

The Renewable Thermal Collaborative: Overcoming Barriers to Renewable Heating and Cooling

November 1, 2018



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Agenda

- Introduction to the Renewable Thermal Collaborative
- Overview of the case study report
- Presentation of key findings from individual projects
- Moderated discussion and audience Q&A



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Featuring



Jessica Leung, Panelist

Solutions Fellow, Center for Climate and Energy Solutions



Steve Skarda, Panelist

Global Climate and Energy Leader, Procter & Gamble



Jay Harf, Panelist

Vice President of Environment, Health, Safety, & Sustainability,
L'Oréal USA



David Gardiner, Moderator

President, David Gardiner and Associates



Renewable Thermal: The “Sleeping Giant of Renewable Energy”



50% OF GLOBAL
final energy is comprised
of energy used for heating
and cooling



\$270 BILLION
amount heating and
cooling cost in the
United States annually.



39% OF GHG
emissions from energy-
related sources can be
attributed to heating
and cooling.

A project of:



Facilitated by:

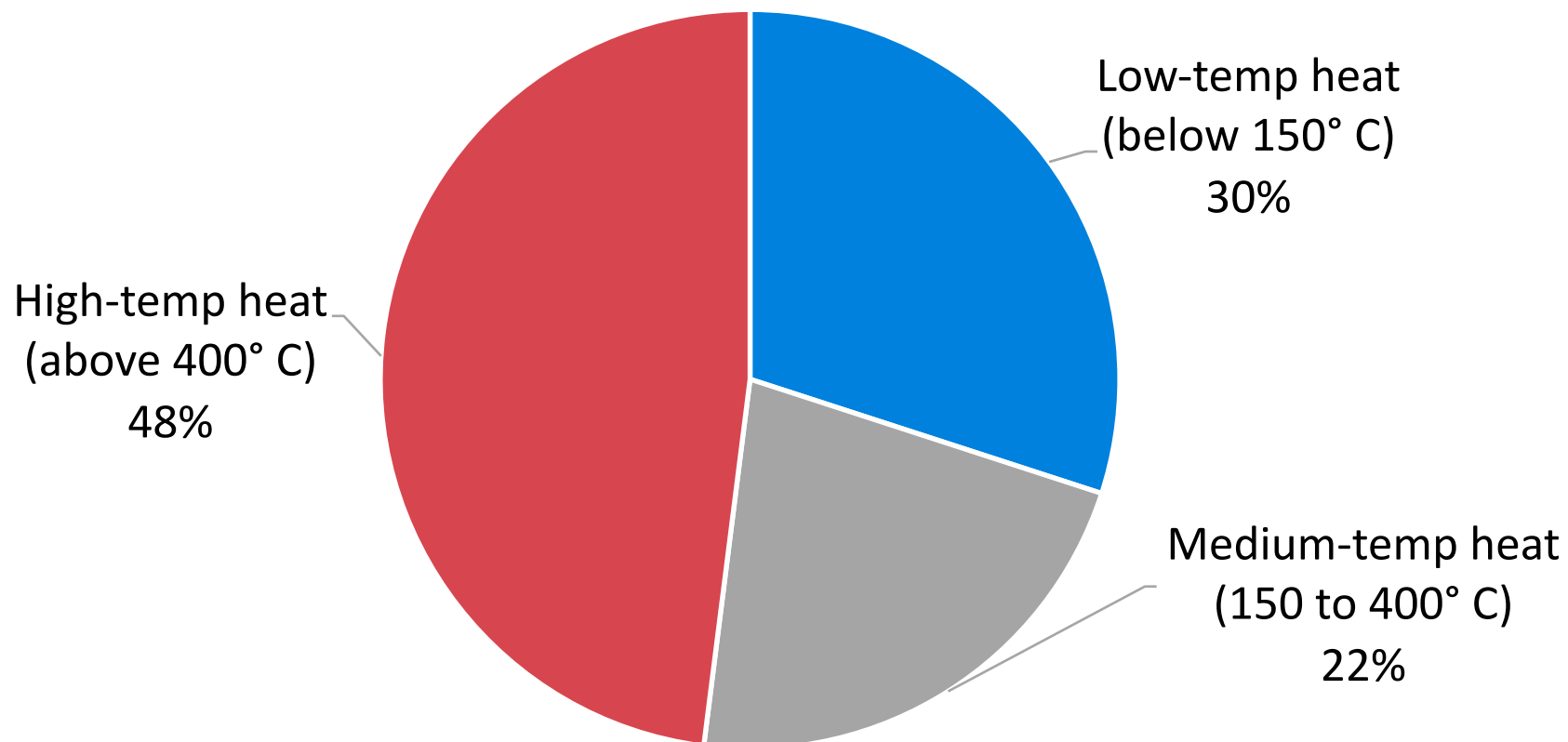


The world already has great renewable electricity solutions but if we are to keep the warming of the planet below 2 degrees then we also need great renewable thermal solutions.

Barry Parkin, Chief Sustainability and Health & Wellbeing Officer, Mars



Breakdown of Heat Demand in Industry



Source: International Energy Agency, 2017



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Members:



Kimberly-Clark



**L'ORÉAL
U S A**

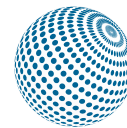
MARS
incorporated



City of
Philadelphia

Sponsors:

element
MARKETS



mas
Energy



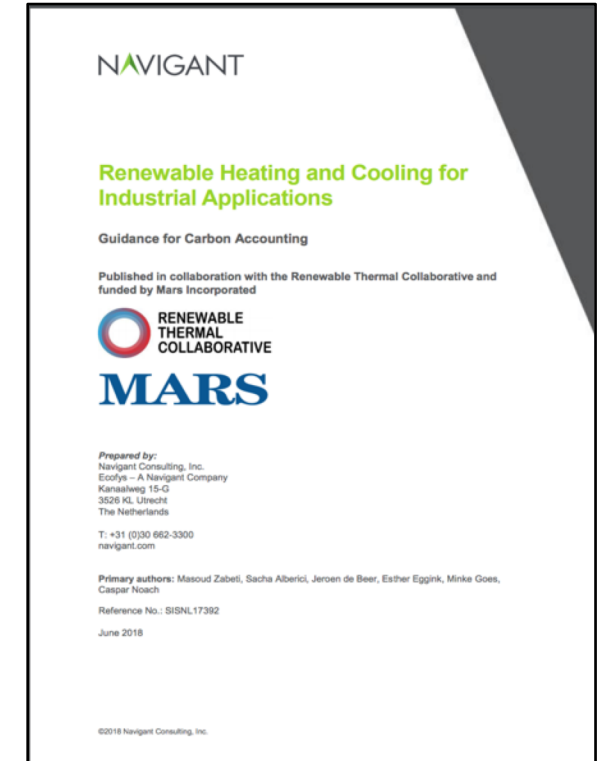
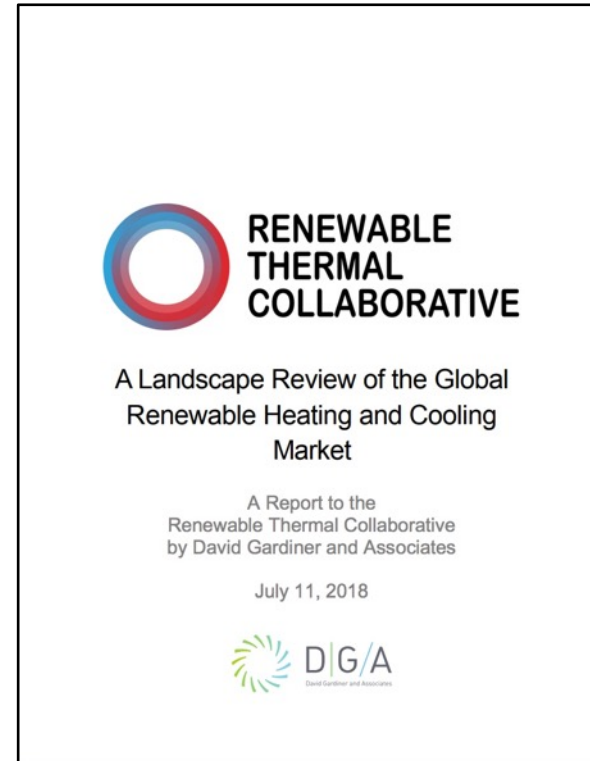
RTC Members' Renewable Energy Targets

- **Cargill** – Source 18% renewable energy by 2020
- **General Motors** – Generate or source all electrical power with 100% renewable energy by 2050
- **Kimberly-Clark Corporation** – Through renewable energy sourcing, reduce GHG emissions 20% by 2022
- **L'Oréal USA** – Goal to decrease carbon emissions for manufacturing and distribution facilities by 60% by 2020
- **Mars, Inc.** – Goal that 100% of energy consumption will be fossil-fuel free by 2040
- **Procter & Gamble** – Source 30% renewable energy by 2020, 100% renewable energy by 2030
- **City of Philadelphia** – Generate or source 100% renewable energy by 2030

Recent Reports

*A Landscape Review of the Global
Renewable Heating and Cooling
Market*

*Renewable Heating and Cooling
for Industrial Applications:
Guidance for Carbon Accounting*



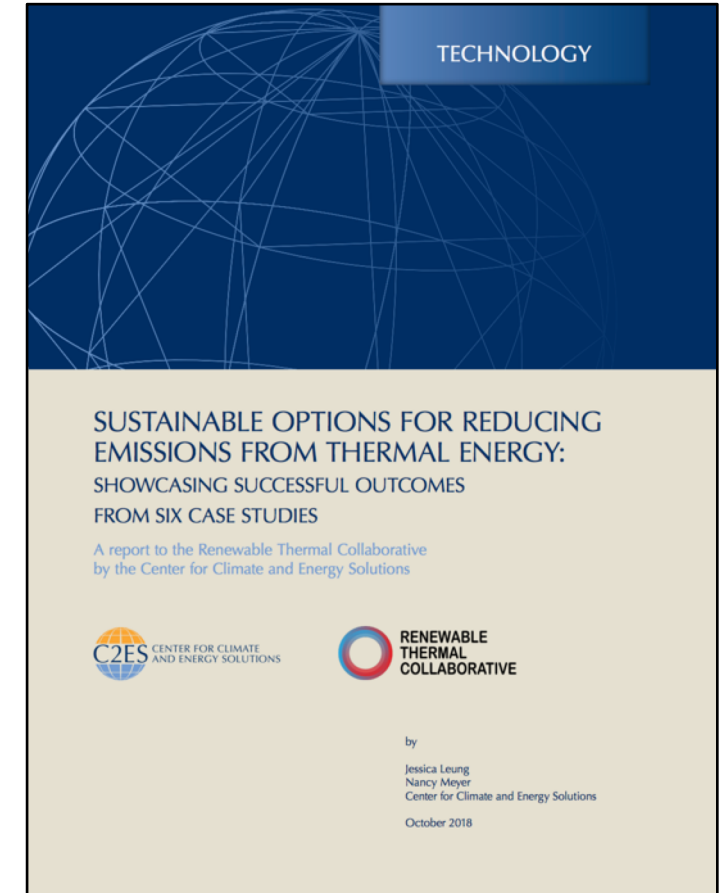


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Case Studies

- Released in October 2018
- Objective: to highlight renewable thermal projects that have been successfully developed by the RTC members and learn lessons about what's working today and identify barriers the RTC could address in the future

Available for download: <https://www.c2es.org/2018/10/meeting-sustainability-goals-with-renewable-thermal-energy/>





Key themes from the report

- Each project was motivated by organization-wide sustainability goals
- Some projects had high + volatile fossil fuel prices or forthcoming environmental regulation that prompted investing in renewable thermal
- A local renewable resource was available for each project
- Most were self-financed and achieved the expected return on investment

Project	Renewable Source	Avoided emissions from	Use	Steam Temperature
<i>Cargill: Uberlandia</i>	Biomass	Fuel oil	Biomass-powered steam boiler	950 degrees Fahrenheit
<i>City of Philadelphia: Northeast Water Pollution Control Plant</i>	Biogas	Flared biogas	Combined heat and power	180 degrees Fahrenheit heat to the digesters
<i>L'Oréal USA: Kentucky Renewable Natural Gas Purchase Agreement</i>	Renewable Natural Gas	Natural gas	Landfill gas to produce pipeline quality renewable natural gas	N/A
<i>Mars, Inc.: Chocolate Poland Waste Water Treatment Expansion</i>	Biogas and waste-to-steam	Natural gas	Waste-to-energy and waste-to-gas recovery	365 degrees Fahrenheit
<i>Procter & Gamble: Xiqing Geothermal</i>	Geothermal	Natural gas/electricity	Reduces load on boilers and provides ~10% of site's energy needs	Water extracted at 176 degrees Fahrenheit
<i>General Motors: Detroit-Hamtramck Assembly Facility</i>	Waste-to-steam	Coal	Heating and cooling applications	Delivered working temperature of the facility is 396 degrees Fahrenheit and 245 pounds of superheated steam

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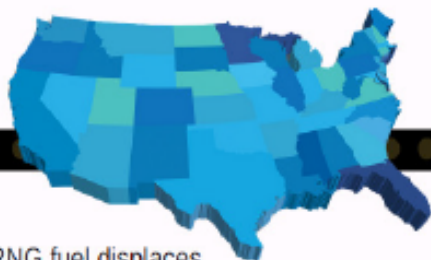
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L'Oréal USA: Kentucky Renewable Natural Gas Purchase Agreement

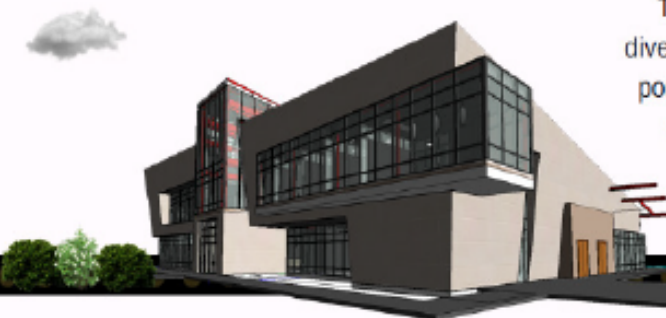
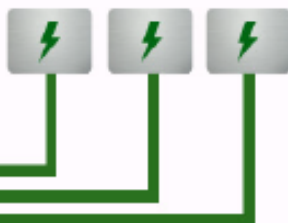
Landfill gas, predominantly consisting of methane – a greenhouse gas 25 times more damaging to the climate than CO₂ – is collected from the Big Run Landfill in Ashland, Kentucky.

Big Run
Landfill
Ashland, KY

The RNG is injected from the Big Run Landfill processing plant into the natural gas pipeline network.

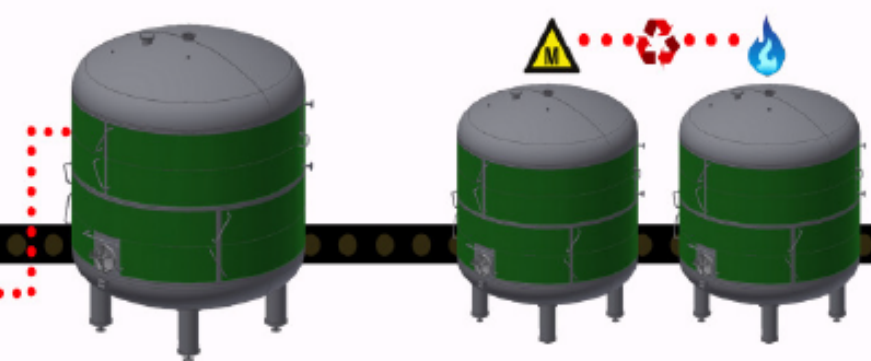


The RNG fuel displaces conventional natural gas, reducing carbon emissions.



This RNG transformation further diversifies L'Oréal's renewable energy portfolio and is a key element of the global Sharing Beauty With All sustainability program.

The collected landfill gas is then processed to remove impurities to produce pipeline quality renewable natural gas (RNG).





L'Oréal USA: Kentucky Renewable Natural Gas Purchase Agreement

- RNG projects are typically costly and can be up to 8x more than natural gas
- To offset project costs and RNG premium, L'Oréal USA plans to sell the RNG into the transportation fuels market for ~5 yrs
- RNG is eligible to create Renewable Identification Numbers (RINs), credits used for compliance with U.S. EPA's Renewable Fuel Standard
- Income from RINs (which have high market value) will help cover the costs
- During this time, the company will buy carbon offsets to still meet its carbon neutrality goals until it applies the Kentucky project's renewable attributes toward its carbon neutrality goal



Lessons Learned

- Finding a financially viable project was challenging since natural gas is much less expensive than renewable natural gas, team had to find a structure that would be financially sustainable
- Addressing Scope 1 and 2 emissions separately allowed L'Oréal USA to be successful in meeting its carbon neutrality goal
- Company is also working to address other Scope 1 emissions in the future including retail, research, and administrative buildings-related emissions. Also exploring ways it can further reduce emissions associated w/ transportation



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Procter & Gamble: Xiqing, China Geothermal Project





Procter & Gamble: Xiqing, China Geothermal Project

- Facility produces personal care products and has been sourcing ~10% of its energy needs from a deep geothermal well since 2012
- Extracted water is used in non-contact heat exchangers to provide heat to buildings or chilled to create cold water for plant
- Use of the geothermal well reduced the need for natural gas (which had high local prices)
- Internal rate of return was 10 points above P&G's normal hurdle
- Reduced CO₂ emissions by ~4,000 MT/year



Lessons Learned

- Needed to drill a reinjection well in addition to production well so water could return to geothermal resource after heat was extracted; there are distance requirements between the wells but P&G had enough space on property
- Sampling well water during test drilling & throughout the project can help foresee corrosion issues
- P&G now surveys sites for renewable energy opportunities and includes inquiries to local and expert consultants to determine if thermal springs or geothermal resources are nearby to production facilities



Discussion



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Thank You!

Learn more about the RTC and download reports
on our website renewablethermal.org



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Appendix



Key Barriers to Renewable Thermal Deployment

	Key Barrier to Renewable Thermal
Information Barriers	<ul style="list-style-type: none"> • Lack of understanding • Lack of information on environmental attributes and how to quantify
Market Barriers	<ul style="list-style-type: none"> • Disaggregated supply • Limited scale for certain technologies • Difficulty quantifying, tracking or gaining ownership of environmental attributes
Finance Barriers	<ul style="list-style-type: none"> • Some technologies are cost prohibitive • For commercial buildings: split incentives and low replacement and refurbishment rates
Technology Barriers	<ul style="list-style-type: none"> • Technology and financial analyses of electrification options for thermal uses



How the RTC Can Help: 2018 Work Plan

Fixing Market Barriers

- Clarifying and standardizing carbon accounting for biomass
- Supporting thermal energy credits
- Organizing buyers to drive change

Tools for Buyers

- How-to guides to help companies get started on the journey and evaluate market options
- Case studies on existing projects

Advancing Thermal Technologies

- Assessments and action plans
 - Solar
 - Electrification
 - Renewable natural gas and bioenergy
 - Geothermal



Long-Term Vision for RTC

1. Educate parties about urgent need to address renewable options for thermal energy
2. Identify market barriers to renewable thermal technologies
3. Enable delivery of cost-competitive renewable thermal options
4. Improve marketplace and financing for renewable thermal technologies
5. Develop long-term vision for scaling up renewable thermal technologies in U.S.