GTAA
PARTNERS IN PROJECT GREEN
A PEARSON ECO-BUSINESS ZONE

Green Economy Webinar Series: Energy Monitoring Technologies and Resulting Cost Savings

- Audience microphones are muted
- Submit questions at any time via the tool bar (questions only visible to organizer)
- Recording, slides, and additional info will be shared after the webinar
- Join our networking session after the panel – computer audio only, Google Chrome browser recommended

partnersinprojectgreen.com

A program of:

Toronto and Region Conservation Authority

Webinar Agenda

1. **Introduction**

   Nathaniel Magder, Program Manager, PPG

2. **Energy Management at 3M: Reducing Energy Use from Energy Data**

   Prasath Vinayagamoorthy, Senior Energy Engineer, 3M

   Tanmay Soni, Advanced Energy Analyst, 3M

3. **Q&A**

4. **Networking Room**

A recording of the webinar will be made available to attendees

Partners in Project Green and TRCA Program Updates

Augmenting our programs to adapt to COVID-19

At Home with Nature:

TRCA e-Learning

Fun e-Learning videos, activities, and resources that will help families deepen their understanding and appreciation of nature, ecology, and cultural heritage.

https://trca.ca/learning/nature-elearning/

Green Economy Webinar Series

Partners in Project Green's free monthly webinar series highlighting important issues and ideas in sustainable business.

Webinars so far:

- Getting to Zero Plastic Waste
- The Business Case for Natural Infrastructure
- Sustainability Reporting: Escaping Acronyms and Rear-View Mirror Reports
- Building Resiliency into your Sustainability Strategy: Lessons from COVID-19
- Microplastics Diversion: Sharing Two Pilot Case Study Successes

Visit partnersinprojectgreen.com/resource to access recorded webinars

Sign up for our monthly newsletter at
partnersinprojectgreen.com/newsletters
to stay up to date on our webinars and programs!

Improving your bottom line with municipal business programs

November 4
Brampton - 10:00AM
Vaughan - 1:00PM

- Discuss programs you can access to reduce energy, waste and water costs
- Showcase how you can gain and retain customers through environmental initiatives
- Show you how to take advantage of available incentives and rebates
- Include local municipal officers to help answer your questions

Register today: https://partnersinprojectgreen.com/events/

Material Exchange

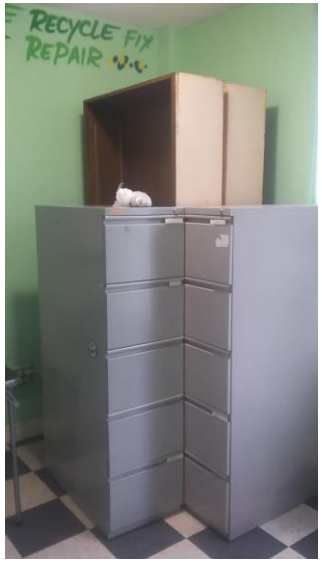
Facilitating the exchange of material between businesses and non-profit organizations to divert waste from landfill, support local communities, and move towards a circular economy.

SickKids Hospital - Furniture

New PPG member SickKids Hospital had 2 rooms full of various furniture that they had no use for.

PPG reached out to our networks and was able to secure exchanges with 4 different organizations across the GTA.

Items exchanged totaled 610 kg in weight and included school desks, filing cabinets, chairs, and tables.



If you have items that need new homes, contact us today.

Contact
connie.choy@trca.ca

Natural Infrastructure and Climate Resiliency

This program helps property managers, commercial developers, industrial manufacturers, institutional facilities, and business owners understand their climate risks and identify opportunities to mitigate those risks and provides support to take action and become more resilient.

For more information, visit:

https://partnersinprojectgreen.com/natural-infrastructure/

Contact **Eric.Meliton@trca.ca** for details

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@TRCA_HQ

Prasath Vinayagamoorthy

Senior Energy Engineer, 3M

Prasath currently works on 3M's implementation and coordination of ISO50001/SEP management systems and the maintenance and improvement of Energy Management Information Systems at 3M Canada sites.

Prasath is the recipient of the 2019 Canada Region Energy Engineer of the Year Award from the Association of Energy Engineers (AEE), as well as the 2018 IESO Energy Manager Award in Ontario.

Tanmay Soni

Advanced Energy Analyst, 3M

In his role as an Advanced Energy Analyst at 3M, Tanmay specializes in designing and maintaining 3M's global portfolio for normalized energy efficiency reporting, leads internal audits for ISO5001/SEP locations and performs technical, feasibility, and financial analyses for energy projects.

Tanmay holds a Masters of Management Sciences and a Graduate Certificate in Business and Entrepreneurship, both from the University of Waterloo. He is also a Certified RETScreen Expert (CRE) and a Canadian Sustainable Energy Practitioner (CSEP).

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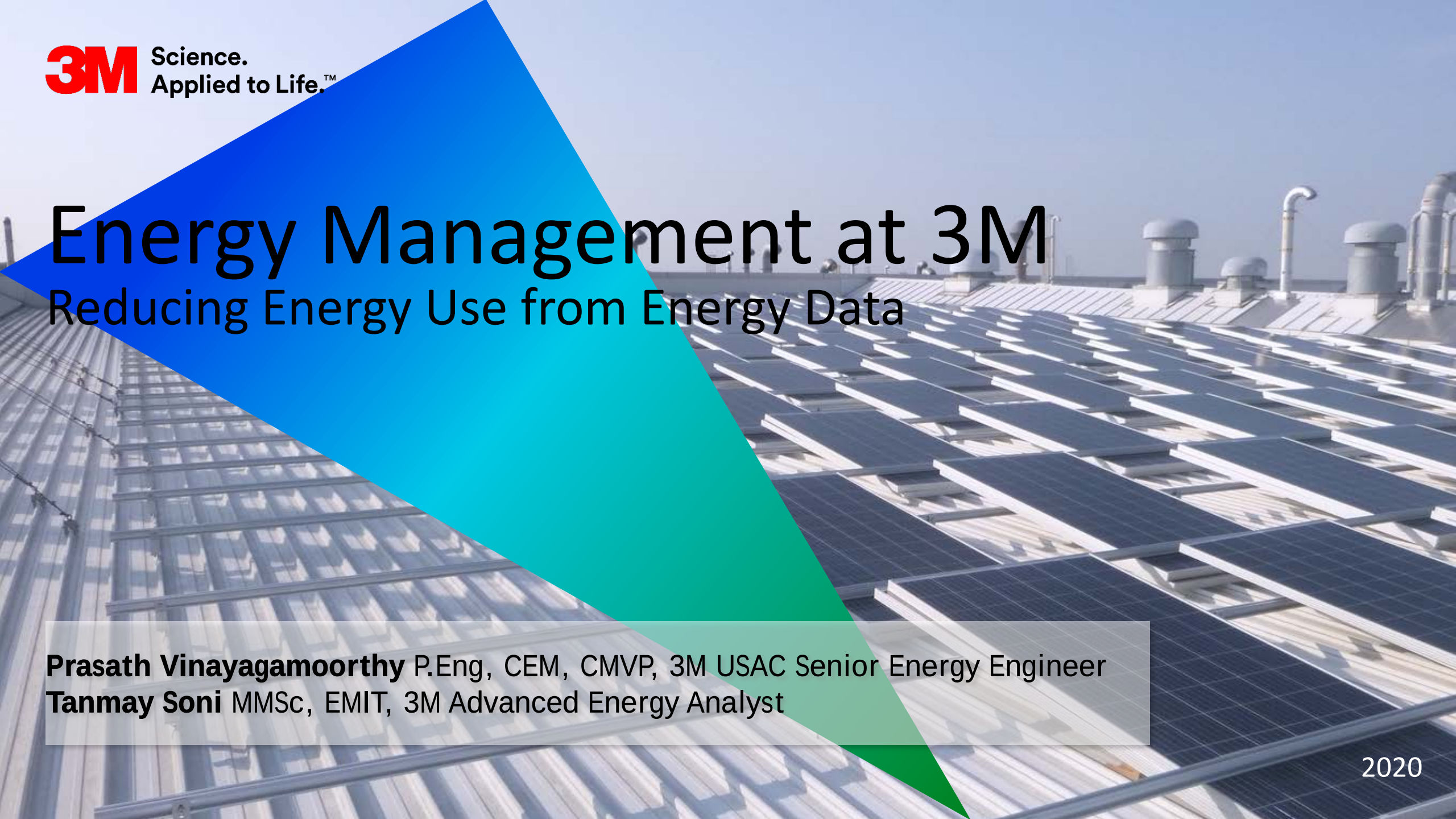
@TRCA_HQ



3M Science. Applied to Life.™

Energy Management at 3M

Reducing Energy Use from Energy Data

Prasath Vinayagamoorthy P.Eng, CEM, CMVP, 3M USAC Senior Energy Engineer
Tanmay Soni MMSc, EMIT, 3M Advanced Energy Analyst

2020

3M Company

Since 1902...

Our Vision

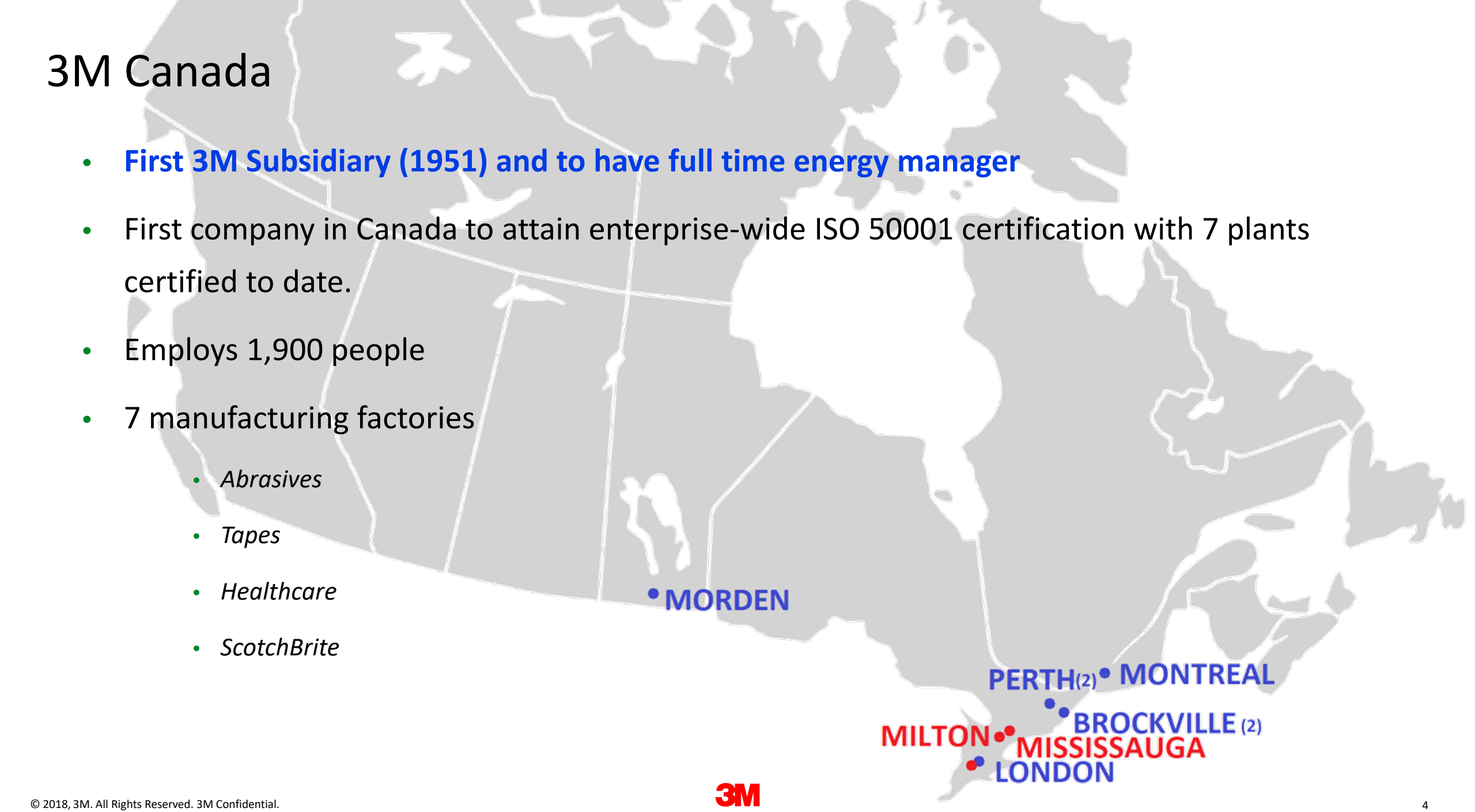
3M Technology Advancing Every Company
3M Products Enhancing Every Home
3M Innovation Improving Every Life

Science improving lives for more than a century

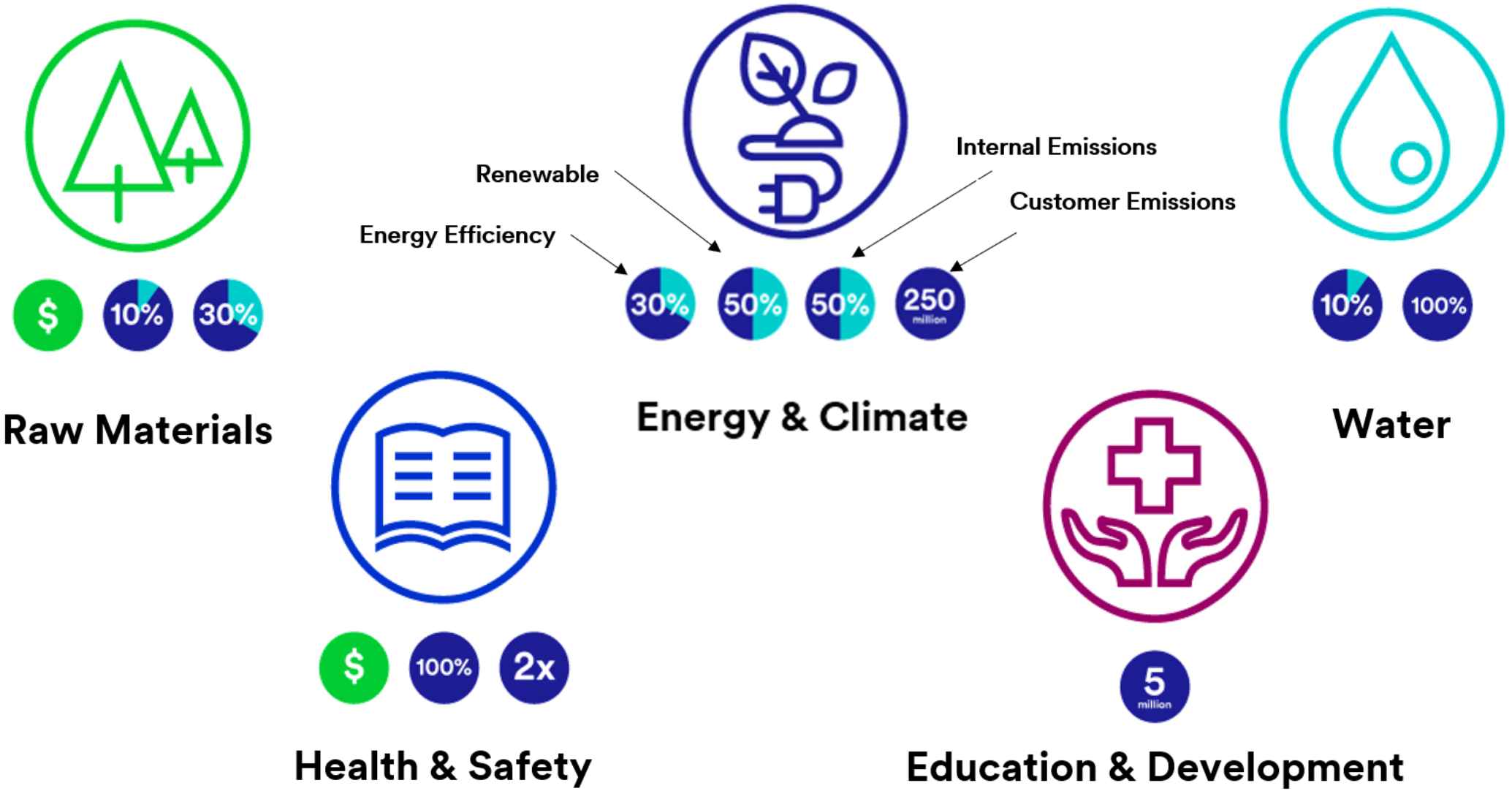
- Wetordry™ Sandpaper
- Scotch® Masking Tape
- Scotch® Cello Tape
- Scotchlite™ Reflective Signage
- 3M™ Flat Fold Disposable Respirator with Valve
- Scotch-Brite™ Sponge
- Micropore™ Medical Tape
- Command™ Adhesive Strips
- Post-it® Notes
- 3M™ Aluminum Conductor Composite Reinforced (ACCR)
- Cubitron™ Abrasives
- 3M™ 360 Encompass™ System
- Scotch® Magnetic Tape

3M Canada

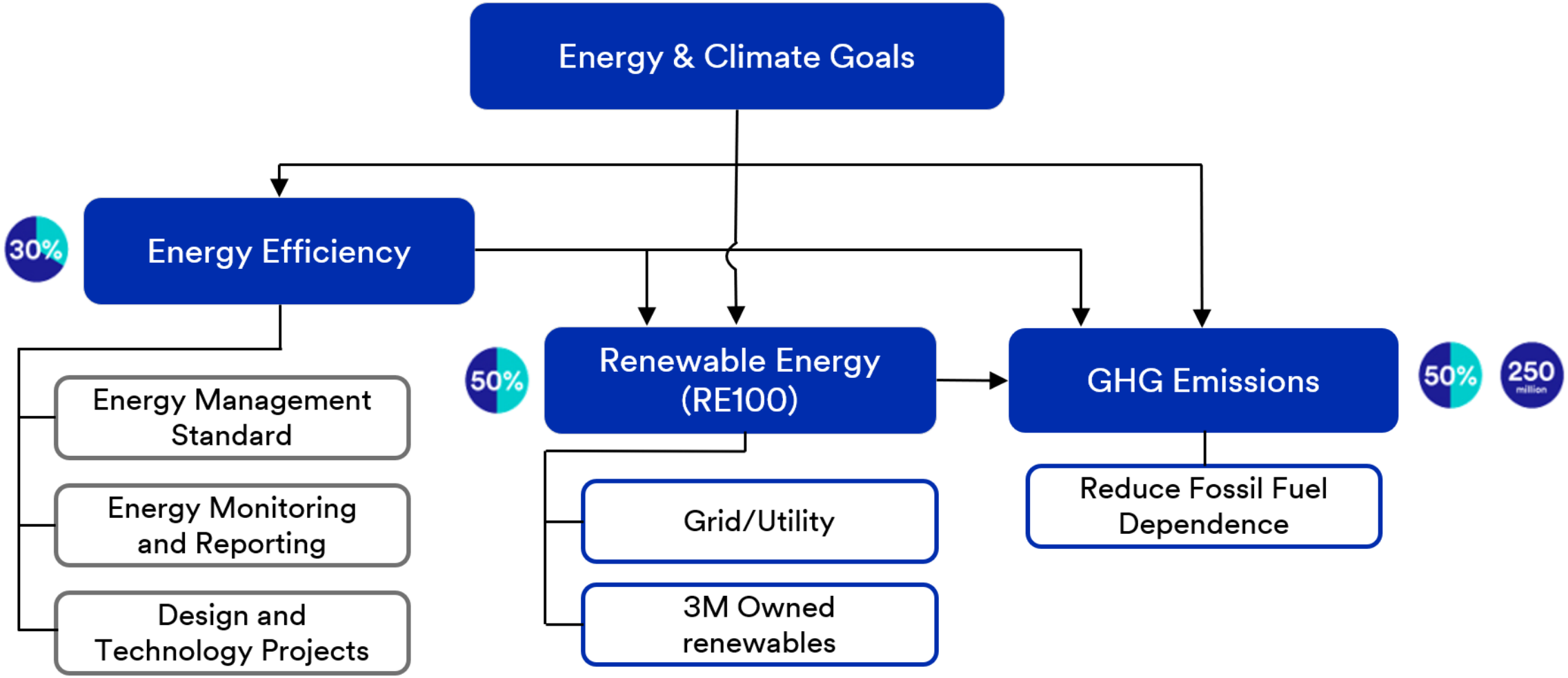
- **First 3M Subsidiary (1951) and to have full time energy manager**
- First company in Canada to attain enterprise-wide ISO 50001 certification with 7 plants certified to date.
- Employs 1,900 people
- 7 manufacturing factories
  - *Abrasives*
  - *Tapes*
  - *Healthcare*
  - *ScotchBrite*



Corporate Climate and Energy Goals



Strategies for Climate and Energy Goals



Energy Policy

3M's corporate energy policy

3M

Environmental, Health and Safety Policy

Corporate Energy Policy

Applies To
This policy applies to all 3M operations.

Policy Statement
3M will seek to both promote the efficient use of energy in our operations and to deliver products to our customers that help them save energy.

Additional Elements
3M is committed to continual energy performance improvement and will take the following steps to support this policy:

- Assess energy performance in our existing operations, in the construction of new facilities, in the development of new products and where applicable, in the procurement process.
- Implement an effective energy management system that supports manufacturing capabilities while providing a safe and comfortable work environment with the information and resources needed to set and achieve appropriate energy objectives and targets.
- Secure adequate reliable, and when feasible, renewable energy supplies at competitive rates and conduct appropriate contingency planning activities to protect operations from interruptions.
- Encourage continuous energy performance improvement by employees in their work and personal activities.
- Drive development and application of innovative energy efficiency technologies in our products and through our operations.
- Cooperate, when feasible, with governmental agencies, utility companies and other organizations on energy programs and comply with all legal requirements relating to energy use, consumption and efficiency.
- Report progress toward 3M's energy objectives and targets to executive management and external stakeholders on a regular basis.

Related Information

- ISO 50001 Energy Management Standard
- Guidelines for Energy Management
- Manual 81 for Energy Best Practices
- Procedure for Managing and Using Energy Consumption Data

For Further Information
Contact 3M Energy Management, St. Paul, Minnesota, 651-737-4206.

Approved By
Environmental, Health and Safety Committee

3M Energy Management
Building 260-06-N-07
St. Paul, MN 55144

Please recycle.

Issued: 08/19/1991
Revised 03/16/2020

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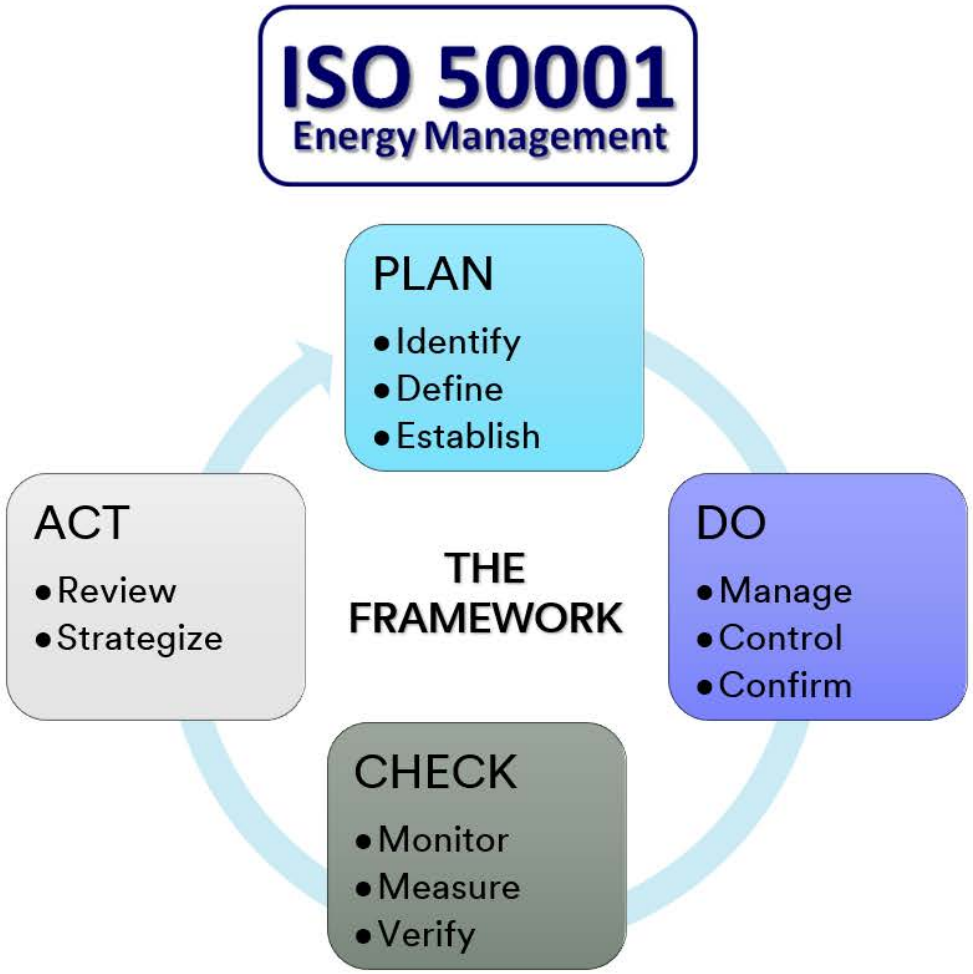
Standards for Energy Management System



Superior Energy Performance®
U.S. DEPARTMENT OF ENERGY

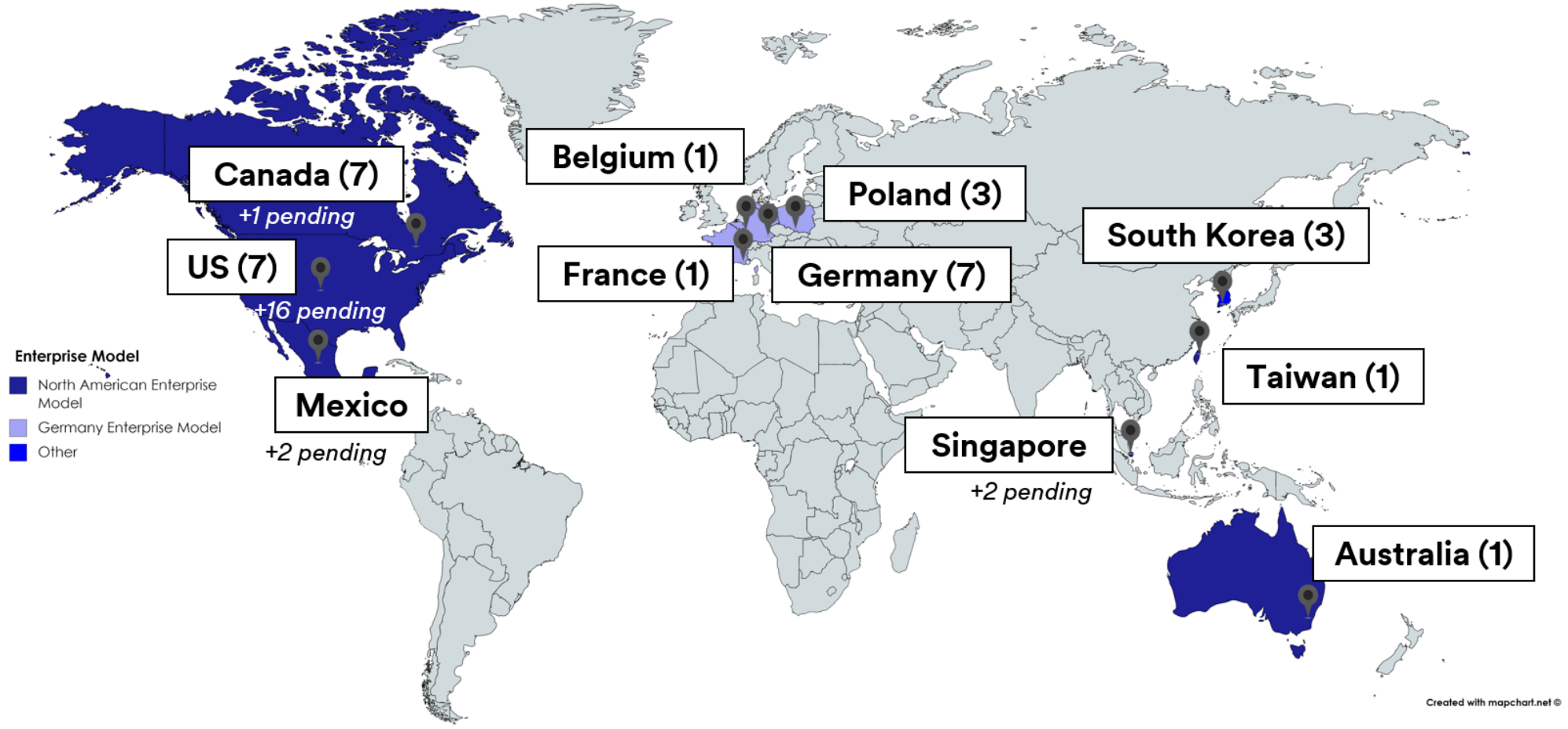
Certification
- 0.0% Energy Reduction
- No Scorecard

Silver Level
- 0.0% Energy Reduction
- No Scorecard

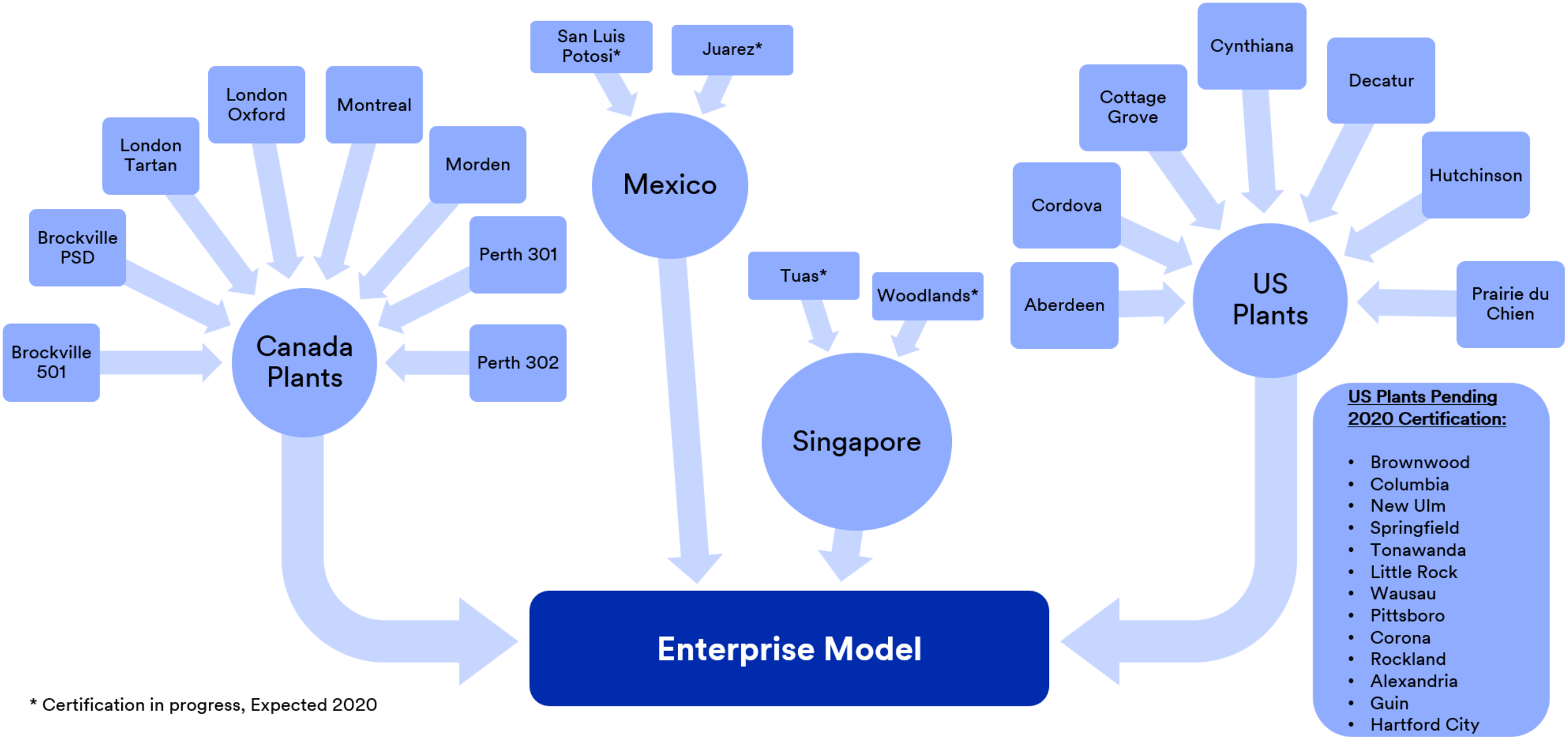
Gold Level
- 0.0% Energy Reduction
- 50+ on Scorecard

Platinum Level
- 0.0% Energy Reduction
- 75+ on Scorecard

31 of 3M Global Sites ISO 50001 Certified



ISO 50001 Enterprise-Level, North America

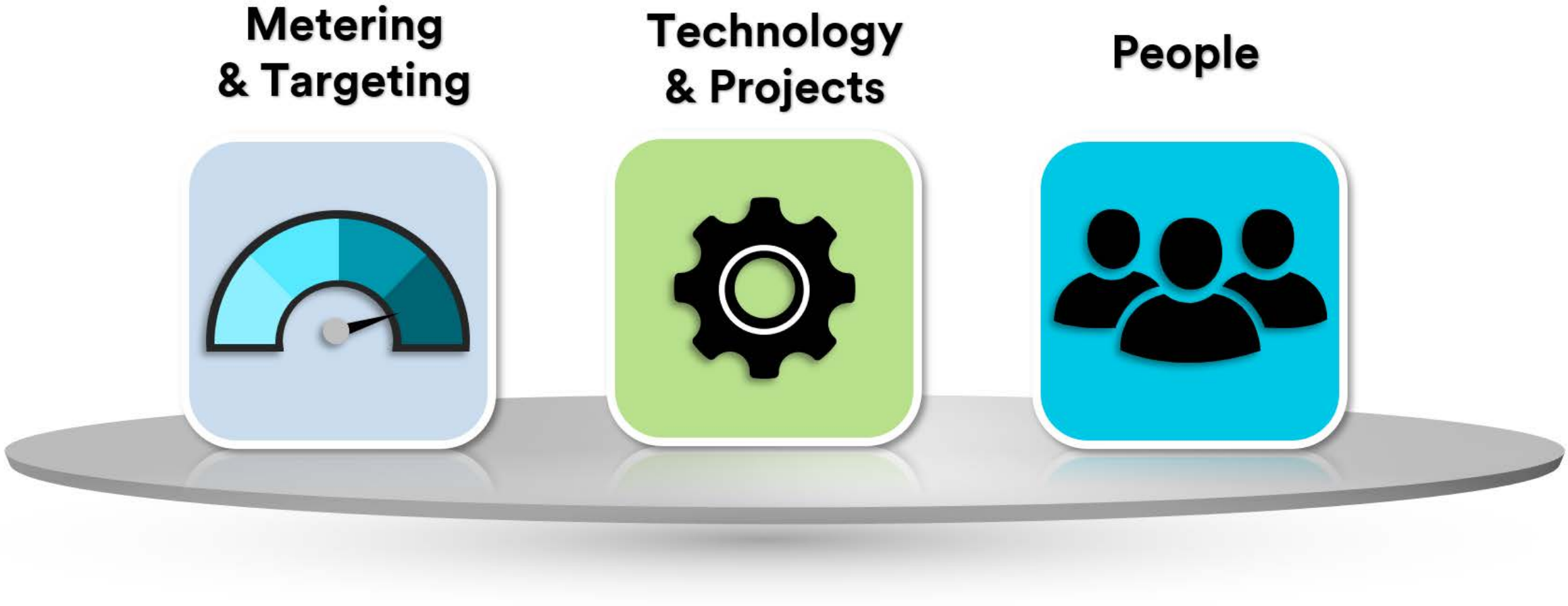


US Plants Pending 2020 Certification:

- Brownwood
- Columbia
- New Ulm
- Springfield
- Tonawanda
- Little Rock
- Wausau
- Pittsboro
- Corona
- Rockland
- Alexandria
- Guin
- Hartford City

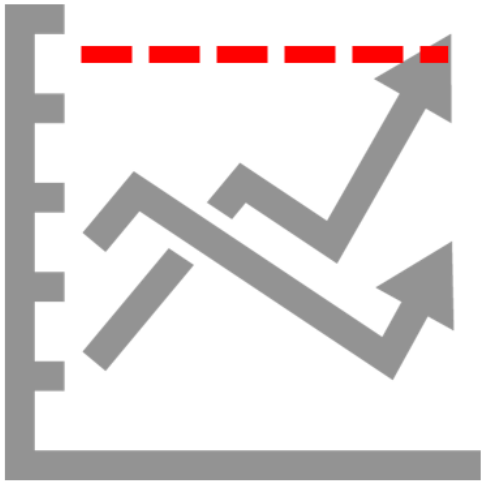
* Certification in progress, Expected 2020

3 Pillars to Successful Energy Management



Metering & Monitoring

I. What you can't measure you can't control – make energy visible
II. Sub-metering
III. Energy Map – identify where energy is used and how much it costs



IV. Establish energy baselines
V. Establish energy targets normalized for product types, outside weather conditions and any other related variables.

VI. Provide real-time energy information for operating personnel.

VII. Provide energy consumption reporting for management for tracking and budgeting.

Design and Technology Projects

Combined Heat & Power (CHP)

- Stable and low natural gas prices
- High electricity cost
- Steady electrical base load
- Steady heat sink for heat recovery
- Government/local utility support

Chillers/HVAC

- Conditioning of air is very expensive - $5 per CFM per year
- Air balance studies to reduce exhaust and makeup air
- Re-commission existing equipment
- Optimize Chilled Water Systems
- Use Free Cooling

Compressed Air Optimization

- The most expensive – 7 HP of electricity used to produce 1HP of comp. air
- Replace with equipment not requiring compressed air (ex. electric blowers, mixers etc.)
- Reduce air leaks – most plants leak at 20-30%

LED Lighting

- Mature technology
- Significant energy savings (60-90%)
- Better illumination and light quality
- Longer life – less maintenance cost

Design and Procurement

- Assess energy efficiency in equipment upgrades
- Re-evaluate the needs for like-to-like replacements
- Include alternative practices for energy intensive process in design phase

Continuous Improvement – Energy Manual 81

- Best practices for all sites to follow
- Metering required for new equipment exceeding threshold limits

Utility	Threshold Criteria
Chilled Water	> 50 TONS
Compressed Air	> 75 SCFM
Natural Gas / LP	400 MBtu / hr
Electrical	35 kW
Steam	900 lbs / hr

People

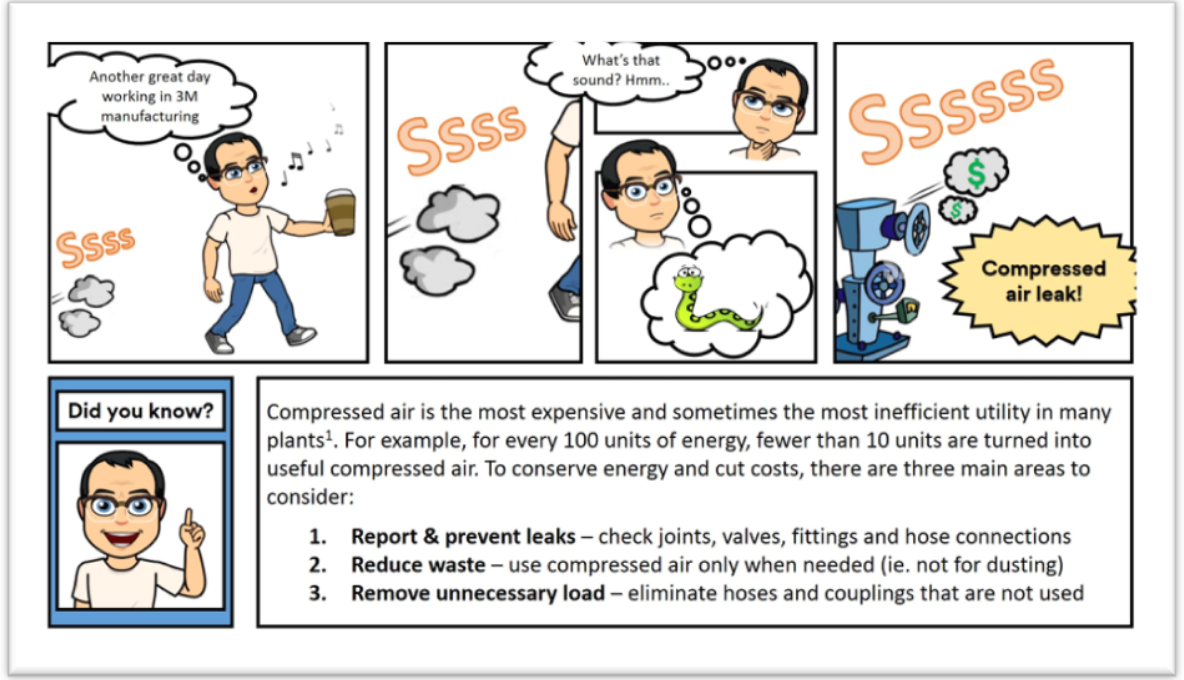
Why?

- Production staff operates and knows the equipment that consumes energy
- Better employee retention and satisfaction
- Increased trust in management

How?

- Employee Suggestion Program
- Conservation Awareness Campaigns
- Energy Training
- Let them know they matter

Energy Awareness Comics



Where is data and how can it help?

For us at 3M Canada Energy Team, it's through

Metering and monitoring of equipment and processes	Weather Stations	Utility Bills

- Identifies facts from opinions and highlights useful trends
- Ability to manipulate data at different levels:
  - ✓ plant vs. equipment
  - ✓ winter vs. summer
  - ✓ peak production days vs. weekend schedules
  - ✓ daily, monthly and annual performance analysis

How data is distracting?

USING IRRELEVANT DATA DURING ANALYSIS	Parameters
	Too many variables
	Time intervals
LOSING FOCUS	Misleading trends
	Not meeting objectives & goals
	Wasted time, money & energy

How to tame data?

1. Use only what you need.

- The way we use data is purely for energy performance.

Ex: We don't need to know how many cars are parked in the parking lot to know how much energy is used in the plant.

2. Use proper analyzing tool.

- There are many different tools to manipulate and understand data.

Ex: Regression Analysis: Using normalization to discard the irrelevant variables and showcase the useful variables

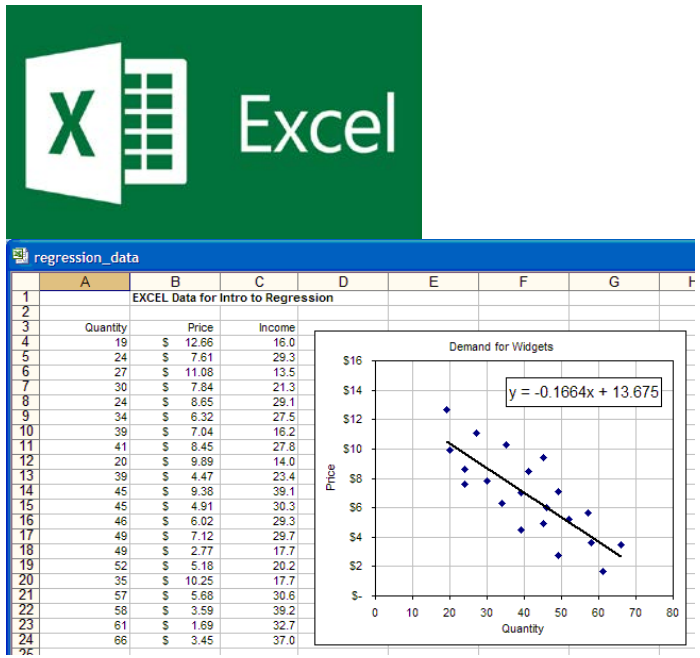
3. Find trends.

- This can pinpoint the areas we need to prioritize such as operational or maintenance control.

4. Use human input!

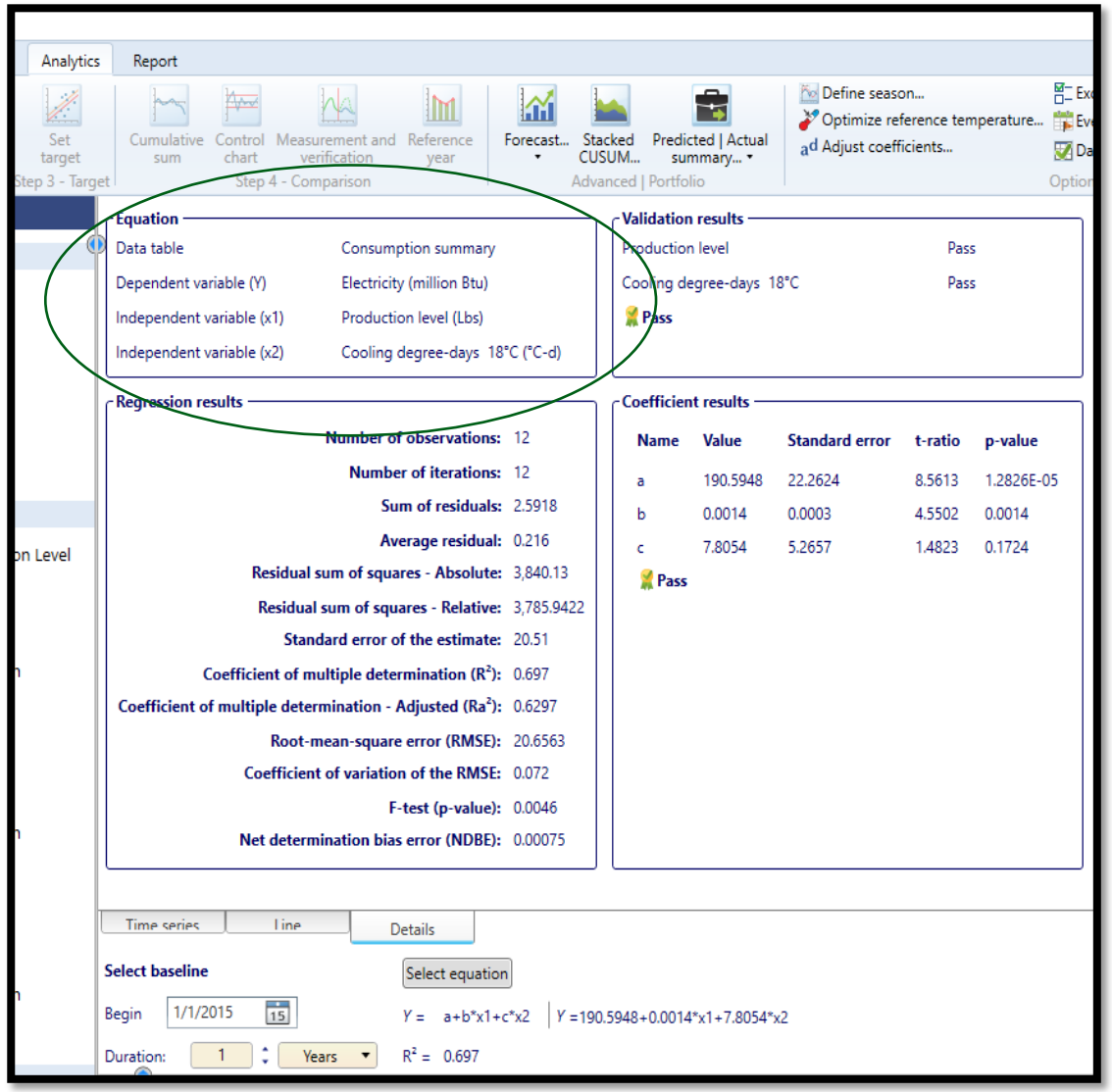
- Plant operators and managers have a better idea of how the plant operates and the limitations faced by resources, equipment and schedules.

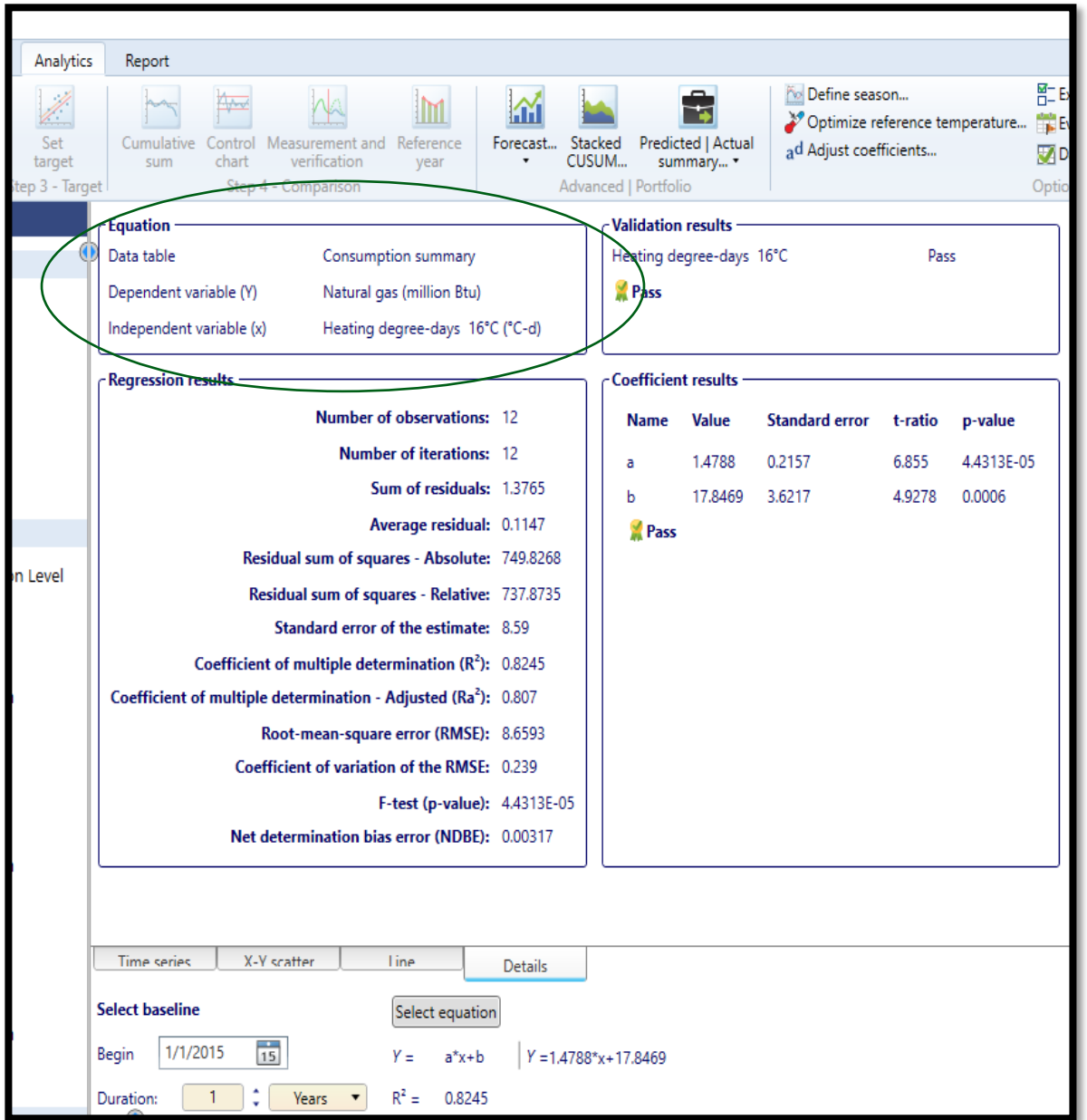
Using the proper tools



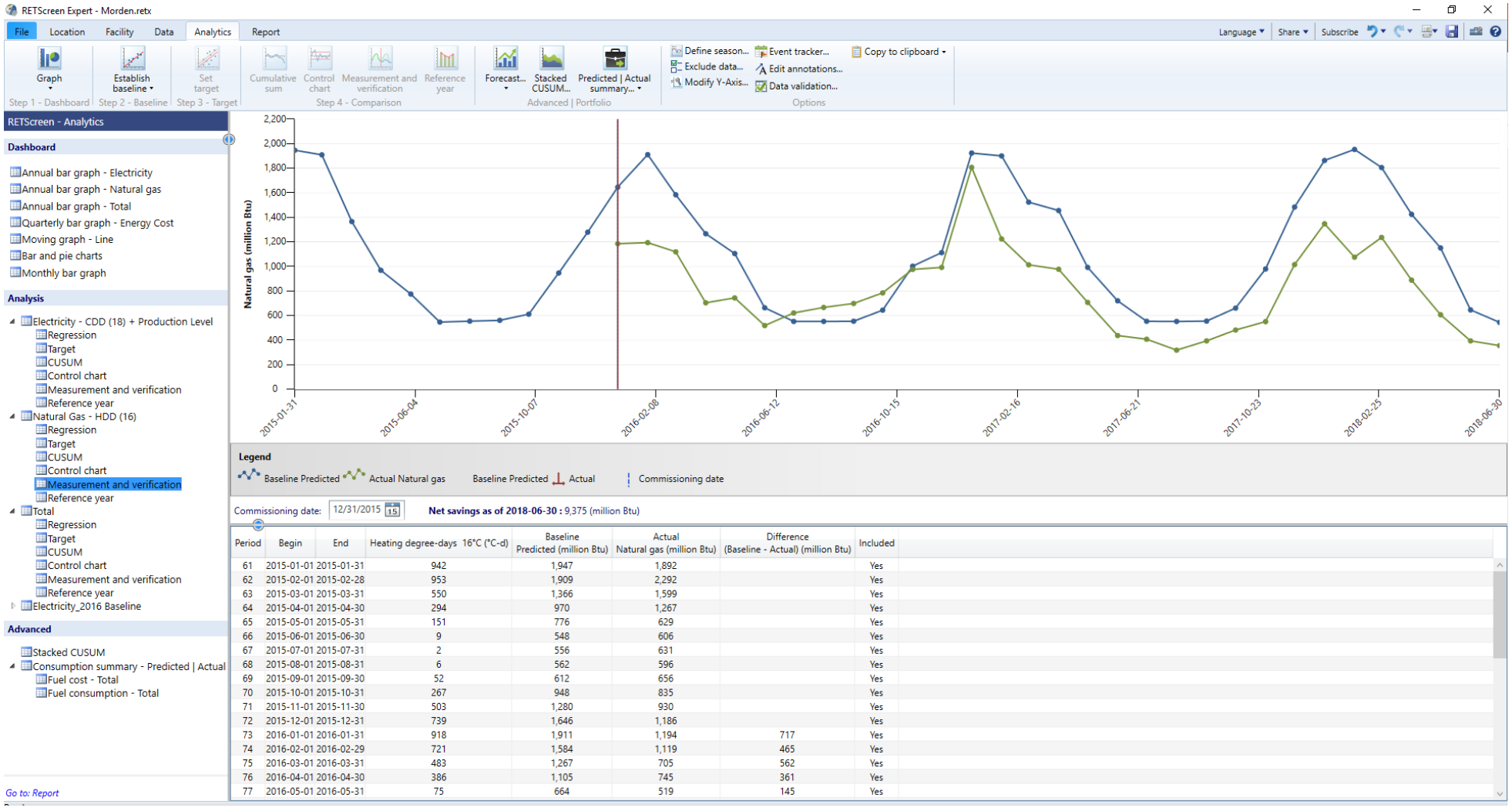
Prior to 2016

Regressions & Data Analysis (Elec, N.gas)

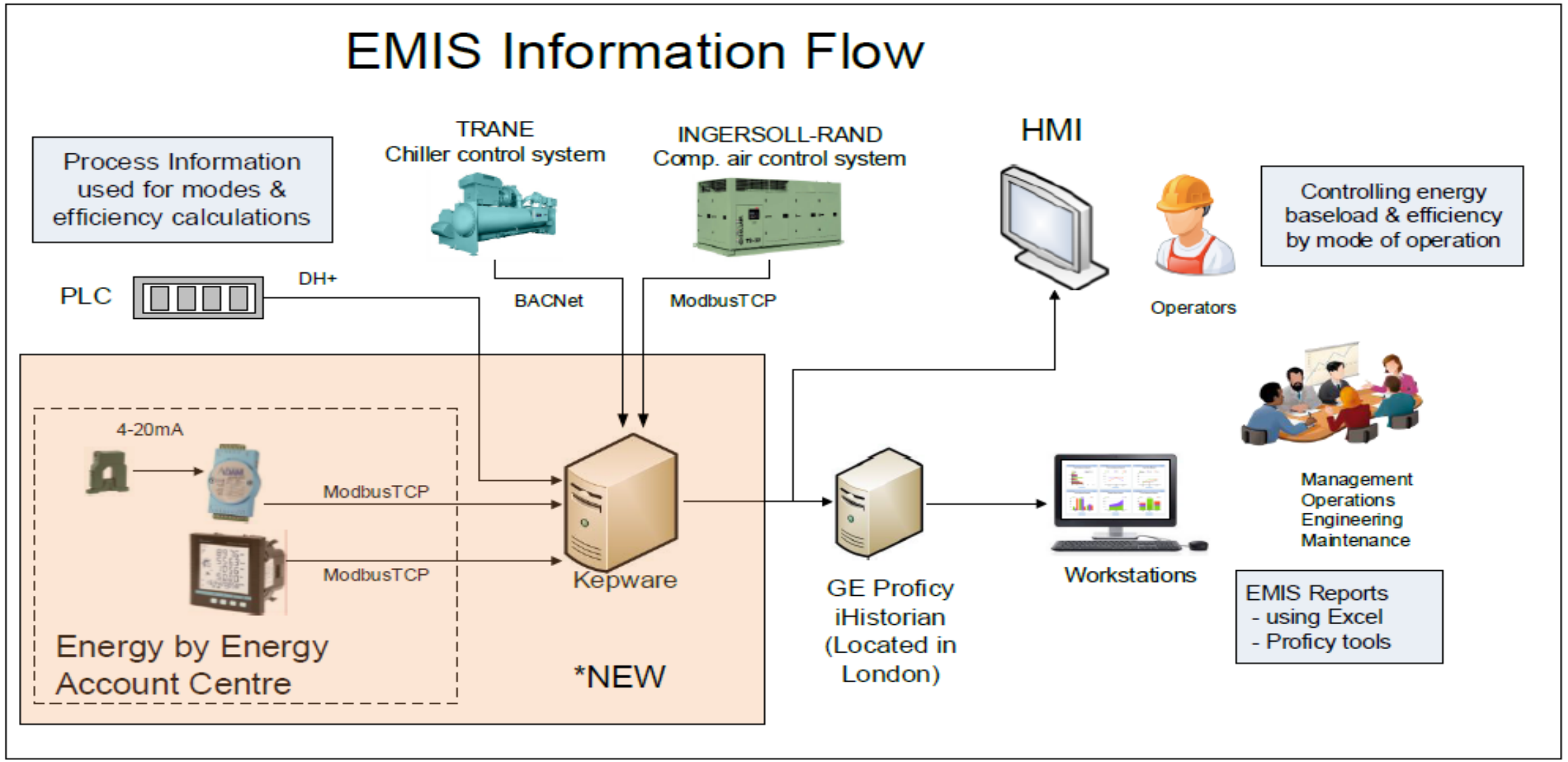




Regressions & Data Analysis (M&V)

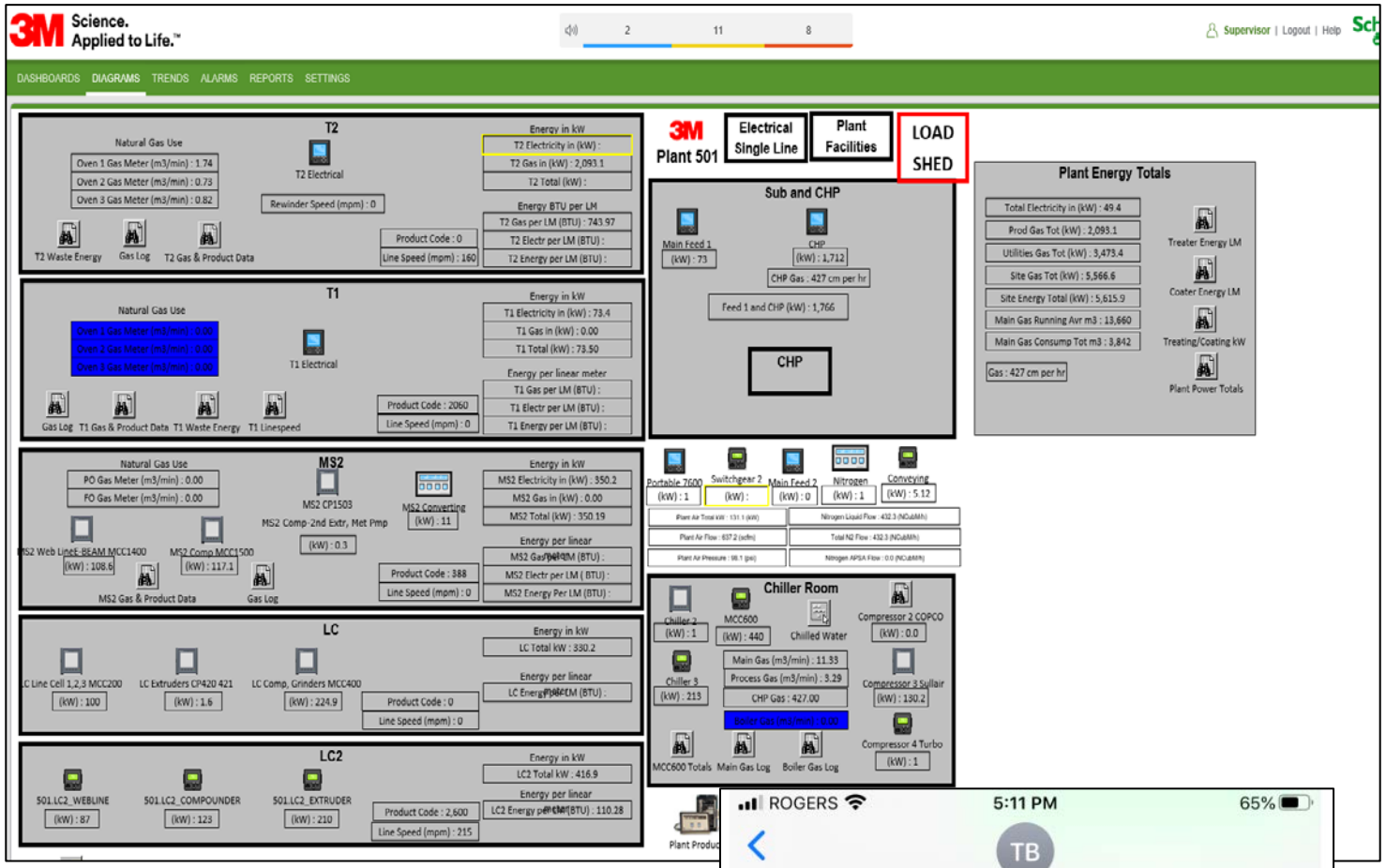


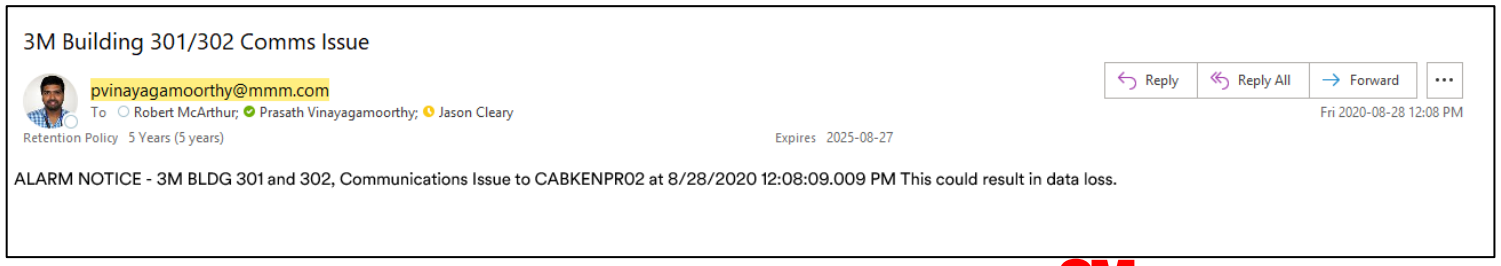
Metering & Monitoring - Overview

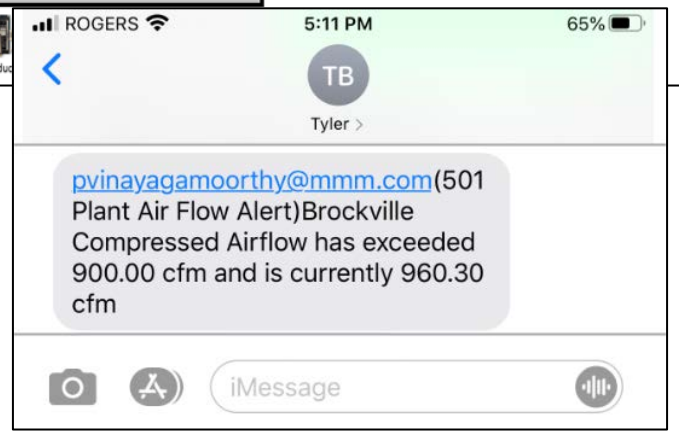


Metering & Monitoring

- Initially, Installed Electrical meters at substation & Feeder level. Unable to connect other meter & production information.
- But now we can able to connect with the PLC & other equipment to monitor online.
- Email & Text Notification are set up.

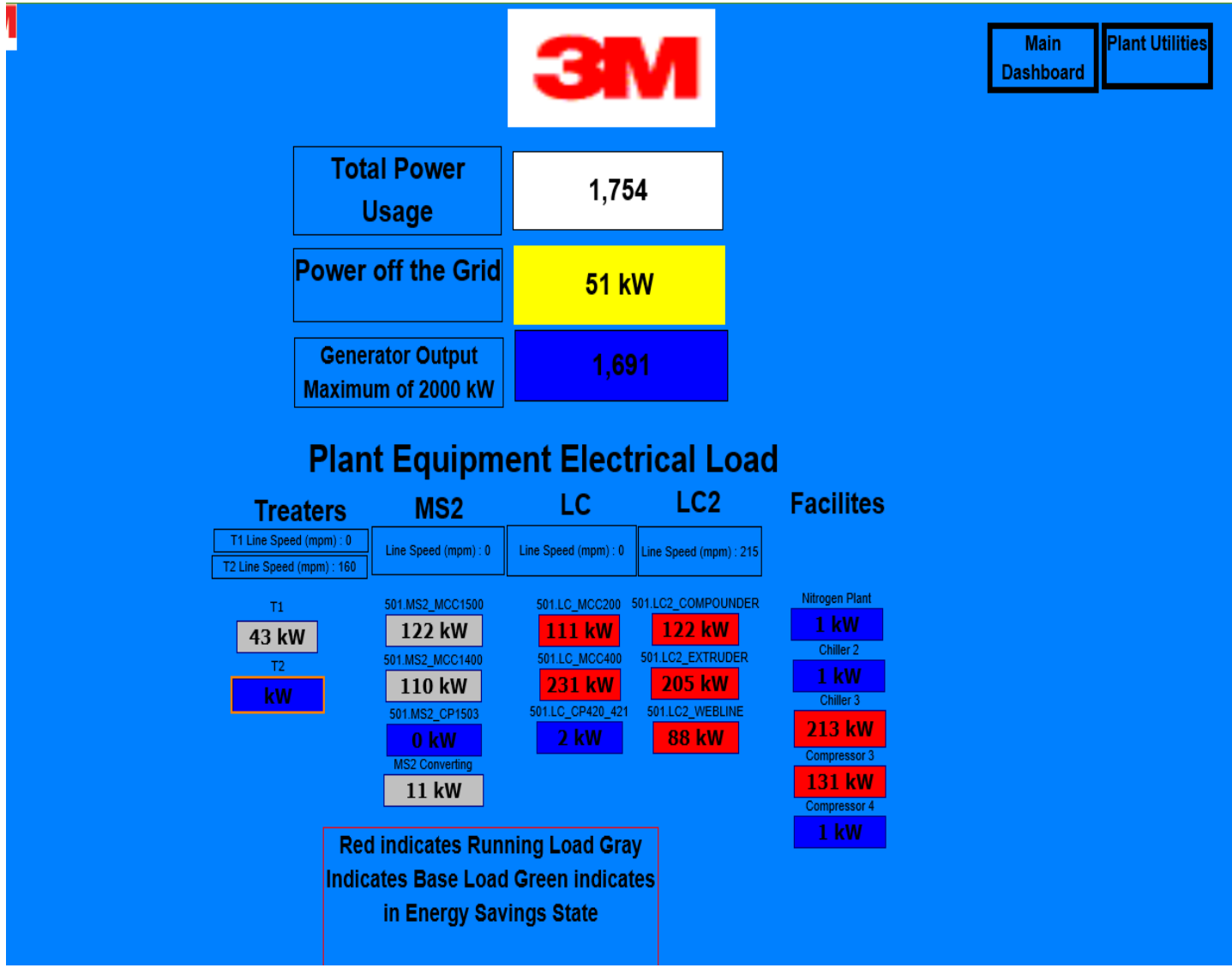




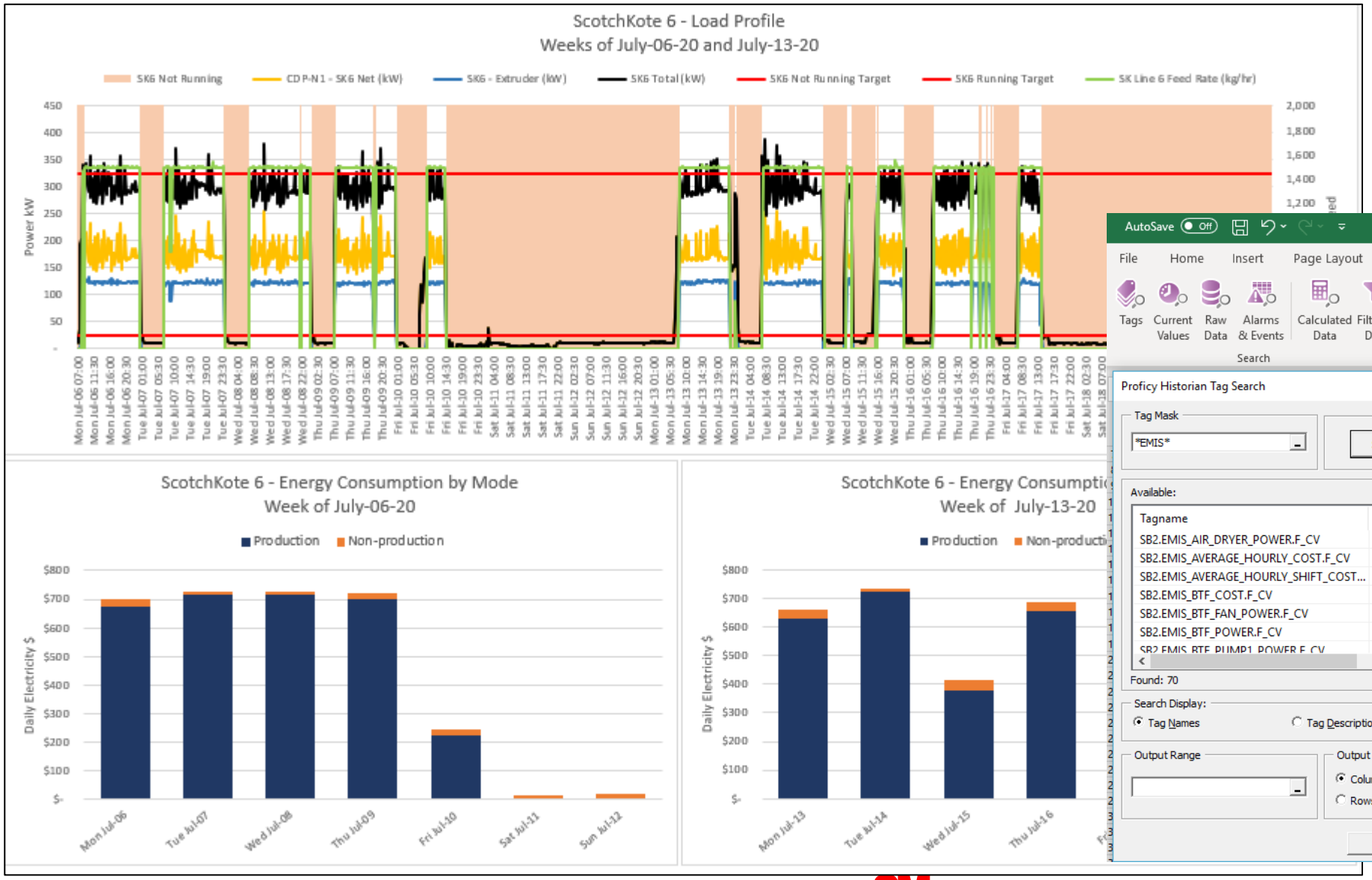


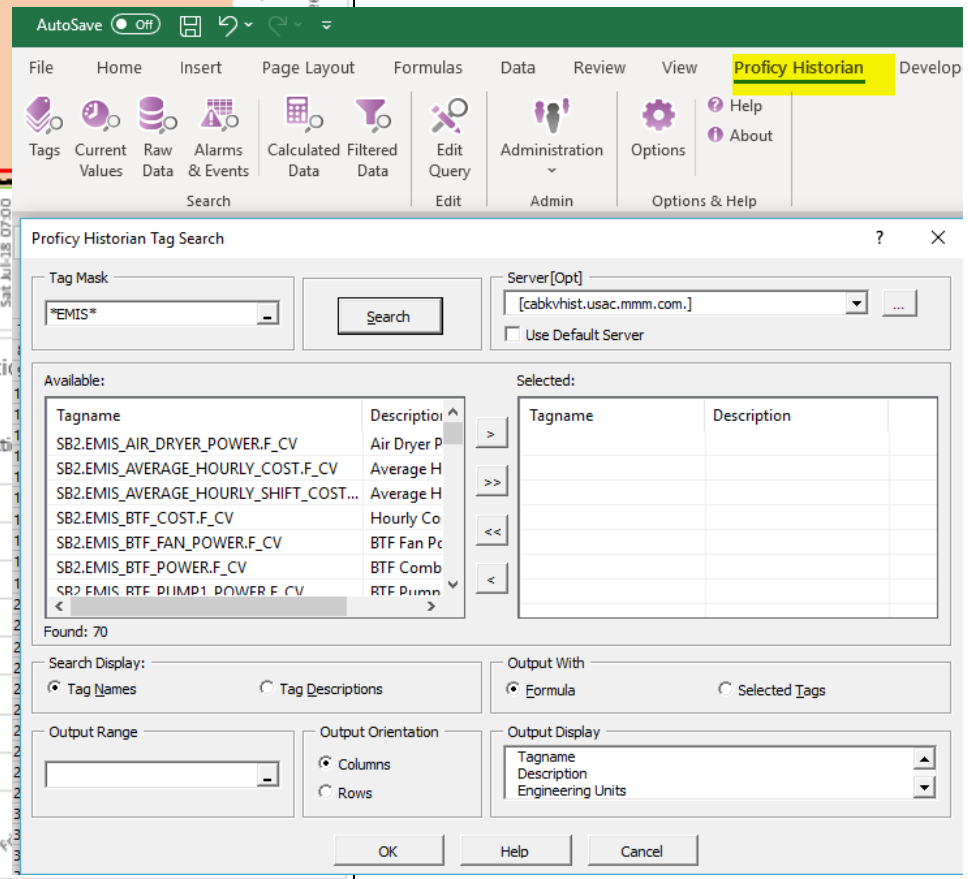
Metering & Monitoring

- This screen is used by the operators when we do load curtailment during Ontario peak days.

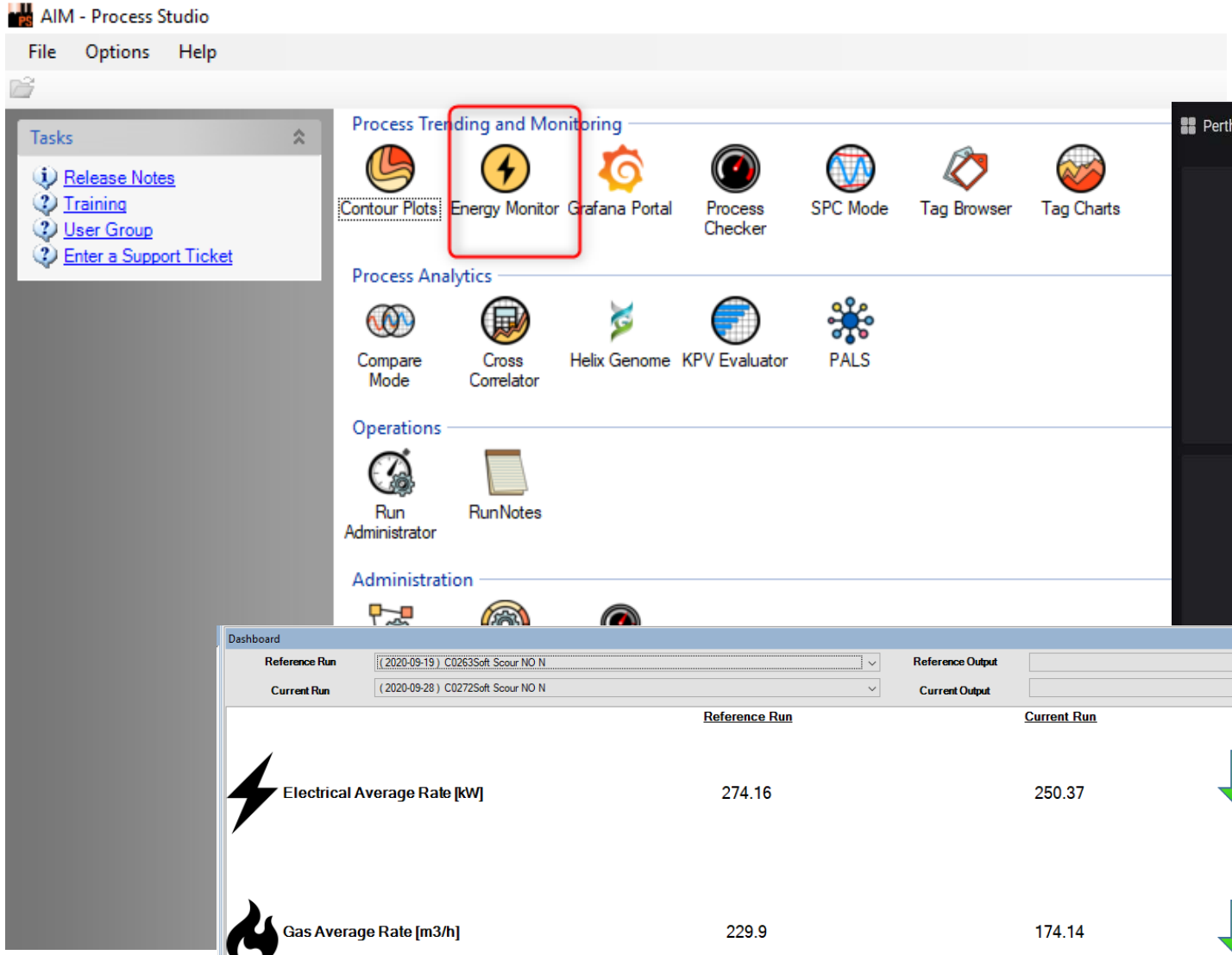


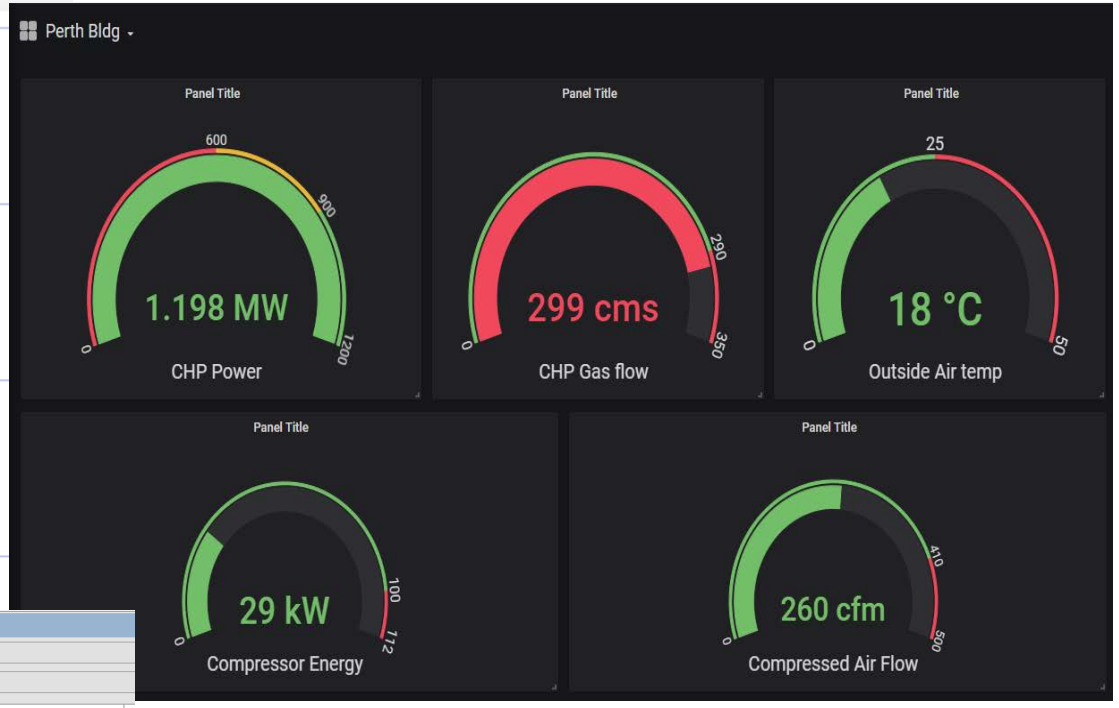
Metering & Monitoring – Historian





Metering & Monitoring –Process Studio





Implementing Energy projects

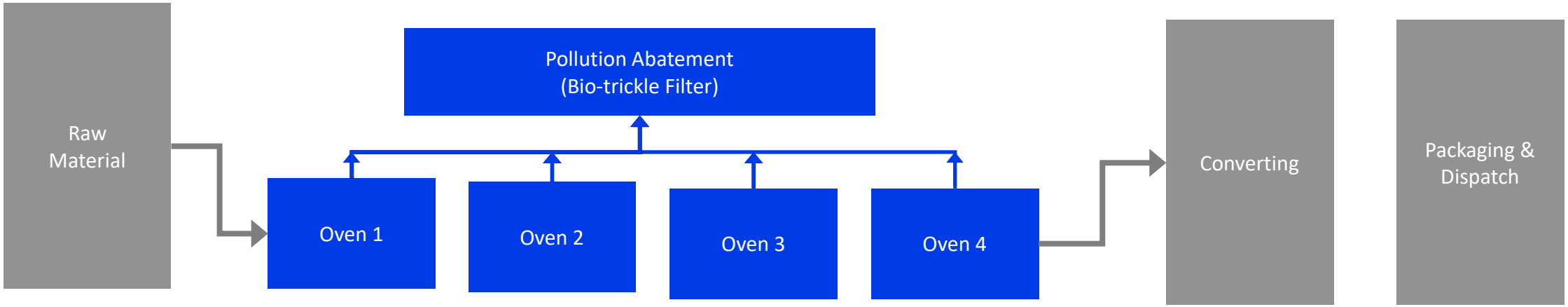
RESULTS: OPERATIONAL & MAINTENANCE CONTROL

- Incentivize the plant to invest in the found opportunities.
- Provides further prioritization of projects.

Maker Operational Control Improvement

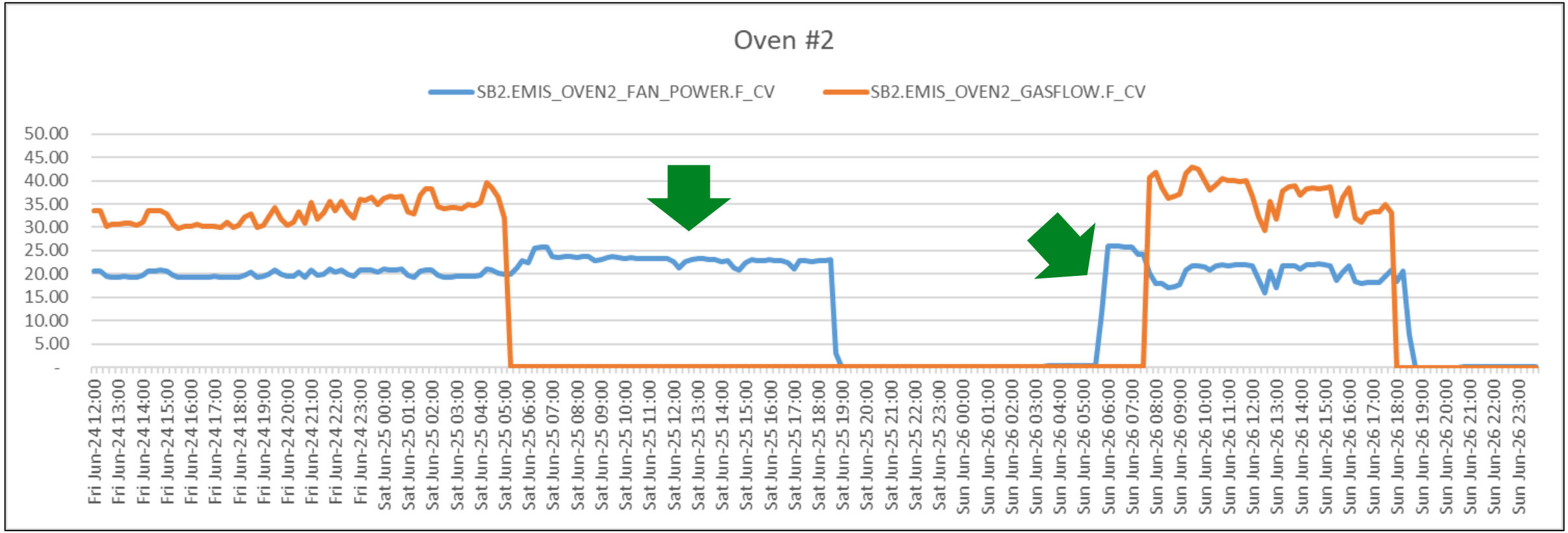
Process Flow:

The Maker consists of four ovens in series, used for drying and curing the product along with pollution abatement equipment and auxiliary equipment. The operational time of each oven is different based on product specifications.

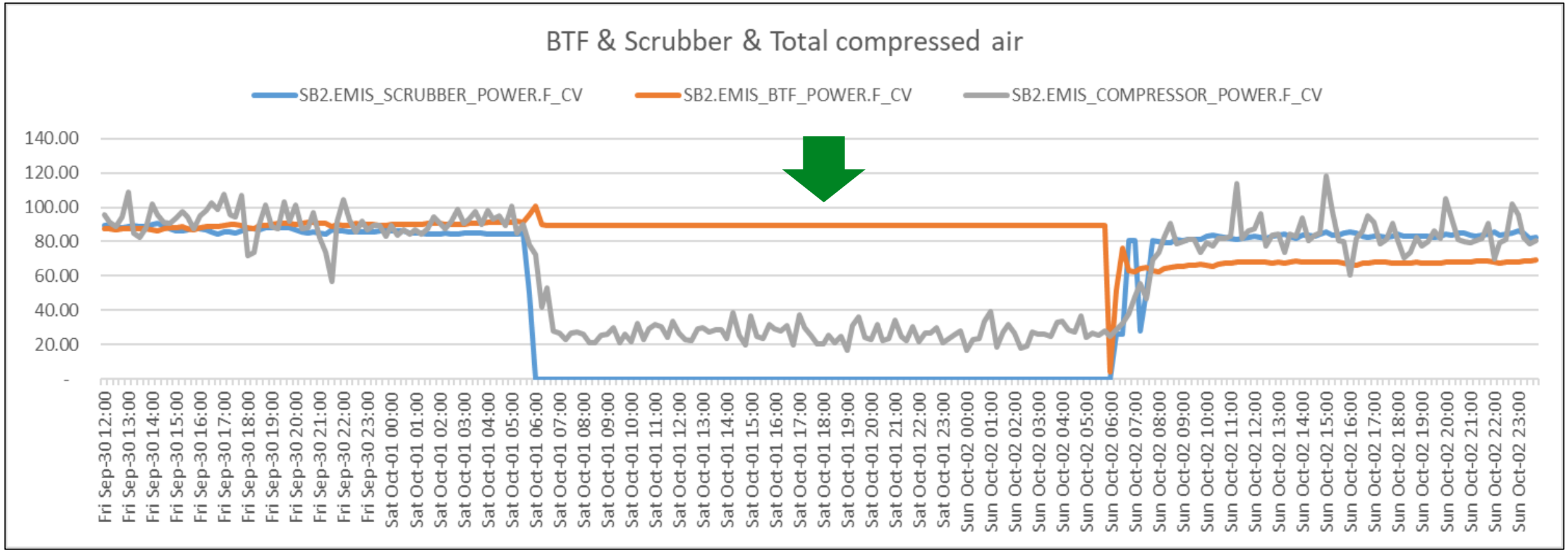


Maker Operational Control Improvement

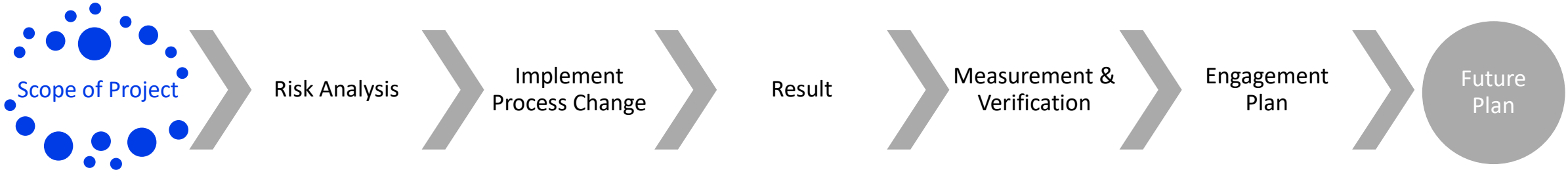
Energy opportunities were identified after reviewing the oven energy report.



Maker Operational Control Improvement



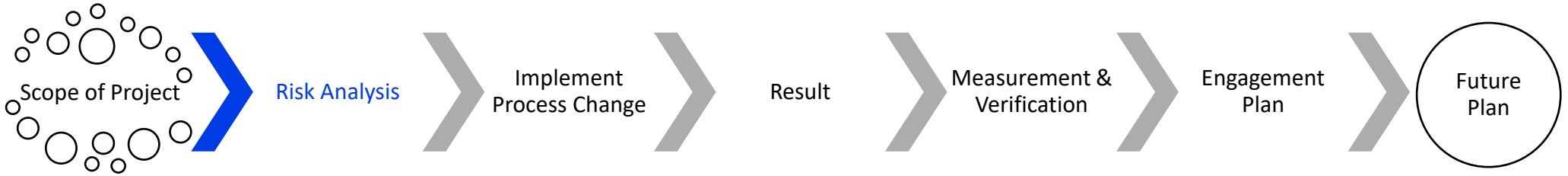
Maker Operational Control Improvement



Scope of the project:

- Develop/Improve the shutdown & start-up procedure for the maker during weekend

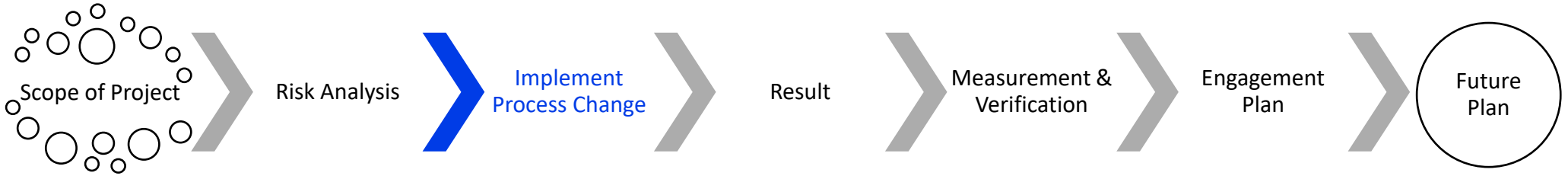
Maker Operational Control Improvement



Risk analysis

- Listed all risks and challenges
- Key challenges: safety issues, production & maintenance issue
- Developed a plan to mitigate the risk and address all the challenges

Maker Operational Control Improvement

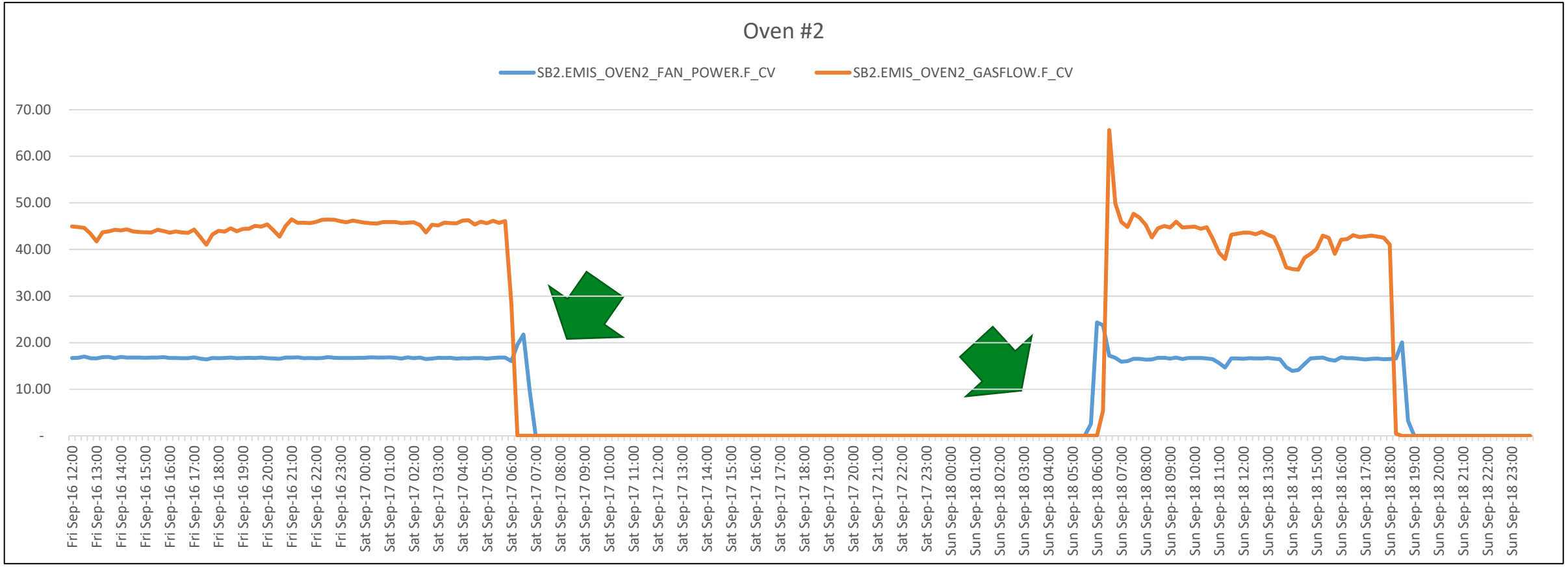


Implemented Process Change

- Started with Management of Change (MOC) process

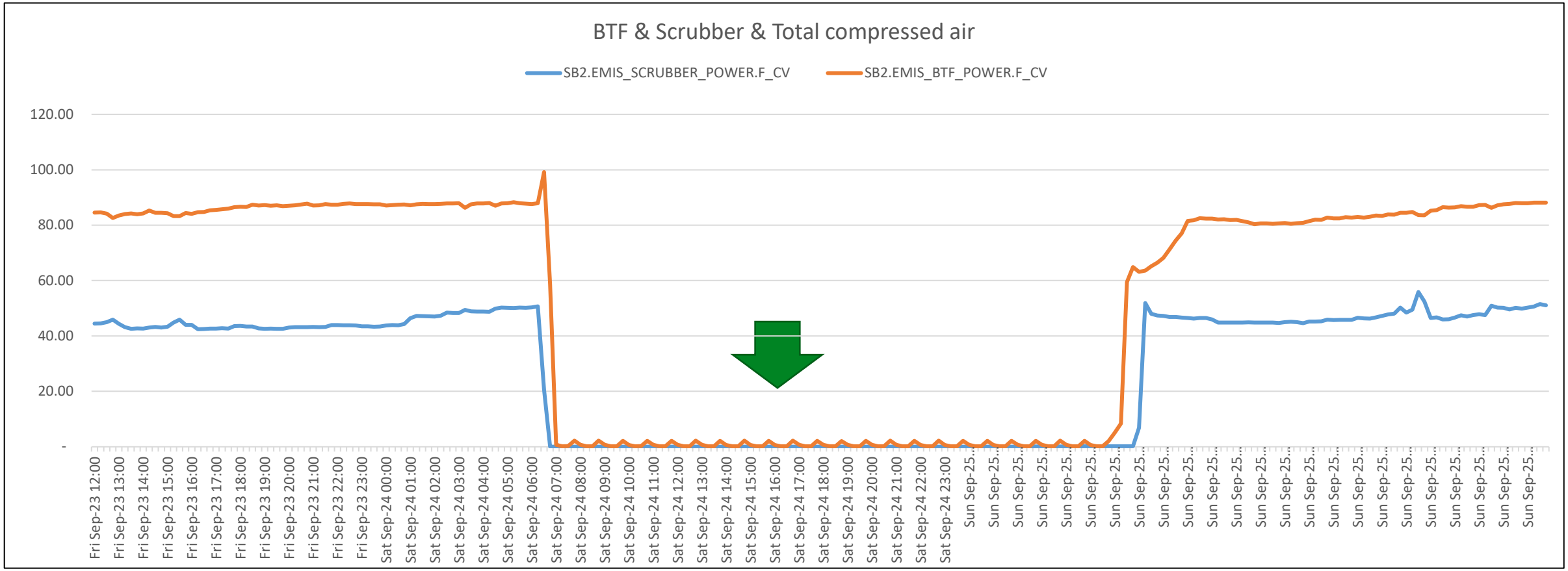
Maker Operational Control Improvement

Outcome



Maker Operational Control Improvement

Outcome



Maker Operational Control Improvement

Results

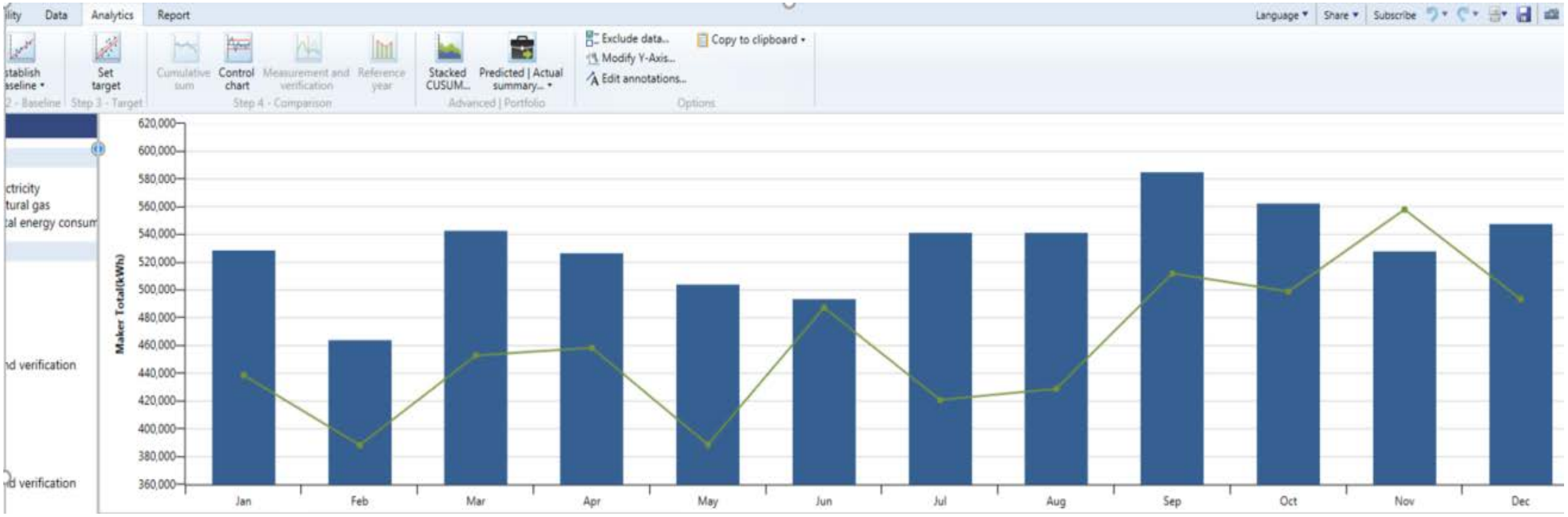
- Energy Saved: 837 MWh/year
- Energy cost: $92,122/year
- Capital cost: $0
- Resources: Internal man hours

- *Other benefits:*
  - Maintenance cost reduced due to lower equipment operating hours
  - Increased confidence level with the change & more engagement from operators
  - More improvement ideas generated

Maker Operational Control Improvement

Measurement & Verification

- Metering was to measure & monitor
- Used RETScreen to calculate actual saving based on the production & schedule.



Maker Operational Control Improvement

Engagement Plan – Sustain Savings

- Team: Engineering Manager, Safety Engineer, Quality Engineer, maintenance employees
- The actions were shared between people to reduce the load on one person
- Support: Our sustainability goal & ISO50001 are key to get support
- Procedures were developed and all the maintenance & operators were trained
- Training was added to the operator checklist, so any new employee hired or job change operator goes through the training

Maker Operational Control Improvement

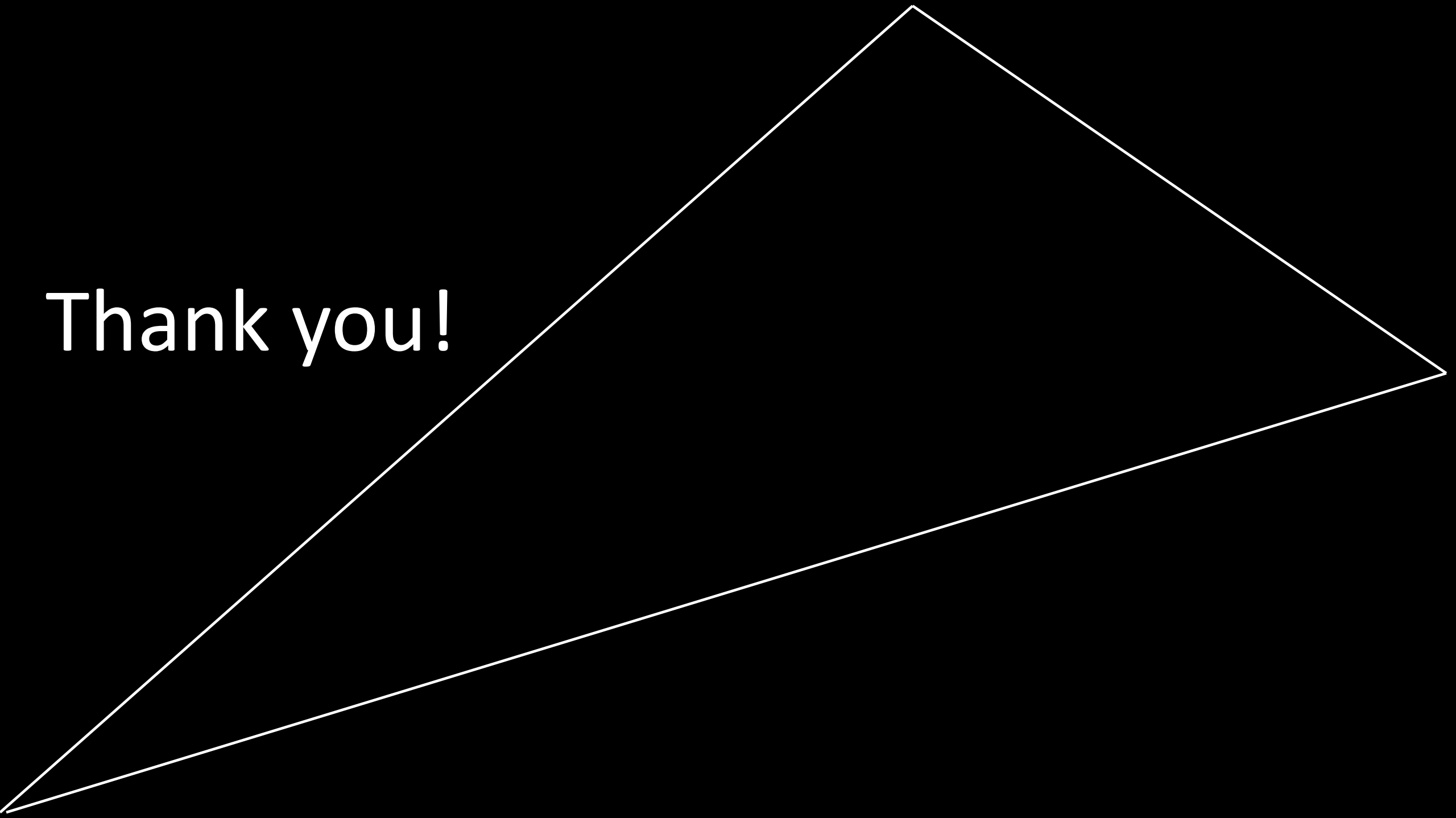
Future Plan – Sustain Savings

- Develop a plan to reduce the maker downtime – Completed
- Natural gas savings: 83,838 m3
- NG Cost: 25,151

- Engineering control & automation on the actions implemented

- Develop a shut-down & start-up procedure for Maker during product change, planned & un-planned shutdown

Thank you!



Q&A

Networking Segment

Tips for joining Go To Meeting networking room:

- A link to the networking room is in the chat window
- Participants will be able to share their microphones and cameras and connect with our speakers

Webinar recording:

- A follow-up newsletter will be sent to all registrants which will contain a recording of today's webinar