TOPIC #2:
HIGHEST METEOROLOGICAL STATION IN CANADA DESIGNED FOR COLD CLIMATE AND COMPLEX TERRAIN RECOGNITION

By Cédric Arbez, Eng. Jr and H.Ibrahim, Ph.D.

TechnoCentre éolien
Wind Energy TechnoCentre

Nos principaux partenaires / Our principal partners

Développement économique Canada pour les régions du Québec
Canada Economic Development for Quebec Regions

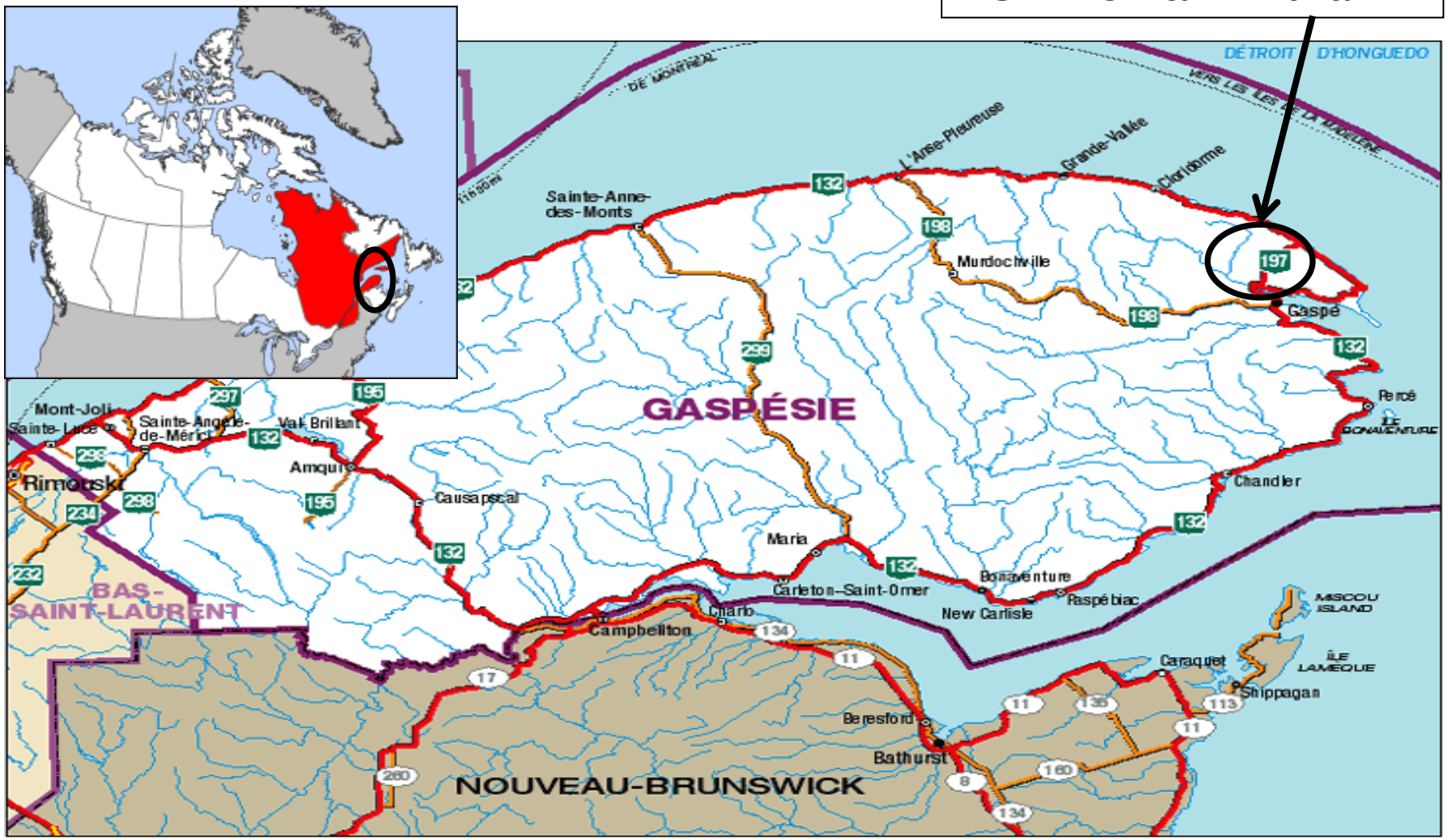
Canada

Québec

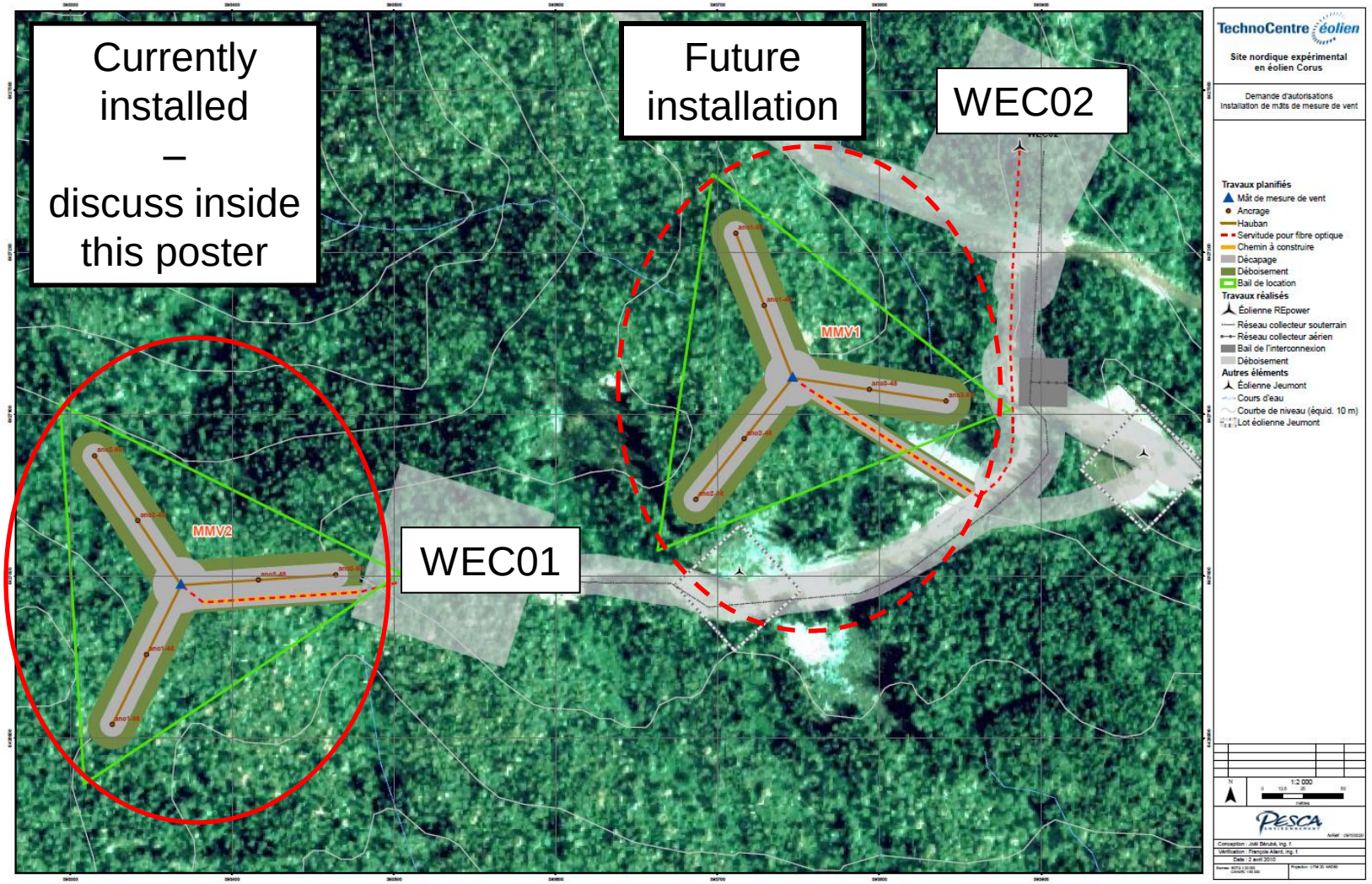
Summary

- TechnoCentre's infrastructure location
- Meteorological mast location
- Undistrubed wind sectors
- Research objectives
- Met mast configuration
- Future works

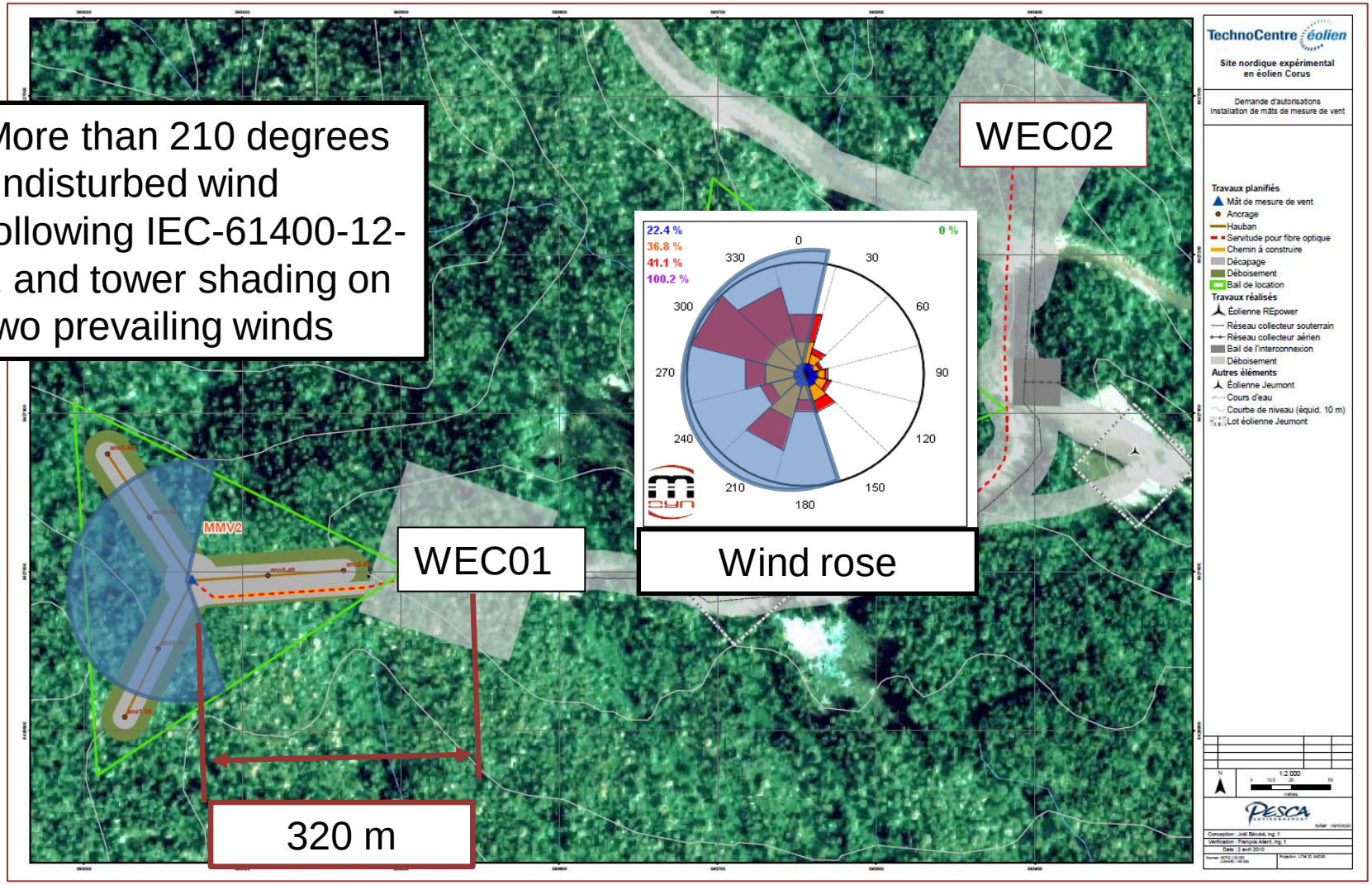
TechnoCentre's infrastructure location



Meteorological mast location



Undistrubed wind sectors

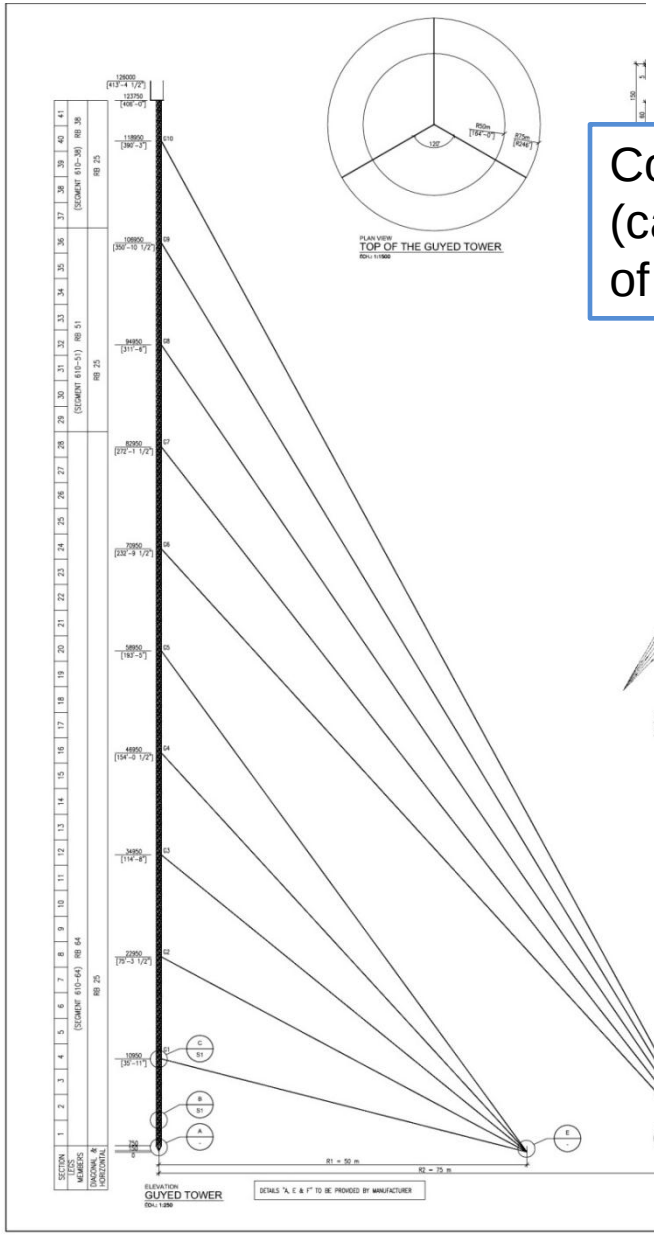


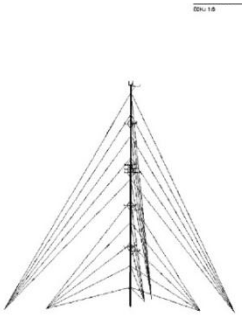
Research objectives

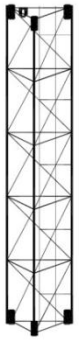
- Analyze power performance of 2 Repower MM92 CCV in cold climate conditions and complex terrain
- Relate the atmopheric boundary layer in relation to icing conditions
- Evaluate wind energy losses due to the cold climate conditions
- Test and compare sensors for cold climate and complex terrain utility
- Compare remote sensing technologies in cold climate (SODAR, LIDAR and met mast)
- Validate numerical flow model in complex terrain
- Analyze the atmospheric boundary layer (IT, shear, thermal stratification)

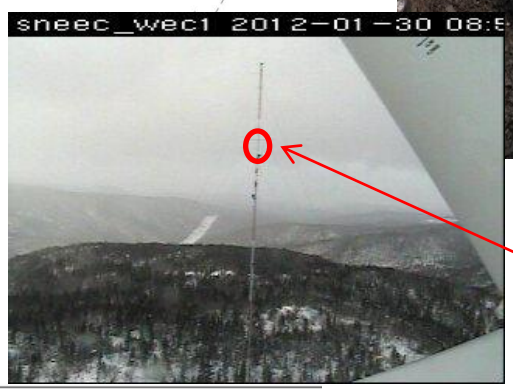
Infrastructure

Compliance with CSA-S37-01 (can resist to a combined load of 40 mm of ice and 57 m/s)

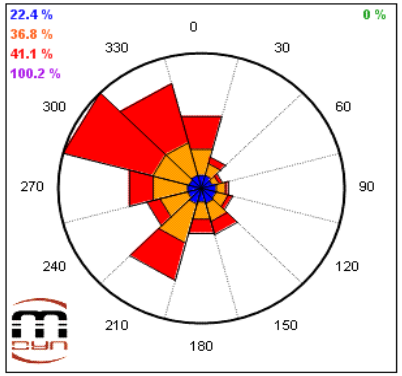








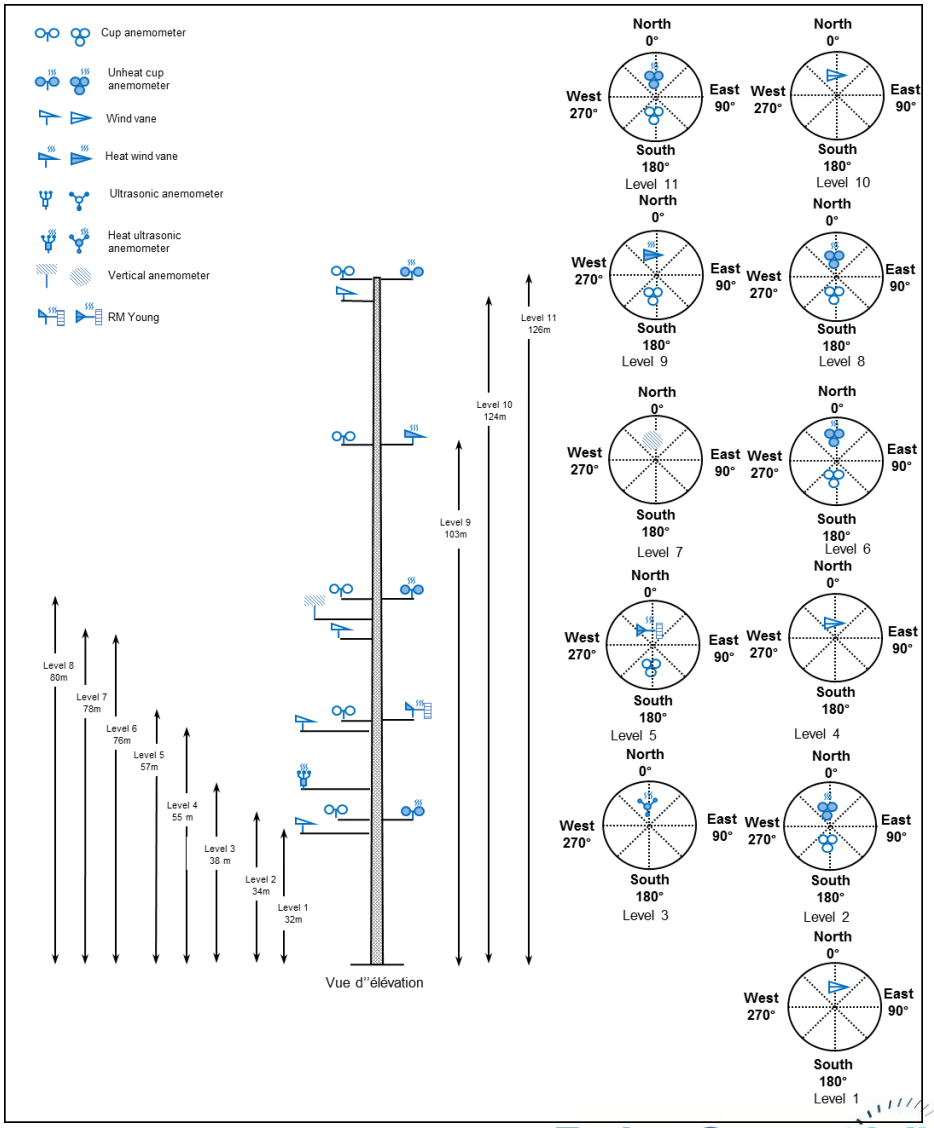
It's now installing booms



Rose des vitesses

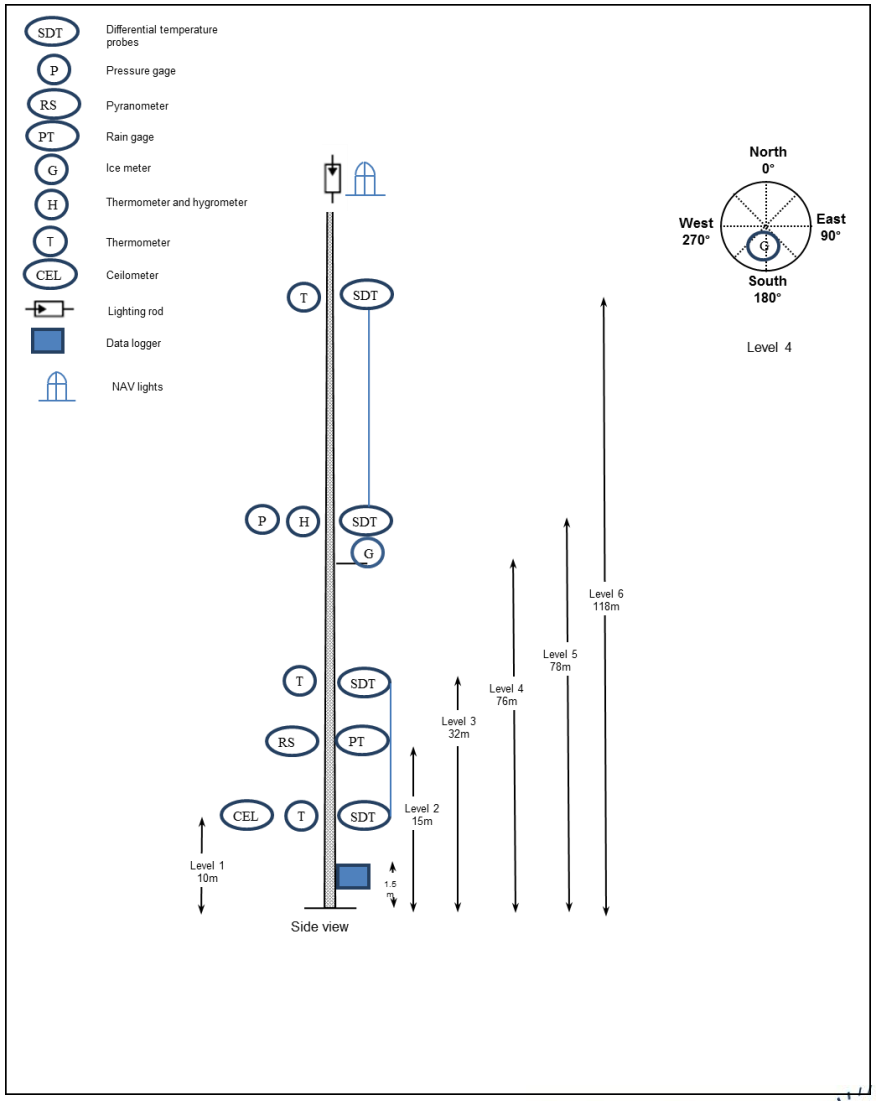
Met mast configuration

- 3 levels with heat and unheat anemometer
- 2 levels to compare heat and unheat wind directions
- 5 levels with unheat cup anemometers class I
- Metek 3D heat anemometer
- One vertical propeller anemometer
- *Design to be fully expandable (adding some sensors after installation)*



Met mast configuration

- Ceilometer to detect cloud height
- 4 thermometers and 2 standard differential temperature probes to detect the thermal stability
- Pyranometer
- Optical ice meter
- Rain gage to detect precipitation
- Hygrometer
- *All data were send to Osisoft PI archive system with 1Hz frequency*
- *A CQ with more than 30 criteria was done on each data*



Met mast configuration

- All meteorological sensors are installed on 4 m long booms

Thies First Class

NRG Hybrid

Met-One 020C

NRG Ice Free III

RM Young 27106-T

Holo Optics T44

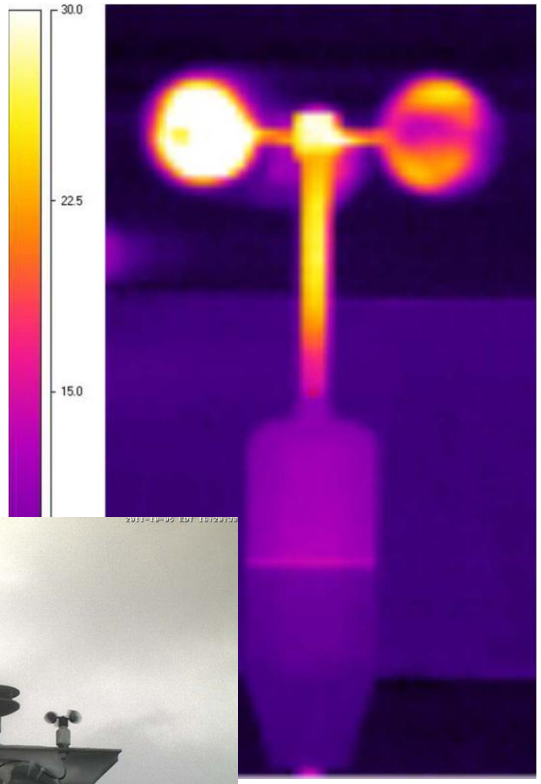
Metek USA-1

AllWeather inc. 8339

4 X CSI 107-L
2 X Risø P1862a

Future works

- Test of prototype heat anemometer from ULaval
- Verify correlation between energy losses within cold climate condition on the met mast comparing to Repower MM92CCV (especially on stability - dT/dz)
- Etablish standard and guidelines for cold climate wind energy production
- Forecast icing type and accretion from the meteorological conditions
- Install cameras points sensors



Courtesy from ULaval

Courtesy from Repower

Merci!

Cédric Arbez, Eng.Jr.
Email: carbez@eolien.qc.ca
Phone: (418) 368-6162 extension 237

TechnoCentre éolien
Wind Energy TechnoCentre

www.eolien.qc.ca
1-888-EOLIENS