



**Grand
Challenges
Webinar**

**Canadian
Academy of
Engineering**



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March 7, 2022

Agenda

- Introduction
- Approach Selection & the Grand Challenges
- Illustrative Case Studies
- Social Sustainability & Justice
- Q&A



Enviro-Stewards

- We cultivate resilient businesses and
- improve lives in extraordinary ways

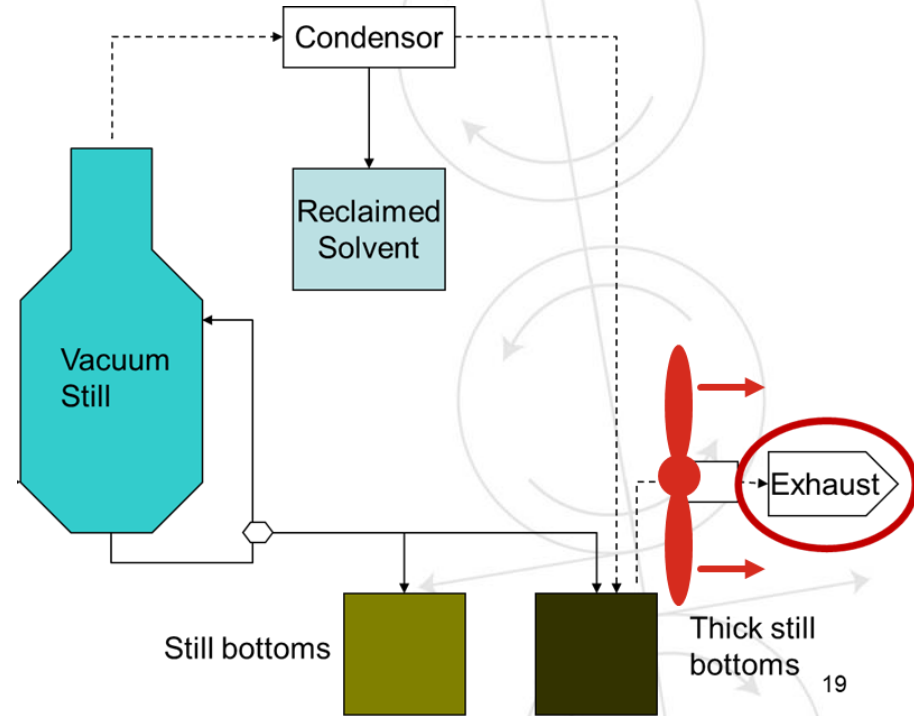


Approach Selection

How you approach a given problem determines the solutions' impact on the Grand Challenges & SDGs

For Example:

- if study electricity ... new motor
- If study thermal ... heat exchanger
- If study toxics ... recover solvent, and
 - Save even more energy & money
 - Reduce worker exposure
 - Reduce toxic emissions
 - Reduce supply chain footprints



Case Study: Enviro-Stewards' Footprint & Handprint



Footprint:

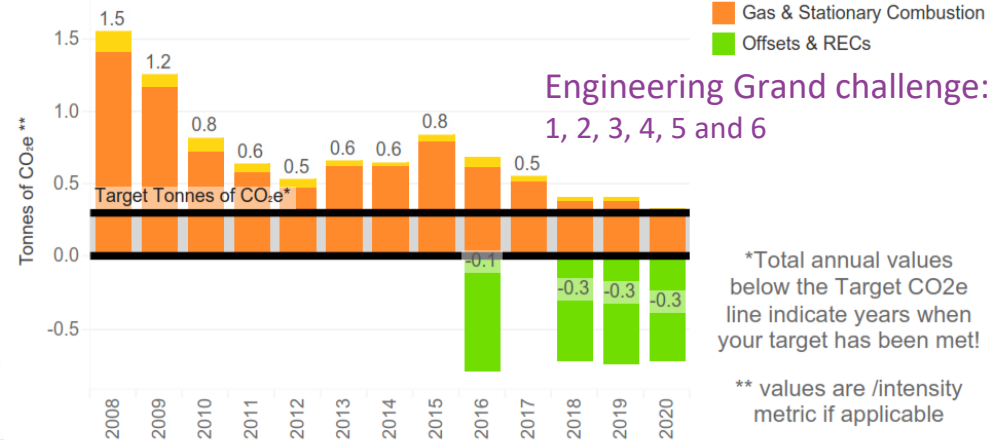
- 97% less outside air required
- 78% reduction in GHG/employee
- 0 L/yr water for living wall for 5 yrs
- Affordable smart blue roof



Impact Business Model (handprint)

- +3.76 tonnes/yr of GHG remain
- -119,858 tonnes/yr due to our work (our work avoids 30,000 tonnes per tonne of our own emissions)

GHGs Over Time vs Target



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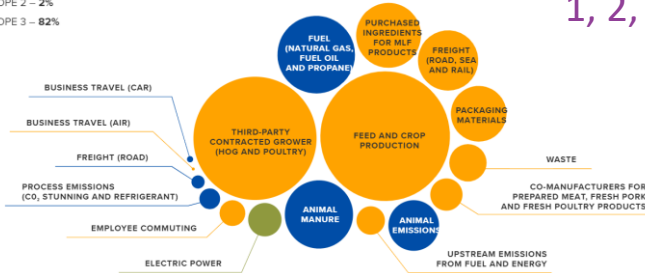
Case Study: Climate Neutral

- Enviro-Stewards completed energy, water, and pollution prevention assessments at 35 facilities
- Enough savings to offset remainder at those facilities as well as their entire supply chain!
- World's First Major Carbon Neutral Food Company (while generating a net increase in profitability)

Carbon Inventory

Total Emission Sources

- SCOPE 1 – 16%
- SCOPE 2 – 2%
- SCOPE 3 – 82%



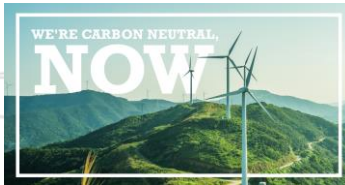
Engineering Grand challenge:
1, 2, 3, 4, and 5



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MAPLE LEAF FOODS & ENVIRO-STEWARDS

LEADING BRANDS ARE COMMITTING TO CARBON NEUTRALITY SOMETIME IN THE FUTURE, BUT WHY WAIT?

There is simply no more time to waste. The urgency of the climate crisis requires us to act now. That is why in 2019, Maple Leaf Foods became the first major food company in the world to become carbon neutral and is on a journey to become the most sustainable protein company on earth.

Even more impressive, they **achieved carbon neutrality while generating a net increase in profitability.**

HOW DID MAPLE LEAF FOODS BECOME CARBON NEUTRAL?

By aggressively avoiding and reducing its greenhouse gas emissions across its operations and supply chain and by investing in high-impact environmental projects across North America to offset the remaining, unavoidable emissions. MLF's sustainability team retained Enviro-Stewards to find practical viable measures to reduce its environmental footprint at each of 35 MLF facilities across North America.

Thus far, the conservation measures have resulted in the following savings*:

- 1.77% absolute reduction in SBT Scope 1 & 2 GHG emissions
- 19.5% reduction in natural gas intensity
- 25.9% reduction in electricity intensity
- 21.6% reduction in water intensity, and
- 12.1% reduction in solid waste intensity (91.6% diversion rate)

All of the above savings have a **payback period of one year on average!**



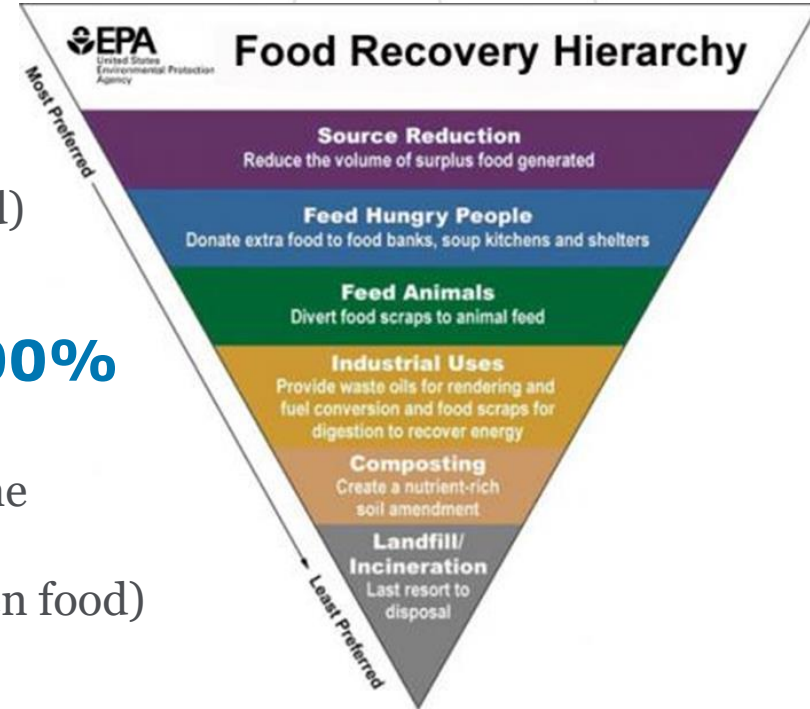
*Note: Performance measured from 2018 baseline with the exception of solid waste, which is a 2015 baseline and SBTi (Scope 1 and 2), which is a 2018 baseline.

Case Study: Food Waste

- **1/3** of all food is presently wasted
- If it were a country, food loss would be the **3rd largest GHG** emitter (after USA & China)
- **2nd largest potable water** consumer (after food)
- **\$49 billion** CDN in lost value

If Succeed in diverting even 100%

- **1/3** of all food will still be wasted
- If it were a country, food loss would remain the **3rd largest GHG** emitter (after USA & China)
- **2nd largest potable water** consumer (after eaten food)
- **>90%** of 49 billion CDN in lost value



Case Study: Food & Utilities

Process Integration (PI) Study:

- 3,233,000 kWh/yr
- 4,570,000 m³/yr of gas
- 123,000 m³ of water

\$1,645,000/yr with 2-year payback

Food Loss Prevention Study

- **\$706,000/year** food savings with 6-month payback (938 tonnes/yr)

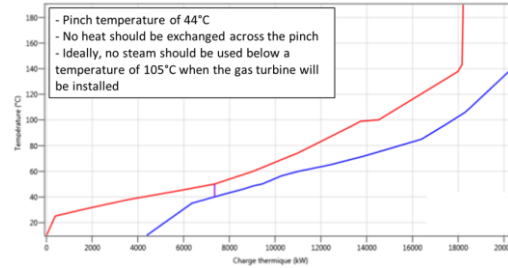
Engineering Grand challenge:
2, 3, 4, and 5



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Case Study: Wastewater Prevention & Treatment

Jackson Triggs, Oliver BC:
\$1.5 million capital cost savings
(plus higher yield & utility savings)



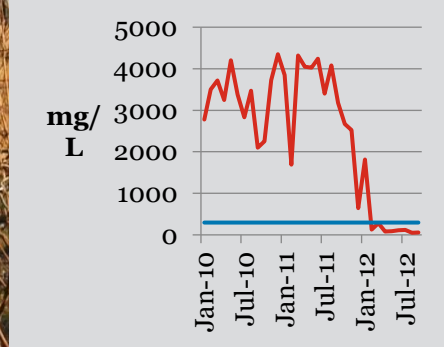
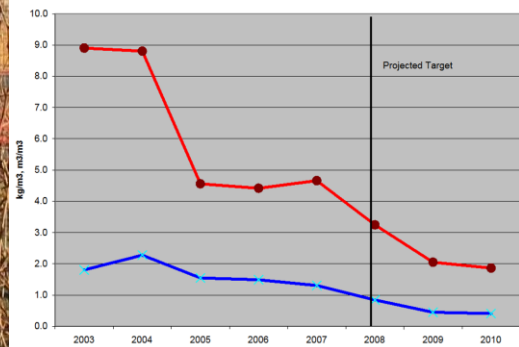
Engineering Grand challenge:
1, 2, 3, 4, and 5



Biofilter



RNG Boiler



Case Study: Water Conservation

2019 OWWA Public Sector Award:

- High participation rate
- Integration of co-benefits (energy, climate adaptation, Pollution Prevention, product yield and embedded water)
- Average **36% water savings per facility** (at 60 facilities)
- Payback 1.5 years avg.

Engineering Grand challenge:
1, 3, 4, and 5



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Case Study: Renewables & Land Use

- LEED gold certified
- Previous audit identified 5% savings with a 20-year payback
- Our assessment identified **40% savings** with a **4-month payback**
- **One-third** fewer solar panels required for remaining energy saved **\$20,000/year** of wine yield and **1/2 acre** of vineyard!

Engineering Grand challenge:
1, 2, and 5



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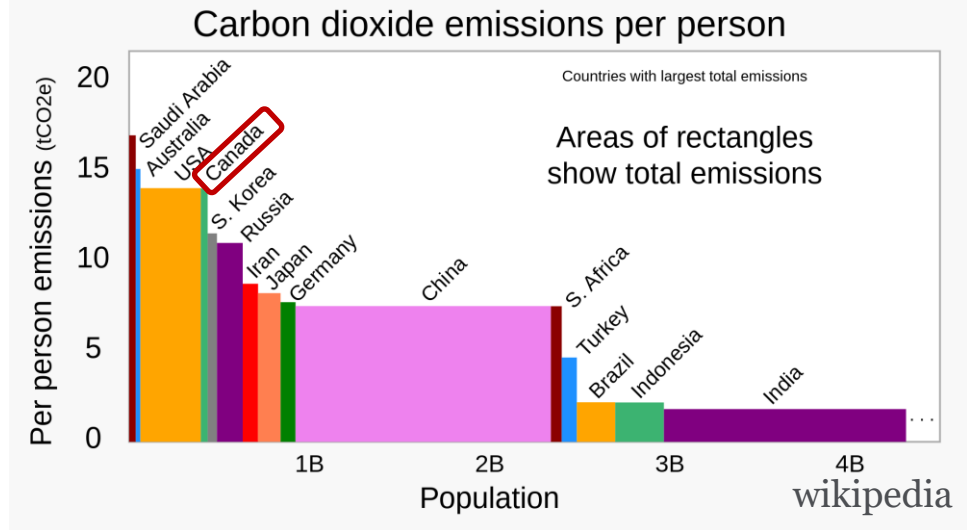
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Climate Justice:

1. The Climate Crisis was primarily caused by developed countries
2. Climate change disproportionately affects developing countries (floods, drought)
3. Climate mitigation solutions are primarily focused on helping developed countries

Canadians: 16.1 tonnes per capita (40 times more)
South Sudanese: 0.4 tonnes per capita



Carbon Offset Prejudices:

- Local bias in frameworks
- Poison pill clauses
- Ignoring suppressed demand

Social Justice:

What is poverty?

Developed world perception:

- Lack of money and “stuff”

Therefore, answer is money & stuff

Developing world residents:

- Shame & humiliation
- No one needs us
- We are like garbage
- Powerlessness

We are not solving the root problem



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Safe Water:

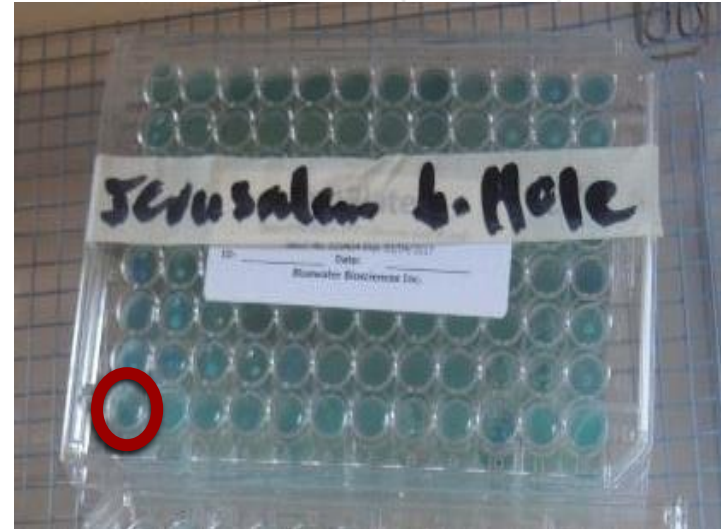
Canadians hate to pay for overhead:

“we want to pay for the well driller and to see a kid drinking well water”

- 45% of wells drilled in Africa are not functional after one year
- 171 of 238 water sources (72%) contained E. Coli bacteria
- The bowl of our office toilet is **800 times safer** than the Jerusalem borehole water in South Sudan!



Photo courtesy of Shutterstock



Social Venture Approach:

Train & Empower Local Groups:

- Market Assessment & Business Planning
- Technical Training
- Business Training
- Sales Agent Trainer Training



Engineering Grand challenge:
1, 3, 4, 5 and 6

<https://safewatersocialventures.com/start-your-own-project>



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Next Steps: Q&A

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