A Brief History of a Saskatchewan Beehive Burner

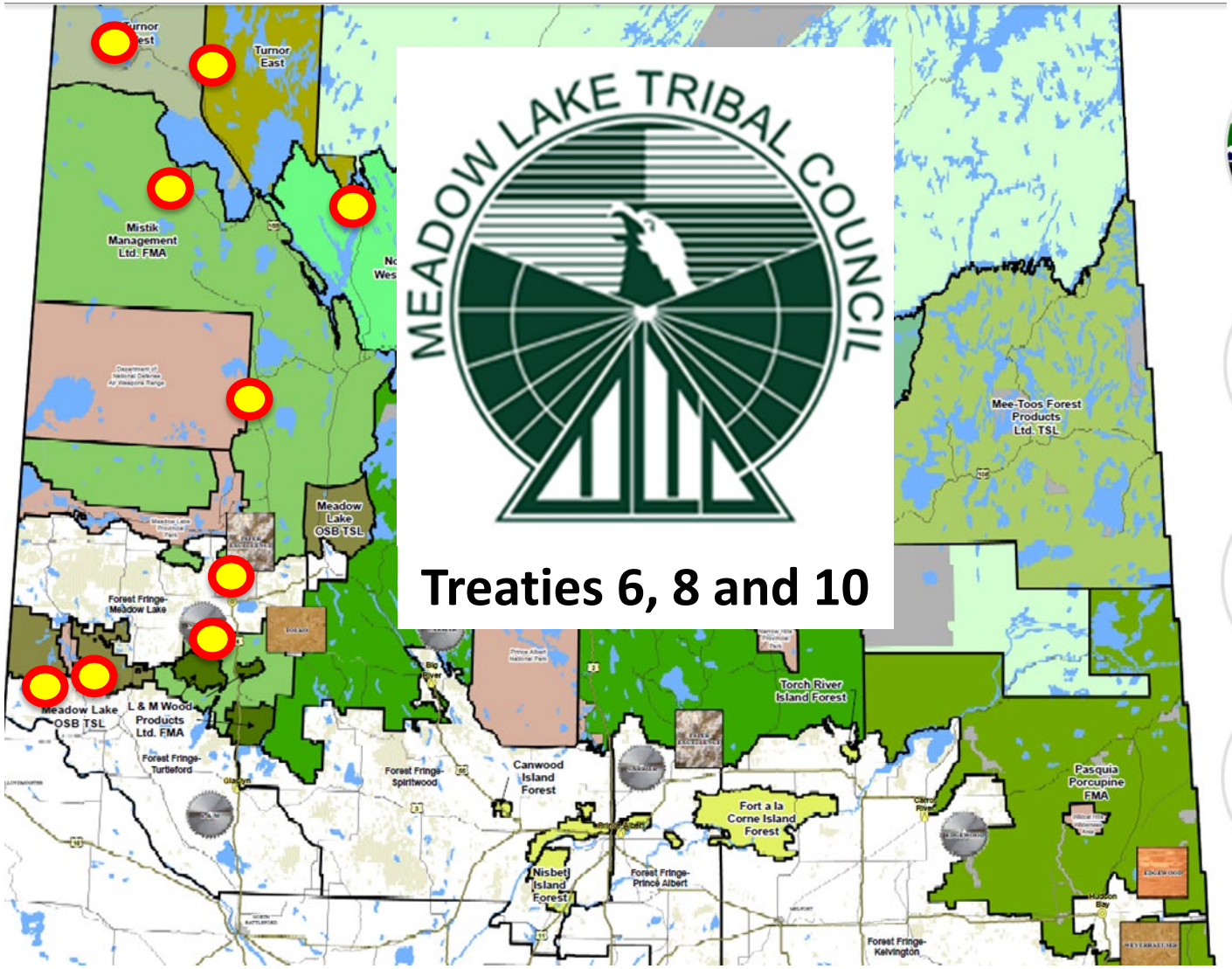
The New York Times

Pulp Mill Planned In Saskatchewan; Cost Is 120-Million

April 14, 1970

REGINA, Saskatchewan, April 13 (Canadian Press) — Parsons & Whittemore, Inc., of New York and the Saskatchewan government today announced plans for a new $120-million pulp mill and a $6.5-million saw mill at two sites in the province's remote northwest.


NOTICE

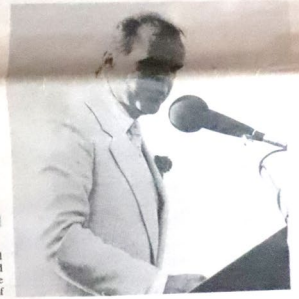

MEADOW LAKE TRIBAL COUNCIL
Treaties 6, 8 and 10
Turnor East
Mistik Management Ltd. FMA
Meadow Lake OSB TSL
Forest Fringe-Meadow Lake
Meadow Lake OSB TSL
L & M Wood Products Ltd. FMA
Forest Fringe-Turtleford
Forest Fringe-Spiritwood
Canwood Island Forest
Nisbet Island Forest
Forest Fringe-Prince Albert
Fort a la Corne Island Forest
Torch River Island Forest
Mee-Toos Forest Products Ltd. TSL
Pasquia Porcupine FMA
Forest Fringe-Kelvington

NORTHWEST
EAGLE

Volume 1 Number 7 June 1988

Sawmill employees and MLTC form NorSask Forest Products Inc.

Platform party (seated, left to right):
Dave Harman (president, TechFor Services),
Arnold Wiklund (director, Techfor Services),
Al Harder (Reeve, RM of Meadow Lake),
Colin Maxwell (minister Parks, Recreation and Culture),
Peter von Sass (president, Nortek Industries),
M.P. John Gormley
Premier Grant Devine,
Percy Derocher (Chief of the Meadow Lake Tribal Council),
Mike Blackmon (mayor of Jans Bay),
MLA George McLeod,
Brian Wilcox (president, Canwood Industries),
Graham Taylor (minister of Public Participation),
Dave Bridger (mayor, Meadow Lake),
Ray Ahenakew (executive director, MLTC),
Terry Lamon (director, NorSask);
(standing:) Rev. Henry Clarke, and
Ray Cariou (Chairman, NorSask).



Premier Grant Devine

"This is one of the finest building projects that you are going to see anyplace in this country, involving all kinds of people all at the same time, that we've seen for probably at least 50 years. This is a very significant event – with people involved at the grass roots level, at the family level, in a very special way... This is how the puzzle of public participation should fit together."

Several thousand people gathered in the Lions Regional Park in Meadow Lake on June 16 to hear the long-awaited announcements concerning the sale of the Meadow Lake Sawmill to NorSask, the planned $3.2 million expansion of the Sawmill, the signing of a forest management licence agreement, and the announcements of the proposed $80 million pulp mill and $11 million chopstick factory.

The fixed assets and inventories of the Meadow Lake Sawmill, the planer mill, and the Green Lake Sawmill were purchased for $6.2 million by NorSask Forest Products Inc. which is half-owned by TechFor Services Ltd. and half-owned by the Meadow Lake District Chiefs Investment Company.

TechFor Services Ltd. is owned by the unionized employees and the management of the sawmill. MLDC Investments is the investment arm of the Meadow Lake District Chiefs who represent 10 reserves with a total of over 5,000 status Indians.

The board of directors of NorSask is made up of two representatives from Techfor (Dave Harman and Arnold Wiklund), two representatives from MLDC Investments (Chief Percy Derocher and Ray Ahenakew), a government appointee (Terry Lamont), and a board appointee (Ray Cariou, who was selected as chairman of the board).

NorSask will spend over $3 million on upgrading the sawmill and in installing equipment which will allow it to process hardwood aspen which will be used by the pulp mill and the chopstick factory.

Nortek Industries will construct an $80 million pulp mill, while Canwood Industries (whose major shareholder will be King, Murphy, Lavalin) will construct an $11 million chopstick factory.

(continued on next page)

Platform party (seated, left to right):
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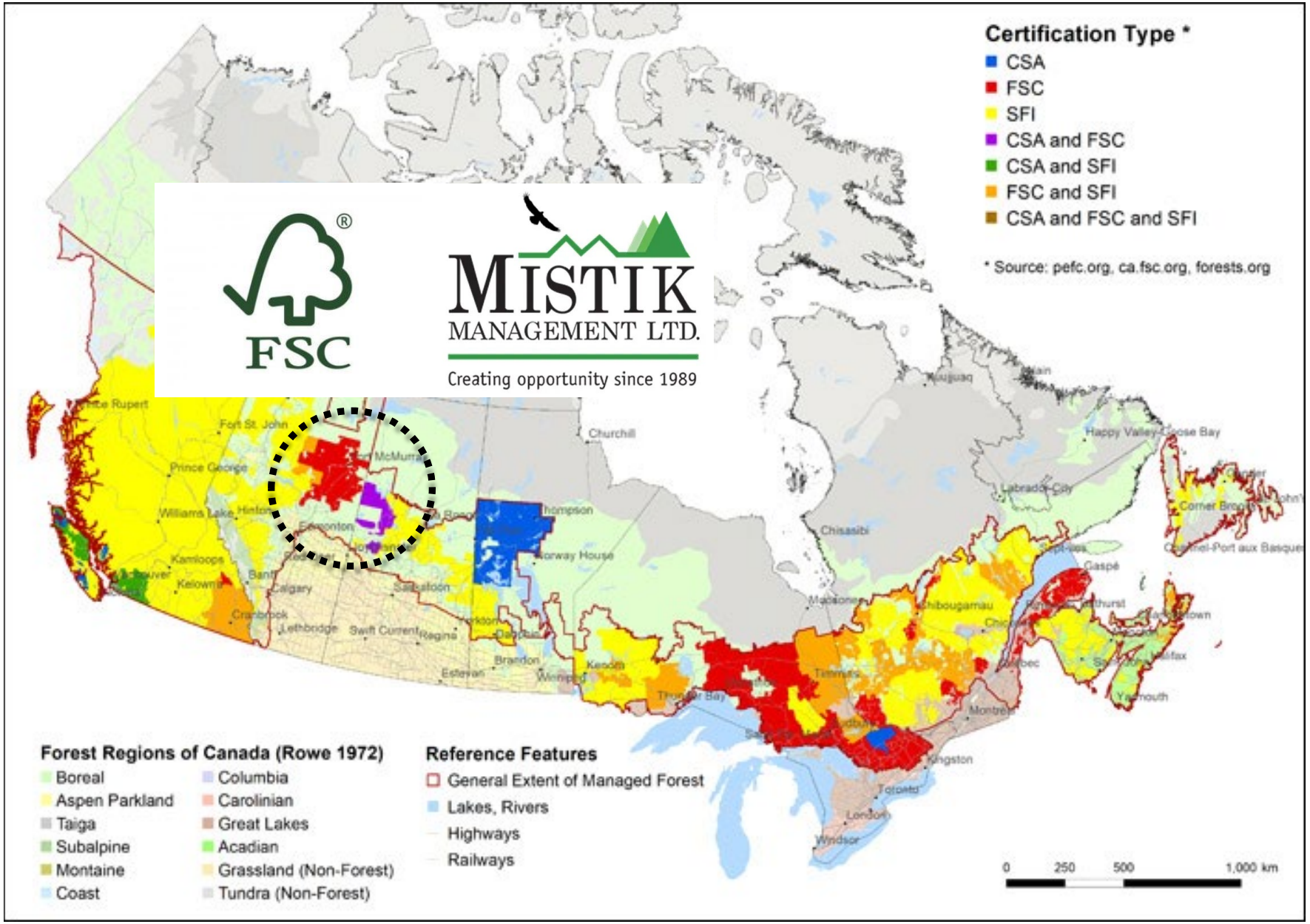
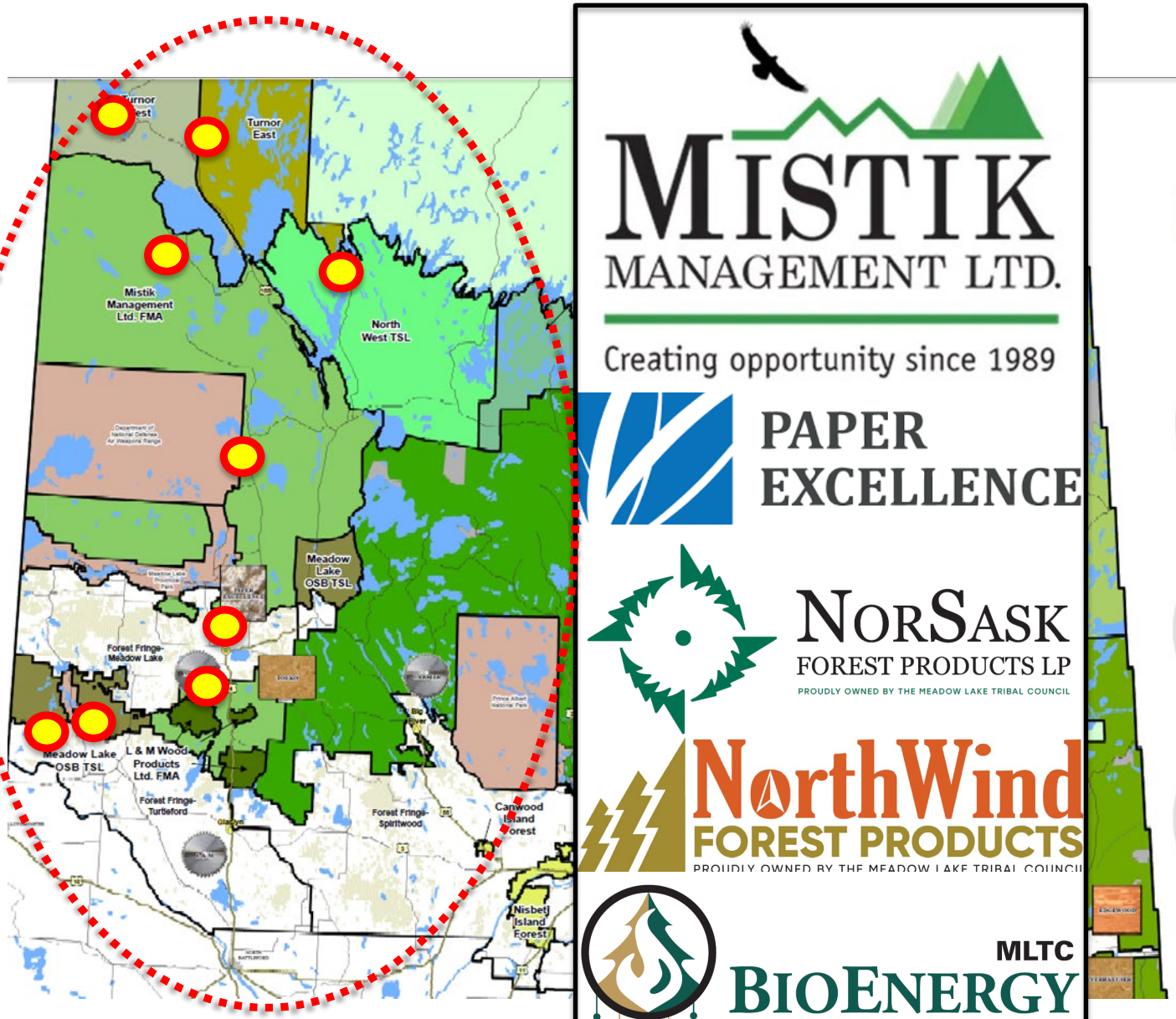
MISTIK
MANAGEMENT LTD.

Creating opportunity since 1989


Certification Type *
CSA
FSC
SFI
CSA and FSC
CSA and SFI
FSC and SFI
CSA and FSC and SFI
* Source: pefc.org, ca.fsc.org, forests.org
FSC
MISTIK
MANAGEMENT LTD.
Creating opportunity since 1989
Forest Regions of Canada (Rowe 1972)
Boreal
Aspen Parkland
Taiga
Subalpine
Montaine
Coast
Columbia
Carolinian
Great Lakes
Acadian
Grassland (Non-Forest)
Tundra (Non-Forest)
Reference Features
General Extent of Managed Forest
Lakes, Rivers
Highways
Railways
0
250
500
1,000 km



MISTIK MANAGEMENT LTD.

Creating opportunity since 1989

PAPER EXCELLENCE

NORSASK FOREST PRODUCTS LP

PROUDLY OWNED BY THE MEADOW LAKE TRIBAL COUNCIL

NorthWind FOREST PRODUCTS

PROUDLY OWNED BY THE MEADOW LAKE TRIBAL COUNCIL

MLTC BIOENERGY CENTRE

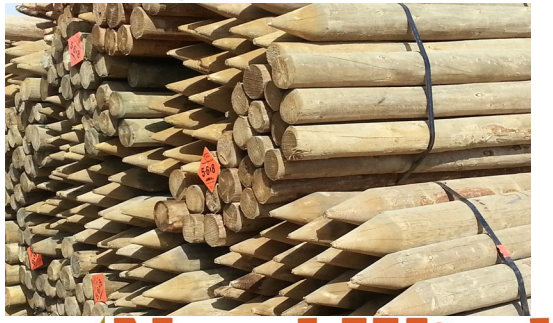
Saskatchewan Forestry Products

Lumber

NorSask Forest Products LP
Proudly owned by the Meadow Lake Tribal Council

Oriented strand board

Treated wood products



NorthWind Forest Products
Proudly owned by the Meadow Lake Tribal Council

Pulp

Paper Excellence

Energy

SaskPower
Powering our future®

MLTC BioEnergy Centre

MLTC

BioEnergy Centre


Proven
experience.
ffective energy
olutions for large
cale projects
rofitab


AIREA
CONSULTING LP
A PROUD INDIGENOUS PARTNERSHIP
RDI
MLTC Resource Development


Responsibility
SaskTel


Sand &
Gravel
Proven
experience.
ffective energy
solutions for large
scale pr
profita
mi Energy
NORTH AMERICA
RDI
MLTC Resource Development
for progress.

Renewable Fuel Supply

Generated as residual wood waste from the NorSask sawmill.

BARK 40%

SAWDUST 21%

PLANER SHAVINGS 20%

TRIM ENDS 17%

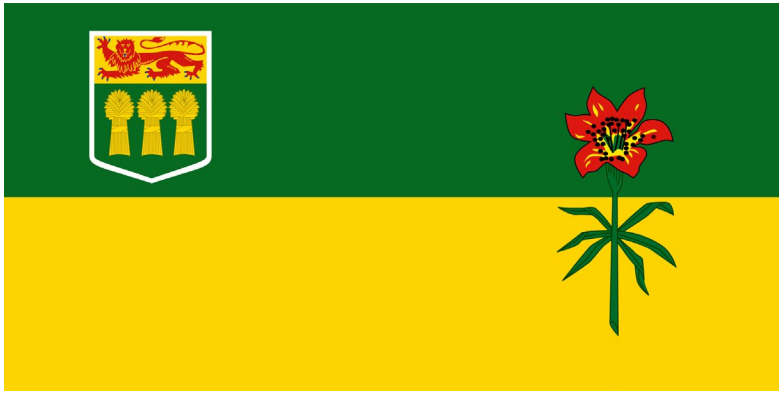
OFFSIZE CHIPS 2%

Government mandate

On November 23, 2015 - SaskPower announced its plans to double Saskatchewan's renewable electricity output by 2030.

October 2018

Investing in Canada Infrastructure Program



ICIP – Green Infrastructure Stream

May 22, 2019 – Federal funding announcement


Building Sustainable Communities
Bâtir des collectivités durables
Canada
Saskatchewan


SaskPower

April 2020

Start of construction


2020-05-04 09:02:13 AM
IP PTZ Camera


2020-05-28 08:12:11 AM
IP PTZ Camera


JLG ULTRA BOOM


TURBODEN


NorstAR
KLEIN TOOLS
OAKLEY


CAW

Construction is essentially complete by June 2022

RAWLINGS WOOD HOGS

RAWLINGS WOOD HOGS

A first-of-its-kind project is about to come online in Meadow Lake, Saskatchewan

The MLTC Bioenergy Centre consists of a 6.6 MW power generation system that is fueled primarily by biomass sawmill residuals. The plant produces 55,000 mw-hrs per year to the SaskPower grid, and provides low-carbon process heating (kilns and building heat). The objective of MLTC's bioenergy project is to generate carbon-neutral green power using sawmill biomass residuals and to reduce air emissions by eliminating one of Canada's last remaining beehive burners. The project consists of installation of a bioenergy power plant at the Meadow Lake Tribal Council's (MLTC) Norsask sawmill site located near Meadow Lake, Saskatchewan.

Bioenergy power plant at the Meadow Lake Tribal Council's (MLTC) Norsask sawmill site located near Meadow Lake, Saskatchewan.

"A first-of-its-kind project is about to come online in Meadow Lake, Sask. The Meadow Lake Tribal Council (MLTC)'s new Bioenergy Centre, which will be operational in 2023 and will turn wood waste from the nearby NorSask Forest Products sawmill into electricity, powering around 5,000 homes in Saskatchewan and providing heat and power for a new continuous kiln.

CAW

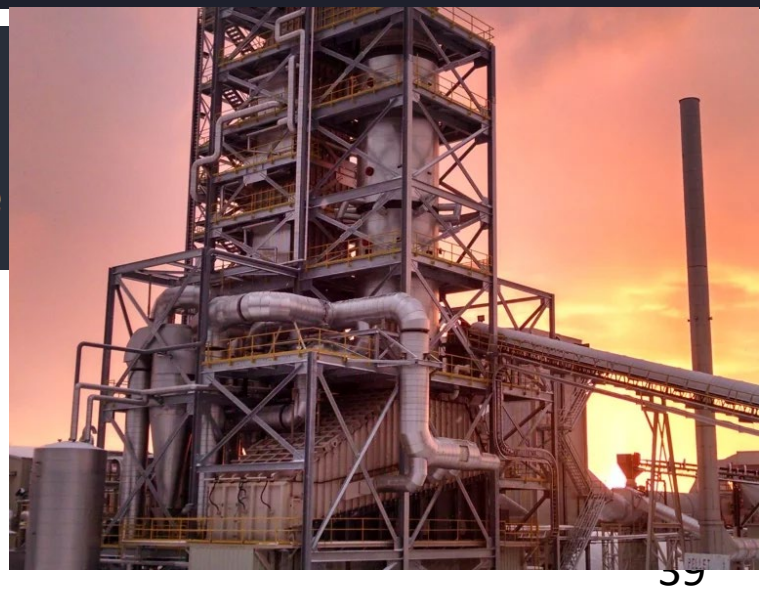
Industrial Combustion and Heat Transfer

Industrial combustion and high temperature process heating

Complete single-source systems solutions
Heat generation | Electricity generation | Waste incineration | Exhaust air purification

More than 100 plants in over 40 countries

CAW supplies you reliably with heat and power - worldwide



CAW

Industrial Combustion and Heat Transfer

Grinding it out in Saskatchewan

A new $90-million bioenergy facility has started up in Saskatchewan – and helping the power plant reach its feedstock goals is a custom-built wood hog grinder from Rawlings Manufacturing.

With the help of technical experts from Italy, Germany, Montana and the province of Saskatchewan, the First Nation Meadow Lake Tribal Council (MLTC) in Meadow Lake, Saskatchewan has now launched a state-of-the-art $90-million bioenergy facility.

The new power facility is producing enough energy to process the wood waste from their sawmill, power the bioenergy plant's in-house facility (heat, lights and run the wood hog), provide power to 5,000 nearby city homes—and has enough energy left over to sell 6.6 megawatts to provincial utility, SaskPower Corporation.

MLTC is made up of nine independent tribes who come together to better manage services among their communities. Four are Dene tribes and five are Cree. Traditionally, the Dene people inhabit the northern boreal and Arctic regions of Canada, and the Cree occupy an area from the northern woodlands to southern plains.

While the two groups have distinct languages and distinct cultures, they have been dealing cohesively and effectively with issues around healthcare and education administration for 40 years. More than 30 years ago they started working toward matters pertaining to economic development.

clean energy ahead

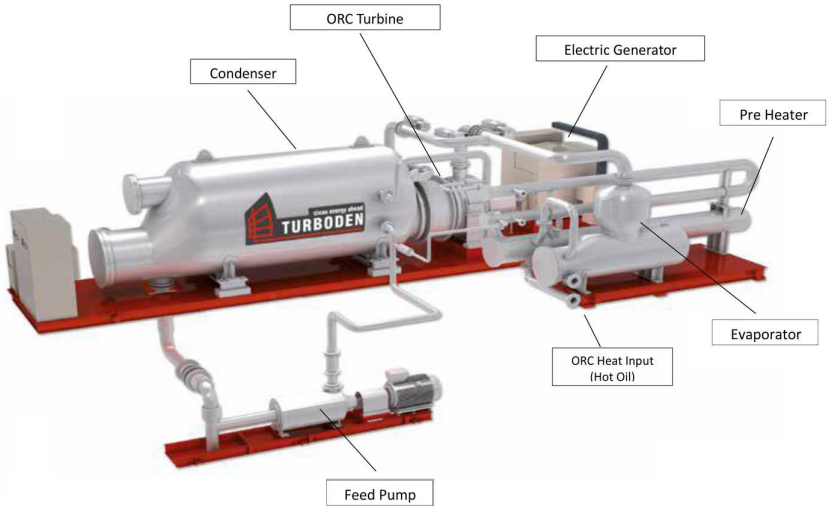
TURBODEN®

Turboden clean energy ahead

Turboden is an Italian firm and a global leader in the design, manufacture and maintenance of Organic Rankine Cycle (ORC) systems, highly suitable for distributed generation, that generate electric and thermal power exploiting multiple sources, such as renewables (biomass, geothermal energy, solar energy), traditional fuels and waste heat from industrial processes, waste incinerators, engines or gas turbines. Today Turboden expands its solutions with gas expanders and large heat pumps to contribute to the worldwide efforts to mitigate global warming by creating reliable and clean energy systems.

49 Countries

432 Plants 59 Plants are under construction



clean energy ahead®
TURBODEN

Turboden to Provide Sustainable Power to Indigenous First Nations in Saskatchewan, Canada

10 February 2020

- **8,000 kW Project enhances environmental and economic sustainability of community thanks to carbon-neutral heat and power generation with woody biomass fuel**
- **System to power 5,000 homes and significantly improve air quality**

Brescia, February 10, 2020 - Turboden S.p.A has concluded a contract to provide the Meadow Lake Tribal Council (MLTC), representing nine Indigenous First Nations in Saskatchewan, Canada, with a 8,000 kW Organic Rankine Cycle (ORC) power generation system that uses sawmill residual woody biomass as fuel.

The carbon-neutral power project, operating under the name of the MLTC Bioenergy Centre, will be located near Meadow Lake, Saskatchewan within the traditional territory of the nine First Nations of the Meadow Lake Tribal Council (MLTC). The green power generation facility, with major equipment supplied by Turboden, is a project of the Meadow Lake Tribal Council, supported with funding from the Government of Canada. The facility will produce electricity from an ORC system(Note) utilizing Turboden's technology, with biomass fuel derived from residual wood waste from the adjacent, MLTC-owned NorSask Forest Products LP (NorSask) sawmill as heating fuel. The system is expected to produce 6,600kW (net) of carbon neutral baseload electricity to power approximately 5,000 homes. The project is expected to decrease greenhouse gas emissions by more than one million tonnes over 25 years (equivalent to CO2 emission of more than 50,000 vehicles per year), as well as significantly reduce smoke and other harmful particulate matter, improving the local air quality conditions. In addition to the generated electricity, the cogeneration system design provides process heat to the NorSask sawmill buildings as well as new high efficiency lumber dry kiln, which will reduce natural gas consumption and also improve the economics of Canada's largest 100% Indigenous-owned sawmill facility.

Note: Turboden's binary cycle power generation system has as its core component an Organic Rankine Cycle (ORC) turbine, which uses as the boiling medium organic material with a low boiling point, such as a fluorocarbon or hydrocarbon-based material. This permits the use of relatively low-temperature heat sources such as biomass, factory waste heat, and geothermal energy. The system can generate up to 40,000kW of electricity, and can be easily installed in non-fuel producing regions or areas lacking water resources, such as inland areas, deserts, and islands. It is also able to provide stable power generation without being subject to the weather or other factors.

MÜHLBÖCK

DRYING-TECHNOLOGY

MÜHLBÖCK
DRYING-TECHNOLOGY

Project MLTC Bioenergy Centre, Saskatchewan / Canada

Mühlböck plays its part for a zero-waste future

A new progressive kiln FLOW 1306 for Canada

The First Nations owned Meadow Lake Tribal Council Bioenergy Centre has started their ambitious project of generating carbon-neutral green power, by building a 6.6 MW power generation system that is fueled primarily by biomass sawmill residuals.

This for Saskatchewan Canada first of its kind green energy biomass project will combine environmental improvement with thermal efficiency, while improving the economic outcome for this nine-member First Nations council. And for this, finding the right partners was key. So we are proud to have been chosen as their Continuous Dry Kiln supplier.

We are providing MLTC Bioenergy Centre with a Mühlböck 6-zone Progressive Flow 1306 PRO. This continuous kiln has the capacity to deliver about 85 million BF lumber per year, 24/7, to the highest quality possible, while Mühlböck's unique 1306 Heat Recovery system ensures considerable reduction of thermal energy consumption.

To ensure a seamless fit of our fully automatic transport system within the Progressive kiln with the existing kiln cart system currently in operation at this sawmill, Mühlböck's in-house engineers are working closely together with MLTC Bioenergy Centre. And we look forward to the summer of 2021, when the installation of this continuous kiln will start and our part in this zero-waste sawmill will come to fruition.

MLTC

BIOENERGY CENTRE

Building Canada's Indigenous-owned green energy future

Meadow Lake Tribal Council's (MLTC) 8 MW Combined Heat & Power Bioenergy Project

MLTC's New State-of-the-Art Biomass-based Bioenergy Centre

Project Socioeconomic Impact During Construction

MLTC Bioenergy Centre construction contributed to Saskatchewan's provincial and regional economic and employment strength in 2020/2021/2022.

~ 50 full-time equivalent (FTE) jobs

~ 30% Indigenous employment

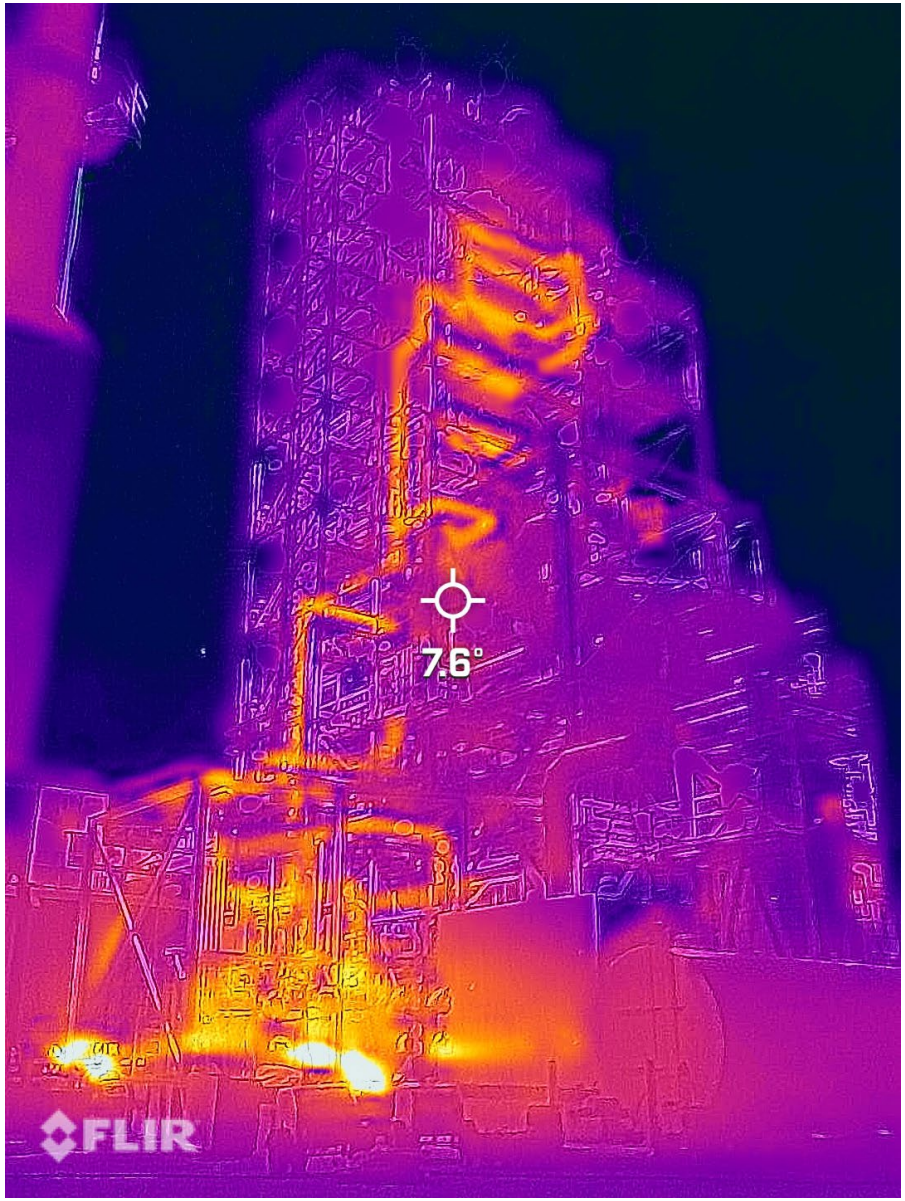
~ 10% female employment

~ $40 million in construction labor

~ $35 million awarded to Indigenous-owned businesses

~ $5 million in Provincial Sales Tax (PST) revenue

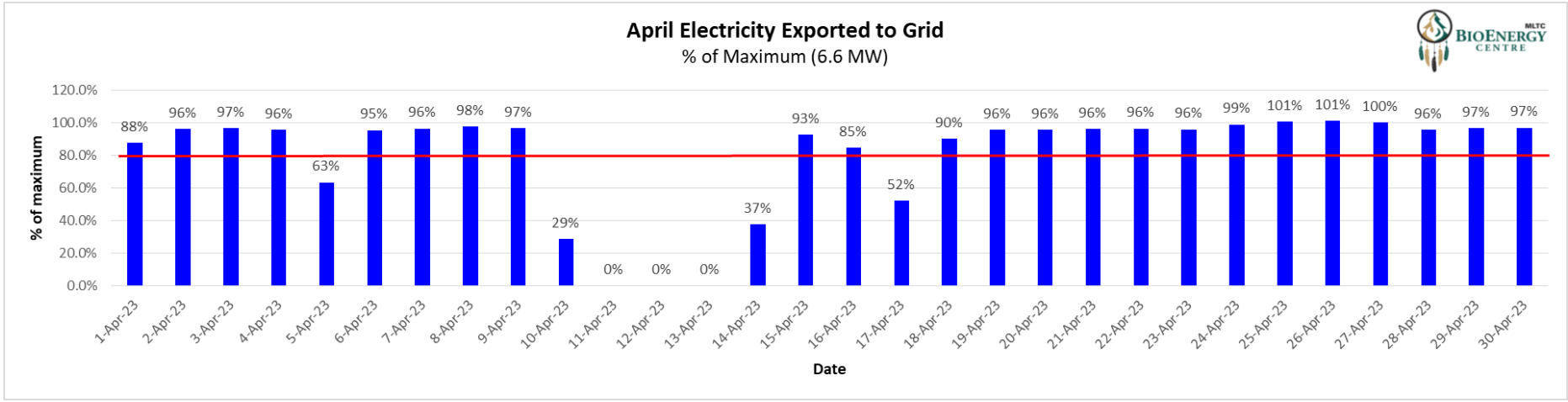
Long term Indigenous-owned green infrastructure asset

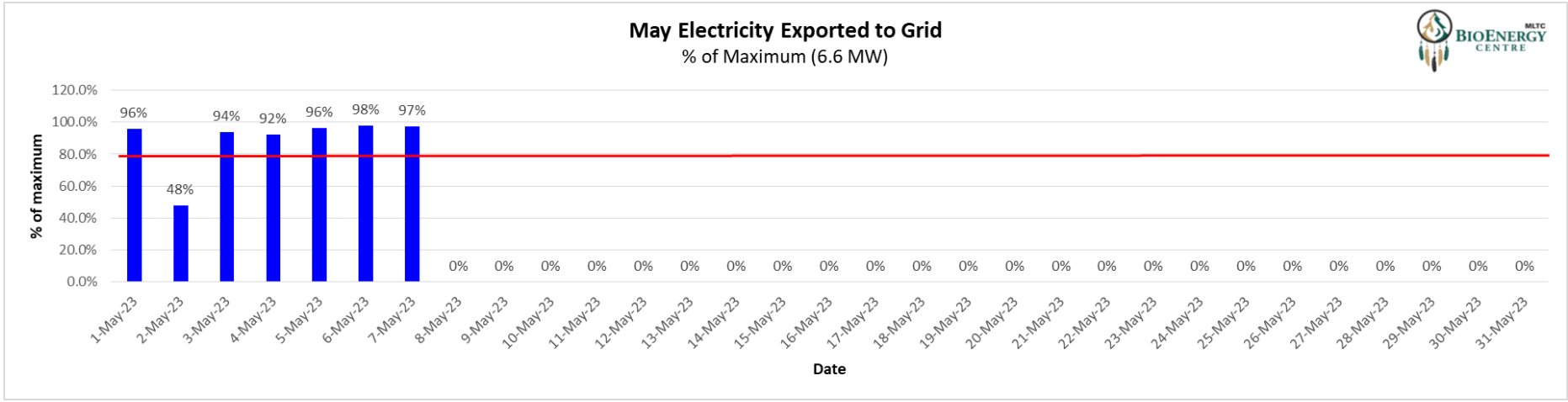

7.6°
FLIR

October 25, 2022

Commercial Operation Date (COD)

Current electricity production





What did we learn?

It’s not easy.

Be cautious.


ZEELAND
Lumber & Supply

Project development effort / cost
Multi-agency support
Multi-government support
Financial commitment / risk
Construction / commissioning risk
Operational finesse

Constant discovery of the unknown

AACE International

Association for the Advancement of Cost Engineering

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

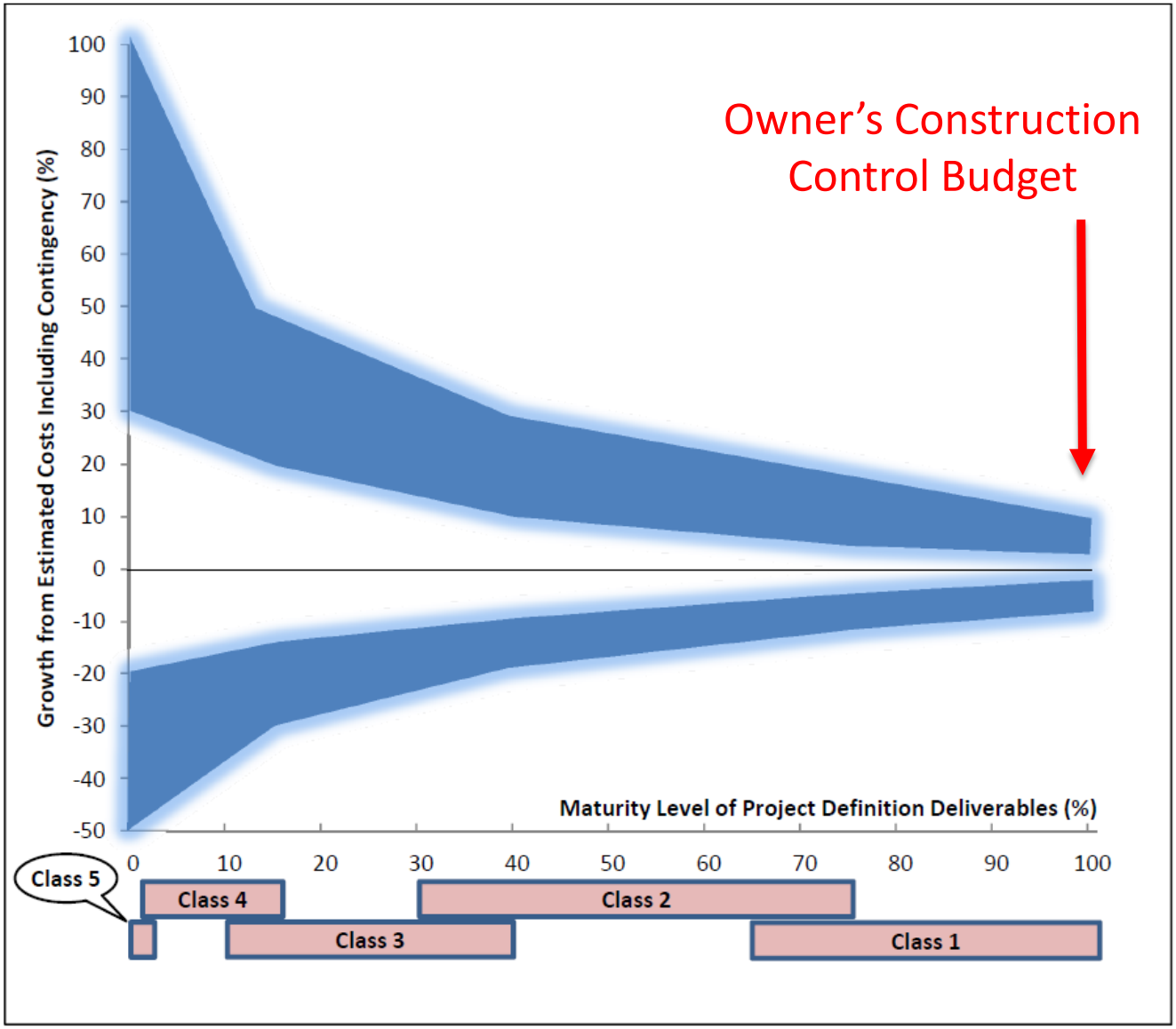
	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

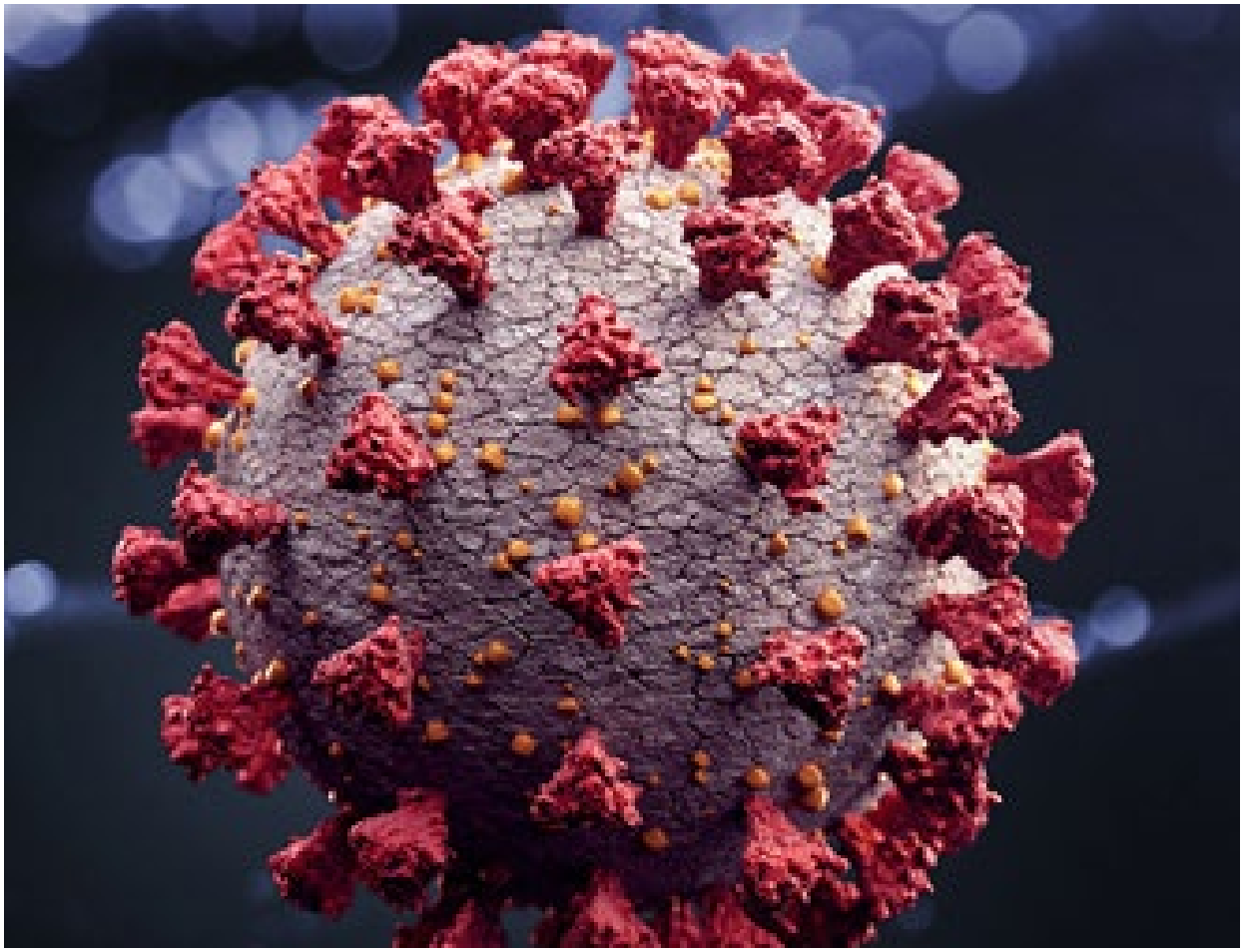
Notes: [a] The state of process technology, availability of applicable reference cost data, and many other risks affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

Table 1 – Cost Estimate Classification Matrix for Process Industries

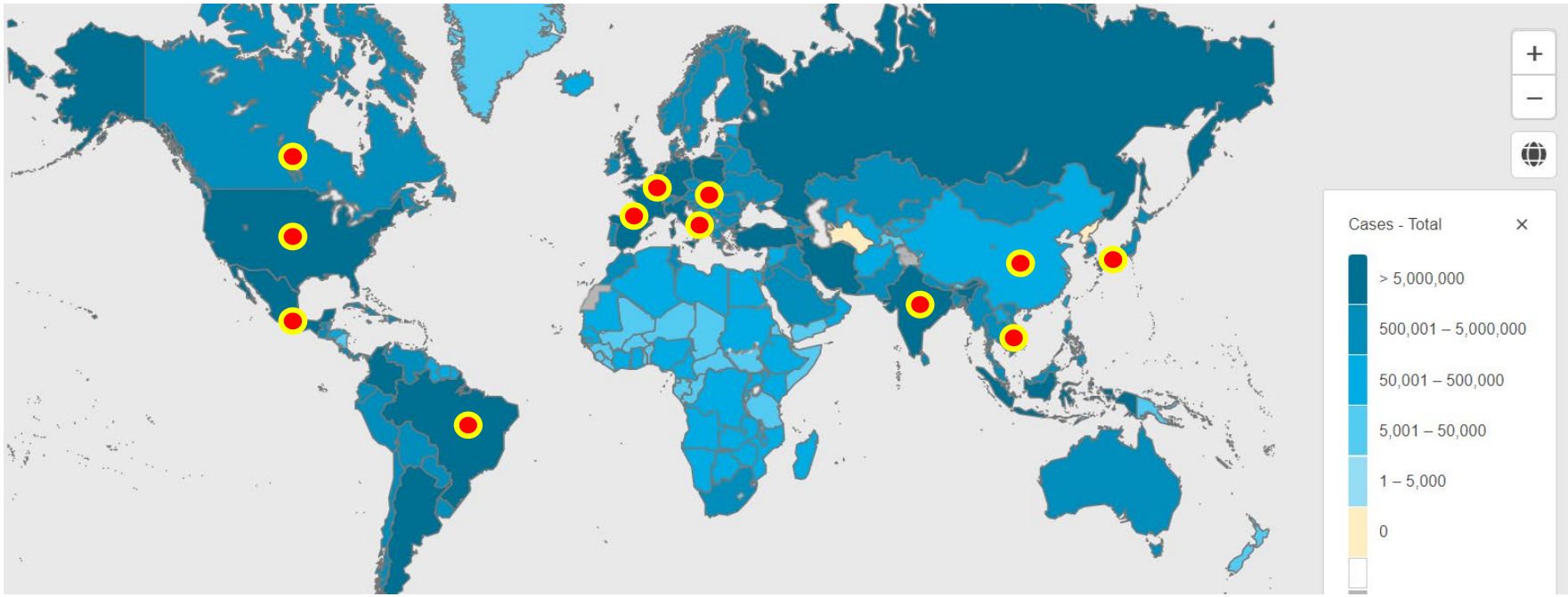
AACE International

Association for the Advancement of Cost Engineering





MLTC undertook an international procurement effort during the height of the COVID-19 pandemic



Equipment procurement locations

100% overlap of construction with COVID-19 pandemic

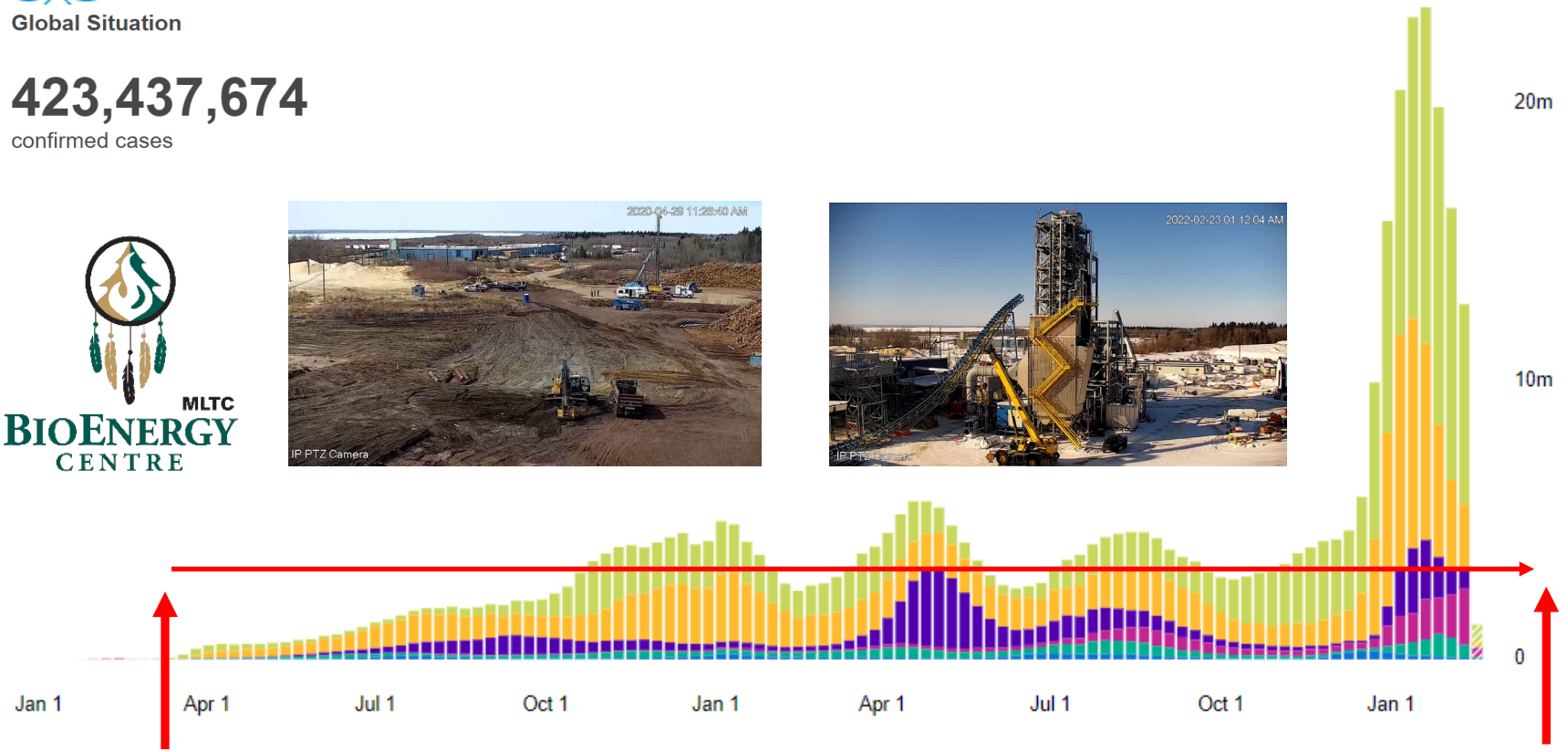
World Health Organization

Global Situation

423,437,674

confirmed cases

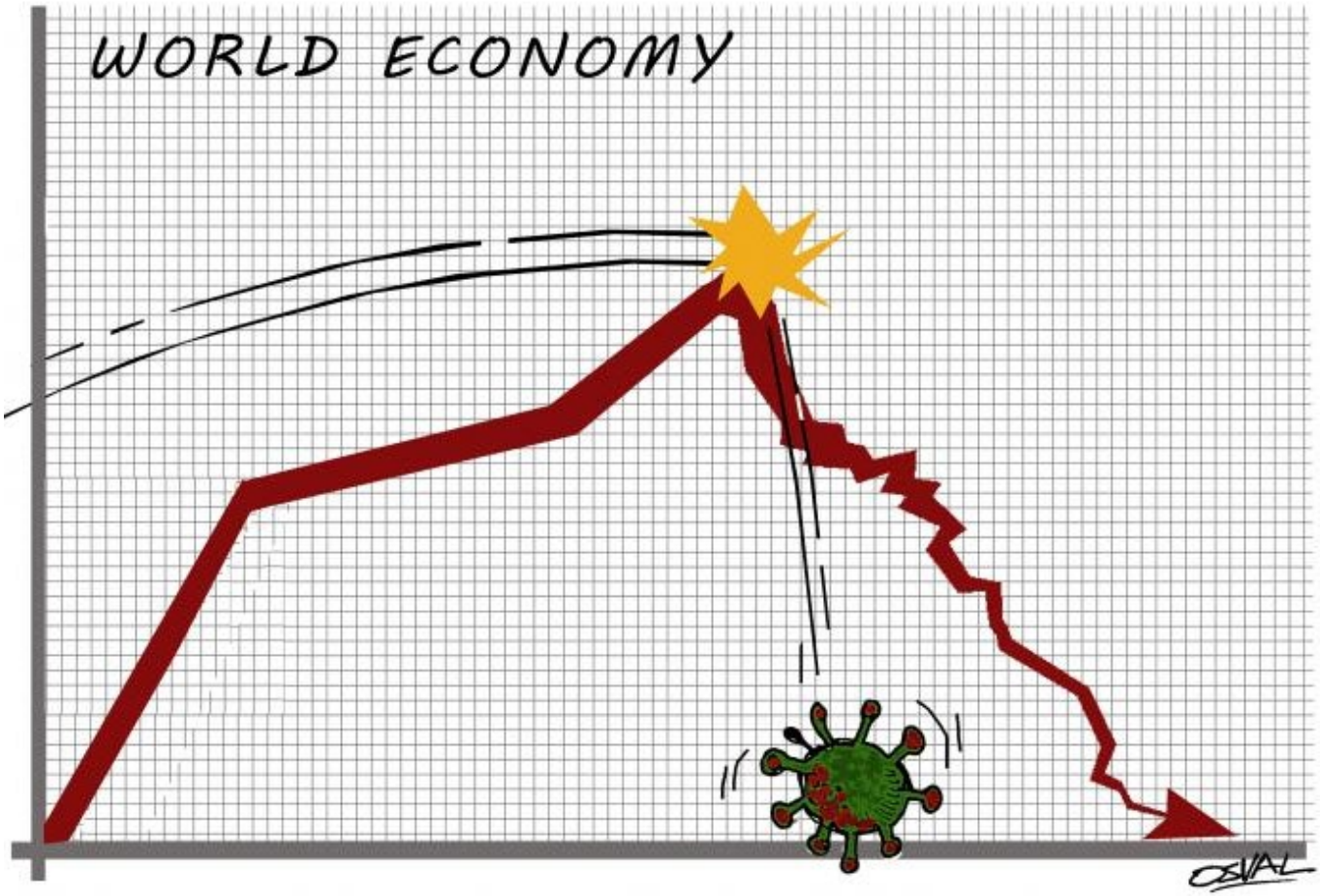
MLTC BIOENERGY CENTRE

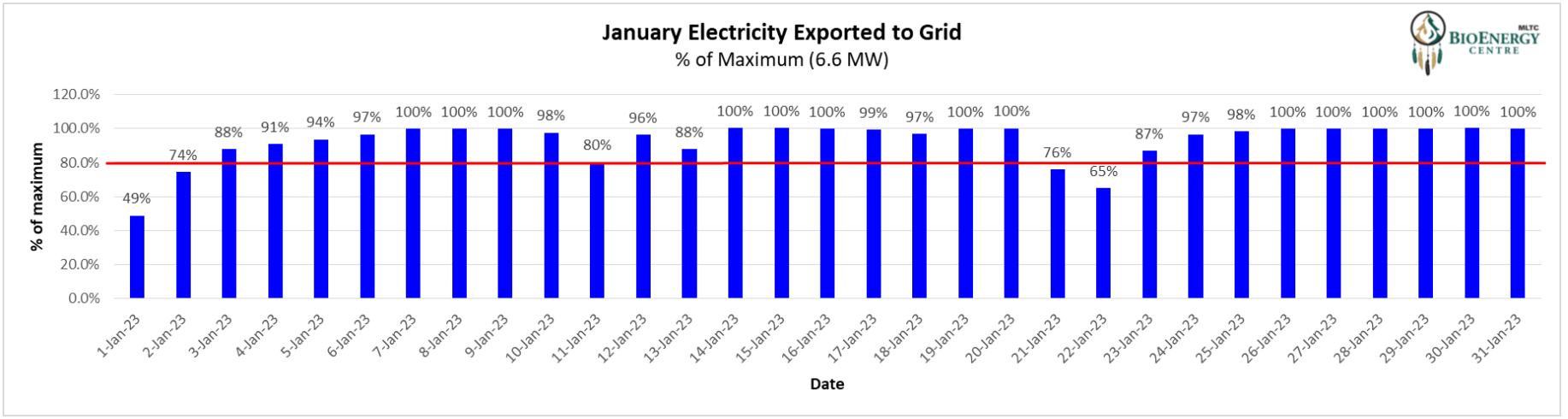


March 2020 - Start

October 2022 - Finish

All construction projects undertaken during COVID-19 (2020 to 2022) were subjected to <u>unforeseen</u> significant cost escalation.




January Electricity Exported to Grid
% of Maximum (6.6 MW)
% of maximum
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
49%
74%
88%
91%
94%
97%
100%
100%
100%
98%
80%
96%
88%
100%
100%
100%
99%
97%
100%
100%
76%
65%
87%
97%
98%
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100%
1-Jan-23
2-Jan-23
3-Jan-23
4-Jan-23
5-Jan-23
6-Jan-23
7-Jan-23
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9-Jan-23
10-Jan-23
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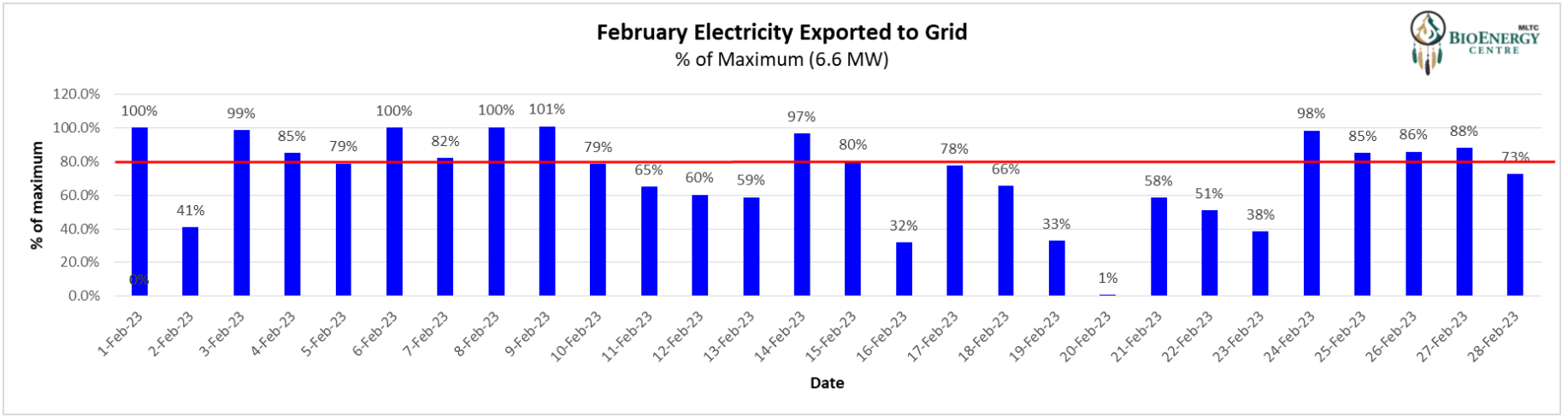
29-Jan-23
30-Jan-23
31-Jan-23
Date


February Electricity Exported to Grid
% of Maximum (6.6 MW)
% of maximum
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
100%
41%
99%
85%
79%
100%
82%
100%
101%
79%
65%
60%
59%
97%
80%
32%
78%
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33%
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58%
51%
38%
98%
85%
86%
88%
73%
1-Feb-23
2-Feb-23
3-Feb-23
4-Feb-23
5-Feb-23
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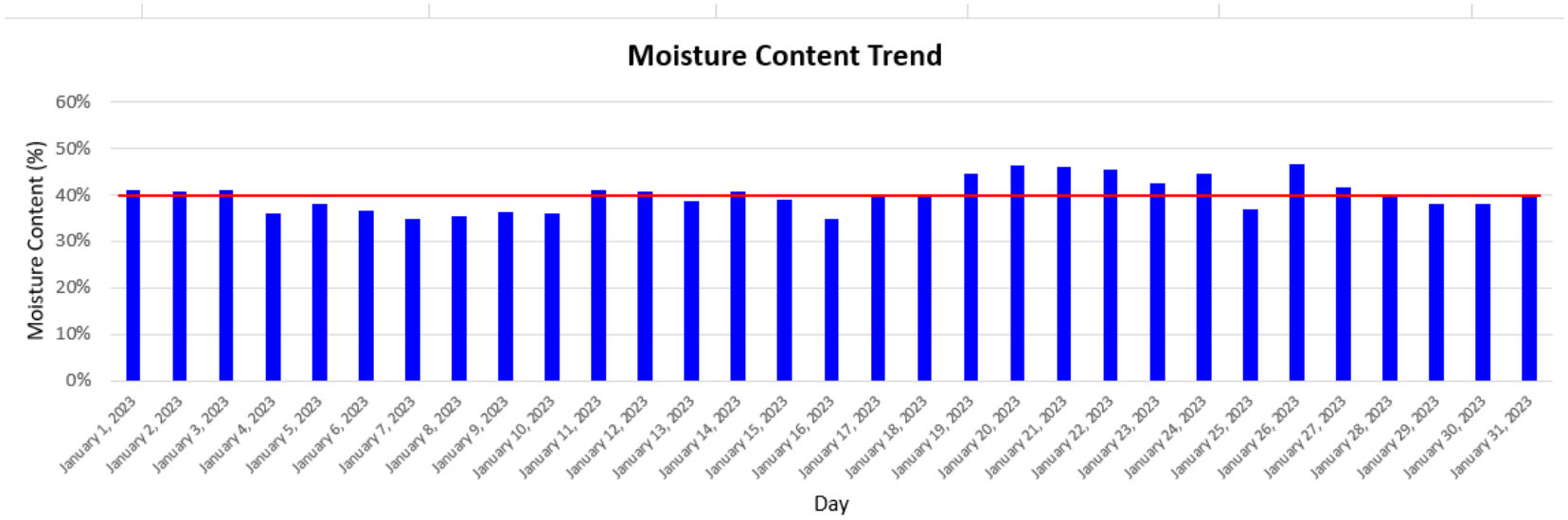
28-Feb-23
Date


Moisture Content Trend
Moisture Content (%)
60%
50%
40%
30%
20%
10%
0%
January 1, 2023
January 2, 2023
January 3, 2023
January 4, 2023
January 5, 2023
January 6, 2023
January 7, 2023
January 8, 2023
January 9, 2023
January 10, 2023
January 11, 2023
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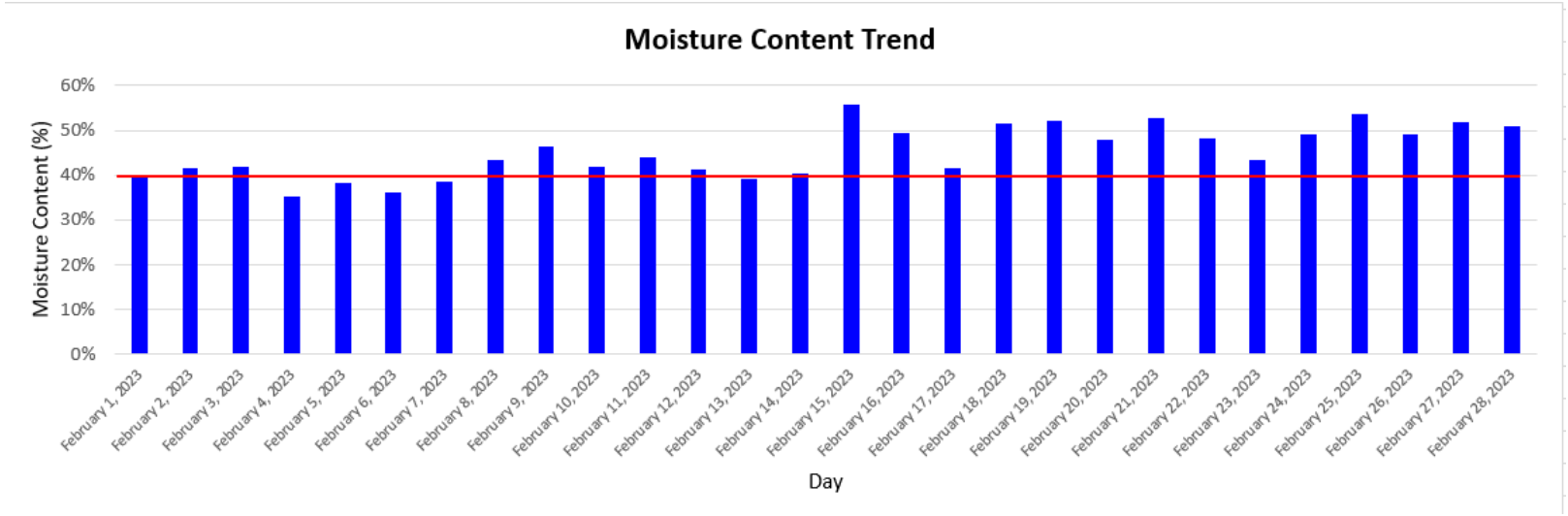
January 27, 2023
January 28, 2023
January 29, 2023
January 30, 2023
January 31, 2023
Day


Moisture Content Trend
Moisture Content (%)
60%
50%
40%
30%
20%
10%
0%
February 1, 2023
February 2, 2023
February 3, 2023
February 4, 2023
February 5, 2023
February 6, 2023
February 7, 2023
February 8, 2023
February 9, 2023
February 10, 2023
February 11, 2023
February 12, 2023
February 13, 2023
February 14, 2023
February 15, 2023
February 16, 2023
February 17, 2023
February 18, 2023
February 19, 2023
February 20, 2023
February 21, 2023
February 22, 2023
February 23, 2023
February 24, 2023
February 25, 2023
February 26, 2023
February 27, 2023
February 28, 2023
Day

MLTC Bioenergy Project

8 MW Biomass-Based Combined Heat & Power Energy System

This successfully completed green energy project is evidence of MLTC's continued evolution as a socio-economic and green energy leader in Saskatchewan – a 100% Indigenous-owned green energy project supplying 8 MW of biomass-based combined heat and power.

The project uses a proven Organic Rankine Cycle (ORC) generator which is environmentally benign, **uses no water**, **creates no effluent** and allows small biomass-based CHP facilities such as this to be economic. The design also incorporates an electrostatic precipitator which **essentially eliminates particulate emissions**.

The project **delivers electrical power** to the SaskPower grid and incorporates a new kiln which utilizes waste heat from the project to dry lumber **reducing natural gas consumption and further reducing GHG production**.

MLTC's 8 MW Combined Heat & Power (CHP) Facility

MLTC – Ultimate Recipient

The Meadow Lake Tribal Council (MLTC) was founded in 1981

- 9 First Nations Communities of Northwest Saskatchewan
- 5 Cree First Nations and 4 Dene First Nations
- Located in northwest Saskatchewan and serving the needs of 16,000 members

MLTC – Indigenous Social Impact

- Indigenous youth and families of MLTC will benefit the most from this project – which will assist in addressing historic socio-economic disparities and sustain Canada's efforts towards reconciliation.

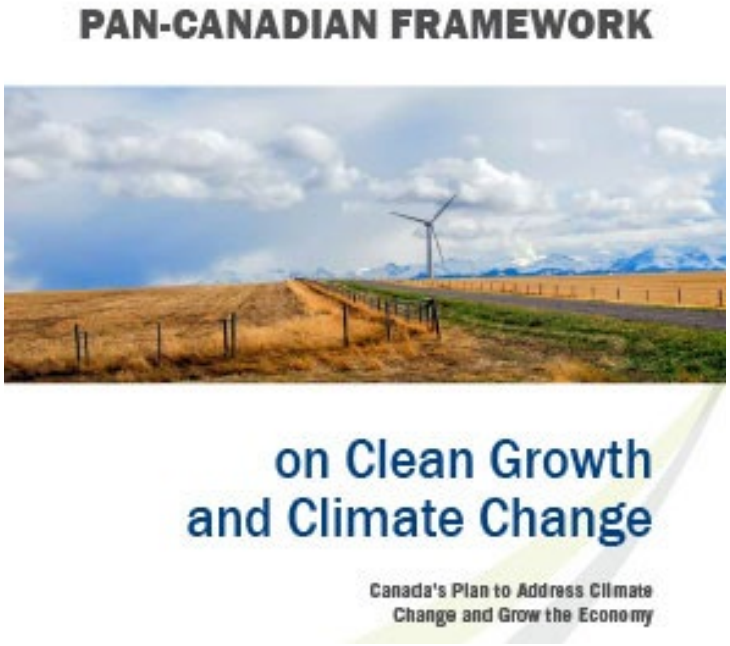
- Expected long term outcomes:
  - ✓ Wellness outcomes
  - ✓ Suicide prevention strategies
  - ✓ Youth engagement activities
  - ✓ Mental health services
  - ✓ Education programming
  - ✓ Life and job skills training

Environmental Benefits

This project is fully aligned with the Government of Canada's Pan-Canadian Framework on Clean Growth and Climate Change

Results:

- ✓ Reduced GHG emissions
- ✓ Improved air quality
- ✓ No water use or effluent
- ✓ Reduced natural gas use
- ✓ Reduced carbon intensity of grid
- ✓ Generate useful green power/heat



Additional Socio-Economic Benefits to Northwest Saskatchewan

This project will **strengthen the regional forestry sector** which has proven **crucial to the economic outcome of rural Indigenous communities** in northwest Saskatchewan.

The regional forestry economy in northwest Saskatchewan is an **integrated system** supporting sawmills, a specialty wood products facility, a BCTMP pulp mill and an OSB facility with **combined direct, indirect and induced employment in excess of 2,500 full-time equivalent (FTE) jobs**.

At 65% - the regional forestry sector in northwest Saskatchewan supports the highest Indigenous employment content of any jurisdiction in Canada.