
IDEA2021
Powering the Future: District Energy/CHP/Microgrids
Sept. 27-29 | Austin Convention Center | Austin, Texas

HAMILTON COMMUNITY ENTERPRISES

Connecting to a better future, today.

District Energy System fueled by Industrial Waste Heat

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hamilton chamber of commerce
your voice in business

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

HAMILTON: WHERE INNOVATION GOES TO WORK

Hamilton, Ontario Canada is located in the centre of the most densely populated corridor of economic activity in all of Canada

Top 7 ranking Intelligent Communities in the World *(Intelligent Communities Forum: 2018 and 2020)*.

The **largest steel manufacturing city in Canada** where **60%** of all the steel in Canada is produced.

HAMILTON: WHERE INNOVATION GOES TO WORK

Hamilton's largest industry sector within manufacturing is primary metals.

The city is known for its history as a steel producer, but now the industry has grown to encompass engineering, product design, steel manufacturing, fabricated metal products, and final product commercialization.

Another key industry sector in Hamilton is automotive.

Automotive, Aerospace & Defence, Machinery, chemical manufacturing, and transportation equipment comprise the remaining major sectors within advanced manufacturing.

Hamilton's high-tech manufacturing industry set the stage for going green.

A business environment built on innovation and technology has fostered an emerging clean energy sector around water and wastewater management, power generation, as well as autonomous and electrification of vehicles.

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BREAKING DOWN BARRIERS
Resiliency, Sustainability

HAMILTON COMMUNITY ENTERPRISES

We connect and power our communities in bold new ways that accelerate them towards a smart, sustainable future. Engineering, implementation and operation of integrated, resilient, underlining data and energy critical network technologies.

"We break down barriers and find innovative solutions to take organizations from operational to optimal."

ENERGY HARVESTING

Driving Change

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67% Energy Lost

Harvest Thermal Energy

33% Energy Utilized

"Energy Rejection greater than Energy Utilization"

HELPING THE GREATER TORONTO-HAMILTON AREA BECOME CARBON NEUTRAL BY 2050

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Challenge for Hamilton

Tackle GHG emissions from Industry

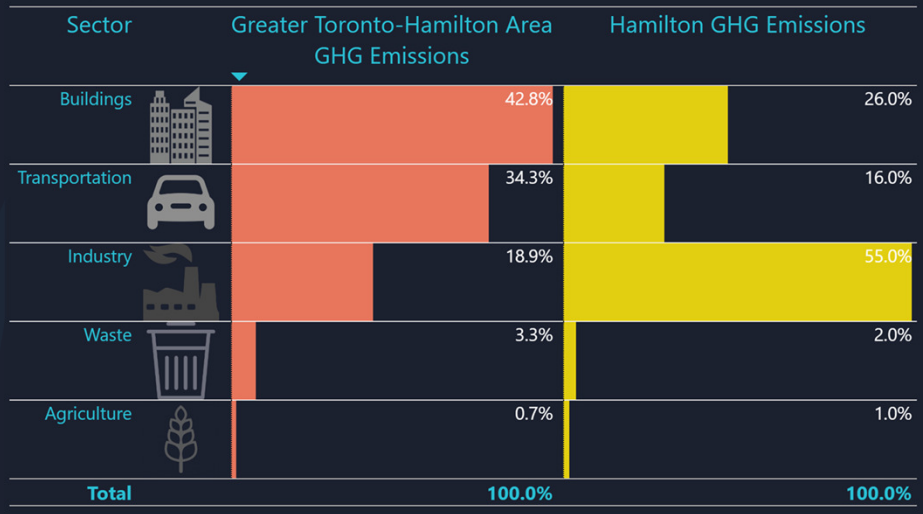
Strategy

Engage businesses and industries to develop and implement solutions

Opportunity

Unlock additional value from industrial waste heat:

- *Improve efficiency*
- *Lower costs*
- *Decrease GHGs*



Source: TAF

A COLLECTIVE RESPONSE TO CLIMATE CHANGE

Answering the call

a 'grand challenge' for the Hamilton Chamber of Commerce and The Atmospheric Fund (TAF) along with its allies

Mission readiness

Capitalizing on the window of opportunity:

- City declares a climate change emergency and advances a plan
- Manufacturers announce commitments to decarbonize
- Federal government deploys a climate plan and associated measures

Taking action

A Collaborative Approach!

ORGANIZING FOR SUCCESS

Project Mission, Building a great team!

Select an area of operation

Investigate the waste heat landscape

Build relationships

Seek out opportunities

Deliver a report with recommendations

Stay involved …

HAMILTON COMMUNITY ENTERPRISES

Including local area NGOs

ORGANIZING FOR SUCCESS

Preparation, Methodology

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Collaboration with Participating Industries

- Individual meetings with personnel from participating companies to identify the flow of thermal energy within each Industrial Facility
- Relationship building for further planning and implementation

Waste Heat Inventory

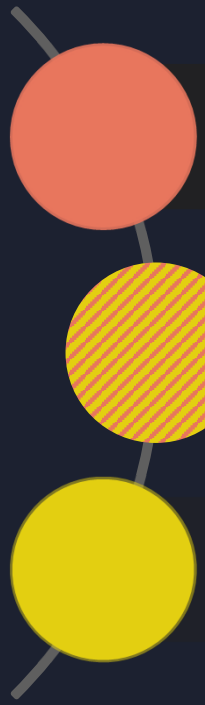
- Collection of process-specific thermal energy data
- Determination of quality and quantity of industrial waste heat available using a first-principles approach

Exergy Analysis & Data Aggregation

- Characterization of heat sources and heat sinks
- "Many-to-many" Area-wide Thermal Network
- Potential development nodes in the West Harbor Area

CLASSIFICATION OF WASTE HEAT

Understanding, Criteria



High-Temperature: > 400°C

Best applied to manufacturing processes and power generation

Medium-Temperature: 100°C – 400°C

Well suited to manufacturing processes

Low-Temperature: < 100°C

Appropriate for space heating and low-temperature thermal processes and District Energy Networks

SOURCE-SINK CHARACTERIZATION

Understanding, Criteria

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PORT TENANTS
Space Heating
Thermal Processes
Ships at Port

WEST HARBOUR AREA
(Existing and New Developments)

Space Heat and Domestic Hot Water

- Commercial
- Industrial

MULTIPLE INDUSTRIAL WASTE HEAT SOURCES

Annealing
Coke Making
Cooling Towers
Galvanizing
Heat Rolling
Refining
Cooling
And more…

INDUSTRIAL NODES HEATING
- Existing Buildings
- New Buildings
- Campus

Thermal Processes

DOWNTOWN & AREA
Space Heat and Domestic Hot Water

- Commercial
- Industrial
- Residential
- Hospitals

Enabling Technologies
- Transfer Stations
- Heat Pumps
- Thermal Grids
- Thermal Storage
- Energy Plants

WAY FORWARD

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Current State Report

- Quantification of waste heat currently available from various industrial processes
- Existing practices and plans by Hamilton Industries that support GHG emission reductions
- Overview of barriers and potential remedies related to waste heat recovery

Mapping Exercise Report

- Methodology to match potential waste heat sources and sinks
- Sample maps to visualize thermal relationships and hotspots
- Conceptualization of a potential District Energy System from multiple waste heat sources to multiple users in the study area

Final Report

- Data aggregation to maintain confidentiality
- Overview of select waste heat recovery opportunities identified by the partnering organizations
- Discussion of Thermal Distribution Networks
- Overview of Enabling Resources
- Policy and Advocacy Discussion
- Recommendations and Next Steps

KEY TAKEAWAYS

Hamilton's Bayfront Corridor produces approximately **50%** of the GTHA's overall industrial GHG emissions

The sampled recoverable waste heat generated by the participating companies is approximately **4 million GJ/yr.**, enough to heat roughly **45,000** homes for a year

The utilization of this waste heat could result in a carbon offset of approximately **200,000 $tCO_2eq/yr.$**

The current scenario of **relatively inexpensive fuel costs and lower carbon pricing** has helped maintain business-as-usual energy practices

KEY INSIGHTS

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Theory of Change

Shared Ownership Model

Involvement of Academia

Managing Expectations through perseverance

RISK MANAGEMENT APPROACH

POLICY RECOMMENDATIONS

Policies and supportive measures matter

Incentives and Disincentives

- Federal level
- Provincial level
- Municipal level

5 Key Recommendations

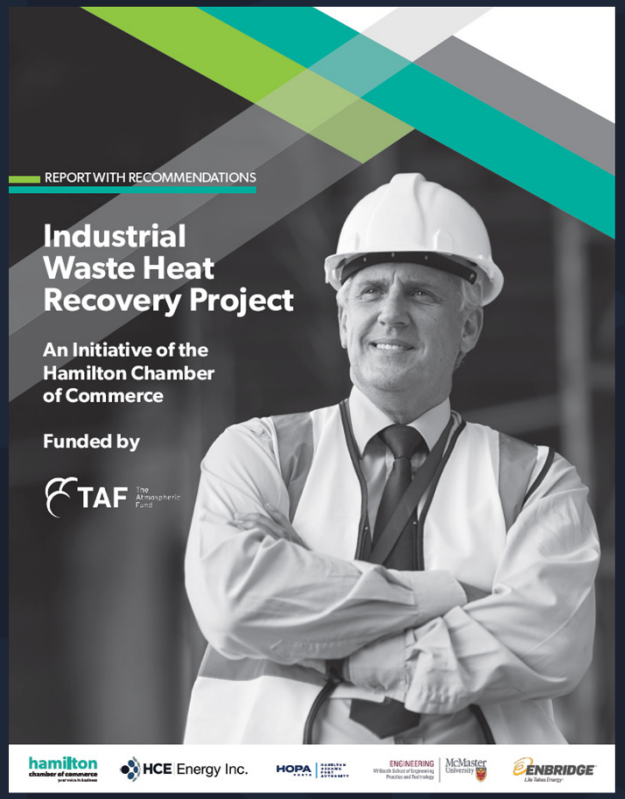
1. Keep it simple
2. Expand demand side management programs
3. Link land use planning and energy policy
4. Develop additional policies and programs that encourage industrial waste heat recovery
5. Invest in district energy infrastructure as a "build back better" initiative

Most Important: Provide carbon credits to suppliers of industrial waste heat

FINAL REPORT

Here is a publicly accessible link to the Final Report with recommendations

https://tinyurl.com/w3nvjz4



IMPLEMENTATION AND NEXT STEPS

- Market synergies between Waste Heat Recovery and District Energy Applications
- Engage with Local, Provincial and Federal Groups to establish awareness & support
- Advocate for Supportive Policies and Funding Opportunities
- Form a public-private sector consortium to drive the initiative

ANY QUESTIONS?

Image Source: Hamilton-Oshawa Port Authority

THANK YOU!

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Connected Technologies for a Sustainable Future