INUVIK Renewable Energy PROJECT

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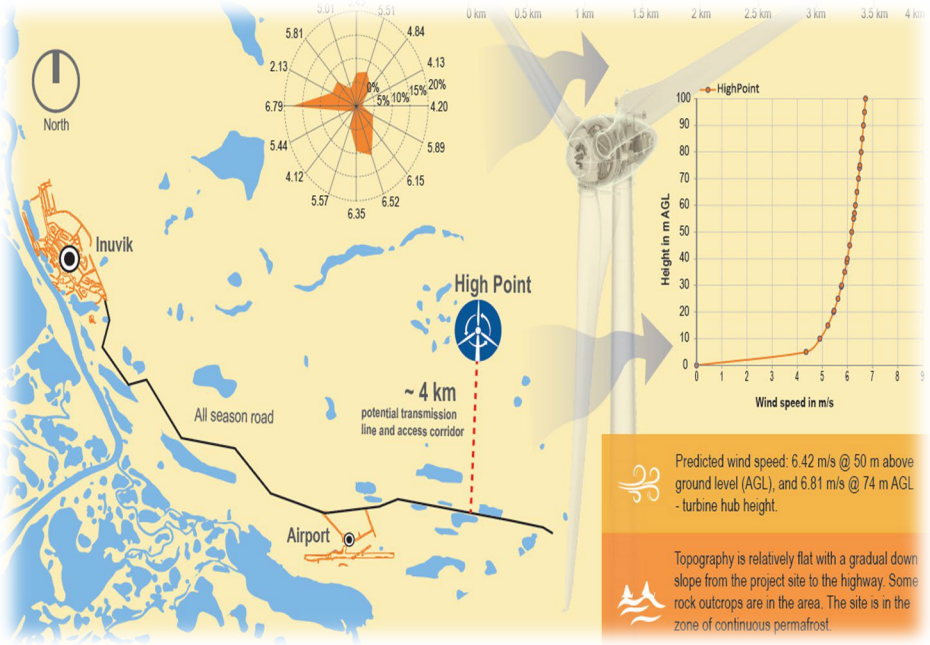
NORTHWEST TERRITORIES POWER CORPORATION
Empowering Communities

PROJECT JUSTIFICATION

- The GNWT and federal government signed funding agreements for strategic green infrastructure projects, in support of achieving Canada's 2030 greenhouse gas (GHG) emission reduction targets.
- The Inuvik Renewable Energy Project is structured to reduce dependence on the existing diesel and LNG generation facility and lower greenhouse gas emissions related to electricity generation.
- Inuvik is the largest community in the Beaufort Delta region and consumes the most diesel fuel and natural gas to produce electricity, compared to other communities.
- Modelling for this project suggested that the wind turbine could generate 30 per cent of the annual total generation required for the area. This equates to a reduction in the community's diesel consumption by three million liters and greenhouse gas emissions by up to 6,000 tonne, annually.
- Funding approval for the project was received on 21st September 2018, and the project was later transferred to NT Energy from GNWT at the same time.

PROJECT SCOPE

- Design, Procurement, Delivery, Construction and Commissioning of a single 3.5MW Wind Turbine Generator (WTG) – *ENERCON Unit*
- Battery Energy Storage System (BESS) included for stability and reliability – *ENEON Unit*
- Installation of a new 25 kV distribution line connecting the WTG to the existing distribution line at the Inuvik Airport
- Site Location: 6km NE of Inuvik Airport; 13km E of Town of Inuvik.



Delivery of Major Components

Delivered By Barge From Hay River to Inuvik

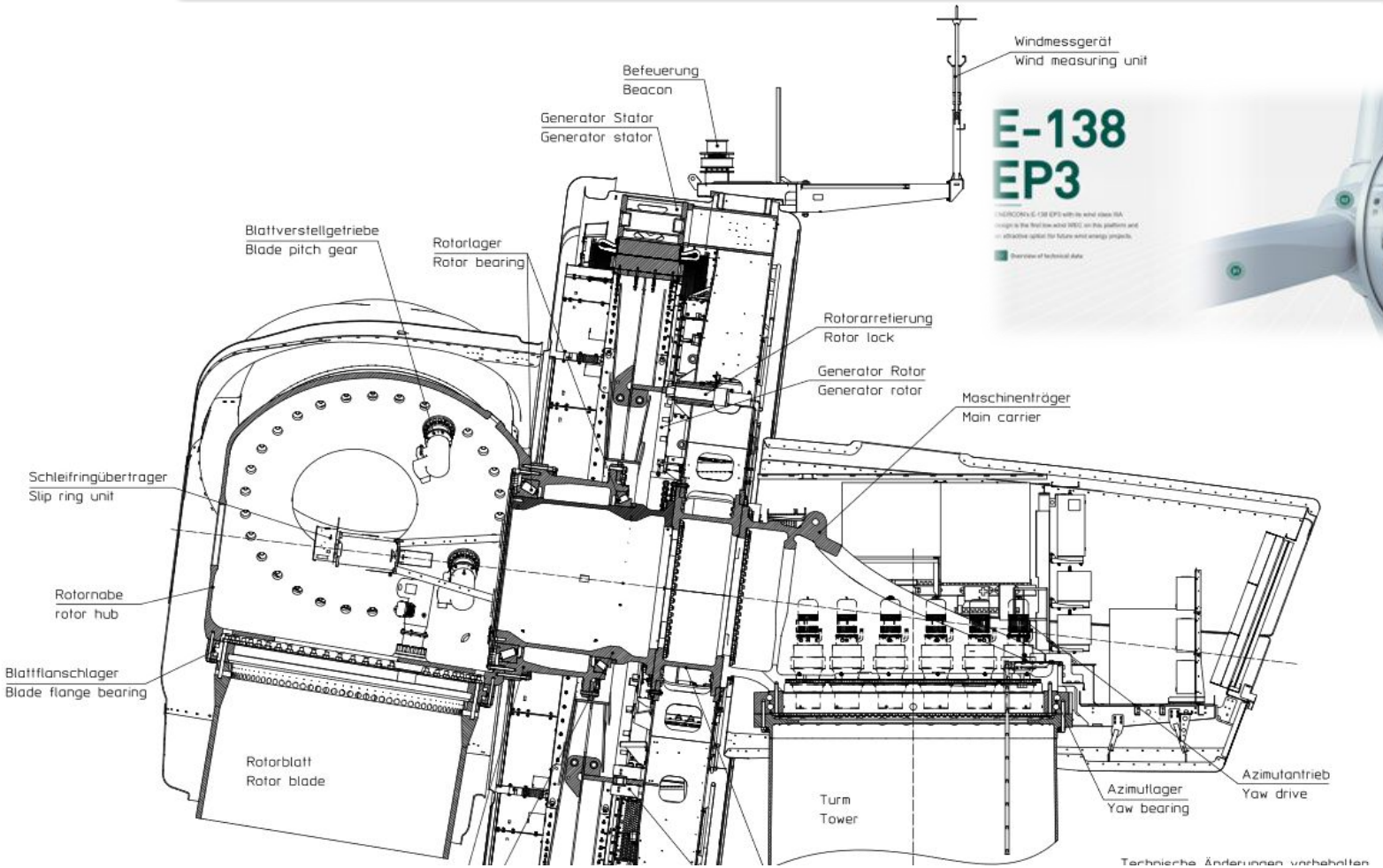
Barge Arrived in Inuvik 20Sep22

PREPARATION OF THE WTG FOUNDATION

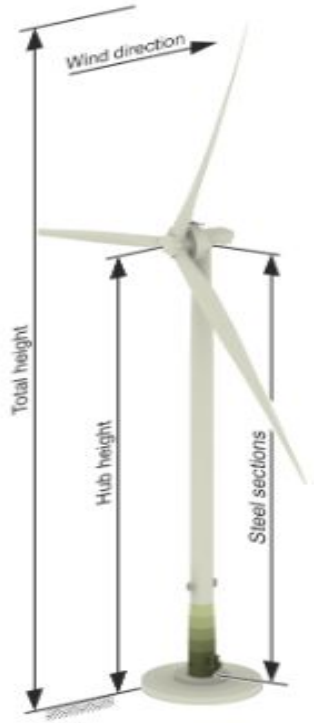
WTG Pad, Piles & Thermosyphons

COMPLETED WIND TURBINE

NACELLE AND BLADES



WTG OVERALL DIMENSIONS



Tab. 1: Heights, wind zones, type

Parameter	Value
Total height above ground level	149.56 m
Hub height above ground level	80.44 m
Hub height above foundation top edge	77.94 m
Tower height above foundation top edge	76.10 m
Wind zone (DIBt 2012)	WZ 2, GK II
Wind Turbine Class (IEC 61400-1:2010)	WTC S[1]
Type	Steel tower
Number of steel sections	4

[1] Operating loads v_{ave} = 6.6 m/s, turbulence category A, extreme loads WTC IIIA; with option of WTC IIIA following site assessment

WZ: Wind zone
GK: Geländekategorie (terrain category)
WTC: Wind Turbine Class

Tab. 2: Dimensions and weights

	Length	Diameter		Weight
	l in m	D_{top} in m	D_{bottom} in m	*m* in t
Steel section 1	28.50	3.22/ 3.56[1]	3.21	61
Steel section 2	20.06	3.21	3.85	64
Steel section 3	14.21	3.85	4.32	60
Steel section 4	13.25	4.32	4.33/ 4.79[1]	89
Foundation basket	2.91	4.93[2]	4.75[3]	15

[1] Outer flange diameter
[2] Outer load ring diameter
[3] Outer anchor ring diameter

BATTERY STORAGE ENERGY SYSTEM (BESS)

ENERGY GENERATION-Model vs Overall

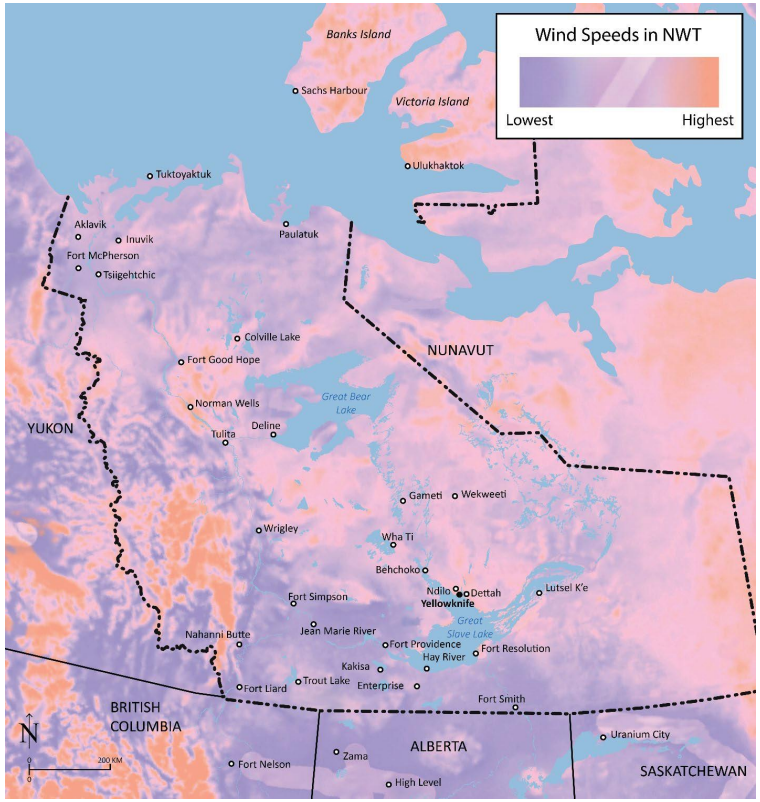
Annual Predicted Production

Modelling suggested the expected WTG Generation
Per annum = 11.76GW.hr
Estimated Capacity Factor = 38.3%

Production 01April2024-31March2025

The WTG has generated approximately 5.6 GW.hr or enough to power approximately 460 houses.

This represents 24% of NTPC's power generation during this period with the expectation of increased wind generation once software changes fully implemented.



ENERGY GENERATION- to April 2025 Summary

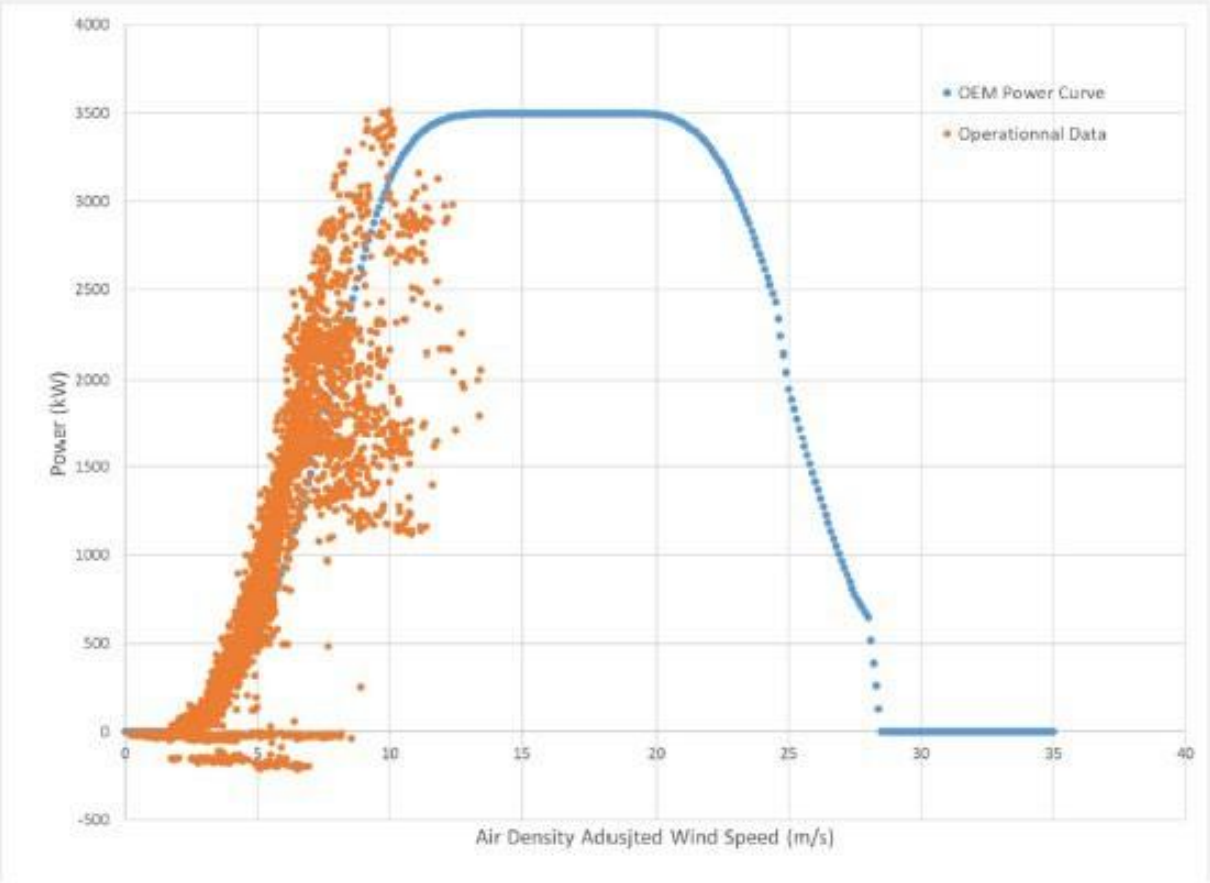
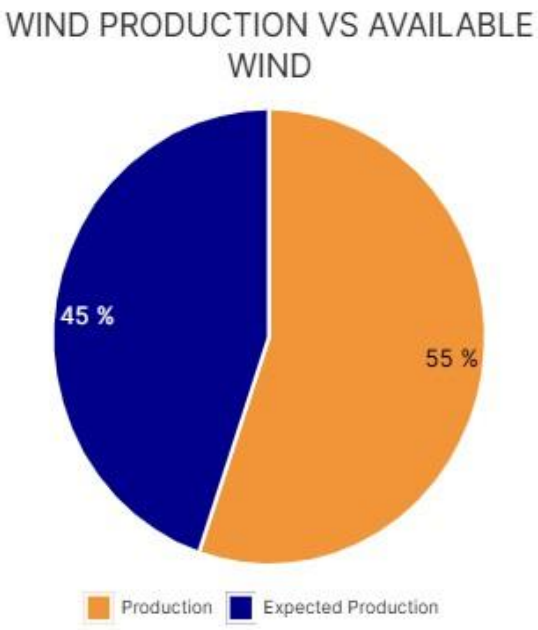
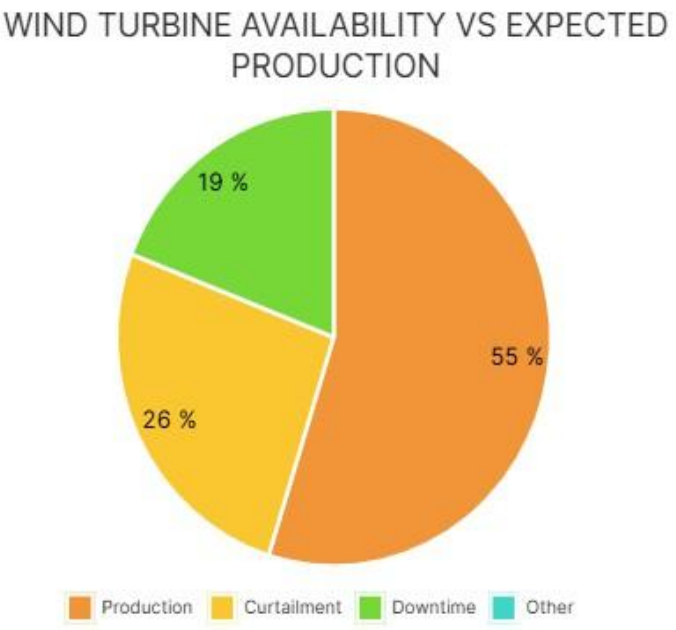


Figure 2-3: Wind Turbine Performance Plot

Actual Production Percentages

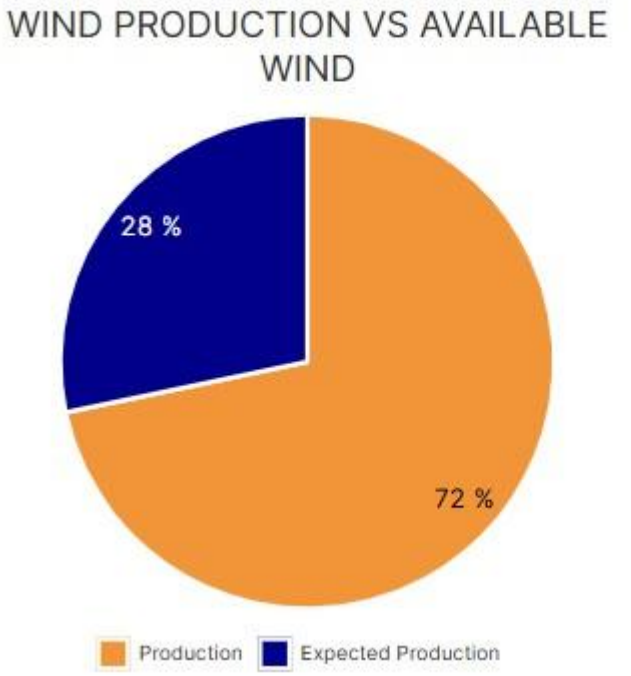
Results for 24-25. Period 23-24 was only 6 months production.

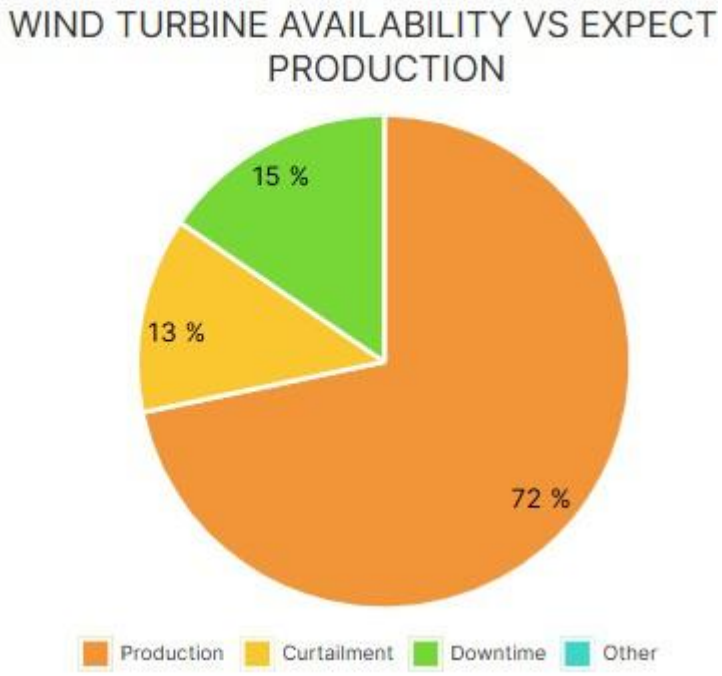




Actual Production Percentages

Results for April and May 2025





Reasons for Differences in Expected and Actual Production

Why Expected Production and Actual Production Differ.

- New equipment working together for the first time.
- Delays in rectifying deficiencies.
- Staff getting familiar with operation and rectifying issues.
- Blade de-icing.
- Curtailment due to initial programming set up, stacking order of gensets with two gensets running to maintain fuel efficiency.
- HATCH (owners engineers) currently modifying software to run one genset.
- Issues with solar not fully resolved

ENERGY GENERATION- Fuel Consumption Avoided

Key Performance Indicator	Total Since COD
Wind Turbine Production (MWh)	9,042
Wind Turbine Consumption (MWh)	227
Solar Plant Production (MWh)	298
Solar Plant Consumption (MWh)	8.8
Estimated Avoided Diesel Consumption (L)	1,324,216
Estimated Avoided LNG/NG Consumption (m^3)	1,746,912
Estimated Green House Gas Emissions Offset (ton of CO_2)	6,347

COD = Commercial Operation Date: September 23rd, 2023

PROJECT COSTS

- ICIP (Investing in Canada Infrastructure Program) funding for the project from the Federal Government was approved at $40 million.
- The Government of the Northwest Territories contributed another $10 million.
- Project cost has increased to >$80M.
- Among the factors contributing to a higher-than-expected project cost are:
  - The access road contract.
  - Estimates for the battery energy storage system.
  - Cost to mobilize large cranes for raising of the turbine.
  - Inflationary pressures and delays associated with the global COVID-19 pandemic,
    e.g., supply chain issues, material, and labor shortages, etc.
  - Delays due to unforeseen events, e.g., third-party accidents which closed transportation corridors and vendor shortcomings (missing bolts).
  - Regulatory delays.

QUESTIONS PLEASE!

Thank you for listening:

If you think of any questions later, you can contact me at:
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and

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