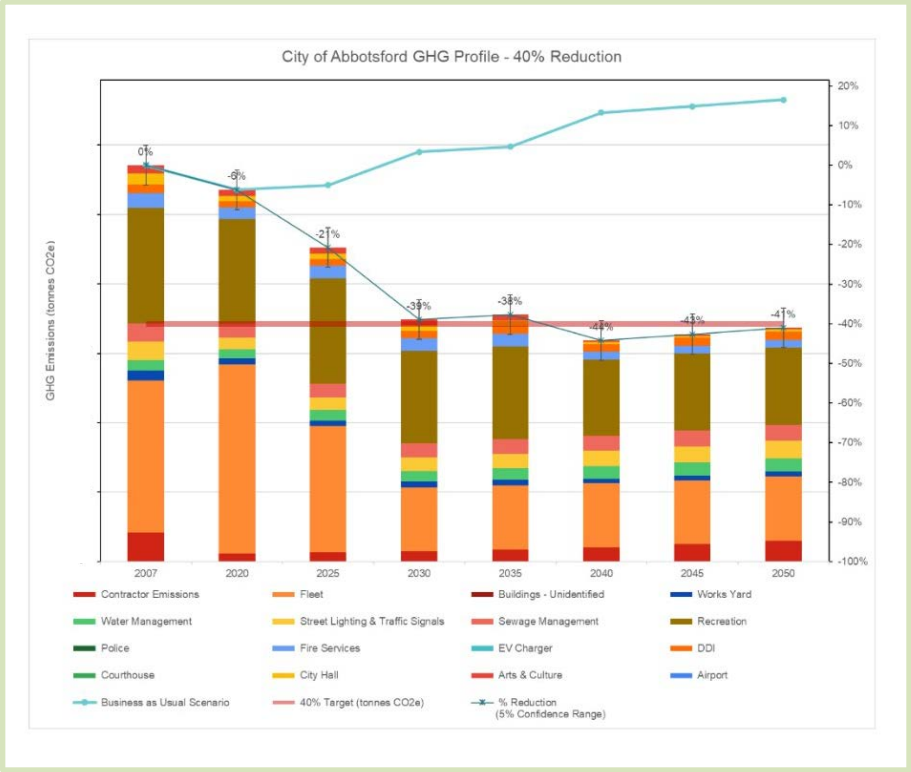
GHG Emissions Model

Impacts on GHG model:

- Emission reduction projects
- Population & Service growth
- Technology changes
- Escalation of GHG emission costs

Outcomes:

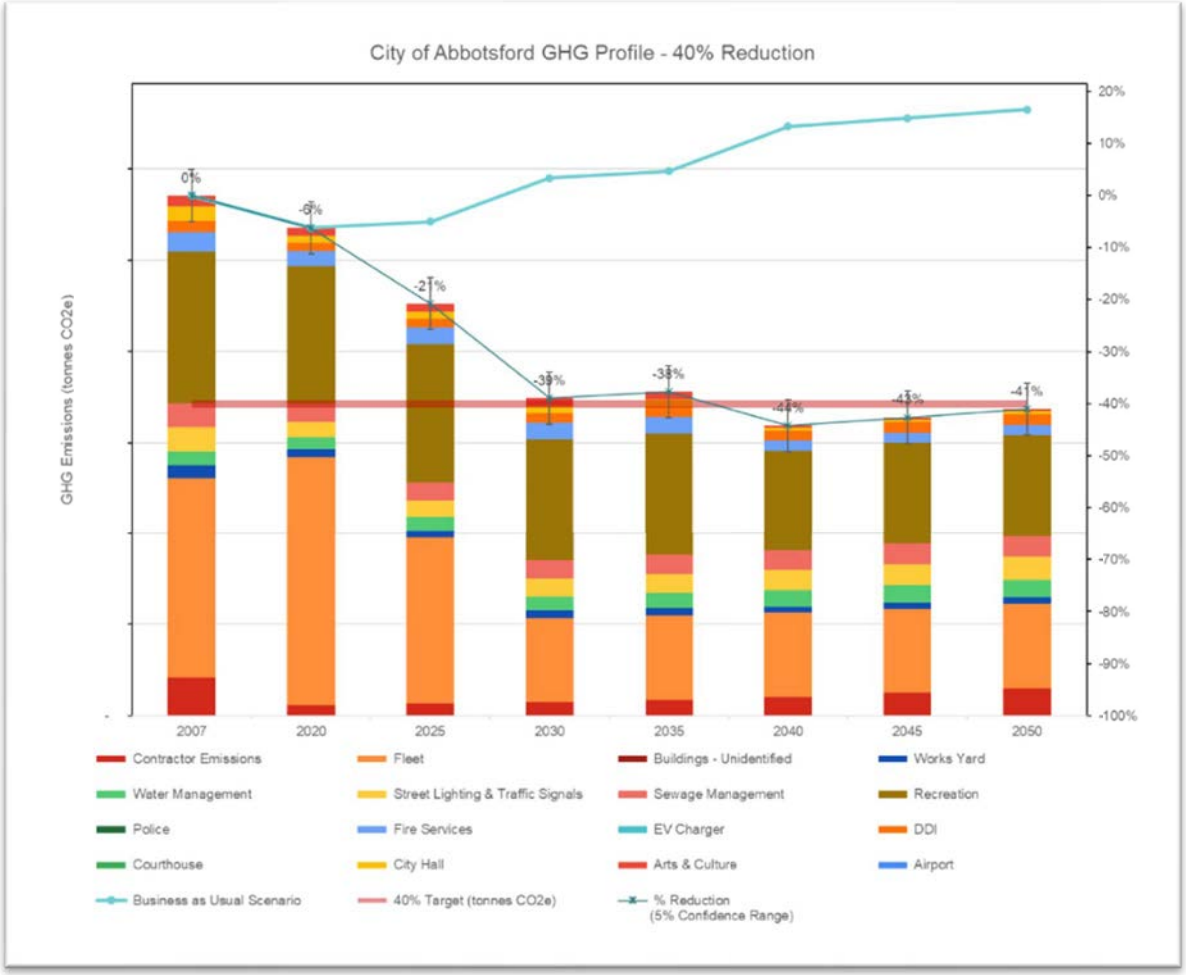
Identification of pathways to 40% GHG emission reduction



GHG Planning:
GHG Emissions Model

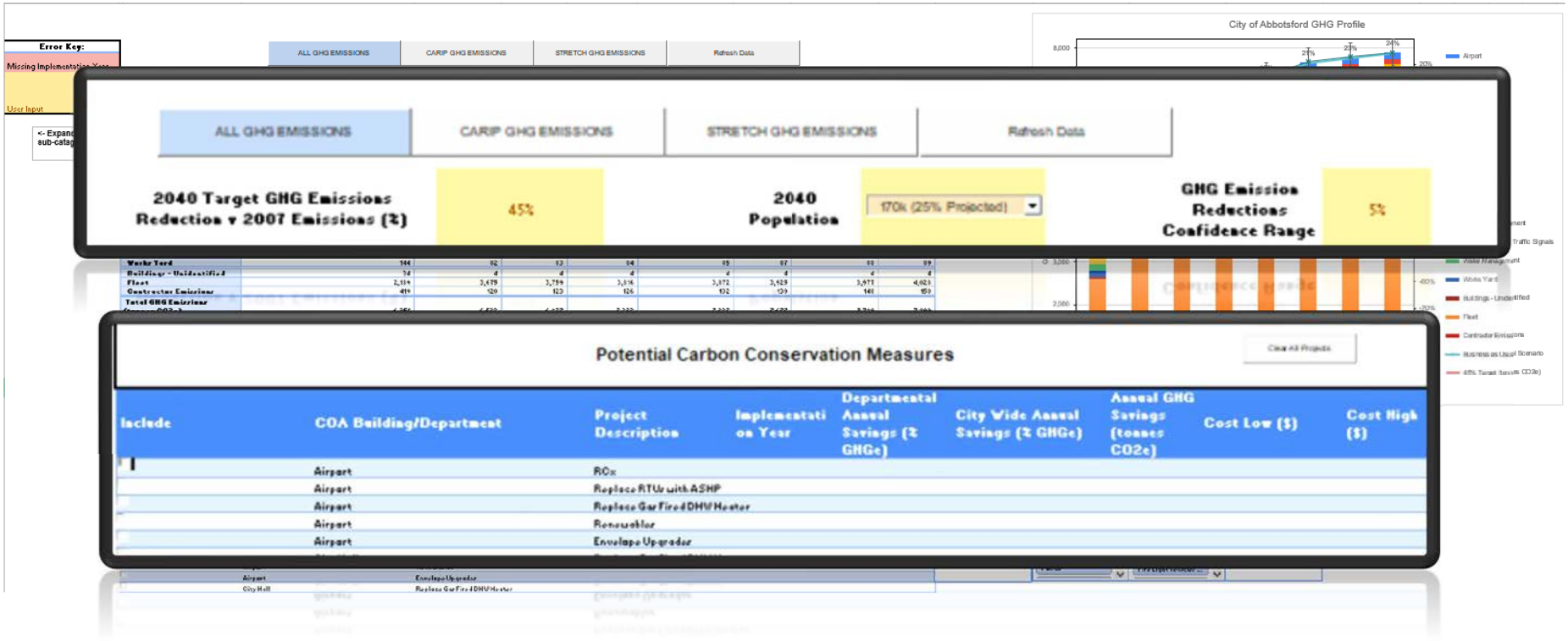
3 understand systems & identify projects

4 find the optimal pathway



GHG Planning:
Summary

4 find the optimal pathway



GHG Planning:
Engage Stakeholders, Develop Policy

5 plan & implement

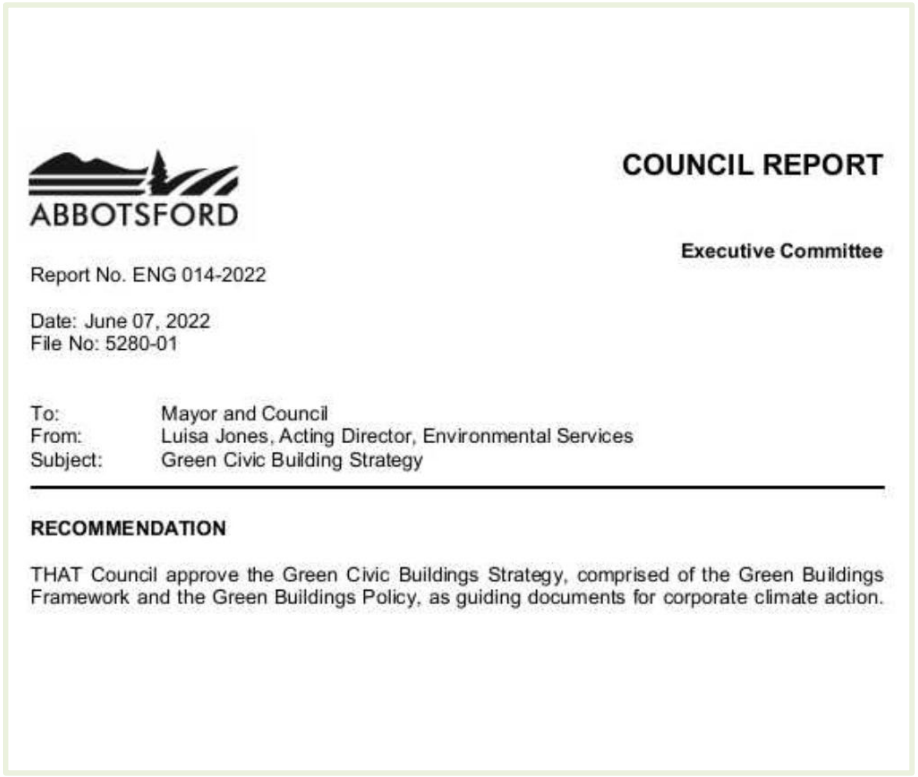
Outcomes:

City Council Approval

- Funding
- Organizational alignment

Corporate Policies Developed

- New Construction
- Asset Planning



ABBOTSFORD

COUNCIL REPORT

Executive Committee

Report No. ENG 014-2022

Date: June 07, 2022
File No: 5280-01

To: Mayor and Council
From: Luisa Jones, Acting Director, Environmental Services
Subject: Green Civic Building Strategy

RECOMMENDATION

THAT Council approve the Green Civic Buildings Strategy, comprised of the Green Buildings Framework and the Green Buildings Policy, as guiding documents for corporate climate action.

CITY OF ABBOTSFORD

GREEN BUILDINGS FRAMEWORK

ABBOTSFORD

GHG Emissions Targets

Official Community Plan (OCP) Targets:

2007 BASELINE → **20%** reduction by 2025 (2025) → **40%** reduction by 2040 (2040)

What we do

Our Climate Action Framework focuses on three key strategies:

Use less energy & resources

Reduce GHG emissions

Use renewable energy

How we drive corporate change

Everyone has a part to play to make a difference on climate action.

The results we seek

Our Climate Action Framework strives for a wide range of positive outcomes:

Buildings & Infrastructure Improvement

- Renewed and improved assets
- Energy efficiency
- GHG reduction

Corporate Excellence

- Develop financial resilience
- Build strategic partnerships
- Maximize external funding
- Meeting climate action targets

Environmental Stewardship

- Fewer extreme weather events
- Cleaner airshed
- Achieve climate resiliency

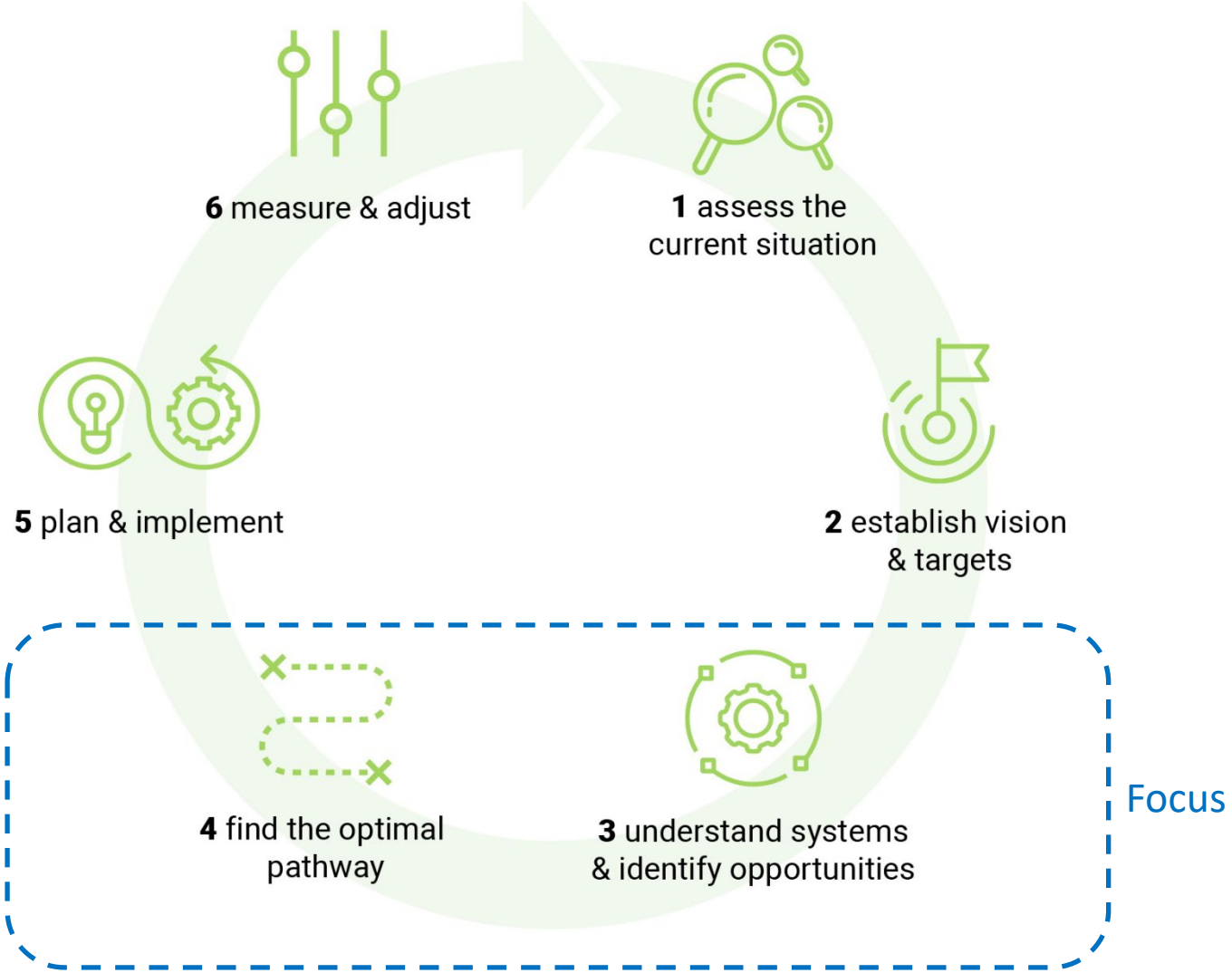
Learn more at: www.abbotsford.ca/community-events/environment/climate-change

PROGRESS ON CLIMATE ACTION COMMITMENTS

Q & A

City of Burnaby

Overview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Focus

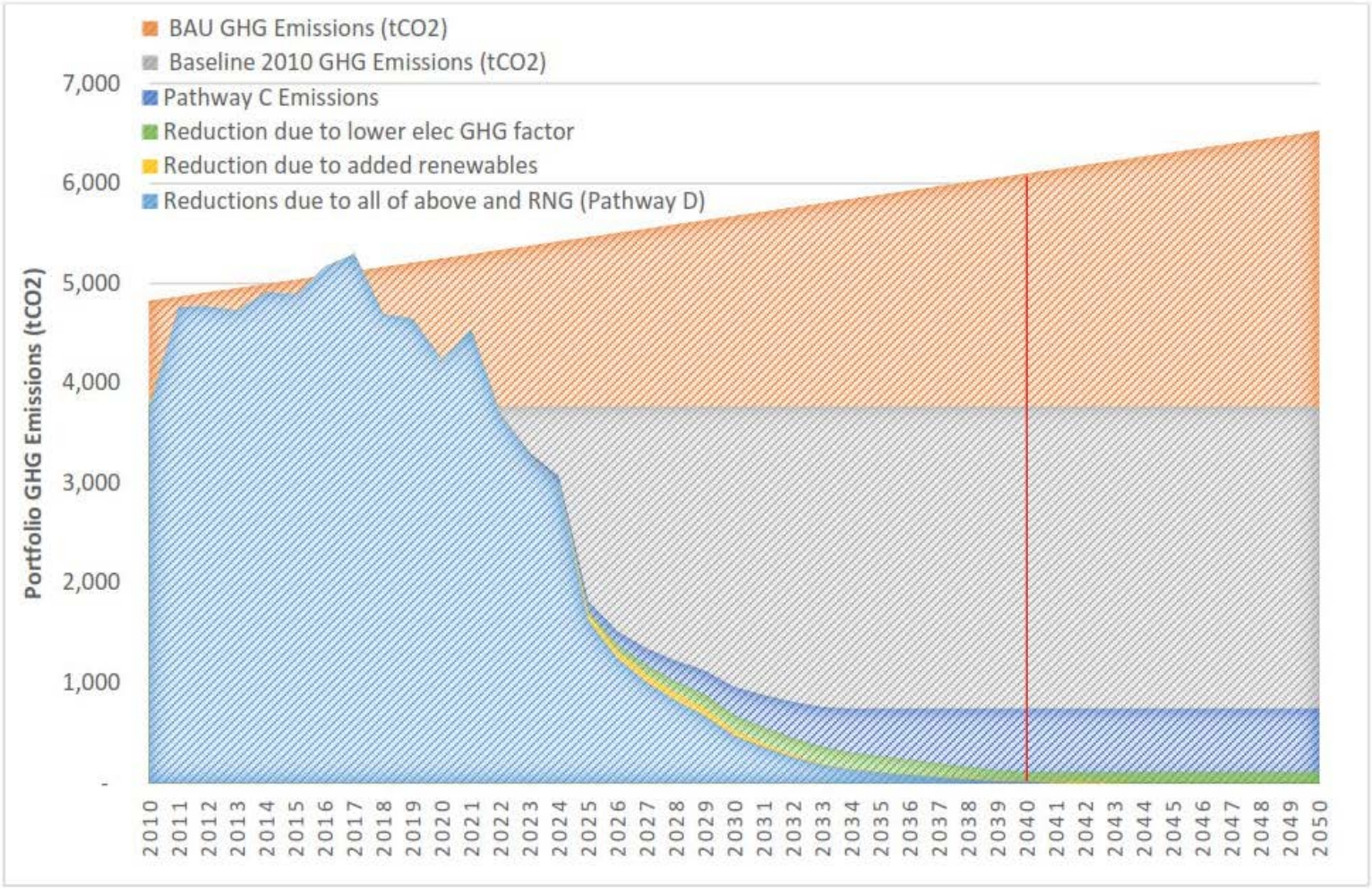
List of Opportunities

Building Number	Building Name	Measure ID	Existing Condition	Proposed Measure	Existing Equipment Installation	Electrical Savings (kWh)	Electrical Demand	Fuel Savings (G	Energy Savings ($/Yr.)	Budget Retrofit Cost ($)	GHG Emissions Red	Investment Per Ton Reduced ($/ton)
1	Anderson House	E-CRM-1B	Atmospheric gas-fired boiler is used to supply heat to the hydronic heating system.	DEEP CARBON REDUCTION MEASURE: Install air-to-water heat pump and modify radiators	2012	-12,754	-6	197	$410	$45,000	9.31	$4,800
1	Anderson House	E-CRM-2	Gaps in insulation, single glazed windows and other envelope deficiencies contribute to envelope heating losses and cold air infiltration.	Repair envelope deficiencies as appropriate.	No Date - High Replacement Urgency	0	0	22	$227	$10,000	1.11	$9,000
1	Anderson House	G-CRM-1a	Atmospheric gas-fired boiler is used to supply heat to the hydronic heating system.	INTERIM MEASURE: Install condensing boiler	2012	0	0	21	$217	$15,000	1.06	$14,100
2	Still Creek Works Yard-Ops Bldg/Storage Bldg/Truck Wash	E-CRM-1	(2) 83KW Natural Gas fired boilers providing backup and supplementary heat for air source heat pump in operations building.	Utilizing electric backup boilers for supplementary heat	2014	-82,940	70	375	-$7,196	$483,799	15.36	$31,498
2	Still Creek Works Yard-Ops Bldg/Storage Bldg/Truck Wash	E-CRM-2	Operations and Truck Wash buildings have natural gas fired domestic hot water heaters	Install electric air source heat pump domestic hot water heaters	2014	-9,220	130	85	-$4,400	$169,620	3.90	$43,493
2	Still Creek Works Yard-Ops Bldg/Storage Bldg/Truck	E-CRM-5	No renewable energy generation on site	Install Solar PV on roof(s) of the building(s) at the facility	N/A	225,720	-	-	$21,737	$648,000	9.03	$71,761
2	Still Creek Works Yard-Ops Bldg/Storage Bldg/Truck	E-CRM-6A	Gas fired MUA-SB-01 provides heat for Storage Building	Install Packaged Heat Pump Makeup Air Unit	2014	-10,265	170	120	-$5,509	$285,268	5.57	$51,216
2	Still Creek Works Yard-Ops Bldg/Storage Bldg/Truck	E-CRM-6B	Gas Fired Unit heaters provide heat in the Storage and Truck Wash	Install electric unit heaters	2014	-17,935	290	85	-$10,413	$191,272	3.52	$54,339
3	Alan Emmott Centre	E-CRM-6	Gas fired MAU-1 provides heat for the building	Install Packaged Heat Pump Makeup Air Unit	2002	-290	30	5	-$957	$57,705	0.24	$240,439
4	Bby. Art Gallery - Gallery	E-CRM-1	High efficiency natural gas condensing boiler to provide heating to the building. Cooling, ventilation and humidity control is provided by air handling units with DX cooling and electric reheats.	Install a VRF heat pump system to provide heating and cooling to the building.	No Date - Low Replacement Urgency	- 38,600	-	540	$811	$70,000	26.54	$2,600
5	Bby. Lake Rowing Pavilion	E-CRM-1	Natural gas fired domestic hot water heating tank used to supply washrooms and kitchen.	Incorporate a residential on-demand electric water heater in place of the existing natural gas heating tank.	2013	- 16,867	- 9	76	-$1,333	$1,800	3.11	$600
5	Bby. Lake Rowing Pavilion	E-CRM-2	Two 60 MBH Natural Gas Unit Heaters currently provide heating to boat and equipment storage.	Replace with two equivalent electric unit heaters.	2020	- 22,066	- 9	99	-$1,744	$9,300	4.06	$2,300
5	Bby. Lake Rowing Pavilion	E-CRM-3b	Two air handling units currently use gas-fired heating. Cooling is provided to the main hall by two	Replace air handling units with an air source heat pump sized to meet building heating requirements. Existing	2016	- 51,219	- 19	565	-$651	$130,000	26.10	$5,000

Pathway Scenarios

Pathway	Description	Result (% reduction in GHG emissions over 2010 base period levels)
Pathway A	**Asset Life Basis** This pathway prioritizes implementing CRMs that involve replacement of equipment with the lowest remaining asset life first.	**38%**
Pathway B	**GHG Cost-Impact Basis** This pathway prioritizes implementing CRMs that have the highest benefit (tons CO_2e/year emission reduction) per dollar invested first.	**68%**
Pathway C	**Blended** This pathway applies a weighting factor to the modelled elements of Pathway A and B to prioritize CRMs that offer benefits both on an asset life and GHG cost-impact basis.	**68%**
Pathway D	**Net Zero by 2040** This pathway builds on Pathway C, and adds the elements required to achieve the City's goal of Net Zero emissions by 2040.	**84% (Standard 1)** **89% (Standard 2)*** **100% (Stretch)* – Net Zero**

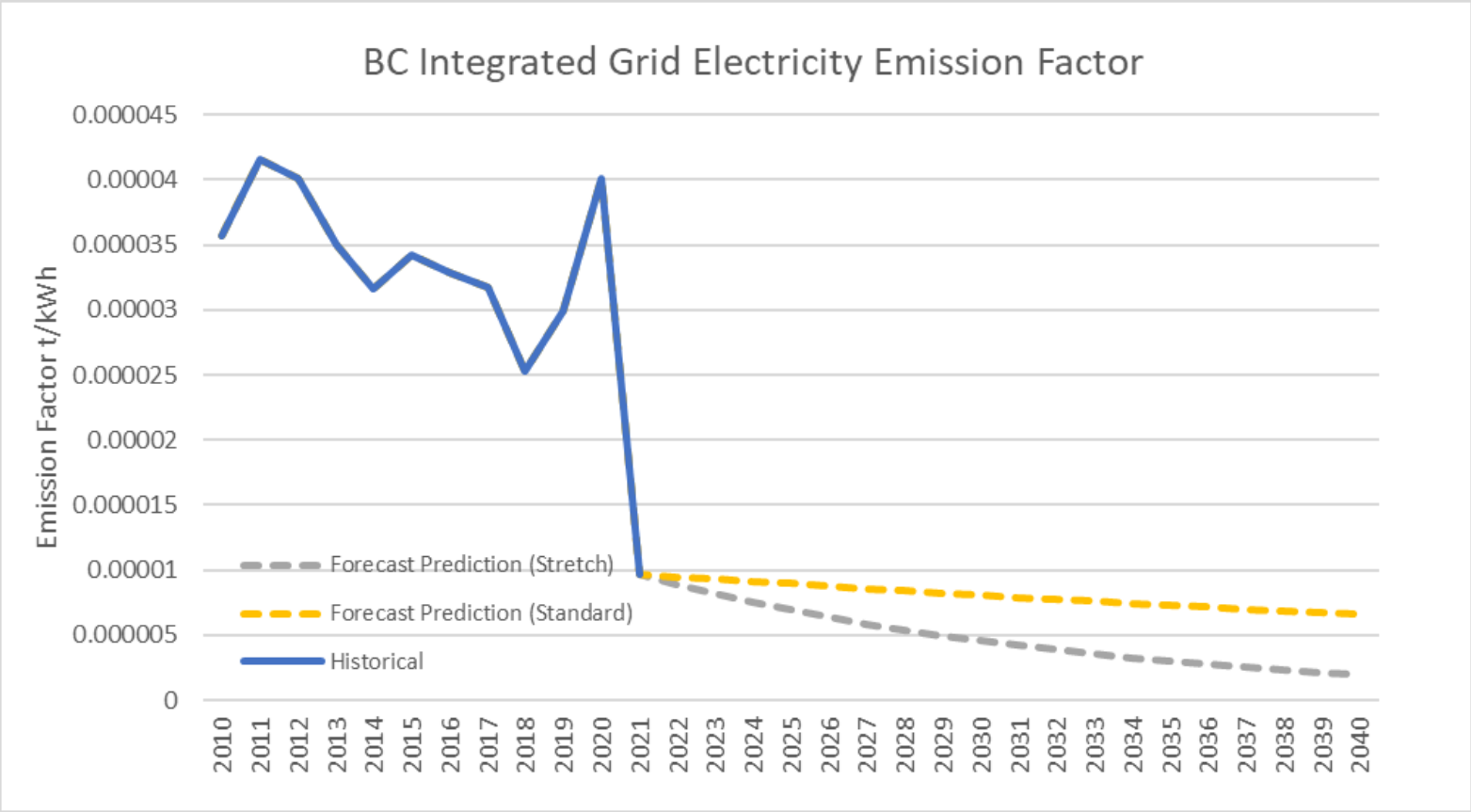
Pathway D – Net Zero



Sensitivity analysis

- Pathways modelling is sensitive to numerous inputs which are important to test and understand.
  - Retrofit costs and savings
  - Electricity emission factors
  - Carbon tax
  - Asset disposals and investments
  - Available supply of renewables such as RNG
  - Disruptive changes in future technologies
  - Others…

Critical model inputs



Q & A

Part 4: Lessons learned

Go back to step 1 if needed

Top-down + bottom-up for targets

Timing is key: sooner is better

Engage people

Ensure modelling inputs are well understood

Don’t let perfect be the enemy of good - *Voltaire*

Thank you.

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