Town of Newmarket
Municipal Energy Plan

Council Workshop #2
January 25th, 2016

Planning & Building Services
Planning Division

Town of Newmarket
395 Mulock Drive
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Welcome

Agenda, Project Team and Schedule

Workshop Agenda

Time	Topic	
10:00	Welcome and Opening Remarks	Adrian Cammaert
10:05	Agenda Review, Project Team and Project Schedule	Susan Hall
10:20	MEP Baseline, Base Case and Energy Mapping	Susan Hall
10:40	MEP Strategies Strategy 1 – Efficiency Strategy 2 - District Heating Strategy 3 – Solar	Peter Garforth
11:15	Q&A	All
11:30	Discussion	All
11:55	Next Steps	Susan Hall

Consulting Project Team

Susan Hall

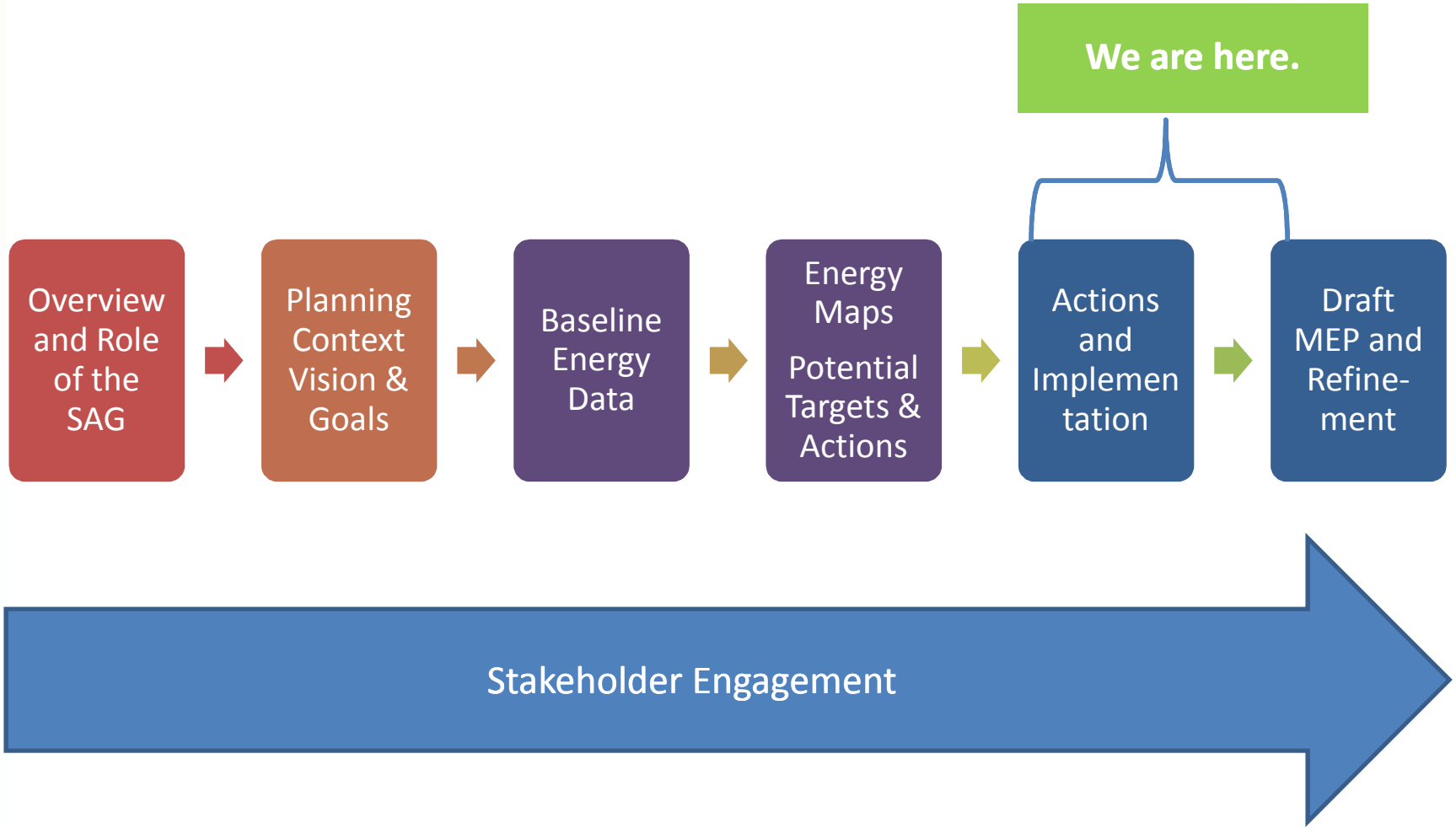
Megan Meaney

Peter Zerek

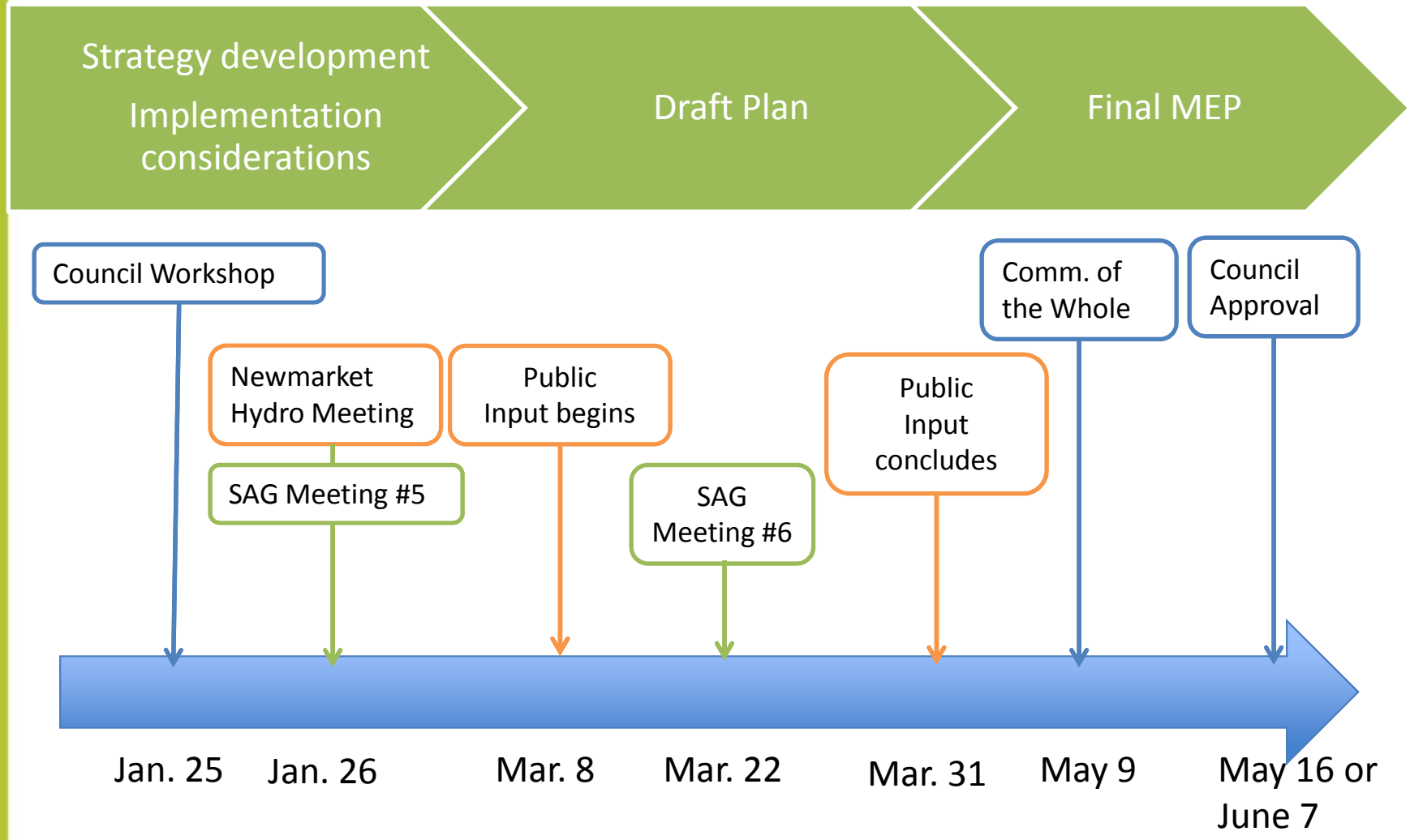
Peter Garforth

Michael Dean

MEP Planning Process Diagram



Project Schedule Update



Stakeholder Advisory Group

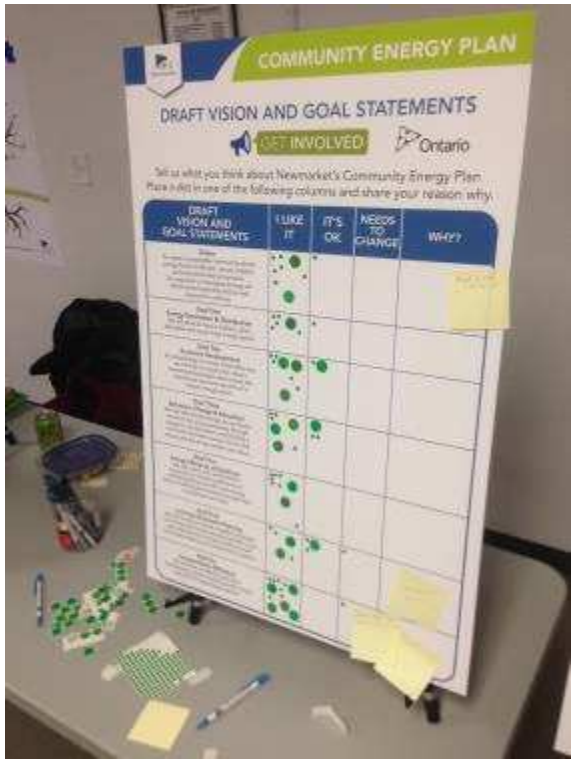
Energy generation & distribution	Energy users
Buildings & built form	Land use planning & development
Transportation	Outreach & Economic Development

- Strategic Advice through each phase of the project:
- Sounding board
- Guidance, critiques and suggestions
- Technical advice and knowledge
- Participating
- Identifying issues or concerns

Update on Community Engagement

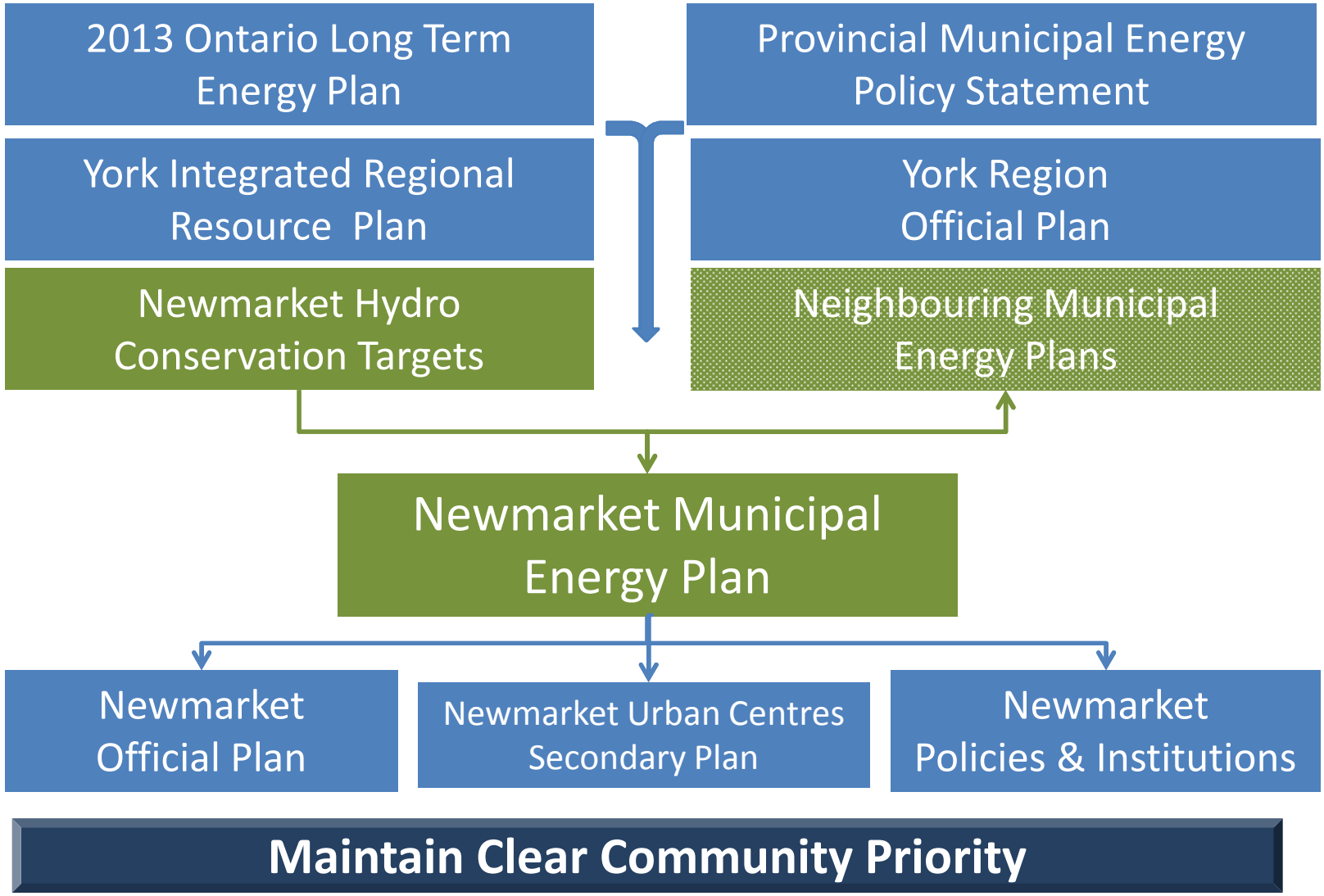
- Community engagement:
  - December 2, 2015 – Magna Centre
  - December 3, 2015 – Community Open House @ Community Centre
  - ~75 participants
  - Received good feedback on preliminary Vision, Goals and Actions.
- Newmarket Business Leaders meeting (Chamber of Commerce & Main Street BIA)
  - ~5-10 participants
  - Presentation of the draft vision, goals, targets and efficiency strategies, introduction to District Energy and best practices
  - Received good feedback on project objectives and actions.

Community Engagement: December 2015 Pop-ups



http://www.yorkregion.com/news-story/6164480-newmarket-s-strategic-priorities-discussed-during-open-house/

Energy Planning Context
Lead and Collaborate

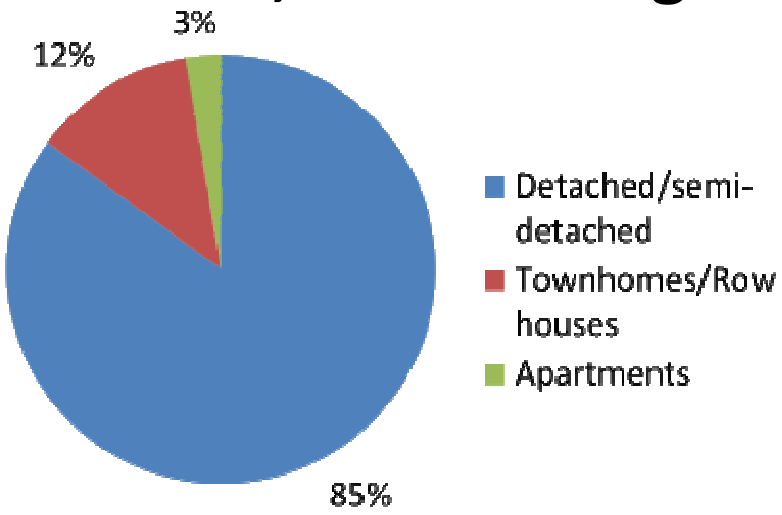


Baseline, Base Case and Energy Mapping

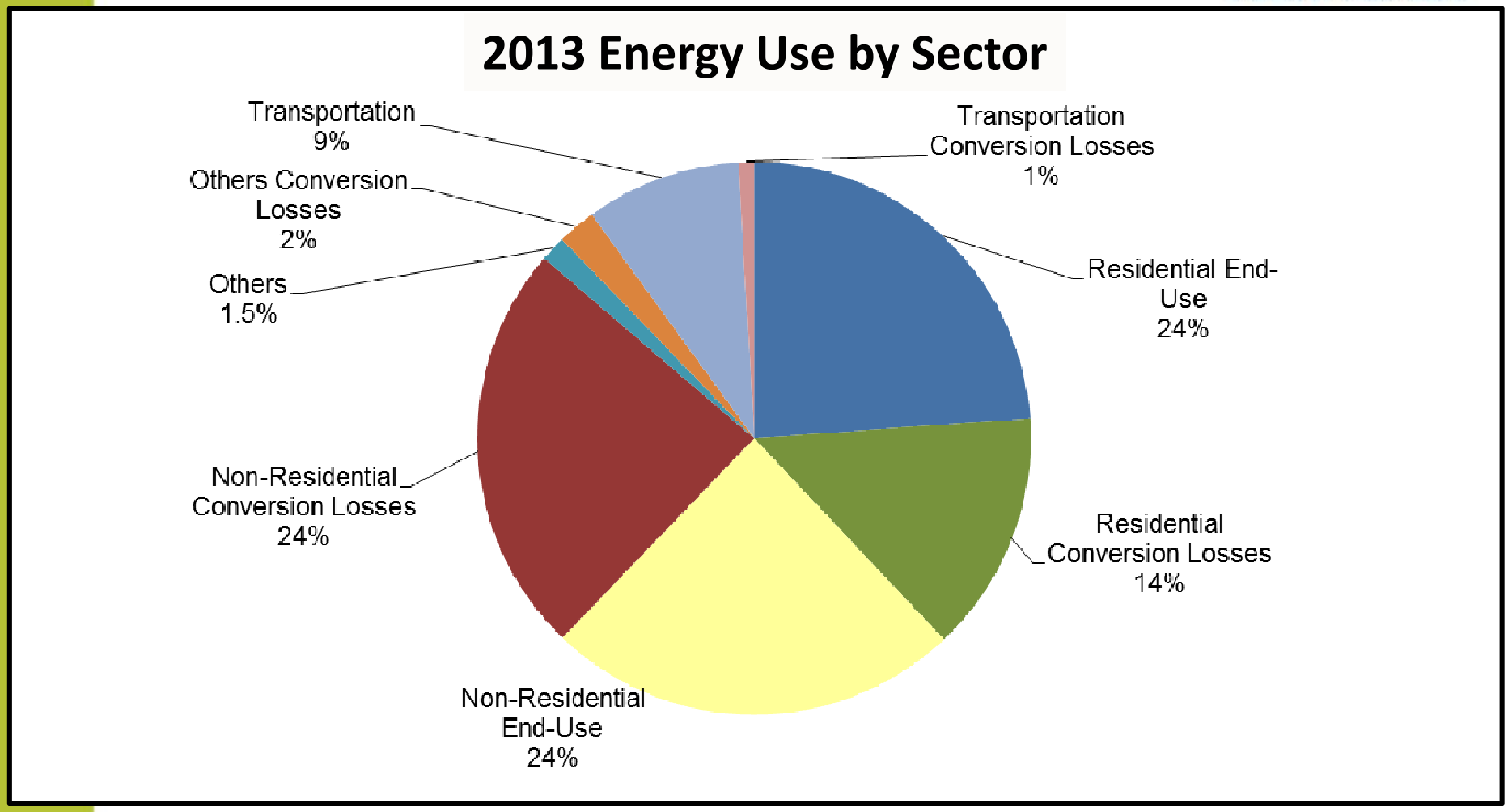
Town of Newmarket

Brief Overview

- **Area:** 38.33 km^2
- **Population:**
  - 86,819 in 2013 rising to 105,885 in 2031
  - Grown by 7.6% since 2006
- **Households: 24,387 dwellings**



Newmarket MEP Baseline
Customer Energy Use–16.3M Gigajoules

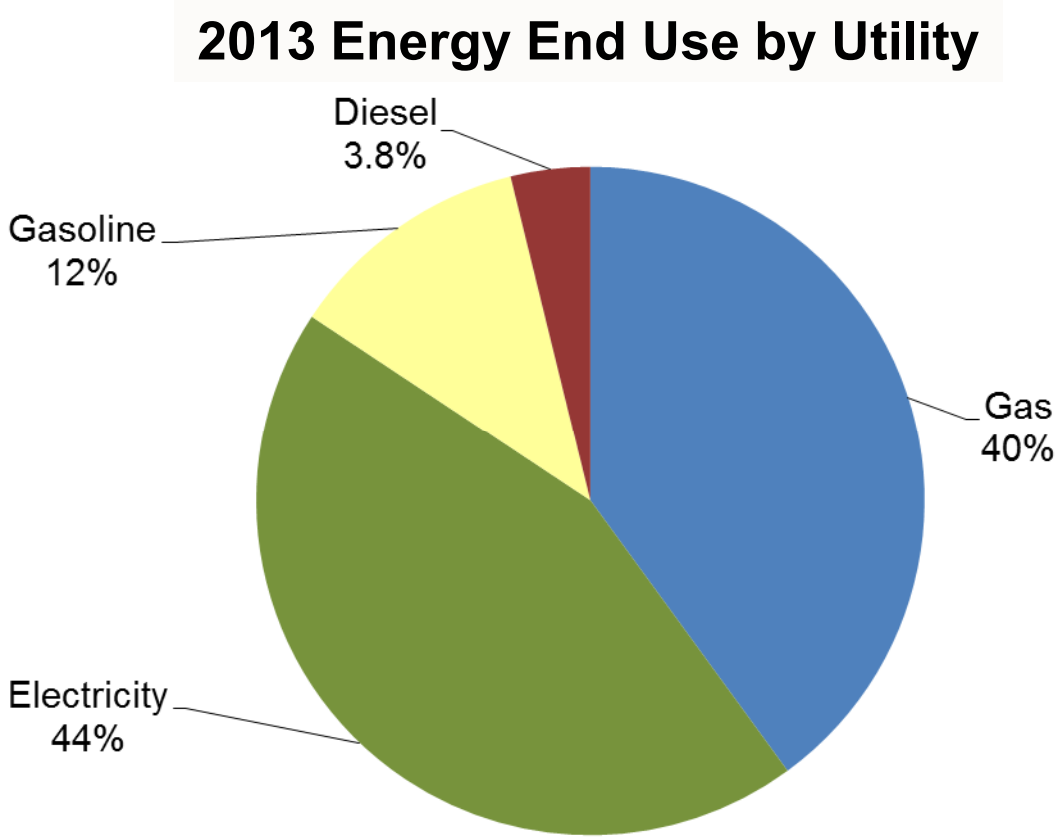


Over 40% Conversion Loss

Draft data subject to revision

Newmarket MEP Baseline

Utility Energy-End Use: 9.6M GJ



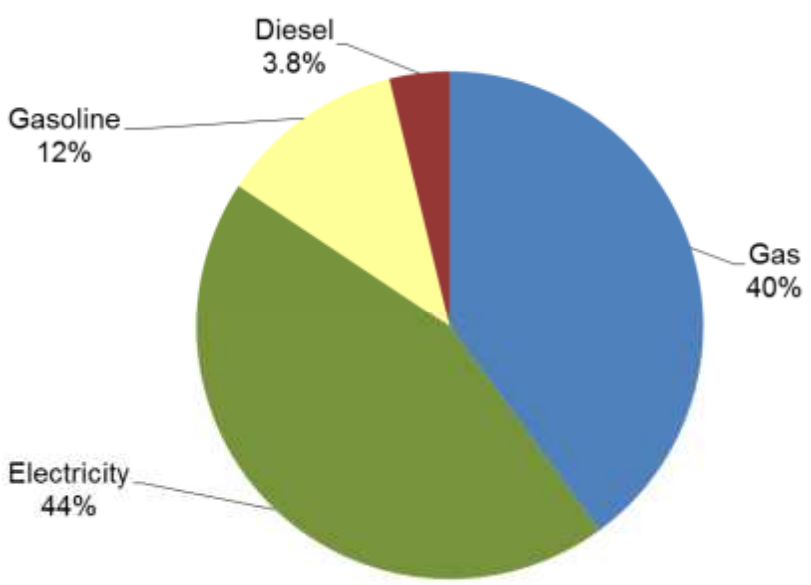
110 GJ for each Resident

Draft data subject to revision

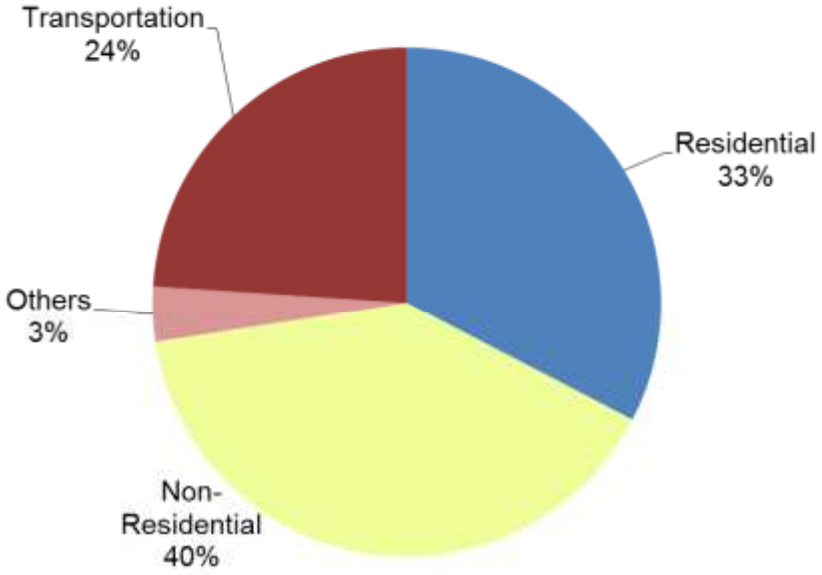
Newmarket MEP Baseline

Energy Cost ~ $242 Million

2013 Energy Cost



By Utility



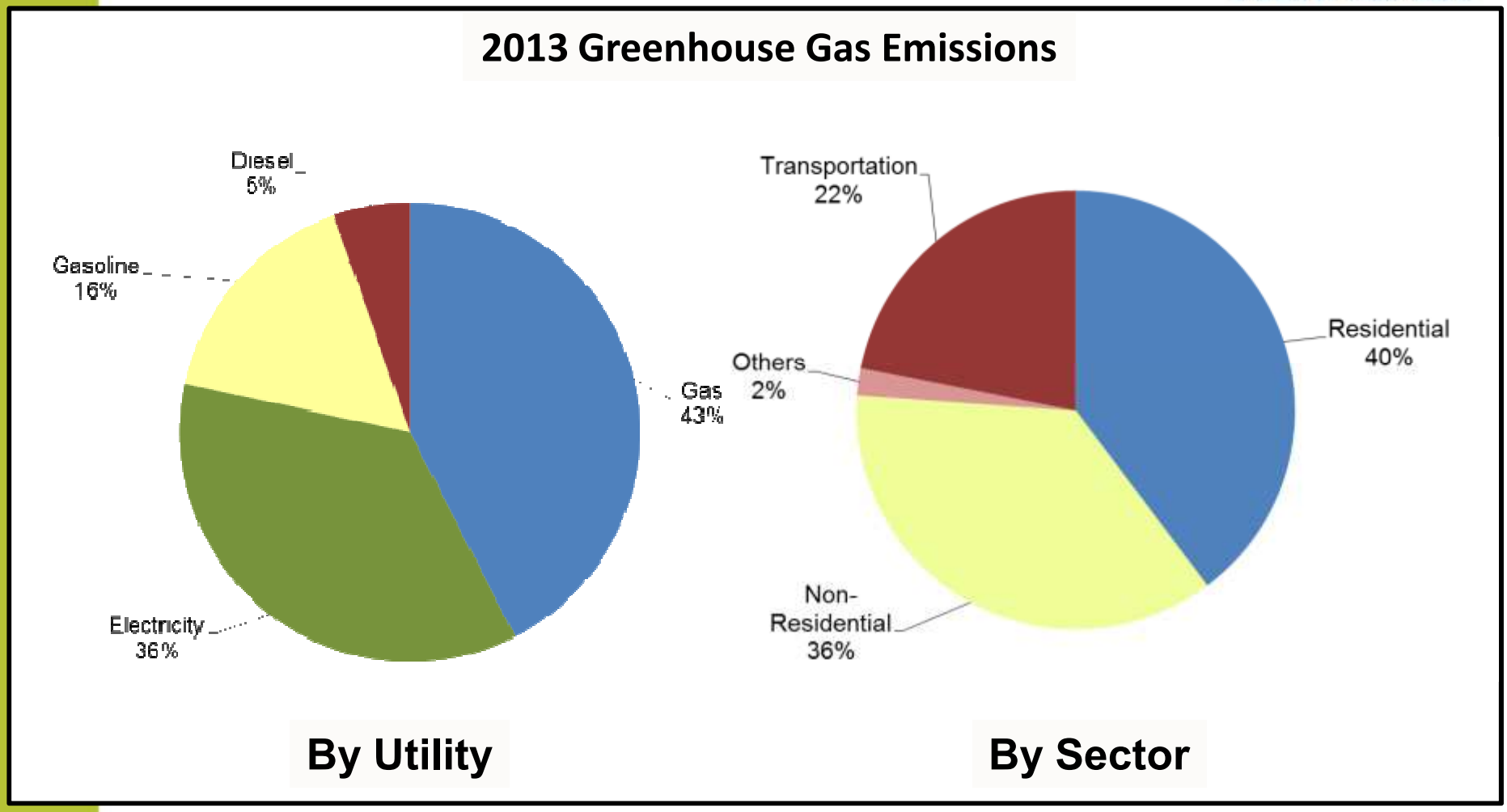
By Sector

Most Value Leaves Newmarket

Draft data subject to revision

Newmarket MEP Baseline

Greenhouse Gas Emissions 499 mt



6 tonnes CO_2 for every resident

Mapping Energy to 2012-2031

Parcel Level Assessment in Process

- Assess over 25,000 parcels
- Evolution to 2031
  - Town development plans
  - Provincial outlooks
  - Efficiency changes
- Building types and sizes
  - Existing
  - Renovation & demolition
  - New construction
- End-use requirements
  - Heating, Cooling , Lighting, Other
- Year-by-year models
- Aggregated to defined boundaries
  - 12 Energy Planning Districts

Aligned with Town Planning

Base Case 2013 -2031

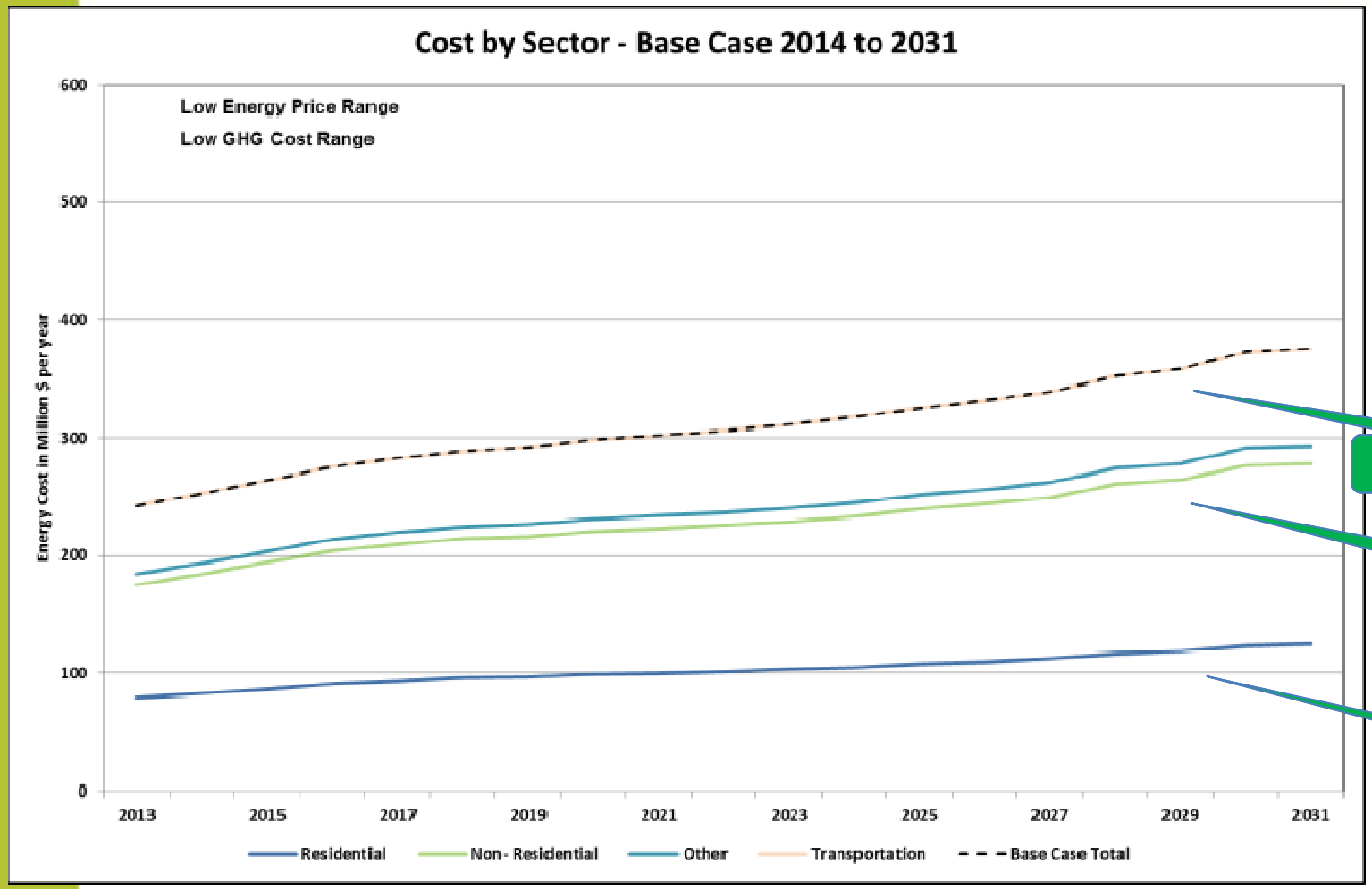
Observations

- Energy performance is average for Ontario
- Energy intensity at least twice global best-practice
- Different characteristics in residential, commercial, employment, and urban EPDs
- Low & medium density residential is high portion of energy use
- At least 80% of $242M annual value leaves Newmarket
- High probability of carbon regulation adding between $10M and $20M costs
- Wide range of future energy price risks

Significant Risks and Opportunities

Total Energy Cost (Low)

2013 -2031 Base Case by Sector



Transportation

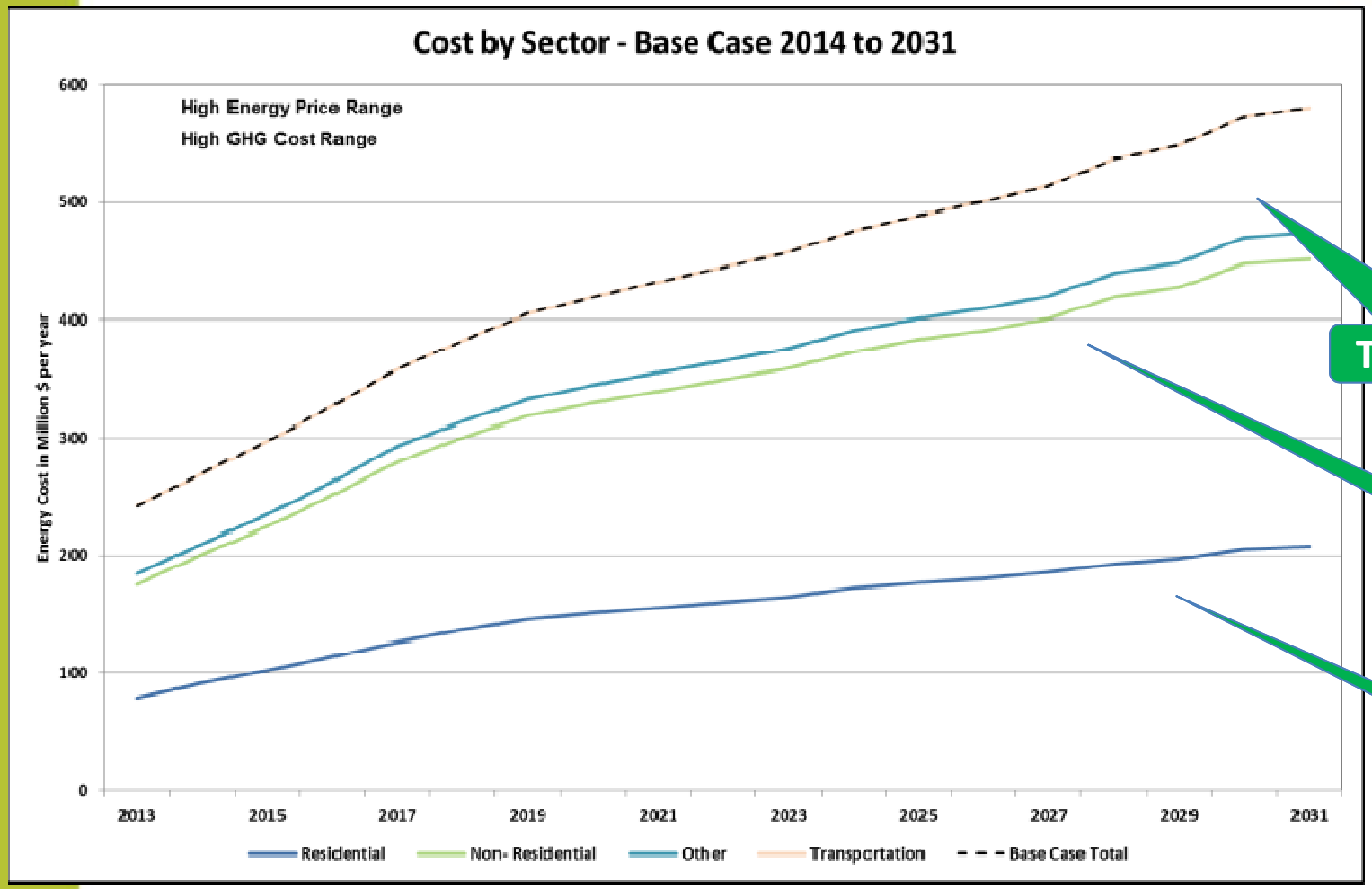
Buildings

Homes

Cost Increases from $242M to $376M

Total Energy Cost (High)

2013 -2031 Base Case by Sector



Transportation

Buildings

Homes

Cost Increases from $242M to $581M

Basis for Draft MEP Vision

Guidance from May 2015 Council Workshop

- "We should focus on a Transformative Plan with credible entry points"
- "We don't want to raise taxes to implement the MEP"
- "Incorporate the ongoing energy planning efforts from the Region and IESO"
- "Consider teaming with neighbouring communities to implement plans"
- "Energy is probably something we should be taking more seriously in the future"

Transformative – Businesslike - Cooperative

Newmarket MEP

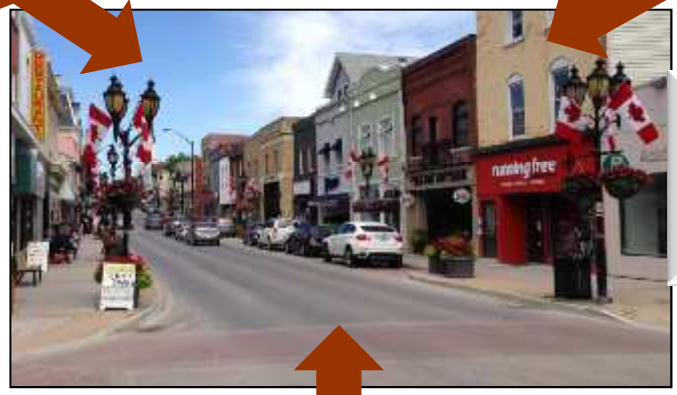
Three Groups of Benefits

Competitiveness

1. Energy cost
2. Employment
3. Investment

Security

4. Supply security
5. Supply quality
6. Flexibility



Environment

7. Greenhouse Gas Reduction

Breakthrough Targets are Established

Draft MEP Vision

To create a sustainable community whose energy future is efficient, secure, reliable, and environmentally progressive. Our approach to managing energy will demonstrate leadership and be *well beyond the ordinary*.

**adapted following SAG #4 Meeting Input*

Draft MEP Goals

1. **Energy Generation & Distribution:** We will strive to have a resilient, stable, clean and secure local energy system.
2. **Economic Development**: As a result of using energy in a more sustainable way we will create jobs and attract investment and businesses
3. **Behaviour Change & Education:** We will help reduce energy use and GHG emissions by raising awareness through programs and education, and building a connection between energy choices and actions and the things people care about.
4. **Energy Efficiency of Buildings:** We will continue to demonstrate leadership in increasing efficiency of existing buildings and will continuously improve building performance through best management practices.
5. **Land Use & Growth Planning:** We will continue to build a healthy, complete community with mixed-use development, local jobs and where our residents will have well connected mobility and transportation options.
6. **Transportation Efficiency:** We will have an efficient and clean transportation system, including multi-modal and active transportation options.

**adapted following SAG #4 Meeting Input*

Draft MEP 2031 Targets

Energy use by 2031 will meet today's global best practice

- Target: 50% per capita primary energy use reduction

Emissions reductions will support global efforts to stabilize climate change

- Target: 40% per capita greenhouse gas emissions reduction

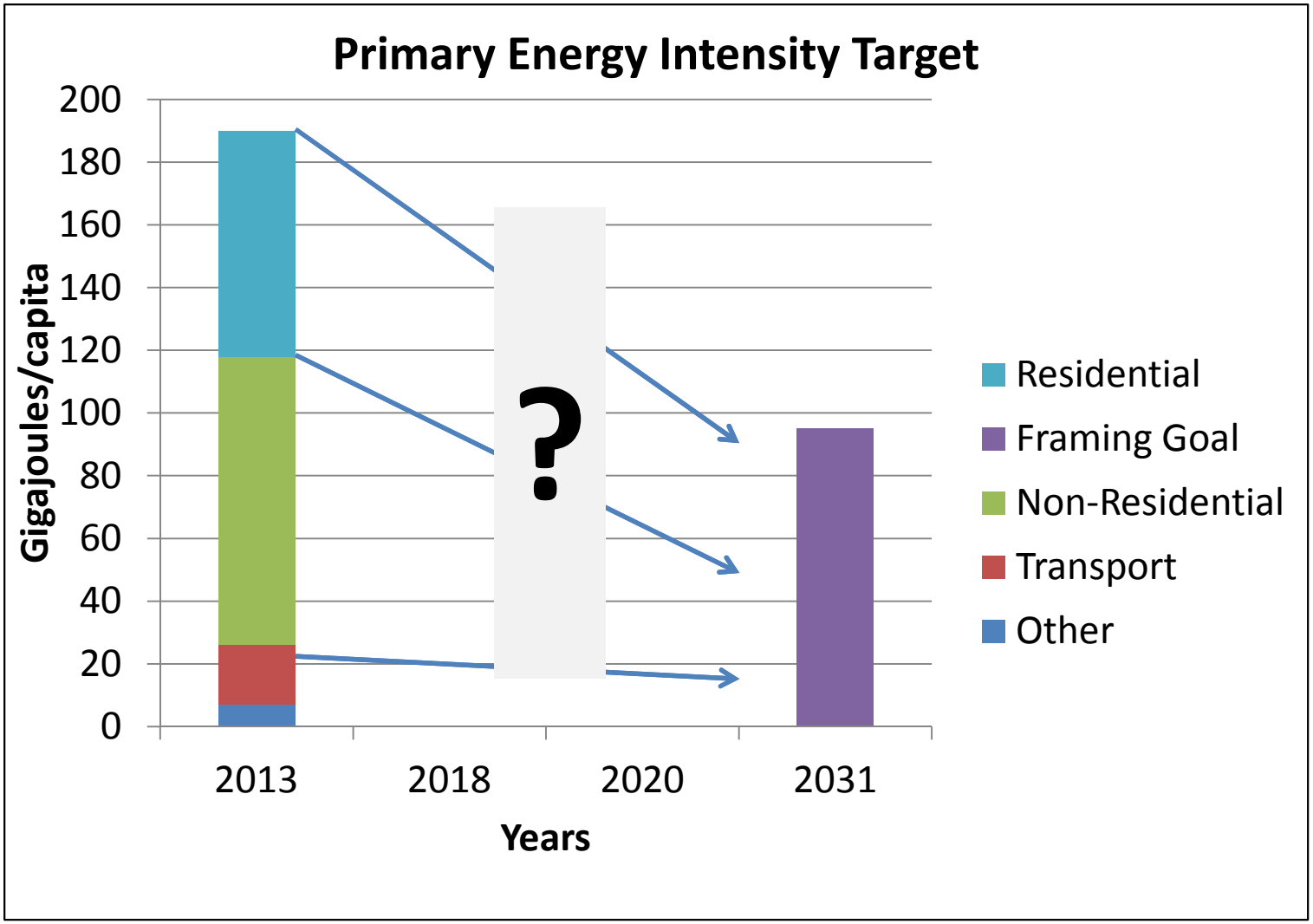
Energy-related investments by the community will exceed return on 20-year municipal bonds

- Target: 5% risk-adjusted 20-year IRR

Current Global Best Practice by 2031

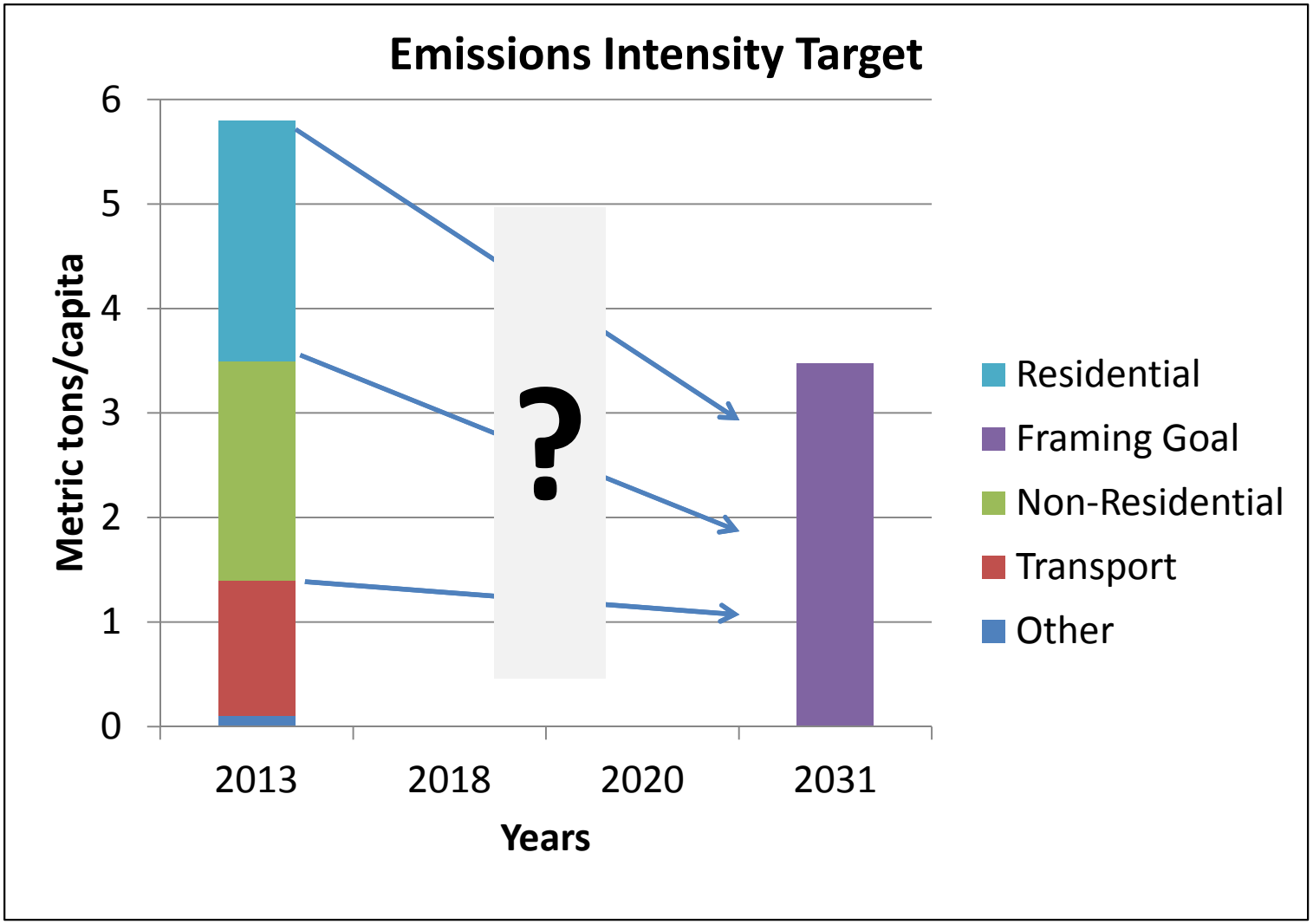
Primary Energy Target

Intensity Reduction – 50%



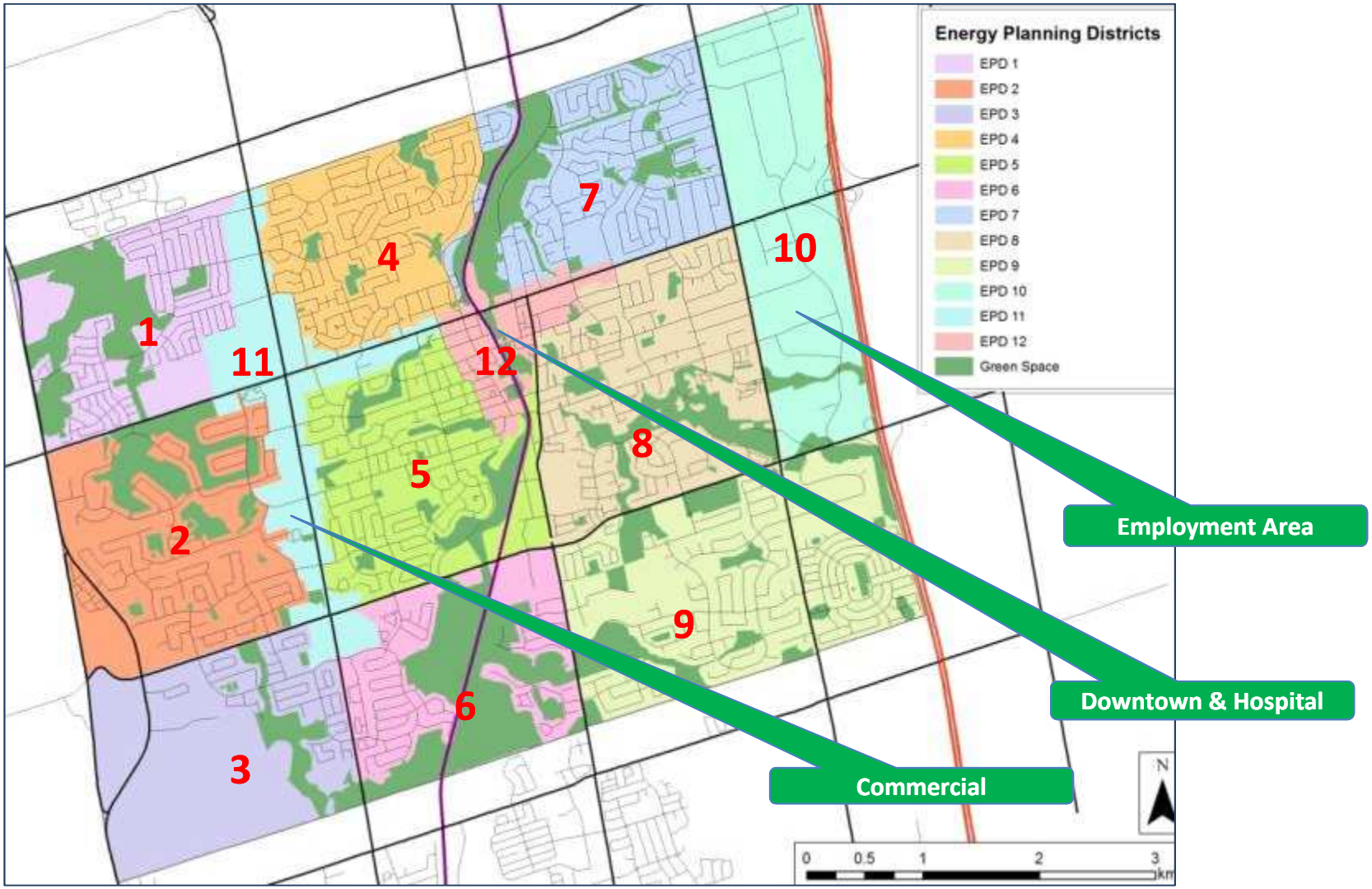
Greenhouse Gas Emissions Target

Intensity Reduction – 40%



Energy Planning Districts

Mapping Energy to 2031



Homes & Buildings Only

Preliminary MEP Strategies

Newmarket MEP

Summary of Strategies Assessed

- Residential Efficiency
- Non-Residential Efficiency
- Transportation Efficiency
- District Energy
- Solar PV

Broadly Meet Framing Goals

Residential Efficiency

Recommended 2031 Efficient Case

- Existing homes by 2031
  - Energy efficiency retrofits for 80% of net housing stock
  - Efficiency gain between 30% & 50% depending on age/type
  - Average 1,500 retrofits/year
- New homes
  - Added in line with population
  - 100% comply with current Code
  - Codes update in 2019 / 24 / 29 each with 5% efficiency gain

Essential to Achieve Scale

Non-Residential Efficiency

Recommended 2031 Efficient Case

- Existing Buildings
  - Energy efficiency retrofits for 60% of net buildings stock
  - Efficiency gain between 30% & 50% depending on age/type
- New Buildings
  - Publicly funded 30% higher than current code
  - Rest 100% comply with current Code
  - Codes update in 2019 / 24 / 29 each with 5% efficiency gain

Essential to Achieve Scale & Consistent Performance

Home & Building Retrofits

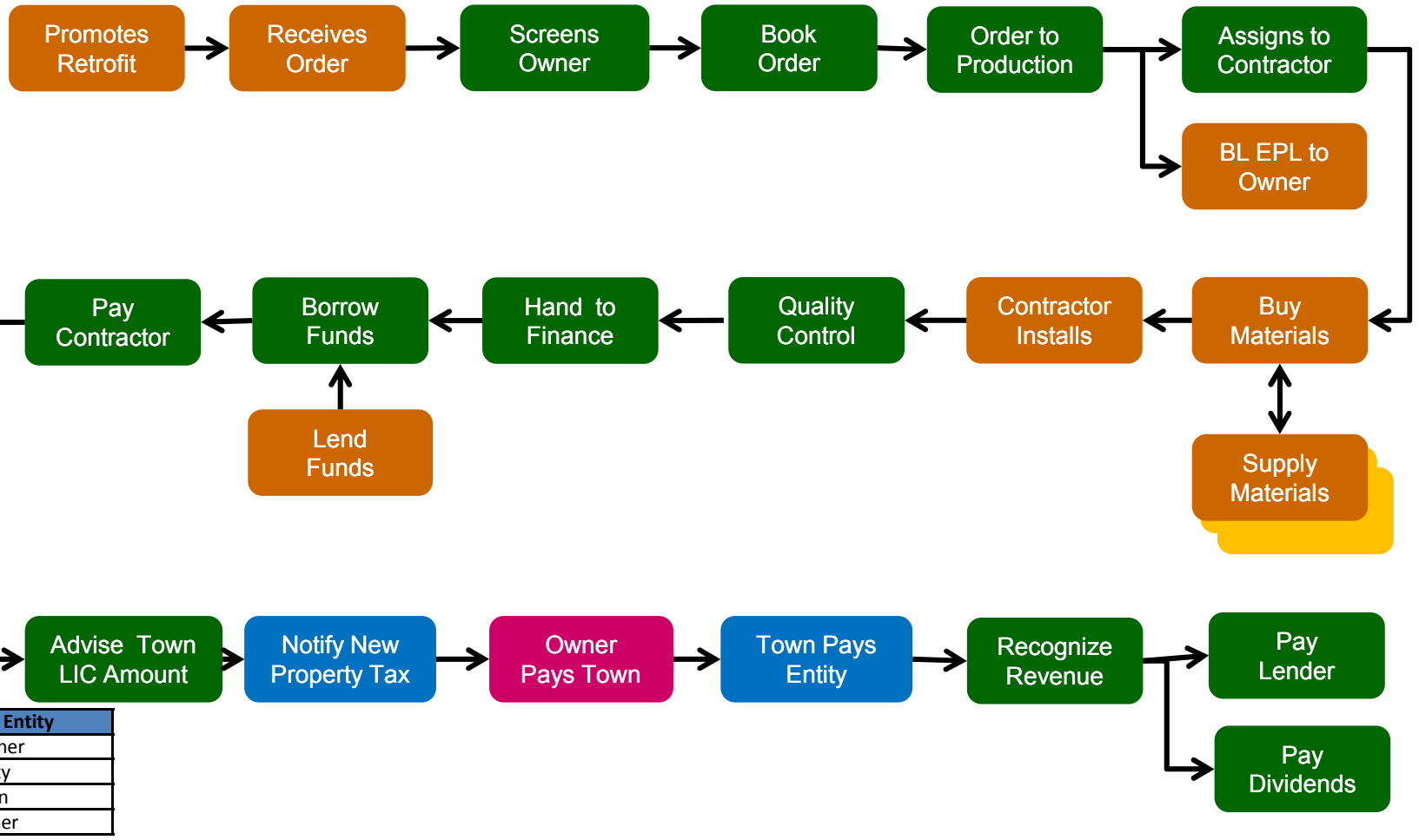
Achieving Scale

- Create Town Entity to deliver energy retrofit packages standardized by property type and age
- Team with local contractors and material suppliers to minimize cost and maximize quality
- Create scale using Local Improvement Charge (LIC) and Standardized Pricing
- Financed from private capital market at near municipal rates under municipal guarantee
- Prioritize Residential Efficiency in 2017

Easy to Sell / Easy to Buy

Strategy to Business Model

Activity Summary – Single Retrofit



Legend	Entity
	Partner
	Entity
	Town
	Owner

Enhanced Value for Current and Future Owners

Transportation Efficiency

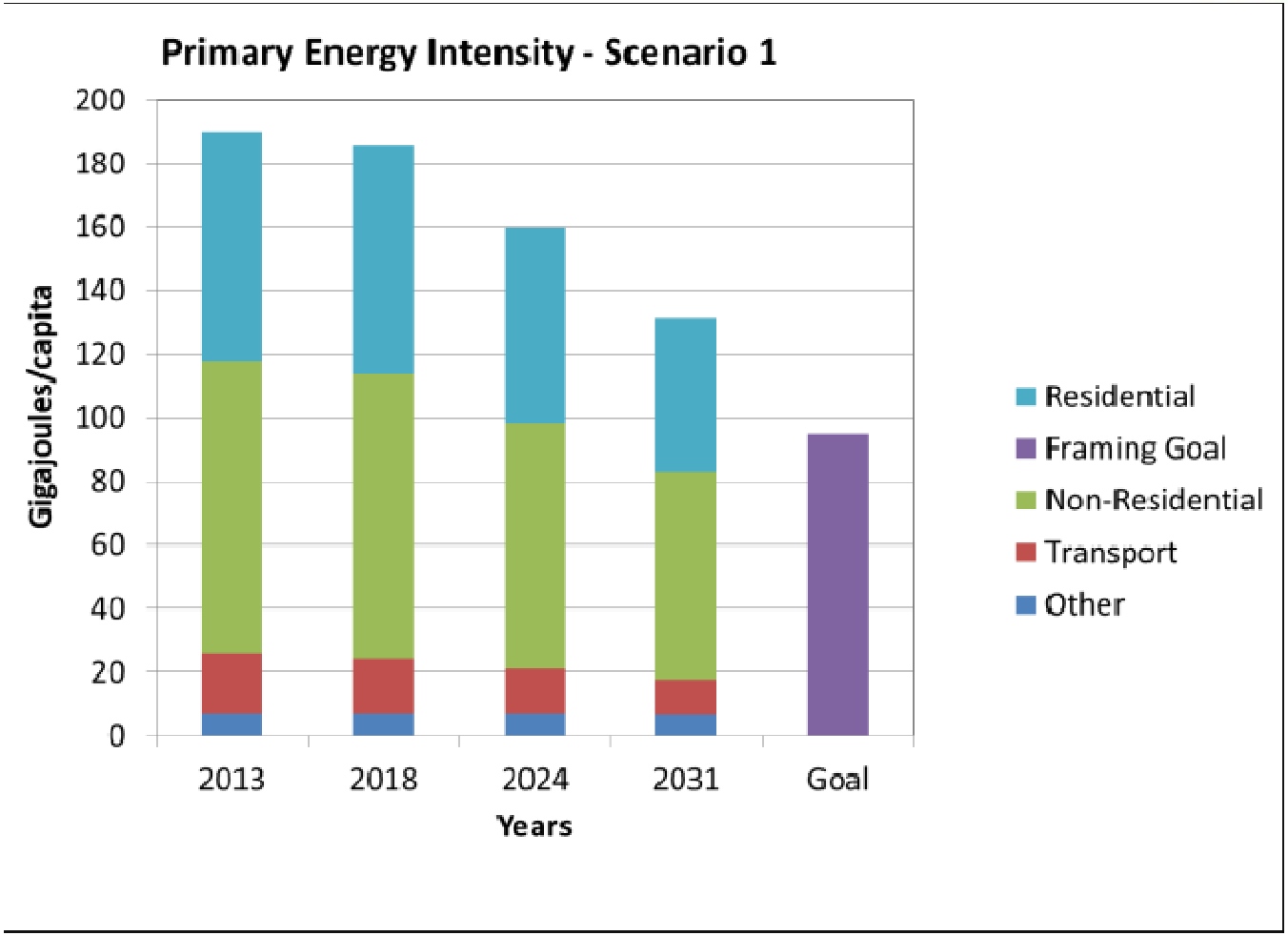
2014-2031 Base / Efficient Cases

- Base Case
  - Same efficiency as 2014
  - Same journey mix
  - Growth driven by population
- Efficient Case
  - Support York Region Smart Commute and other initiatives
  - Encourage EVs with parking and charging infrastructure
  - Redesign neighbourhood & streets to increase multi-modal, foot and 2-wheel traffic

Limited Impact from Town Initiatives

Primary Energy Performance

Impact of Strategy 1 - Efficiency



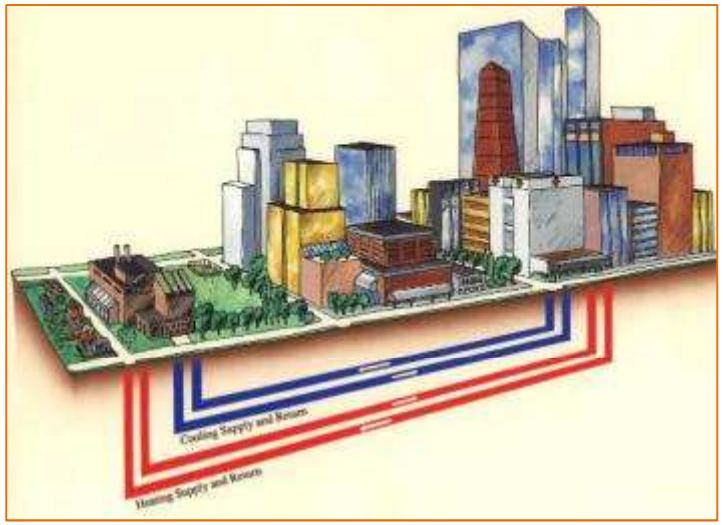
Fails to Meet 50% Target

Total Heating Intensity
2013 Baseline by EPD

Intensity is Key to Supporting District Energy

What is District Energy?

Community Level Asset Optimization



- Serves > 300 M users
- ~15,000 km/year added
- Utility quality operation
- Competitive costs

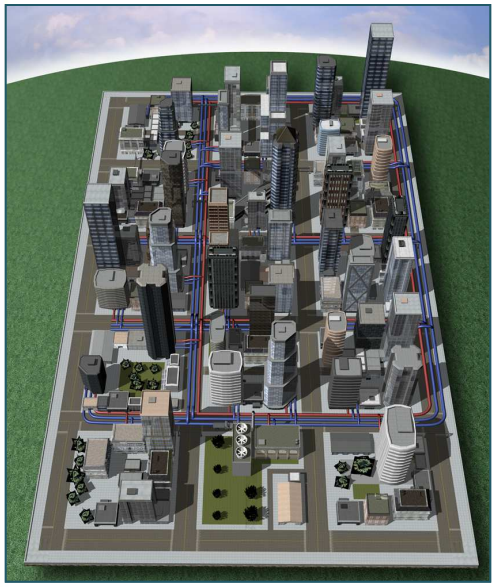
- Shared supply assets
- Network of insulated pipes
- District Energy includes:
  - District Heating
  - District Cooling
- Serves homes-buildings-industry
- Combines sources/fuels:
  - Combined Heat & Power
  - Boilers
  - Absorption and Electric Chillers
  - Solar and Biomass
  - Waste heat recovery
- Operated by Thermal Utility

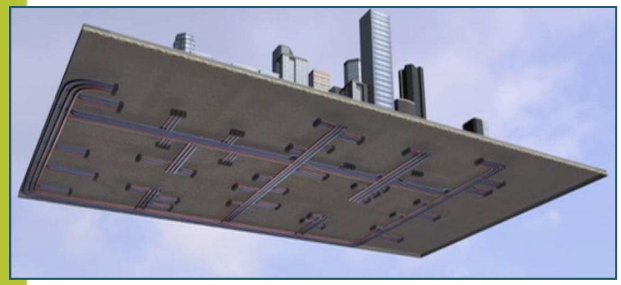
Widely Deployed - Proven Approach

**Illustration Courtesy of IDEA*

District Energy Background

Community Scale Heating & Cooling





- Creates market for thermal energy
- Reduces price volatility
- Energy dollars re-circulate in local economy
- Fuel flexibility improves energy security
- Quality jobs in construction & operation
- Creates scale for fuels and technologies not feasible on single-building
- Facilitates Combined Heat & Power
- Positive economic development effects

Pathway to Zero Greenhouse Gas Emissions

**Illustration courtesy of IDEA*

District Energy Background

Elements of DE System

Energy Centre

Customer Building

Sub-station

In- building supply

Distribution Network

Service Pipes

Flexible and Easy to Scale

District Energy Networks

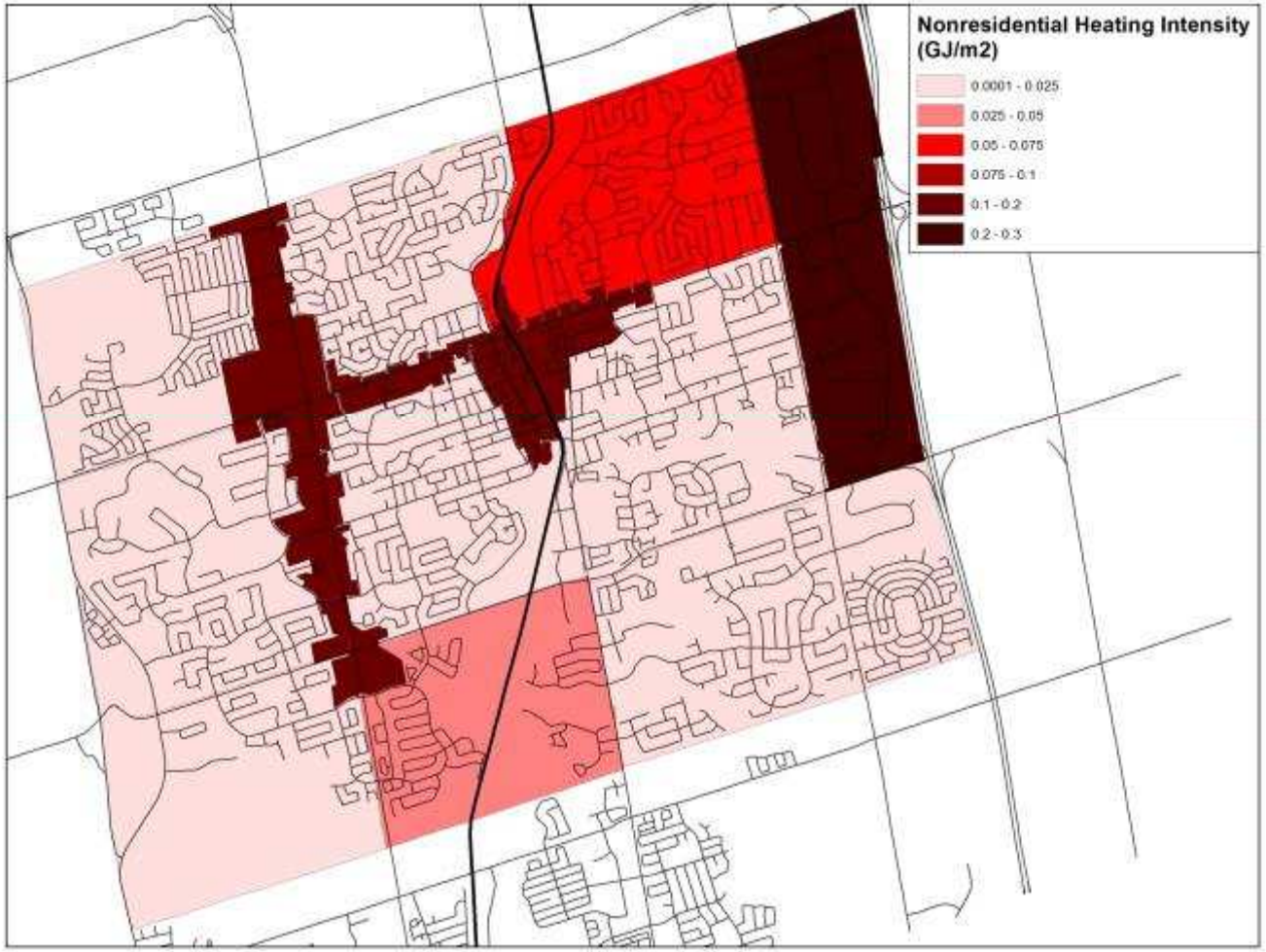
Standardized – Easy to Lay

- Certified 30-year operation
- 50-year typical
- Pre-insulated pipes
- Global standard for pipes and accessories
- “Soft lay” – no tunnels needed
- Automatic leak-detection
- Medium temperature & pressure

Multiple Vendors – Reasonable Costs

Non-Residential Heating Indexes

2013 Baseline by EPD



Basis for Services Prioritization

District Energy

Downtown / Commercial (EPD 11/12)

Heating Intensity (Total)

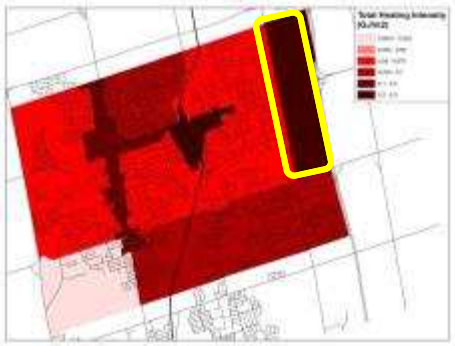
Heating Intensity (Non-Res)

- Create District Energy Company - NDECo
- Target Customers
  - Commercial/Institutional
  - High-density Residential
  - Healthcare
- DE Services
  - Heating via EN253 network
  - Cooling on individual / local basis
- Sources
  - CHP sized for optimum heat
  - Boilers & Chillers

High Quality Competitive Service

District Energy

Employment District (EPD 10)



Heating Intensity (Total)

Heating Intensity (Non-Res)

- Create District Energy Company – NDECo
- Target Customers
  - Industrial
  - Heavy Commercial
- Flexible Energy Services
  - Heating and Cooling via EN253 network
  - Possible other utilities/services – Steam, compressed air, waste heat disposal, on-site reliable power
- Sources
  - CHP sized for heat and reliability
  - Boilers, Chillers, compressors…

Team with Town Economic Development

Example of District Energy Expansion Plan

Creating a City-wide Thermal Utility

District Energy

Selected Benefits

- Town of Newmarket
  - Stable long-term returns from NDECo
  - Economic development advantage
  - Pathway to zero carbon built environment
  - Magnet for inbound investment and employment
- All Customers
  - Stable competitive heating and cooling prices
  - Reduced capital and operating costs
  - Increased usable space
- Industrial / Heavy Commercial Customers
  - Tailored energy services
  - Optimized on-site Combined Heat & Power (CHP)
  - Reduced space and utility staffing requirements

Economic and Environmental Benefits

District Energy

*Indicative Financial from Benchmark**

- Mature DE Systems are positive contributors
- NDEC0 Internal Rate of Return
  - Low price outlook ~ 7% to 9%
  - Higher price outlook ~ 14% to 17%
- Net Present Value: tens of millions
- Positive operating results in 2 to 5 years
- Downtown investments ~ $13M over 5 to 7 years

Economic and Environmental Benefits

**City of Guelph District Energy Strategy 2013*

District Energy

Critical Assumptions

- Timing
  - Complete DE Business Plan - 2017
  - Create NDECo Legal and Operating Framework – 2017
  - Connect first customers - 2018
  - Initial Phase completion - 2028
  - Mature Market in target EPDs by 2031
- Competitive
  - Pricing relative to current practices
  - Investments no higher than global norms
- Policy
  - EPD 10,11, 12 designated DE Areas
  - New construction / major renovation “DE ready”

Solar PV

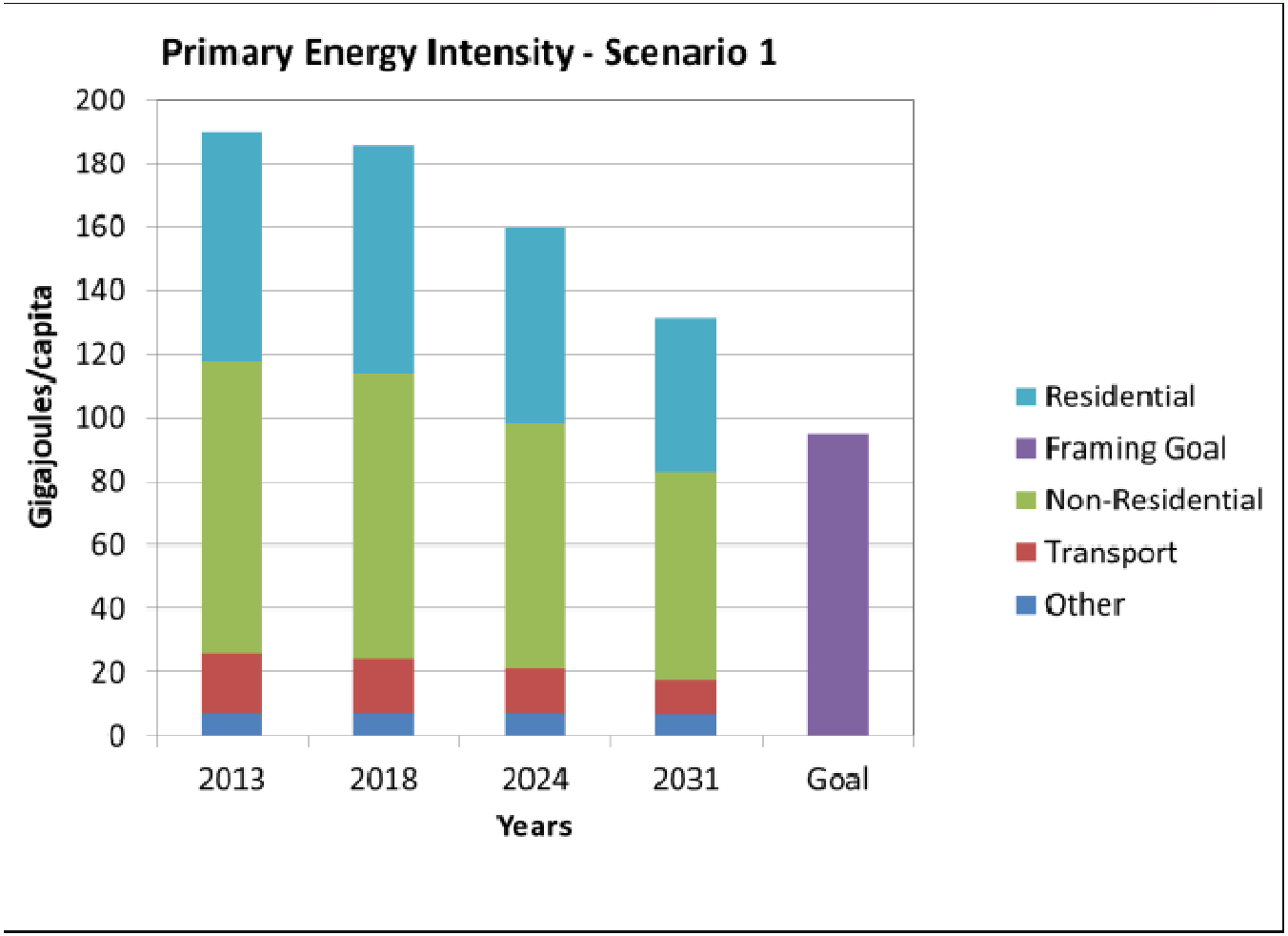
Significant Potential

- Supportive Provincial policy
- Reducing panel and installation costs
- Reduce summer peak by 20% to 25%
- 4% to 5% of total power
- Carbon free
- Possible Capacity
  - Res: 5 to 15MW
  - Non-Res: 7 to 20MW
  - Surface: 10 to 25MW

Impact of 50MW Estimated

Primary Energy Performance

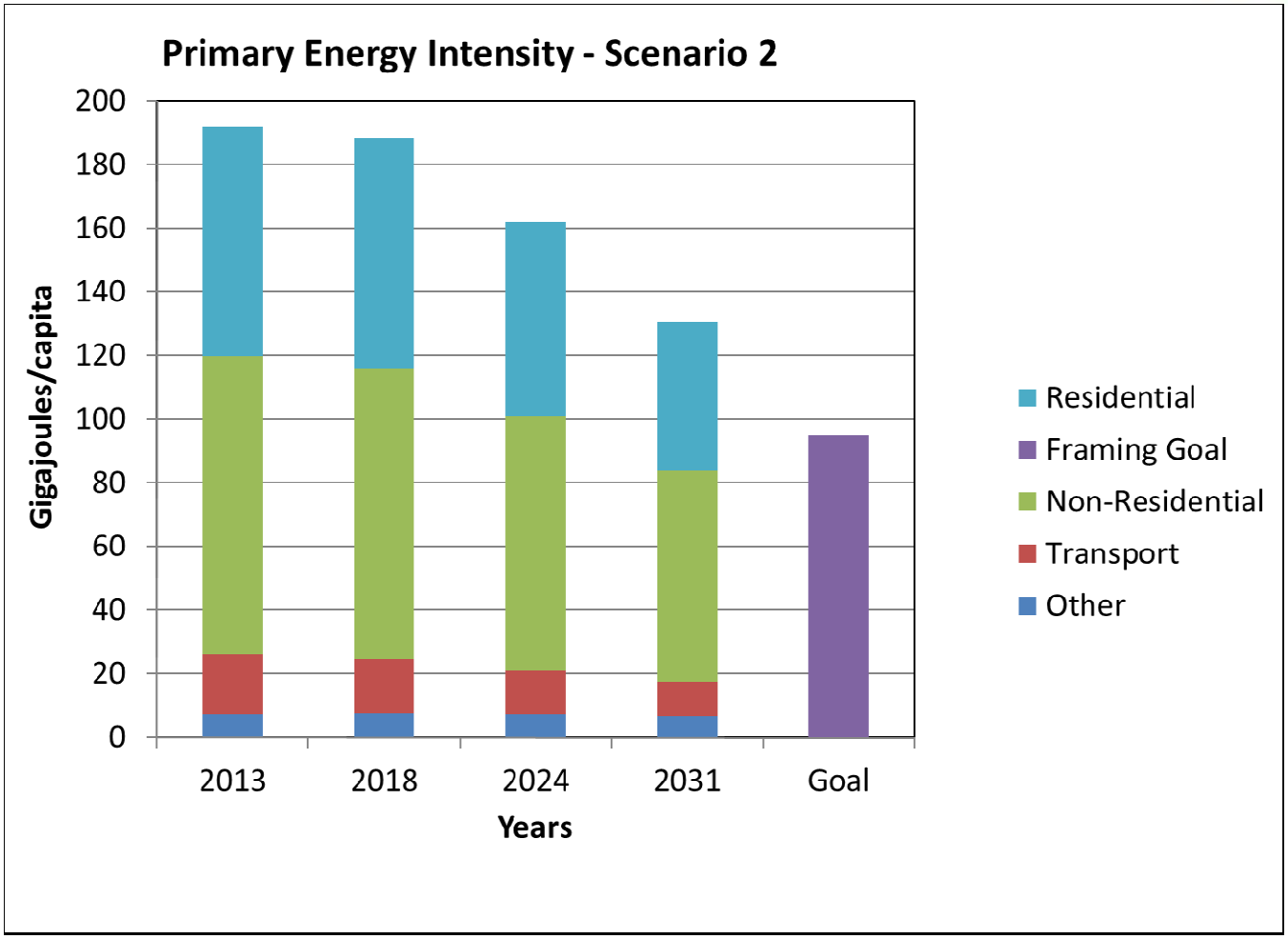
Impact of Strategy 1 - Efficiency



Fails to Meet 50% Target

Primary Energy Performance

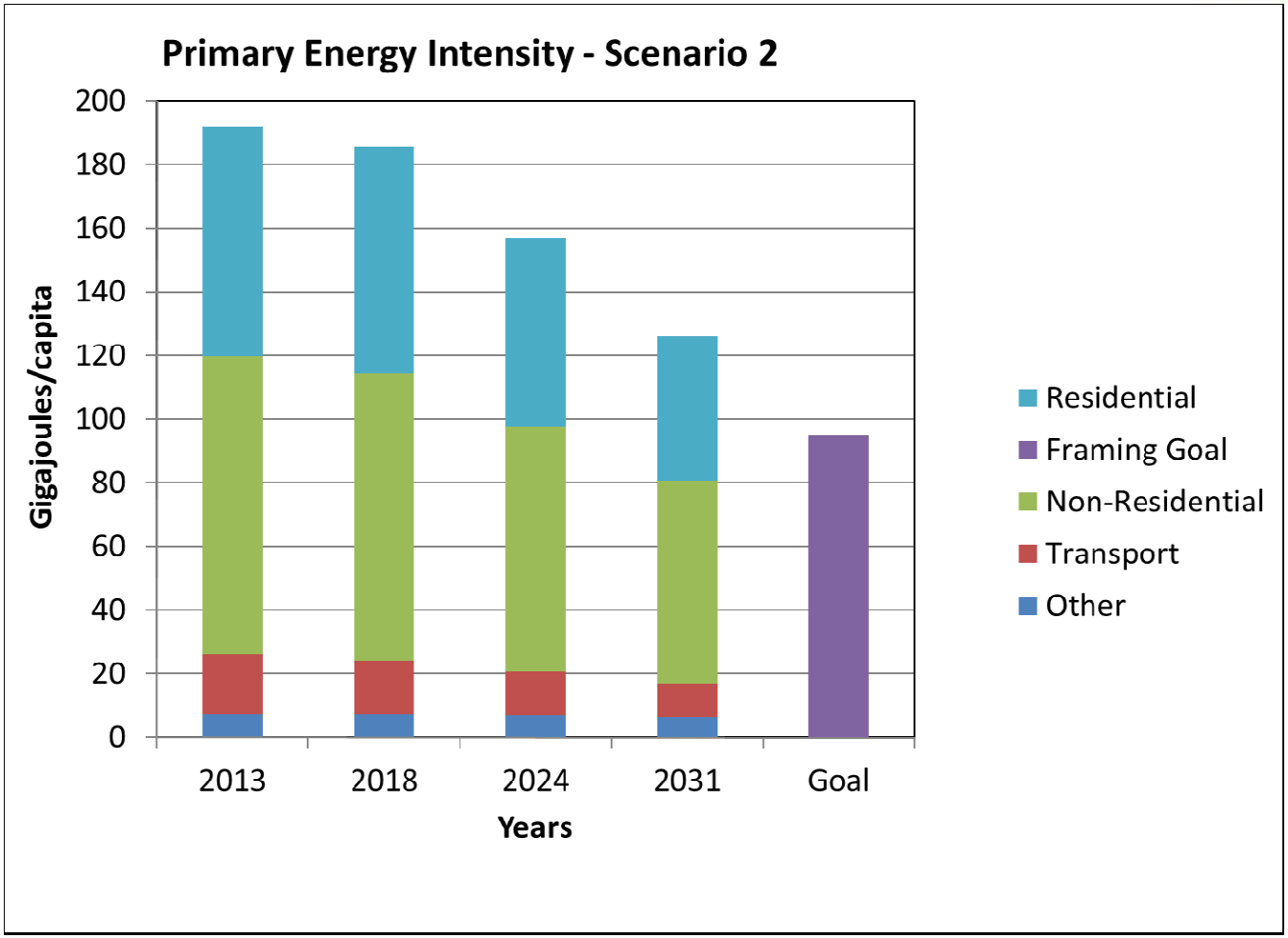
Impact of Strategies 1 & 2 (Efficiency & DE)



Fails to Meet 50% Target

Primary Energy Performance

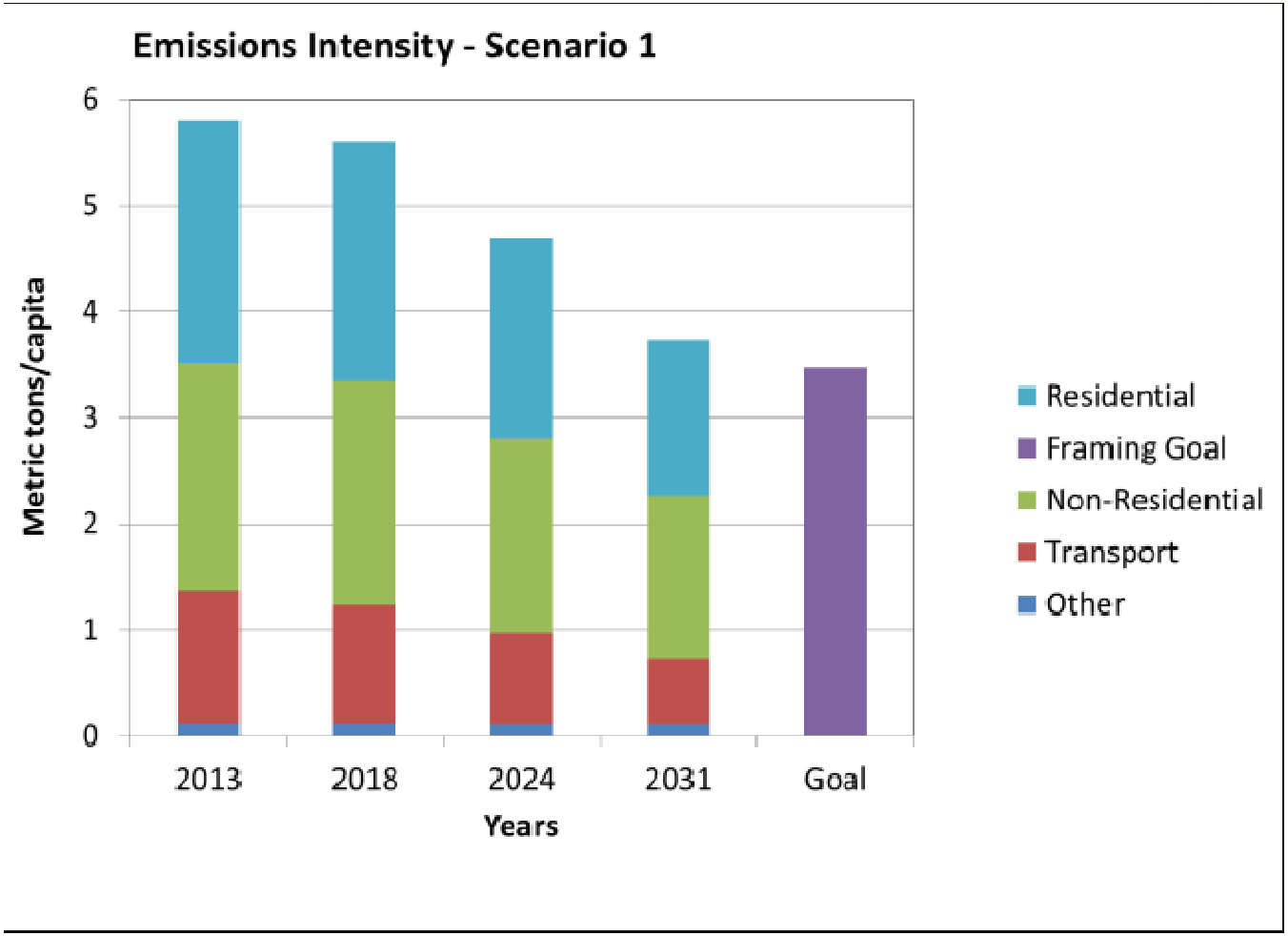
Impact of Strategies 1-3 (Efficiency, DE & PV)



Still Fails to Meet 50% Target

GHG Emissions Performance

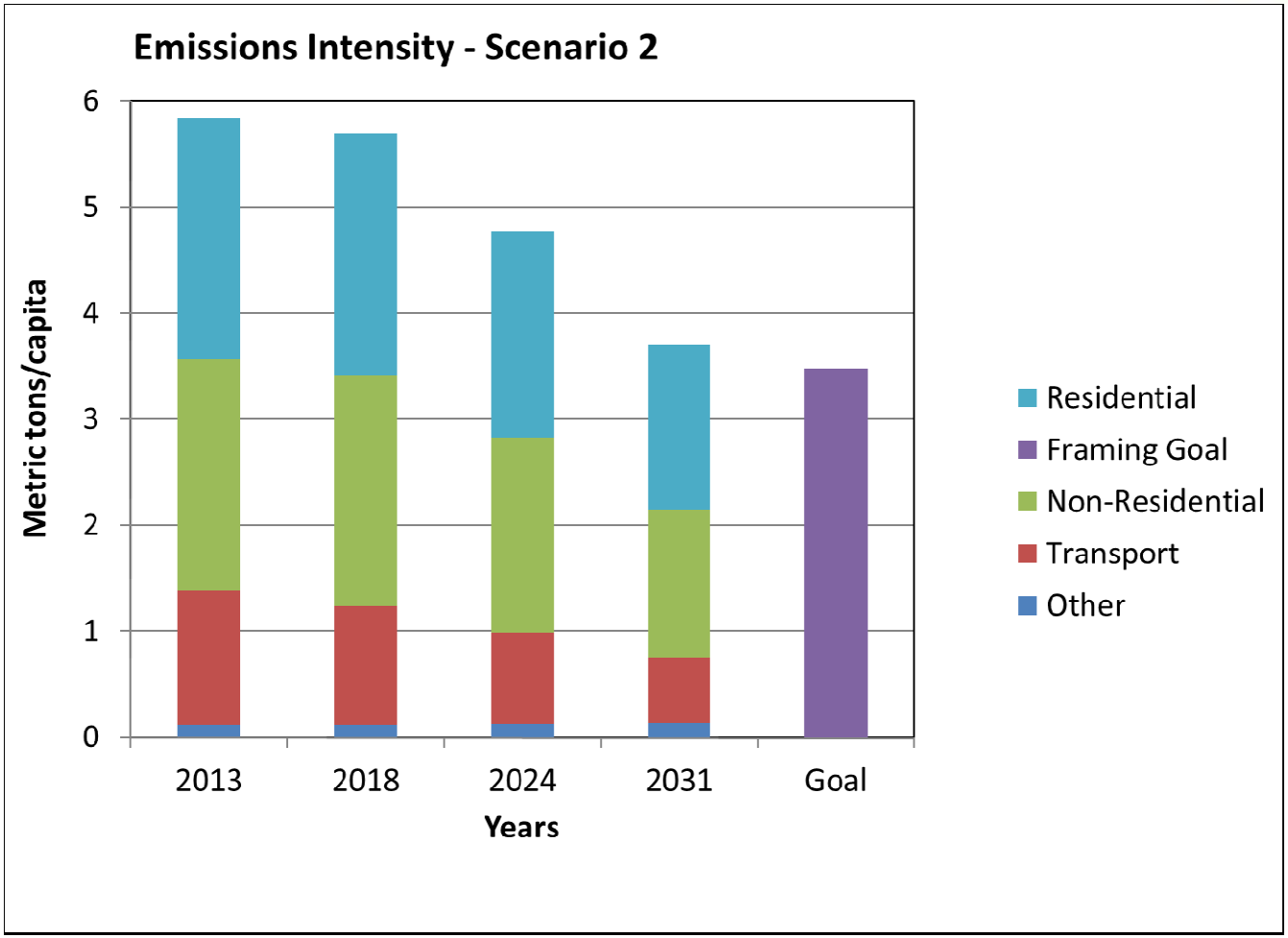
Impact of Strategy 1 - Efficiency



Fails to Meet 40% Target

GHG Emissions Performance

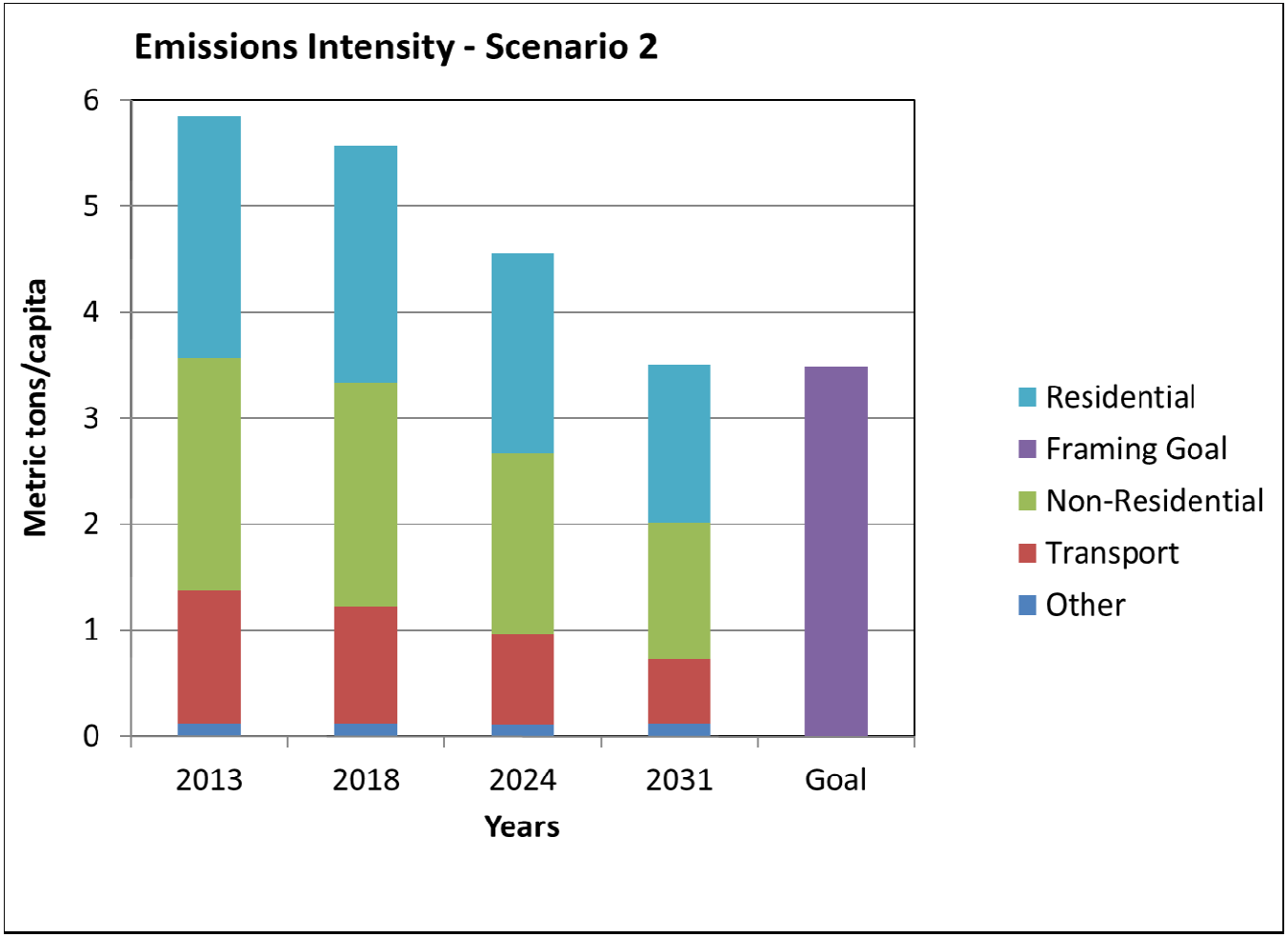
Impact of Strategy 1 & 2 (Efficiency & DE)



Approaches 40% Target

GHG Emissions Performance

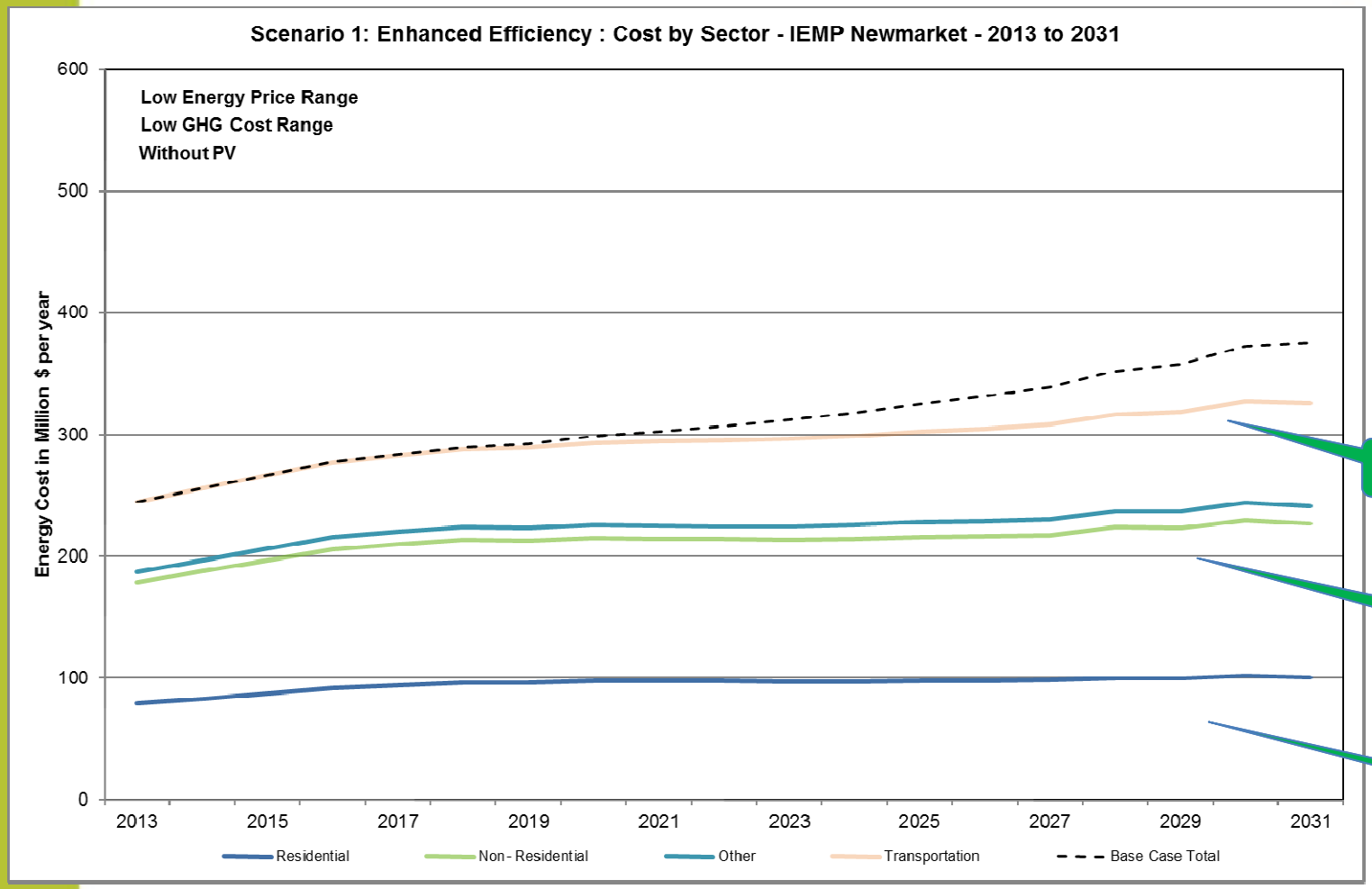
Impact of Strategies 1–3 (Efficiency, DE & PV)



Meets 40% Target

Total Energy Cost (Low)

2013 -2031 Strategy 1 by Sector



Transportation

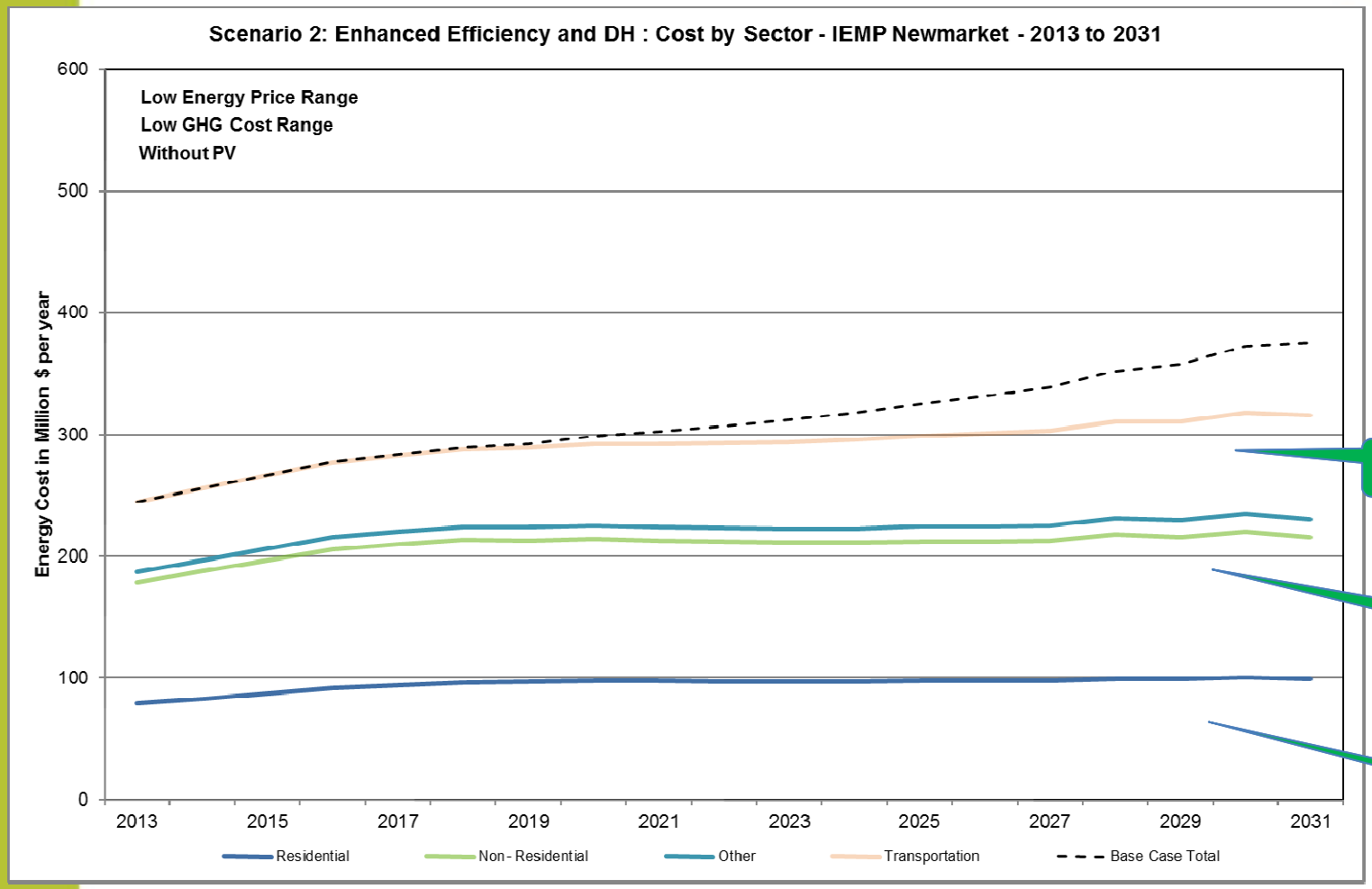
Buildings

Homes

2031 Avoided Cost of $49M

Total Energy Cost (Low)

2013 -2031 Strategy 1+2 by Sector



Transportation

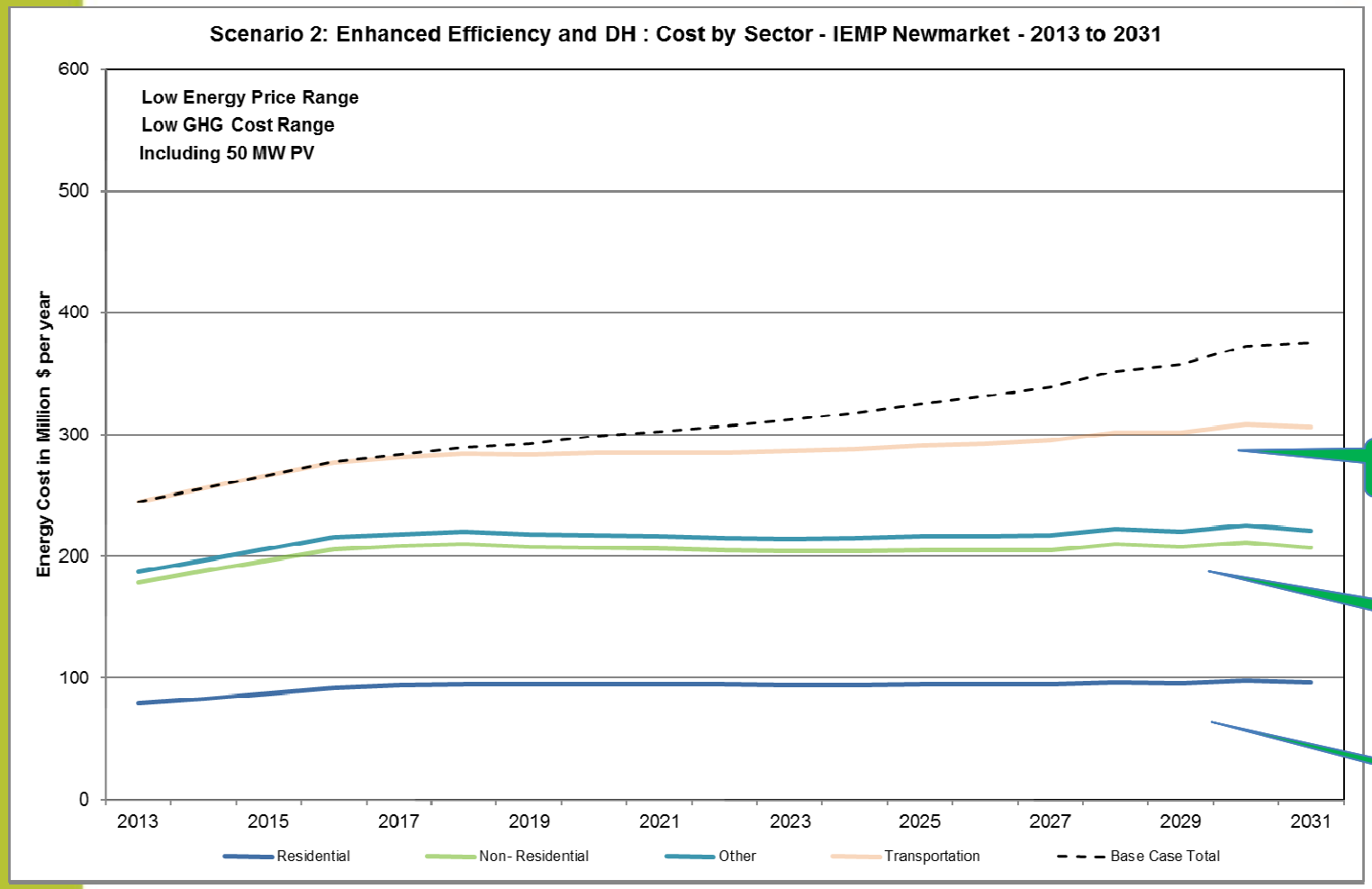
Buildings

Homes

2031 Avoided Cost of $60M

Total Energy Cost (Low)

2013 -2031 Strategy 1, 2 & 3 by Sector



Transportation

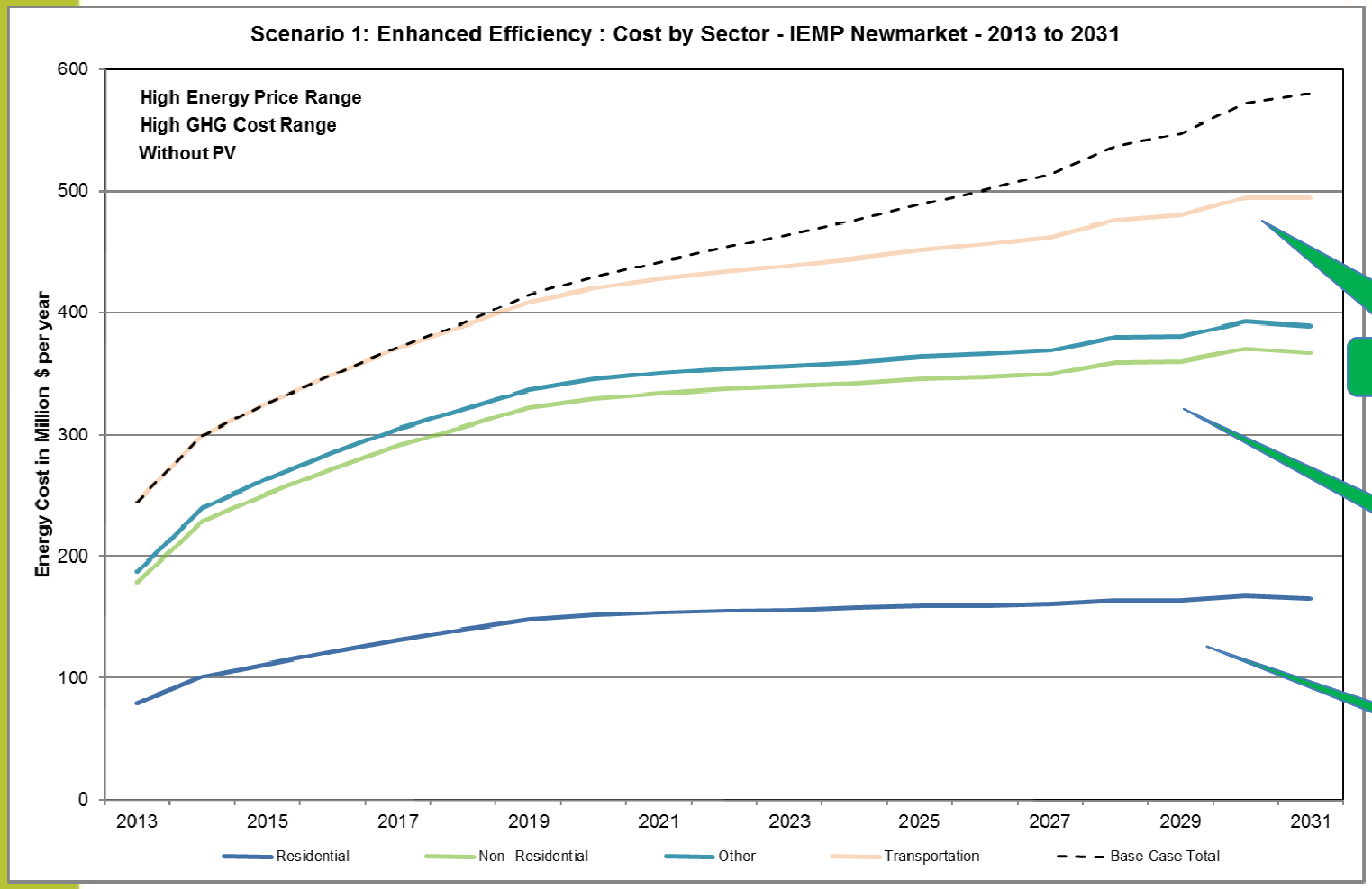
Buildings

Homes

2031 Avoided Cost of $69M

Total Energy Cost (High)

2013 -2031 Strategy 1 by Sector



Transportation

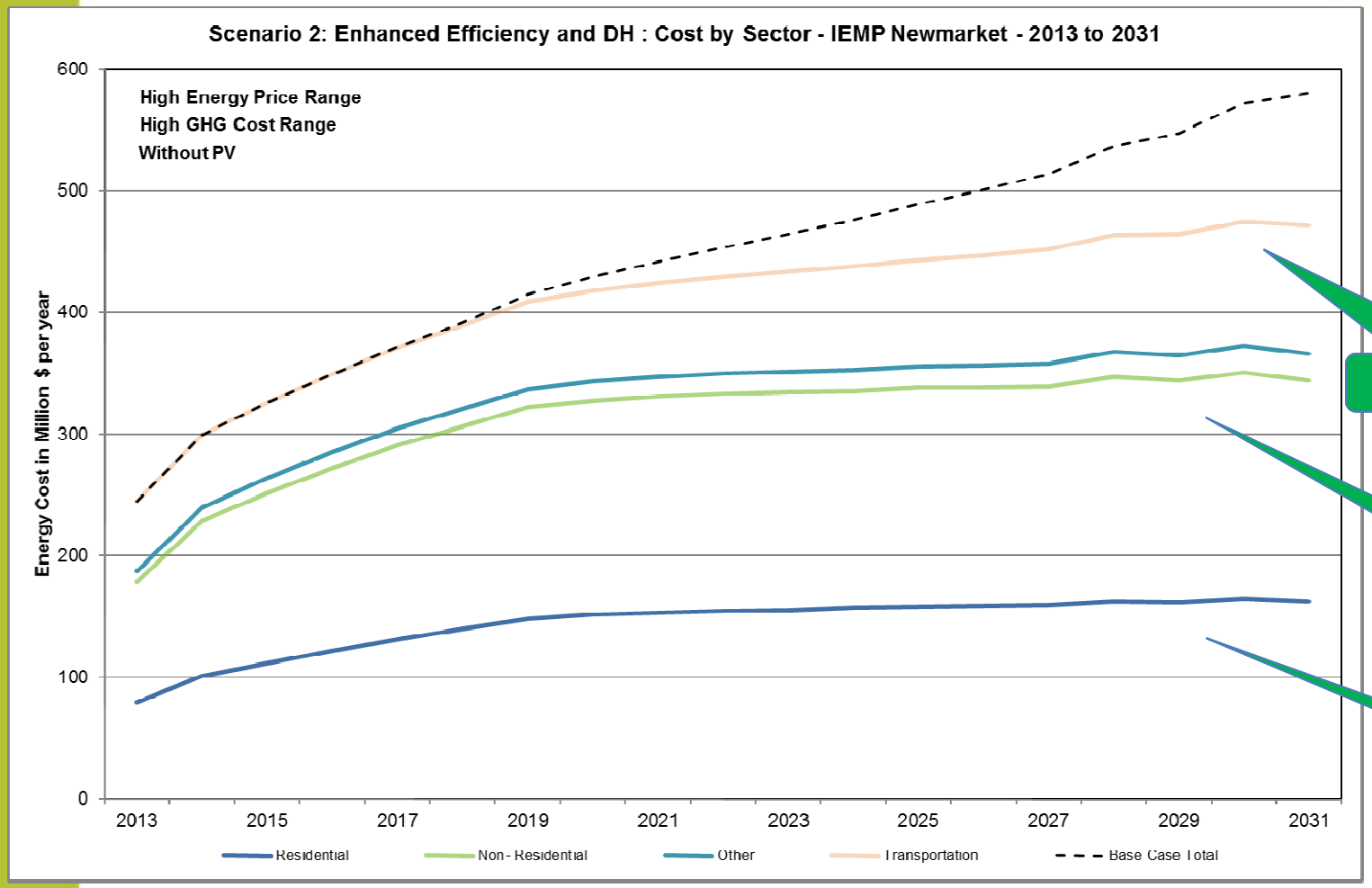
Buildings

Homes

2031 Avoided Cost of $85M

Total Energy Cost (High)

2013 -2031 Strategy 1 & 2 by Sector



Transportation

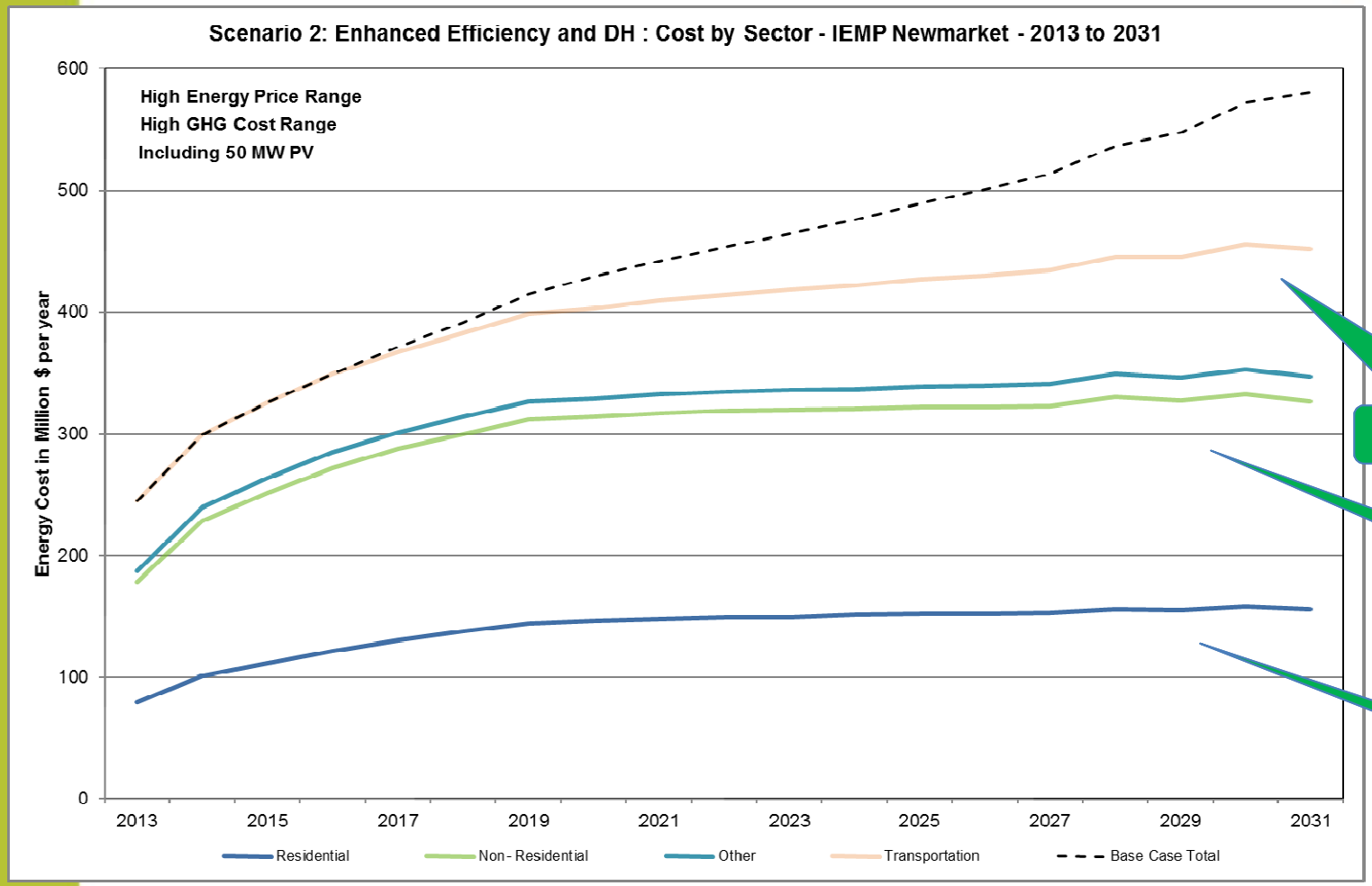
Buildings

Homes

2031 Avoided Cost of $108M

Total Energy Cost (High)

2013 -2031 Strategy 1, 2 & 3 by Sector



Transportation

Buildings

Homes

2031 Avoided Cost of $128M

Assessment

- Efficiency, DE & PV approach efficiency and meet emissions target
- Increased non-residential could meet efficiency targets
- Potential to increase new construction performance
- District Energy has benefits and potential to grow faster
- District Energy facilitates biofuels and waste heat to further reduce Newmarket carbon footprint
- 50MW PV and 20MW CHP could reduce summer power peak by 30% to 35%
- Major repatriation of energy value through quality jobs and local services
- Efficiency, DE & PV avoids between $73M and $135M annual energy costs for Newmarket

“Well Beyond Ordinary”

Newmarket MEP

Preliminary Recommendations

- Confirm Vision, Goals and 2031 Targets
- Fully implement Residential and Non-residential Energy Efficiency retrofit strategy
- Implement District Heating and District Cooling services in Downtown, Commercial and Employment districts
- Actively encourage widespread implementation of large scale solar PV
- Incorporate MEP requirements in policy and secondary plans

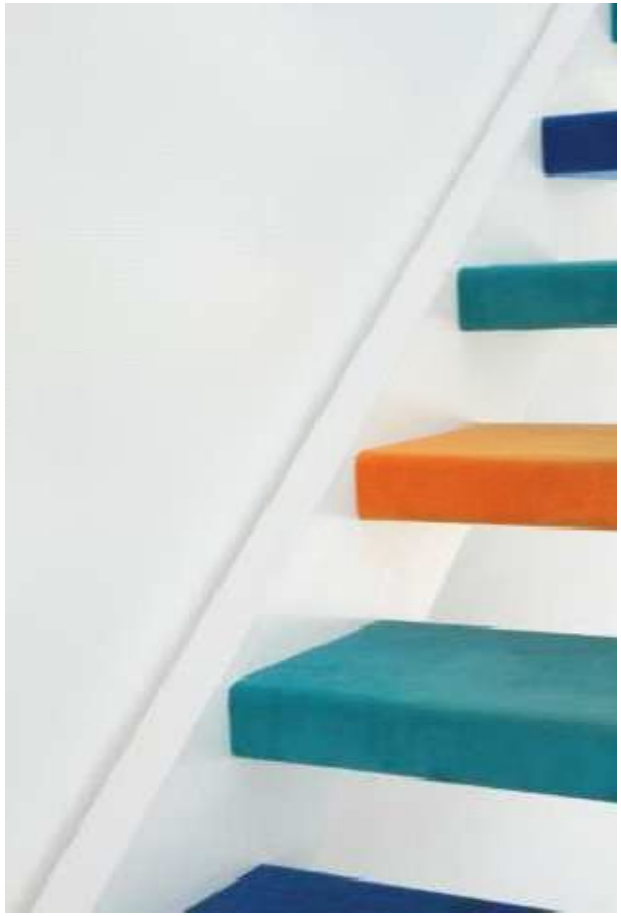
"Well Beyond Ordinary"

Questions & Discussion

Next Steps

Immediate Next Steps

- Next SAG meeting #5 - Jan 26, 2016
- SAG meeting #6 - March 22, 2016
  - Review draft plan
  - Finalize recommendations
  - Discuss implementation considerations
- Committee of the Whole - May 9, 2016
- Council - May 16 or June 7, 2016 (TBD)



Thank You!

Any questions or comments? Please contact us.

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