

Implementing Guelph's Community Energy Plan

Mayor Karen Farbridge

Federation of Canadian Municipalities

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External Drivers (global)

- Climate change
- Energy security
- Declining supply (peak oil)
- Rising cost
- Political and social pressure for action (CSR)
- Provincial, national & international policy & regulation





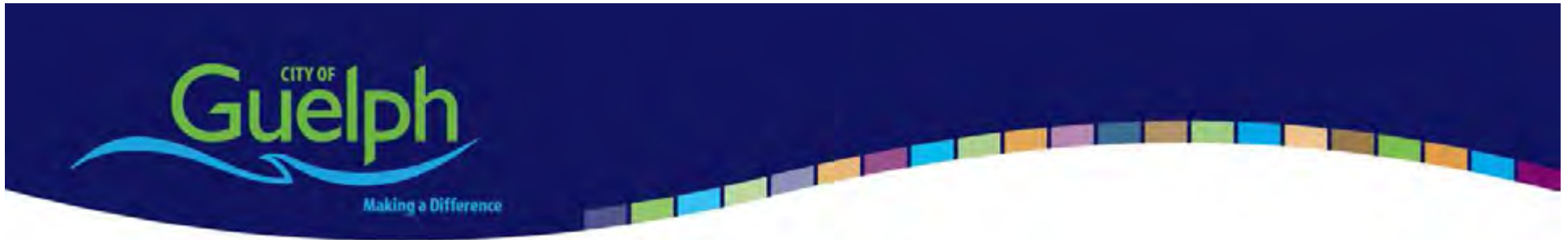
Energy Productivity and GHG Overview

Energy / Economic Productivity KWh (equiv.) / \$ GDP		Greenhouse Gas per Capita Tonne CO ₂ (equiv.)	
Canada	5.2	Canada	23.7
USA	2.8	Ontario	16.4
Sweden	2.4	USA	23.9
Germany	2.2	EU	9.3
		Sweden	7.8
		<i>Guelph</i>	<i>12</i>



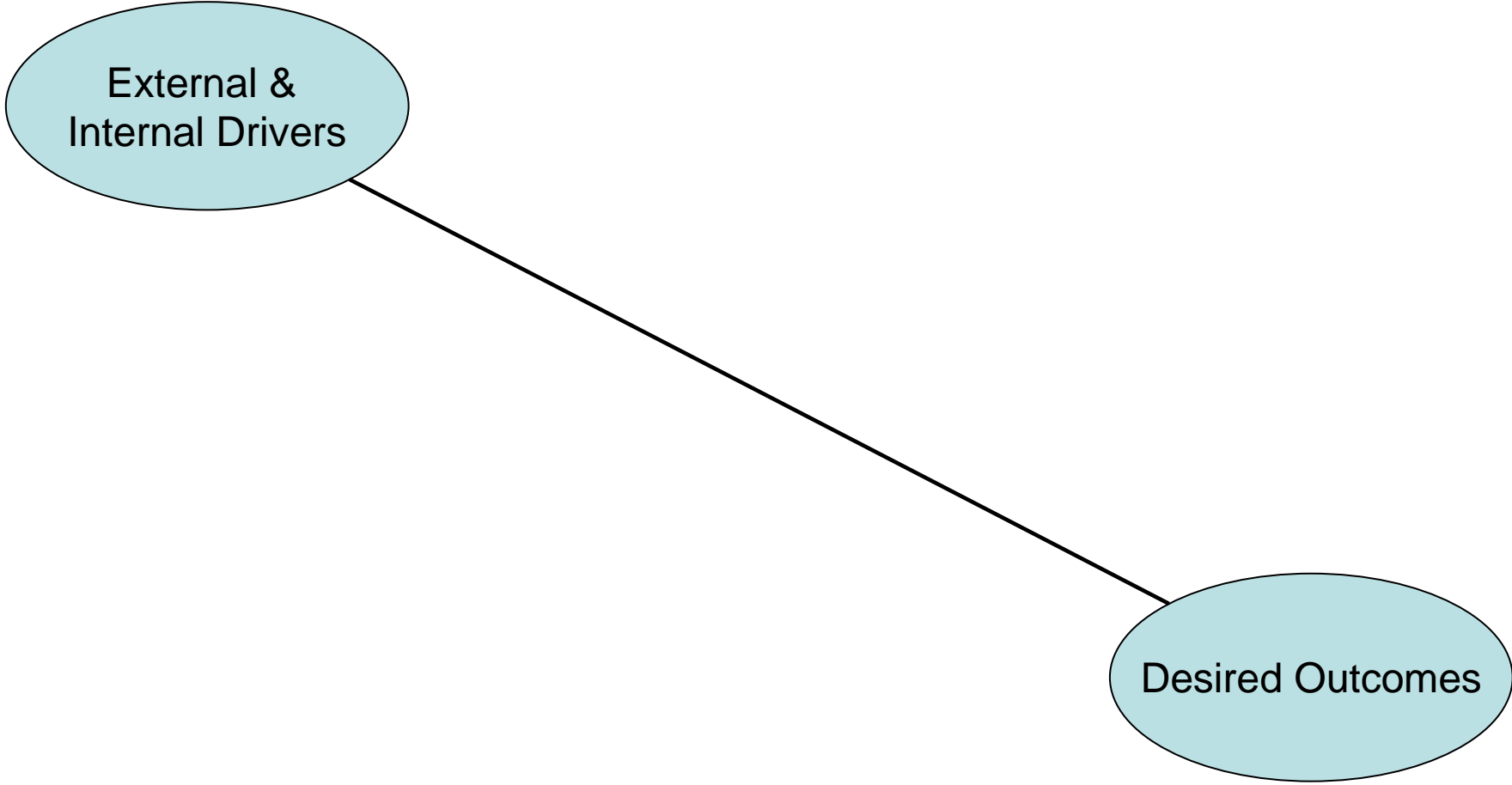
Internal Drivers (local)

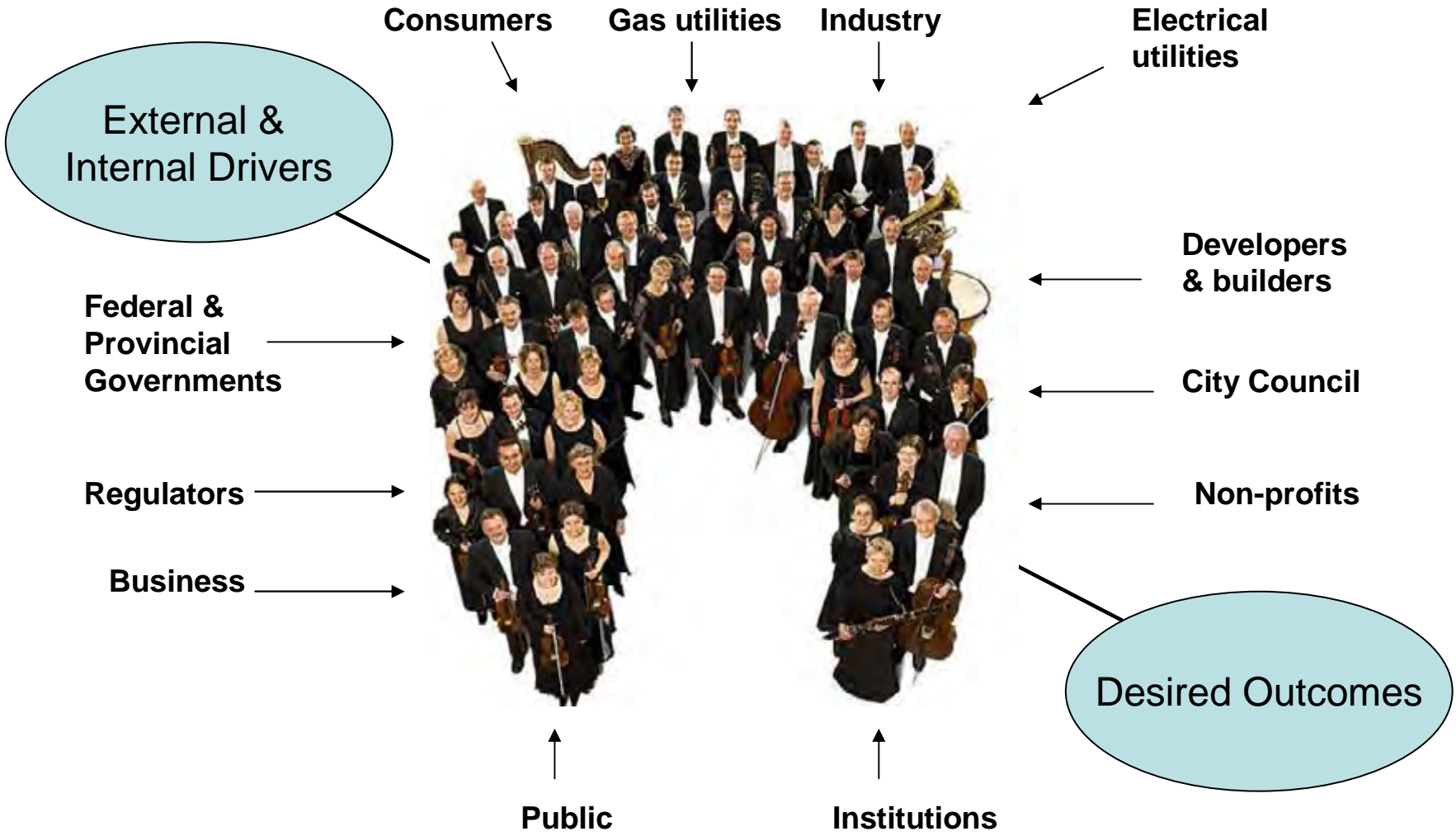
- Competitiveness
- Community resiliency
- Energy security
- Environmental sustainability
- Managing population growth
- Political and social pressure
- Demonstrating municipal leadership
“Making a Difference”



Outcomes (Local Benefits)

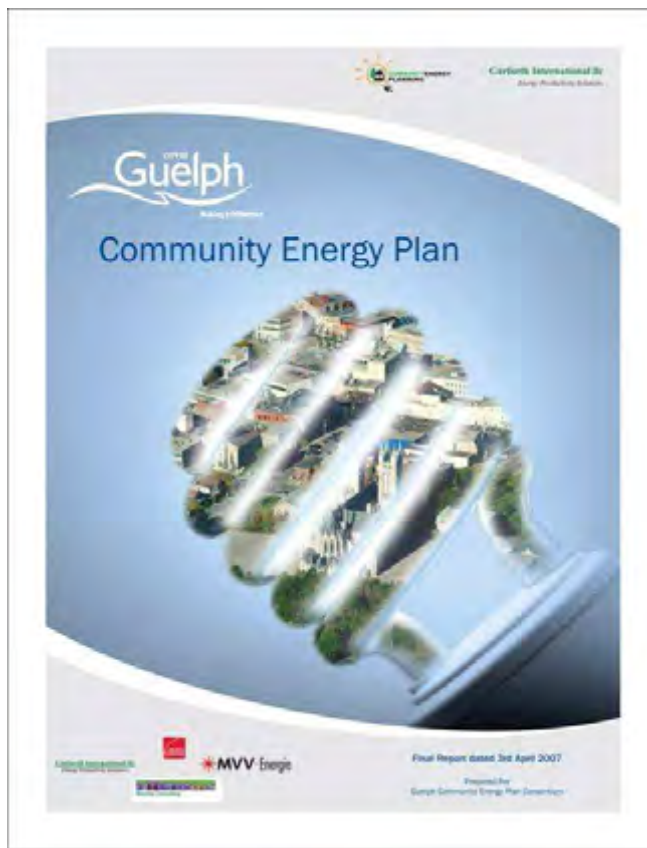
- Investment
- Talent
- Reputation/centre of excellence
- Reliable, competitive energy, water and transportation services
- Lower than average per capita use of energy and green house gas emissions
- Visibility of public investments into CEP goals







Community Energy Plan (2007 – 2031)



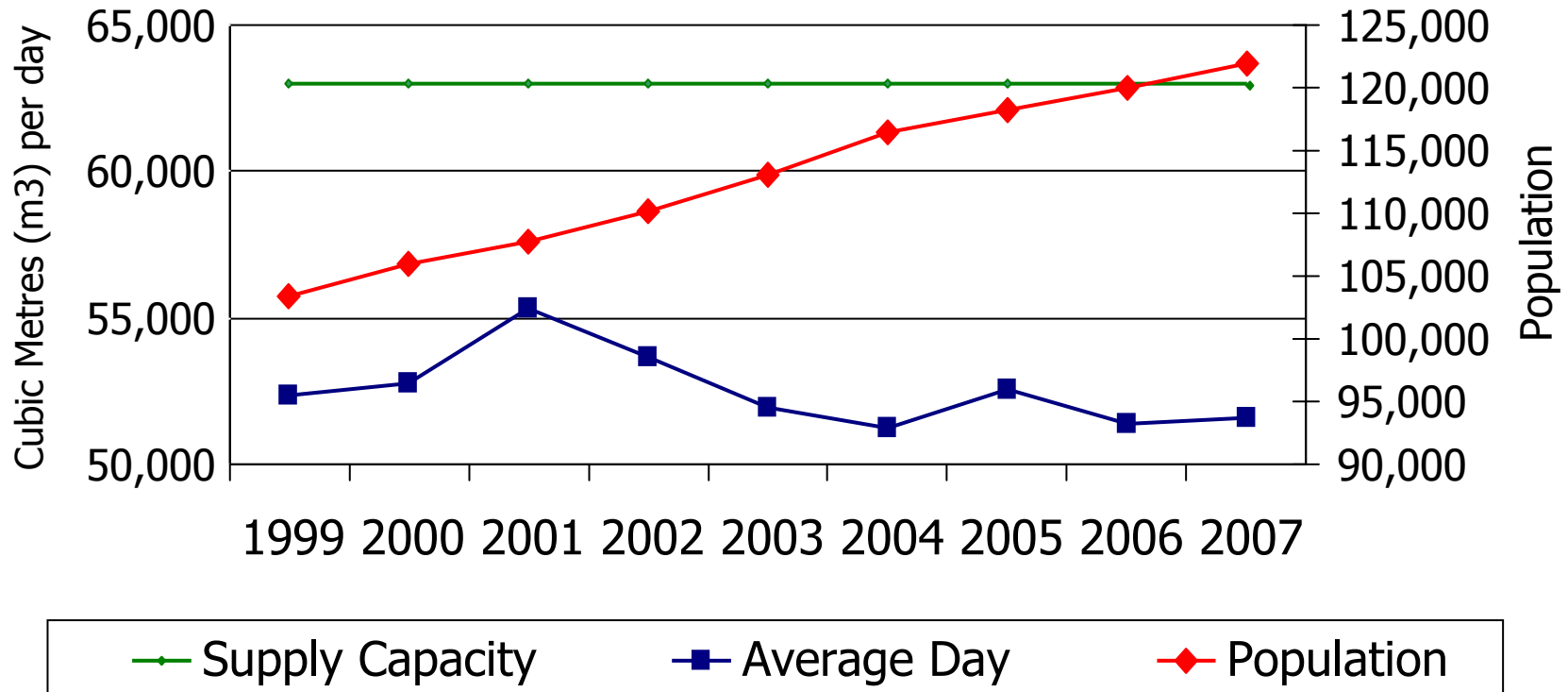
50% less energy use per capita

60% less GHG emissions per capita

Decouple energy consumption from population growth



Historical Average Day Water Demand





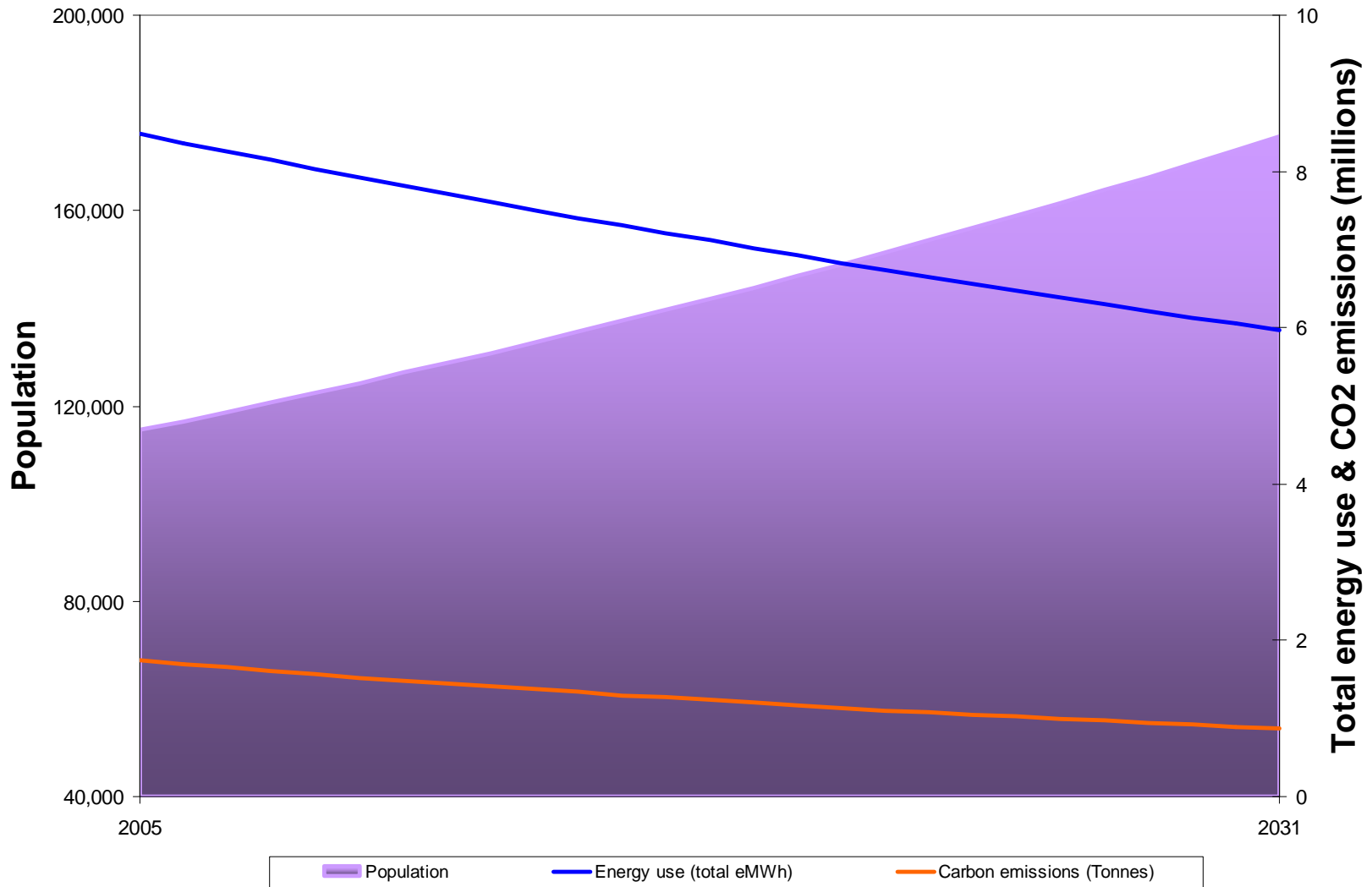
Co-benefits of Water Conservation

2,412 tonnes of CO₂ reductions per year

2,348,934 KWh reduction in annual City electricity use
(\$140,936)

Defer up to \$44 M in infrastructure costs for new water supply

Model for energy conservation programs



Dysfunctional Energy Supply Chain

From fuel to service

Uses 70% of all energy

25%

5%



- High greenhouse gas
- High-cost low returns
- High risk

Pay for 100 get less than 10

Community Energy Plan (2007 – 2031)

25% renewable energy in 15 years

10% biomass for base load heat (2031)

20% solar for electricity demand (2031)

40% reduction in the summer grid electrical peak (2031)





Community Energy Plan (2007 – 2031)

30% electricity associated with combined heat & power (2031)

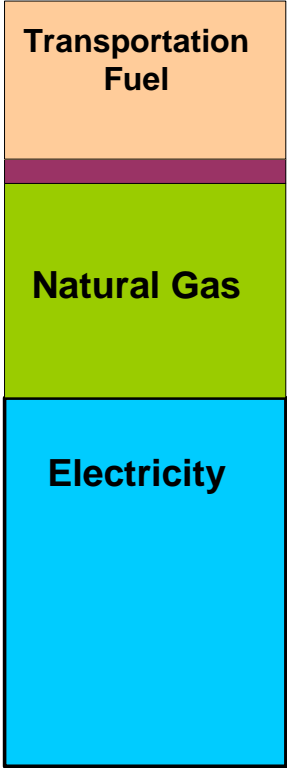
25% reduction transportation-related energy costs (2031)

Conservation & efficiency

Investment in the green economy & green jobs

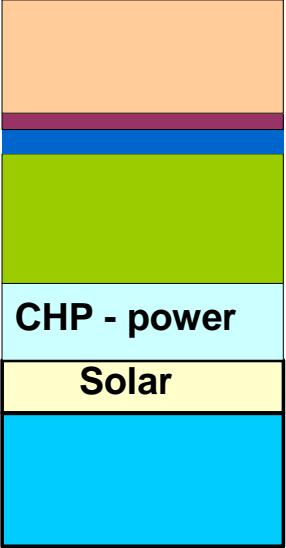
Energy Source Profile Change

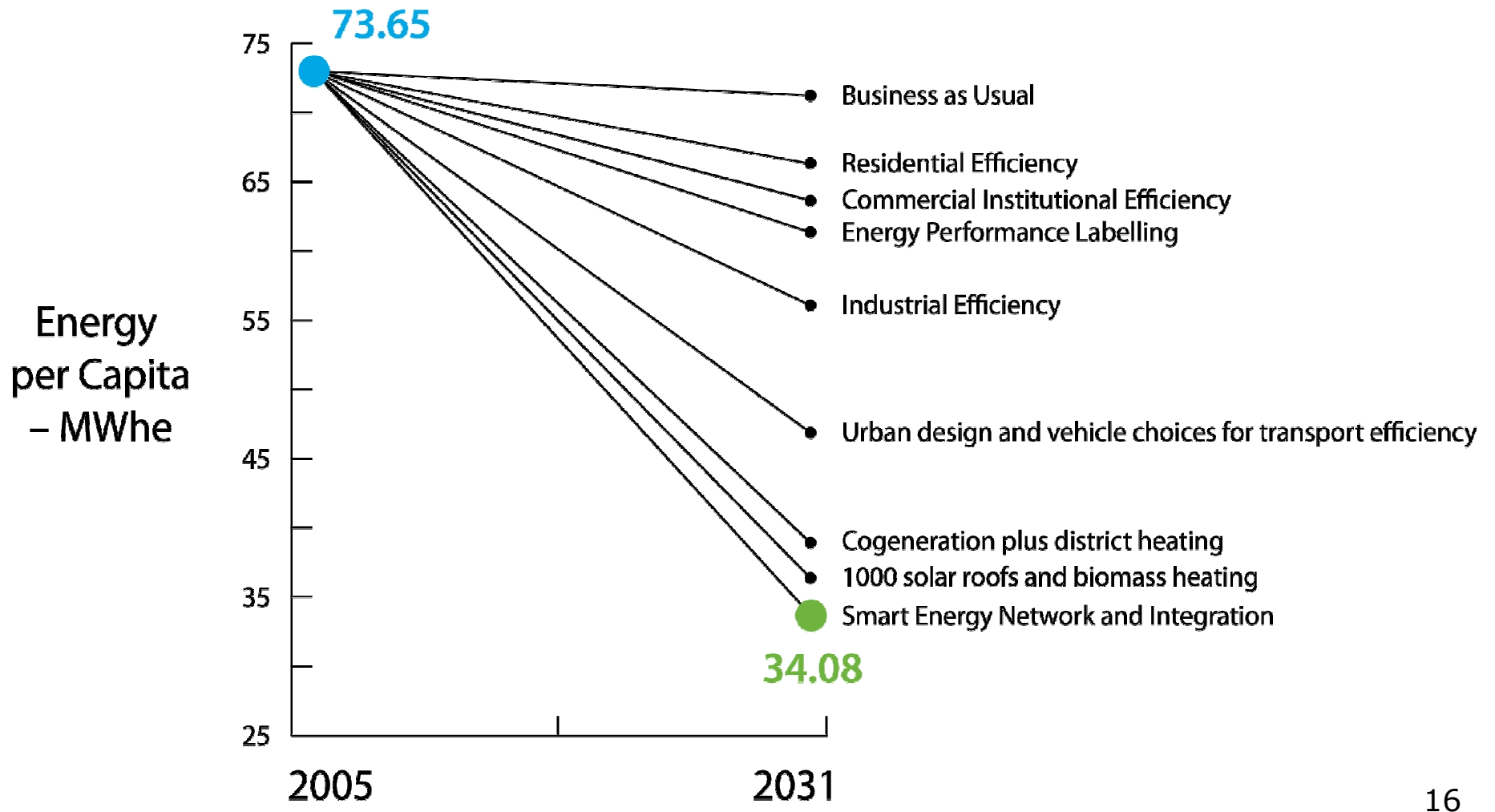
2005

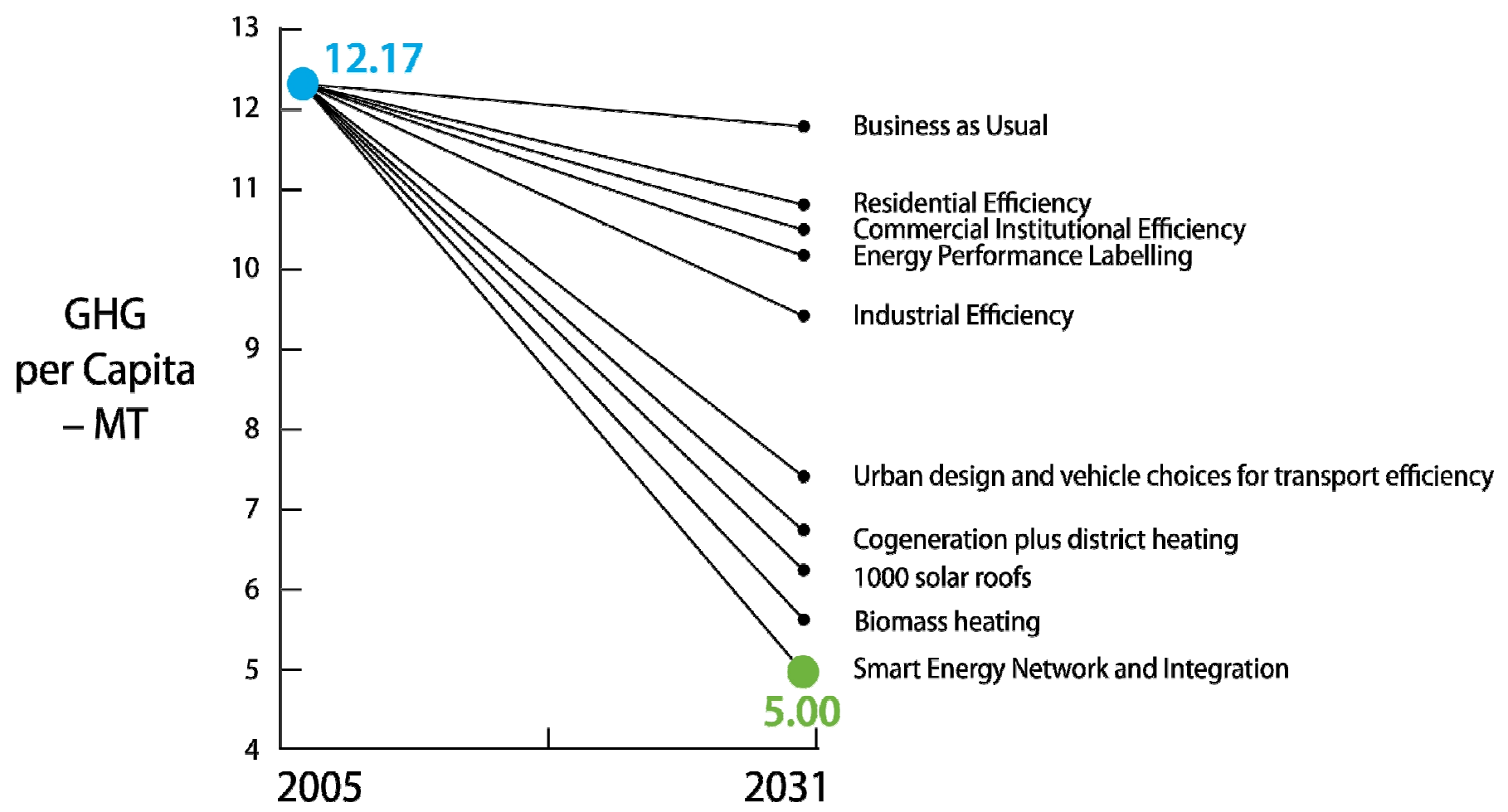


2031

CHP – heat →





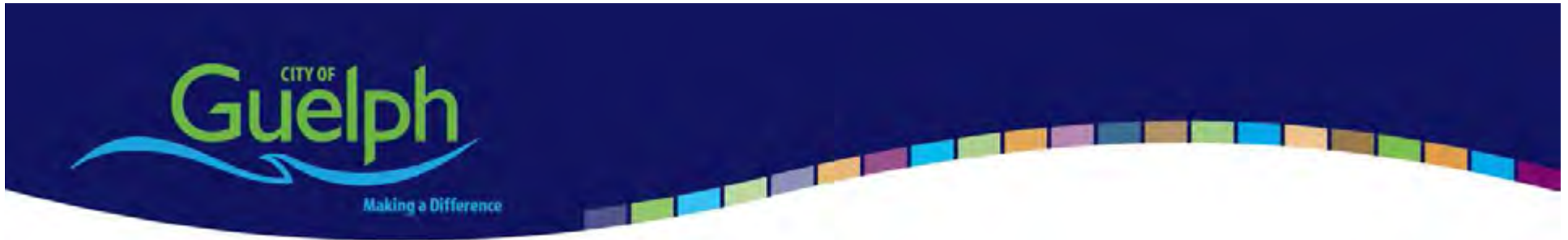




Prioritization of CEP Recommendations

Guelph CEP “Loading Order”

- | | |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1. Energy Efficiency | If you don't need it, don't use it |
| 2. Heat Recovery | If it's already there, use it |
| 3. Cogeneration | Why waste fuel at the power plant? |
| 4. Renewable Energy | If it makes sense, go carbon free |
| 5. Team with utilities | Invest where it makes sense;
maximize the use of the grid as a
resource to optimize the overall
system and ensure reliability |



Efficiency

- **City Leadership Activities**

- Water and Wastewater efficiency and optimization
- Energy Audits & Retrofits of City facilities
- City Fleet – Testing Energy Efficient Vehicles
- NRCan – Building Performance Labelling Pilot
- Operation Power-Down
- Mayor’s Megawatt Challenge (City facilities)



Efficiency

- **Guelph Hydro as a Key Partner and Leader**
 - Lead partner in Conservation and Demand Management (CDM) activities
 - Great Refrigerator Round-up
 - Peak Saver Program
 - Summer Savings Program
 - Electricity Retrofit Incentive Program (ERIP)



Efficiency

- **Community-led Activities**

- Green Impact Guelph (Guelph Environmental Leadership)
- Energy Productivity Improvements (GEL) – Home kits
- Project Porch Light – 40,000 CFL delivered to homes

- **Development Industry**

- First LEED Platinum home in Canada
- LEED Commercial Node
- Energy Star Homes

Hospital District Energy System – Phase 1
Natural gas cogeneration (CESOP)

Downtown District Energy System – Phase 2
Geothermal potential

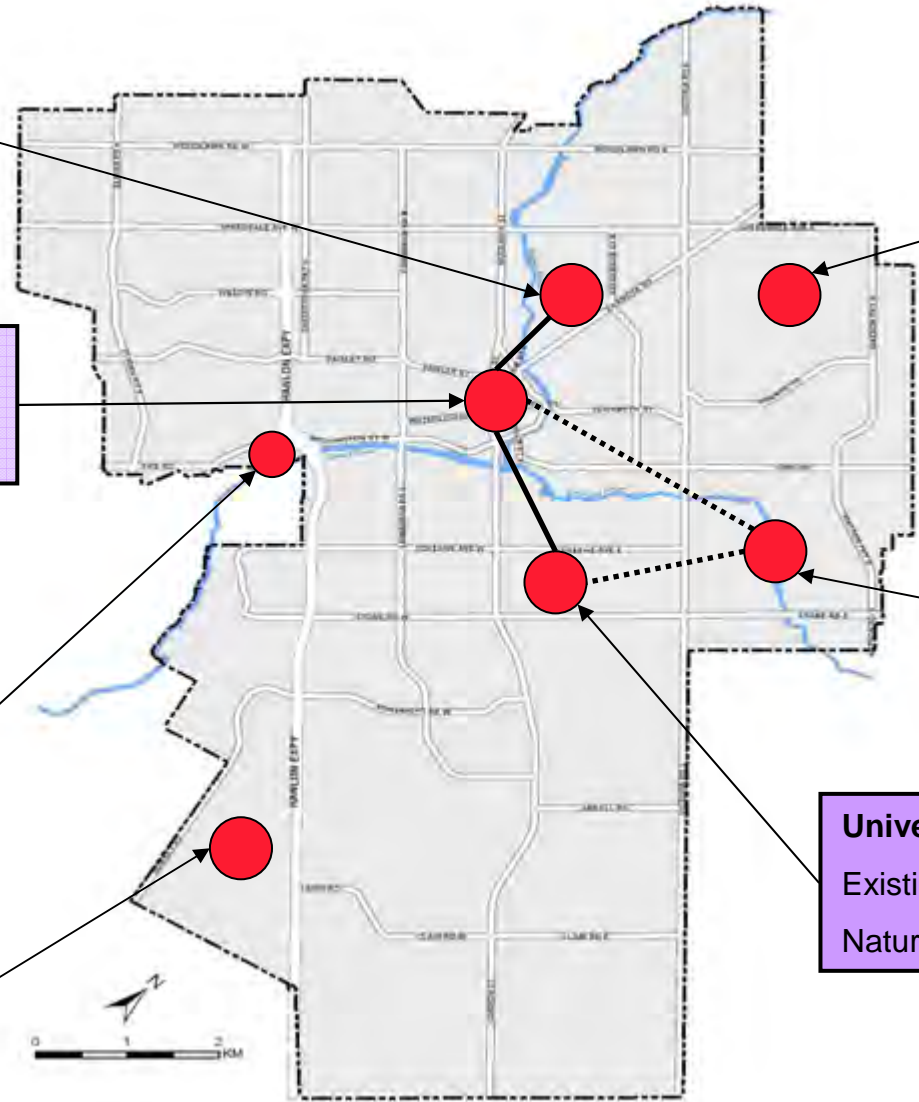
Wastewater Treatment Plant
Biogas cogeneration

Hanlon Creek Business Park District Energy System

Ecotricity
Landfill gas cogeneration with CHP Potential

Guelph Innovation District Energy System

University Cogeneration
Existing District Heating
Natural gas (CESOP)



Integrated Energy Management

Inputs

Outputs

CO2 equivalent emission reductions

Landfill gas (2 MW)



80,000 tonnes /yr



Methane



Cogeneration facility



Electricity (100,000 MWh)
= to power 2800 homes



Heat (3,200 MWh/y)
= to heat 500 homes

Renewable energy



100,000 tonnes/yr

Industrial anaerobic digestion of waste (2 MW)

864 tonnes/yr



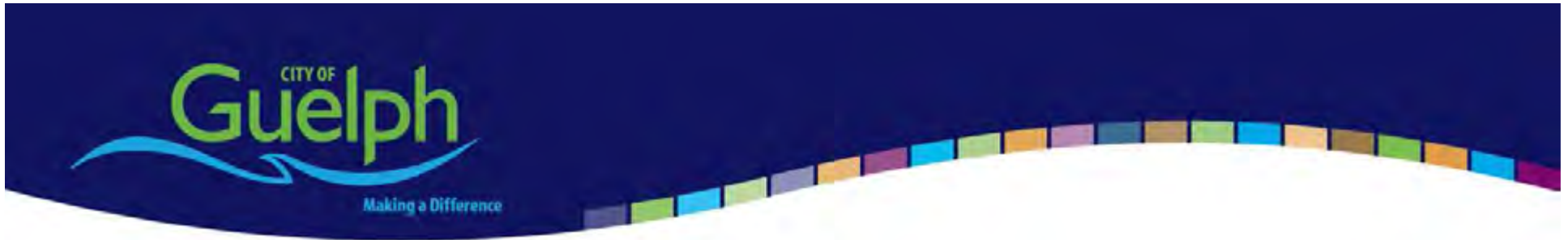
District energy system



Wastewater Treatment Facility

Cogeneration

- Biogas from biosolids
- 4,020 mWh green energy (power 469 homes)
- 3,500 tonnes of annual GHG reductions
- \$300K annual savings



University of Guelph

Cogeneration (existing district heating)

- 7.2 MWe of electricity
- 26.4 MWt of 150 psi steam
- \$400K annual savings
- 16,000 tonnes annual GHG reductions
- Backup generator to protect critical research projects in the event of an extended grid power outage
- Benefits GHESI and Hydro One by reducing load in a constrained region

Renewables

- 1,000 Solar Roofs
- Solar Park – Letters of Interest
- Biofuels in City Fleet
- Biogas (landfill, wastewater bio-solids, industrial waste)
- Assess geo-thermal for larger developments

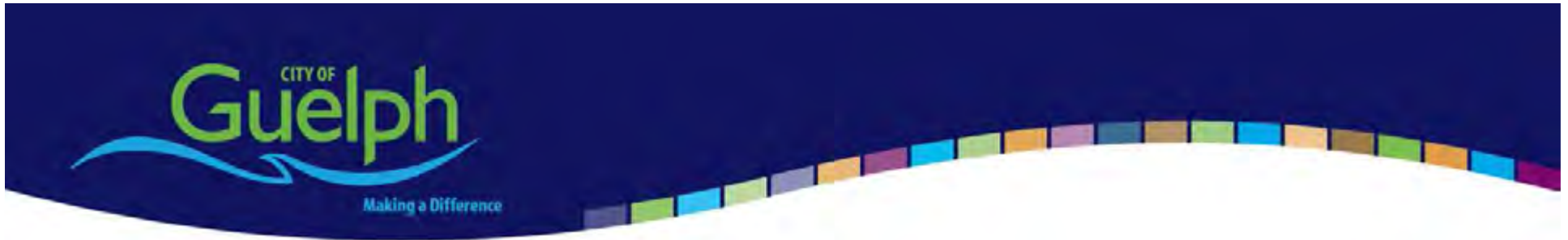


Key City Role – Reporting

Leverage rigorous planning analysis into reporting systems

- Map Building Categories
- Map Transport Flows / Energy Use
- Model Energy / Water Demand
- Model Energy Supply
- Greenhouse Gas by Key Source
- Legal / Regulatory Frameworks
- Reconcile Modeling Results to Gas / Electricity Data
- Benchmark against Canada and Global Best Practices





City levers

- New City Positions
 - Energy Conservation Coordinator
 - Community Energy Plan Program Manager
- Building Efficiency Guidelines
- City Policies and By-laws
- Energy Zoning Guidelines
- Planning and Permit Requirements
- Transportation Guidelines
- Energy Mapping (CUI partnership)



State of the Science (QUEST/OCE/CUI etc)



External &
Internal Drivers

- Leadership & governance
- Integrated decision making process
- Measurement & reporting
- Sustainable investment & funding
- Technology availability & innovation
- Talent
- Stakeholder engagement
- Stakeholder & individual participation



Templates/Methodologies (GHI/OCE MOU)

Desired Outcomes



Thank you for your
attention