

Greenhouse Gas Reduction

Priorities Committee Meeting
June 18, 2019

Greenhouse Gas Reduction

Report purpose:

To provide the Priorities Committee with an approach and update toward reducing the County's greenhouse gas emissions through:

- a Fleet Emissions Reduction Strategy
- development of a Strategic Energy Master Plan for municipal facilities



Priorities and Role

- Local governments have influence over approximately 50 per cent of Canada's GHG emissions
- Alignment to our strategic goals
- Greenhouse gas reduction strategies for fleet and building management — significant to making a difference

Emissions Reduction Strategy

Strategy purpose:

- To define the approach to reducing GHG emissions in our fleet-based service delivery
- Knowledge, actions, timelines and change management required

Police Hybrid Vehicle



Where We Are Today

- Completed the Fleet Services Emissions Strategy
 - Working with a consultant to continue the research that is required
 - Developing the action plans that will capitalize on opportunities
 - Phase one of the plan utilize the current options to guide Fleet
 - Procurement
 - Maintenance
 - Idling guideline
 - Right sizing the Fleet
 - Utilize technology (Vehicle shut off option when idling)
 - Creating GHG targets
 - Continue education
 - Phase two the extensive research
 - Phase three public engagement
 - Autonomous Vehicles

Core Business Functions (2019 - 2022)



A sample of Canadian municipalities that have set emissions targets to reduce their carbon footprints

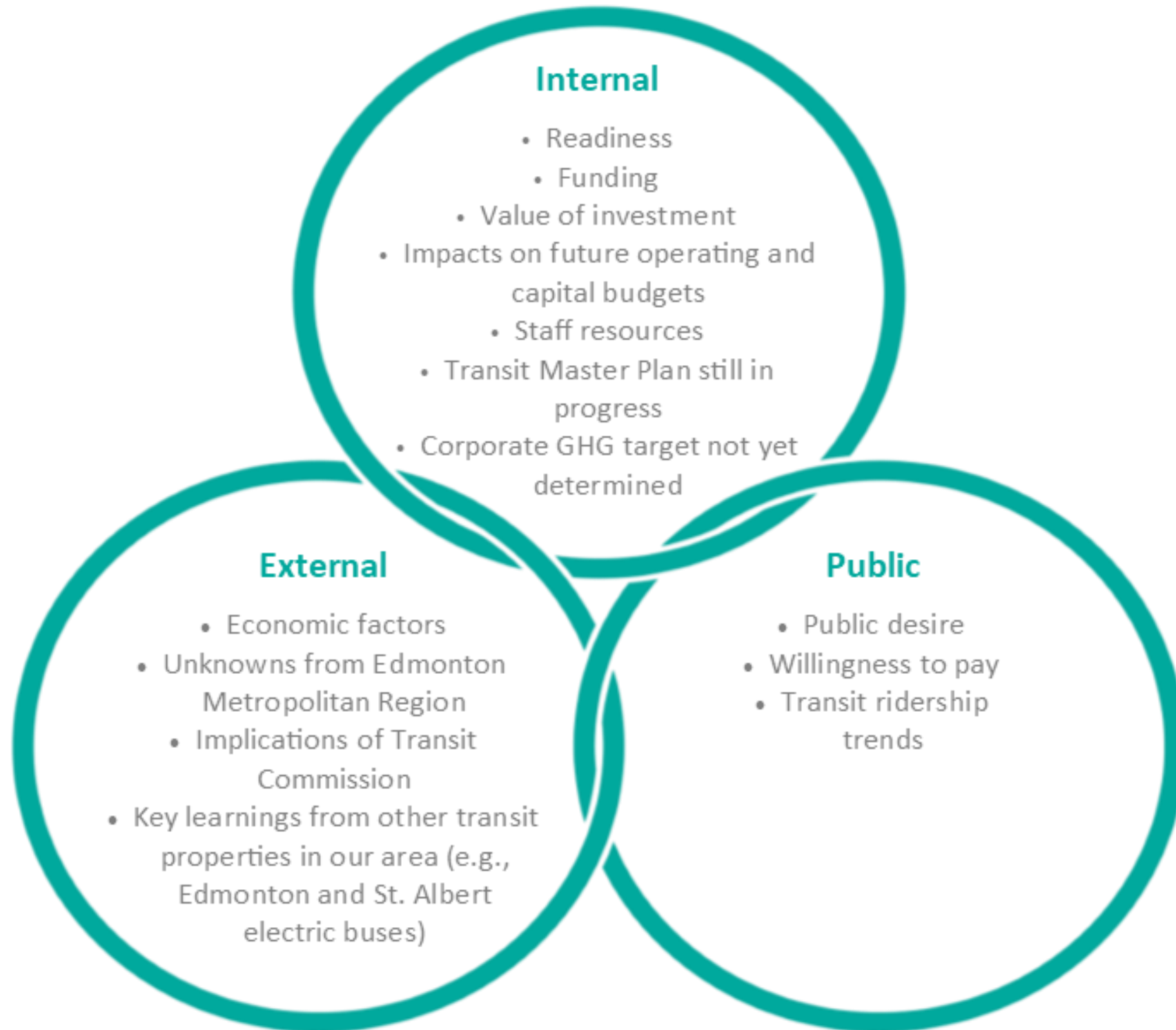
Red Deer	Corporate Greenhouse Gas Initiative
Victoria	Zero Emissions Fleet Initiative
Ottawa	Transit Vehicle Emissions Reduction Strategy
Calgary	Climate Change Program; Green Fleet and Electric Vehicle Strategy



Fleet Partnership

Partners

- Fleet Services' Emissions Reduction Strategy is adaptive and collaborative in nature. The department will respond to emerging technologies and knowledge while working in partnership with stakeholder groups.



Alberta's GHG emissions profile

- | | |
|---------------------------------|-----|
| • Oil sands | 26% |
| • Electricity / heat generation | 18% |
| • Oil and gas mining | 17% |
| • <u>Transportation</u> | 15% |
| • Agriculture | 7% |
| • Residential / Commercial | 6% |
| • Manufacturing / construction | 6% |
| • Industrial | 4% |
| • Waste | 1% |
- Source: www.alberta.ca/climate-change-alberta.aspx

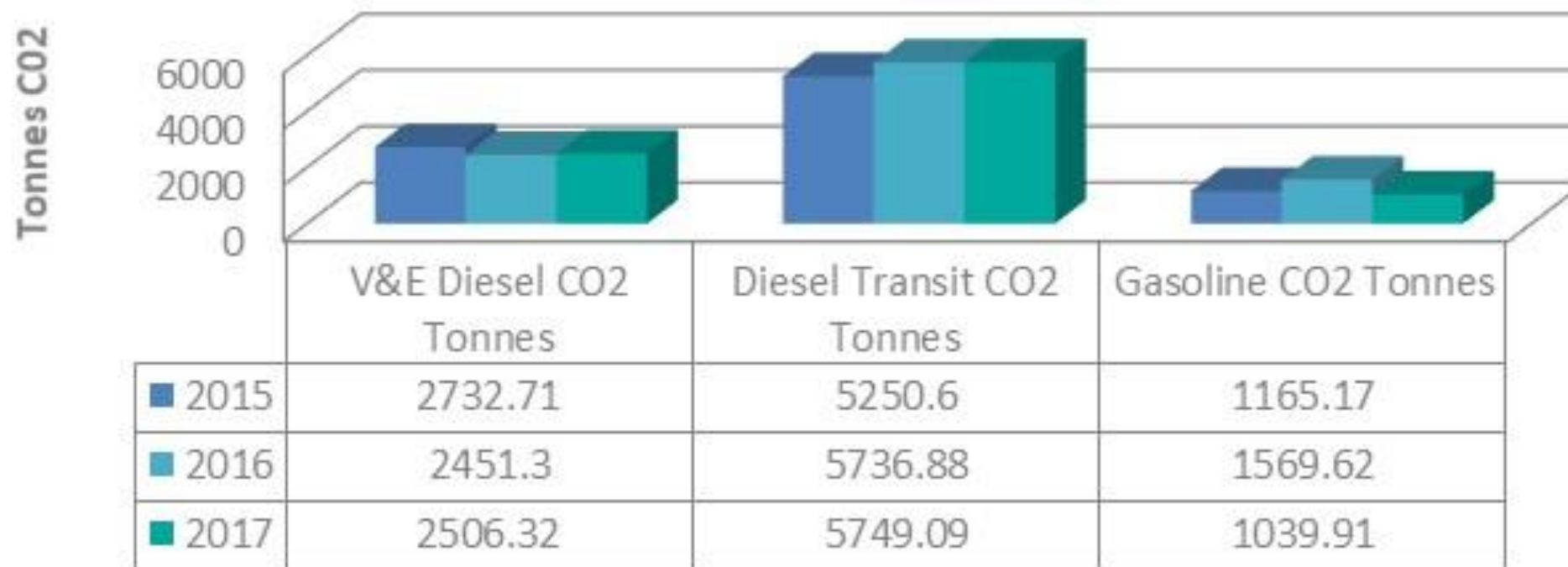


Areas of Focus



Data Collection

Strathcona County Fleet Carbon Footprint 3-Year Comparison by Fuel Type



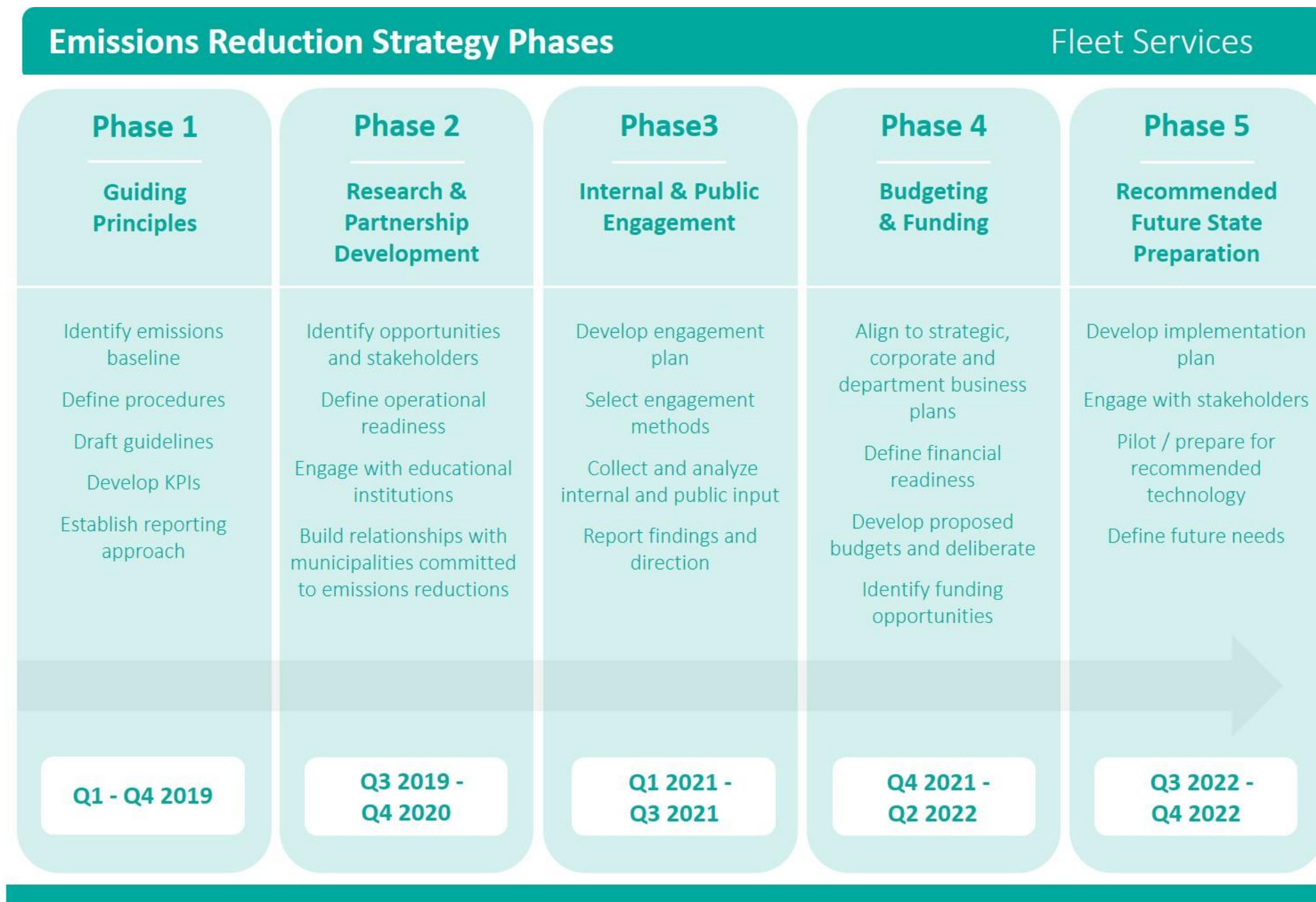
Key components

Emissions Reduction Strategy

- Preventative Maintenance
- Procurement
- Idling Guideline and eco-driving
- Alternative Fuels
- Autonomous vehicles
- Community Engagement
- Emissions target and policy development

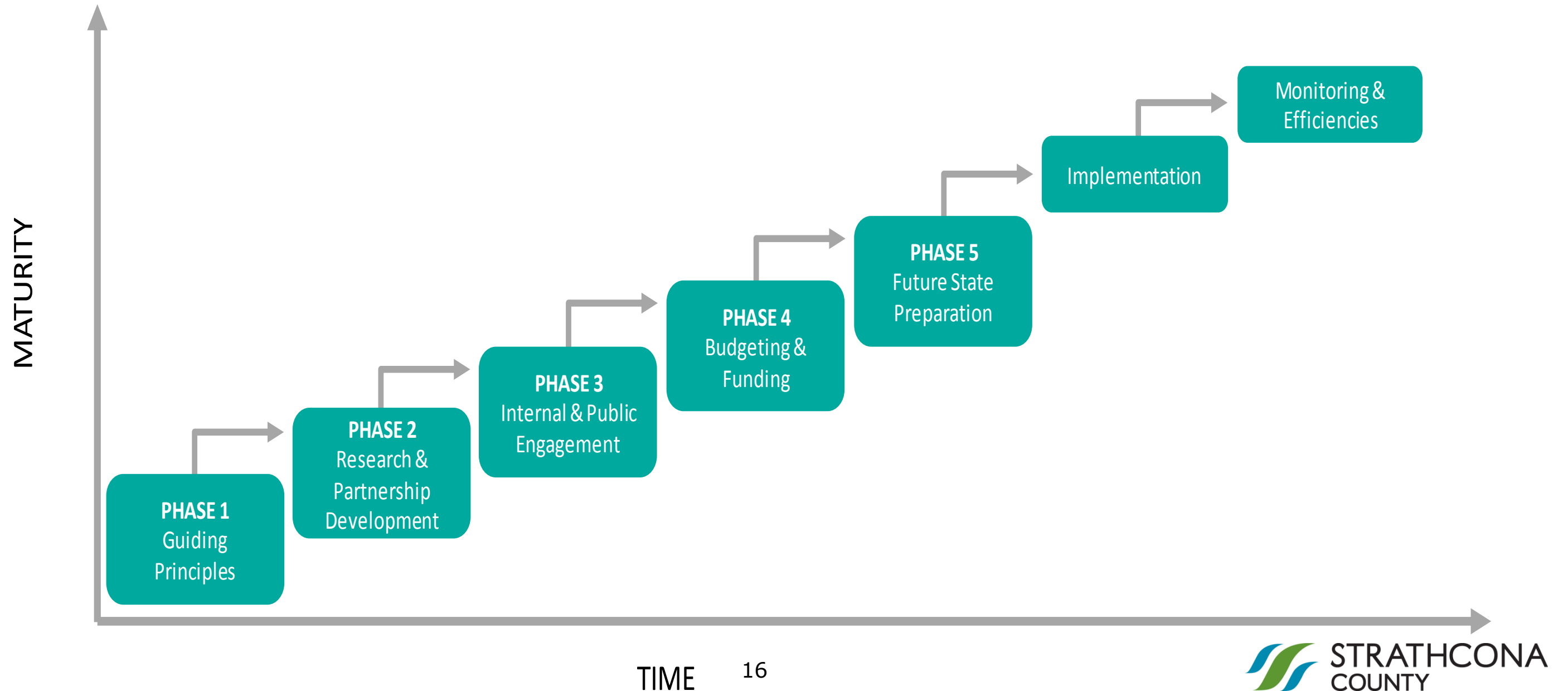
Future State

- Fleet Services is already taking many steps to reduce Strathcona County's carbon footprint from fleet-based service delivery. Building upon these actions and capitalizing on new initiatives through the implementation of this Emissions Reduction Strategy will bridge the gap to the Future State in which Strathcona County is prepared, adequately informed and making significant progress.



Emissions Reduction Strategy

Maturity



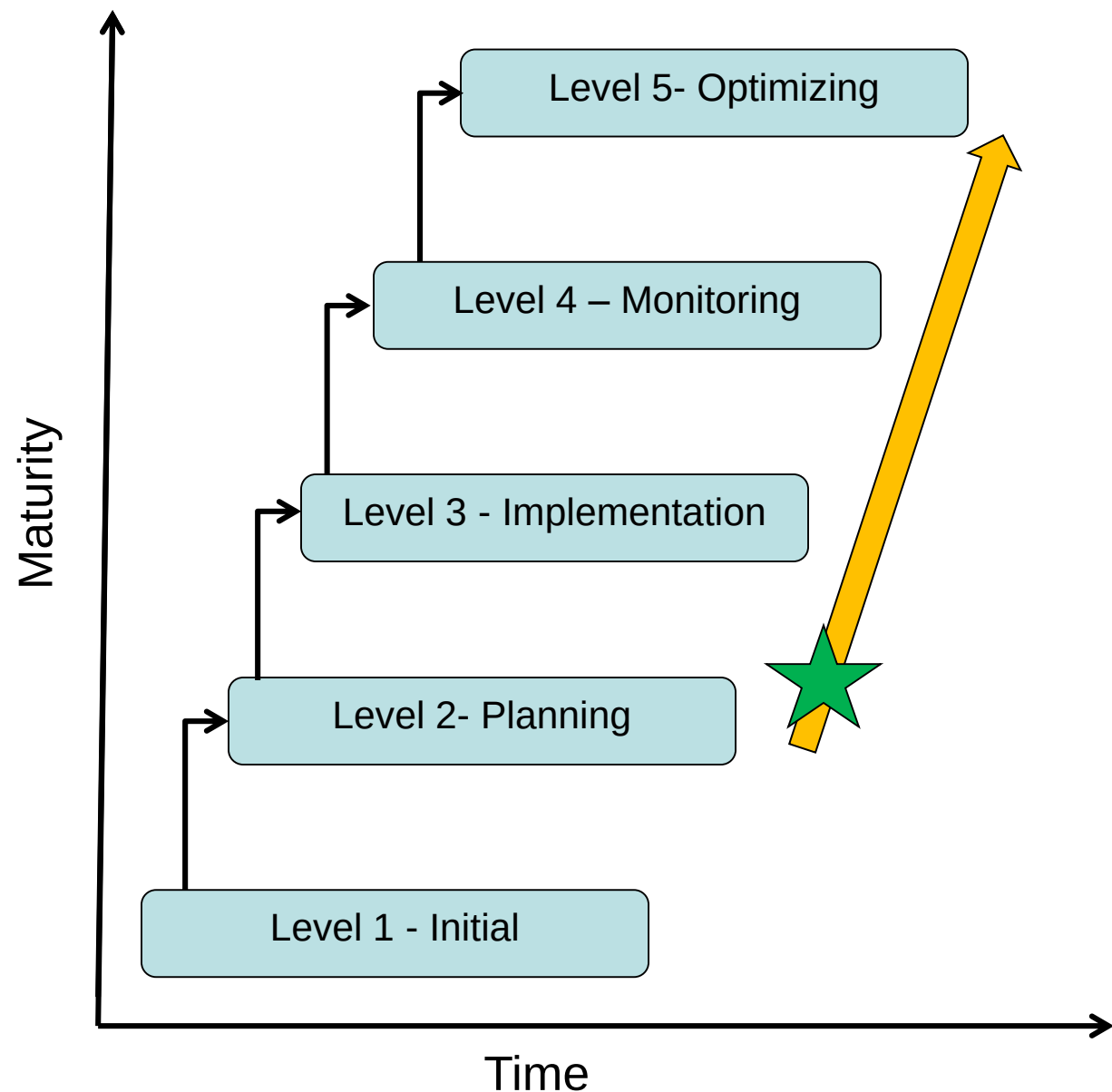
Strategic Energy Management Plan

Objectives:

To facilitate a shift for Strathcona County to become more strategic in the way it approaches energy management and greenhouse gas reductions.

- To confirm energy performance targets
- To confirm the approach to adoption of renewable energy systems
- To confirm criteria used to make energy investment decisions
- To establish performance reporting criteria
- To increase municipal capacity relating to energy management
- To establish continuous improvement culture for energy management

Energy Management Maturity (Buildings)



Level 5	Optimizing	Continuous Improvement
Level 4	Monitoring	- Metering systems and standards - Monitoring and analysis - Routine program audits
Level 3	Implementation	- Investment plans - Procurement strategies - Training and development - Communication - Documentation
Level 2	Planning	- Ensure leadership commitment - Current energy management review - Benchmark current performance - Conduct energy audits for improvement opportunities - Establish energy management roles - Set objectives and targets - Create Action Plan
Level 1	Initial	No defined activities

Energy Management Leadership

To increase the level of maturity in energy management, leadership has to be engaged and participate in setting energy objectives and performance targets.

- Setting of energy performance targets and to support resource investments required to achieve them
- Establishing criteria for renewable energy investments where economics alone will not support the investment.
 - Understanding the value of economic, environmental and social considerations as part of the decision criteria
- Establishing principle or policy statements to support energy management objectives
- Enabling the organization through capacity building

Where We Are Today

- During the fall of 2018;
 - Current energy management assessment completed.
 - Energy Consultant contract finalized
 - Workshops conducted to establish current department activities / energy management maturity
 - Review of energy benchmarks by major facility
 - Review of energy information management systems (Asset Planner)
 - Energy audits conducted on 4 buildings (Millennium Place, Kinsmen Leisure Centre, Strathcona Public Service Yard)
 - Energy reduction target scenarios developed
 - Draft SEMP report submitted.
 - Energy management maturity roadmap developed
 - Selection criteria for energy improvement projects, including renewable energies
 - Benchmarking KPI's
 - Energy Improvement projects identified for the 4 audited buildings
 - \$500,000 approved by Council for 2019 to support energy improvement projects

Scenario Reduction Targets Using BEPI (ekWh/ft²)

	Scenario 1 - Low		Scenario 2 - Medium		Scenario 3 - High	
Year	Reduction Target %	BEPI Target	Reduction Target %	BEPI Target	Reduction Target %	BEPI Target
2017		51.0 Baseline		51.0 Baseline		51.0 Baseline
2018 planning						
2019 Year 1	- 3.8%	49.1	- 5.0%	48.4	- 7.5%	47.1
2020 Year 2	- 7.5%	47.1	- 10.0%	45.9	- 12.5%	44.6
2021 Year 3	- 11.3%	45.2	- 15.0%	43.3	- 17.5%	42.0
2022 Year 4	- 15.0%	43.3	- 20.0%	40.8	- 30.0%	35.7

- Building Energy Performance Indicator (BEPI)
- Example shown is using Community Centre/County Hall, SPSY, Kinsmen Leisure Centre and Millennium Place as indicative properties to establish range of potential energy reduction targets across the facility portfolio.

Draft Energy Improvement Target Required Investments

Scenario	Reduction Target	Estimated Annual Investment	How targets Will Be Met		
			Known Opportunities	Additional Studies Required	Renewable Energy Required
Low	15%	\$400,000 – \$600,000 +	√		
Medium	20%	\$700,000 – \$900,000 +	√	√	
High	30%	\$1m – \$1.4 +	√	√	√
Stretch	TBD	TBD	√	√	√

Potential Energy Savings (Low Target Scenario)

Building	Demand Savings (Kw)	Electrical Savings (Kwh/yr)	Fuel Savings (GJ/yr)	Energy Savings (\$/yr)	Budget Retrofit Costs (\$)	Simple Payback (yrs)	CO ₂ Reduction (tonnes/yr)
County Hall & Community Centre	150.7	871,400	1,470	\$108,000	\$1,100,000	10.2	922
SPSY	19.8	302,100	1,360	\$40,000	\$380,000	9.5	355
Millennium Place	94.1	1,031,400	13,300	\$175,000	\$840,000	4.8	1,643
Kinsmen Pool	0.8	21,900	750	\$52,000	\$57,000	1.1	58
Total Savings 4 sites	265	2,226,800	16,880	\$375,000	\$2,377,000	6.3	2,978
Combined Site Energy Consumption (2017)		14,373,454	92,496	\$2,024,506			
% Savings		15%	18%	19%			

Draft Project Ranking Tool

- Due to capacity, projects are ranked by priority.
- Ranking tool will require Council input as to evaluation criteria rating
- Through the tool projects, resources and timelines can be established

Project Ranking Criteria Inputs:

Years		Score
From	To	
0	2	5
2	5	4
5	10	3
10	15	2
15	100	1

tonnes eCO2/yr		Score
From	To	
200	10000	5
100	200	4
50	100	3
10	50	2
0	10	1

[Click to Rank](#)

Scale: 0 = no impact (neutral), 5 = very positive impact. If negative impact, enter a negative number between -5 and 0.

	Energy & Environmental		Operational			Social			Overall Project Priority Score
	Simple Payback	GHG Reduction	Occupant Comfort	Operator and Public Safety	Severity of Failure of Existing Equipment	Creation of local employment	Demonstrates leadership in renewable energy	Improves services to community	
Score:	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5
Relative weighting factor:	40%	10%	5%	10%	5%	5%	15%	10%	100%

<< Must total to 100%

5.0	2.0	4	2	3	3	0	5	3.40
5.0	5.0	3	0	2	2	0	3	3.15
4.0	4.0	3	5	1	3	0	3	3.15
5.0	2.0	5	2	2	2	0	2	3.05
3.0	5.0	4	5	3	3	0	3	3.00
5.0	1.0	5	2	2	1	0	3	3.00
3.0	5.0	3	5	1	3	0	3	2.85
4.0	3.0	5	2	0	2	0	3	2.75
3.0	4.0	3	5	1	3	0	3	2.75
4.0	3.0	4	2	0	2	0	1	2.50
3.0	2.0	5	3	1	3	0	3	2.45
4.0	1.0	5	2	1	2	0	1	2.40
3.0	2.0	3	2	3	3	0	3	2.35
4.0	2.0	2	0	2	3	0	2	2.35
2.0	5.0	3	3	2	3	0	3	2.30

Draft Project Ranking

- Energy reduction opportunities are identified through audit.
- Opportunities are evaluated as to viability and business cases developed.
- List of projects are ranked through ranking tool.
- Priority list developed, along with resource requirements
- Projects aligned with Facility Lifecycle program
- Capacity / funding / timing requirements confirmed
- Project funding requested though formal budget process.

Energy Project Inputs								Overall Project Priority Score
ECM / Report Section	Description	Facility	Measure Type	Total Cost Savings	Project Budget cost	GHG reduction	Simple Payback	1 to 5
				\$/yr	\$ (est.) Including incentives	tons eCO2/yr	yrs	100%
5.3.3	Natatorium dehumidification heat recovery	MILL	Mechanical	\$ 9,000	\$ 18,000	21	2.0	3.40
5.1.1	Recommission AHU Control	CCCH	Mechanical	\$ 22,000	\$ 15,100	220	0.7	3.15
MILL-L1	Exterior	MILL	Lighting	\$ 23,000	\$ 78,000	197	3.4	3.15
5.4.1	Restore AHU-1 Control	KLS	Mechanical	\$ 37,900	\$ 6,500	28	0.2	3.05
MILL-L2	Rinks/Playing Fields	MILL	Lighting	\$ 38,000	\$ 230,000	330	6.1	3.00
5.4.2	Eliminate Simultaneous Heating and Cooling	KLS	Mechanical	\$ 1,700	\$ 2,600	1	1.5	3.00
CCCH-L2	Parkade	CCCH	Lighting	\$ 33,000	\$ 330,000	303	10.0	2.85
5.3.2	Upgrade Rink Spectator Heating Control	MILL	Mechanical	\$ 5,900	\$ 17,800	63	3.0	2.75
PSY-L1	Exterior	PSY	Lighting	\$ 20,000	\$ 164,000	181	8.2	2.75
5.2.4	Revise Rooftop Unit Control	PSY	Mechanical	\$ 4,800	\$ 9,700	51	2.0	2.50
5.4.3	Add DDC for RTU-4 & RTU-5	KLS	Mechanical	\$ 2,200	\$ 12,800	21	5.8	2.45
5.2.5	New Addition Heating Plant Control	PSY	Mechanical	\$ 700	\$ 3,200	7	4.6	2.40
5.2.1	Main Boiler Plant Mechanical Upgrade	PSY	Mechanical	\$ 2,000	\$ 12,800	19	6.4	2.35
5.1.4	Demand Control Ventilation for Council and Agora	CCCH	Mechanical	\$ 1,200	\$ 3,400	13	2.8	2.35
MILL-L3	Remainder of the Site	MILL	Lighting	\$ 31,000	\$ 322,000	254	10.4	2.30
KLS-L1	Kinsmen Leisure Lighting	KLS	Lighting	\$ 1,100	\$ 9,000	8	8.2	2.30
5.1.3	Improve CHWS Pump Efficiency	CCCH	Mechanical	\$ 700	\$ 3,000	7	4.3	2.30
5.4.4	DHW Temperature Setback	KLS	Mechanical	\$ 600	\$ 700	1	1.2	2.25
7.3.4b	Solar Photovoltaic installation (230kW, 5%)	MILL	Renewable	\$ 22,000	\$ 380,000	348	17.3	2.25
7.3.4c	Solar Photovoltaic installation (460kW, 10%)	MILL	Renewable	\$ 44,000	\$ 750,000	697	17.0	2.25
CCCH-L1	Exterior	CCCH	Lighting	\$ 7,000	\$ 88,000	45	12.6	2.15
KLS-L2	Kinsmen Leisure Power Factor	KLS	Electrical	\$ 8,000	\$ 25,000	-	3.1	2.15
7.3.4a	Solar Photovoltaic installation (100kW, 2%)	MILL	Renewable	\$ 9,600	\$ 150,000	151	15.6	2.15
5.3.4	Cold Water Rink Resurfacing	MILL	Mechanical	\$ 300	\$ 100	3	0.3	2.10
CCCH-L3	Library	CCCH	Lighting	\$ 9,000	\$ 126,000	63	14.0	2.05
PSY-L2	Remainder of the Site	PSY	Lighting	\$ 8,000	\$ 120,000	48	15.0	1.95
CCCH-L4	Remainder of the Site	CCCH	Lighting	\$ 35,000	\$ 526,000	271	15.0	1.85
5.1.2	Revise Cooling Tower Fan Staging	CCCH	Mechanical	\$ 100	\$ 1,000	1	10.0	1.70
5.2.6	DHW Scheduling	PSY	Mechanical	\$ 300	\$ 1,600	3	5.3	1.35
5.2.2	Variable Flow Vehicle Exhaust System	PSY	Mechanical	\$ 2,800	\$ 46,300	30	16.5	1.30
7.1.1	Demand Controlled Ventilation for Vickys Kitchen	CCCH	Mechanical	\$ 5,200	\$ 53,500	49	10.3	1.25
5.2.3	Vehicle Bay MAU-1 and Exhaust Fan Control	PSY	Mechanical	\$ 1,200	\$ 19,300	15	16.1	1.20

Next Steps

- Complete the SEMP and present to Council
 - Confirm energy management objectives
 - Confirm energy performance targets
 - Confirm project evaluation criteria
 - Confirm approach to renewable energy adoption
- Implement maturity road map through;
 - Complete energy audits for remaining buildings
 - Develop investment strategies
 - Staff training and development
 - Technology enhancements
 - Establish monitoring and performance KPI's
 - Improve energy use communication / reporting
 - Establish continuous improvement culture for energy management

Questions?

