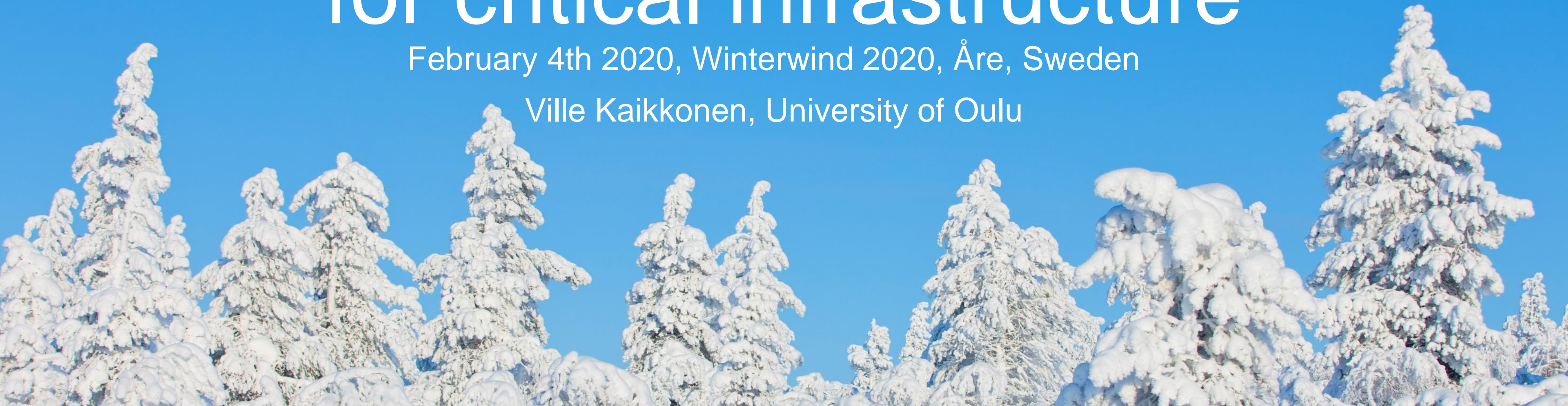


# Ice and snow management innovations for critical infrastructure

February 4th 2020, Winterwind 2020, Åre, Sweden

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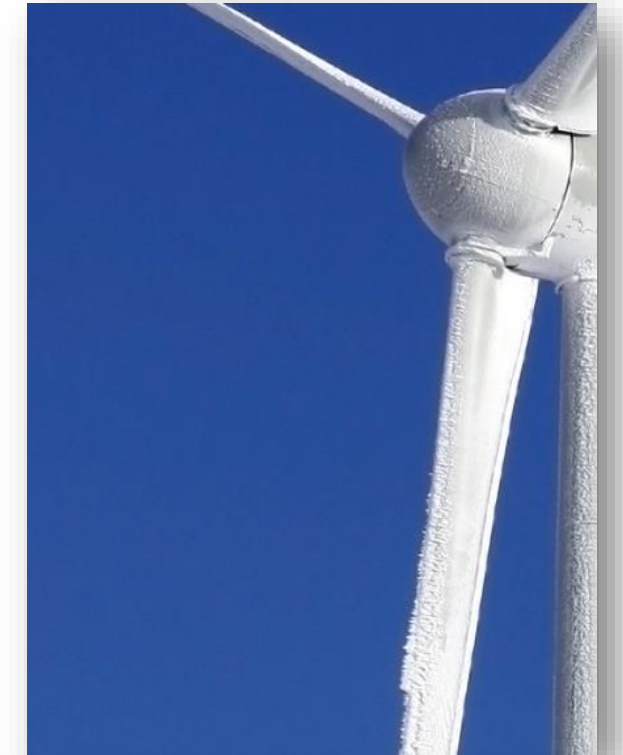
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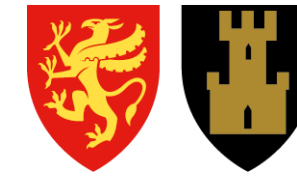
**Ice Proof Arctic (IPA)** - Innovations for ice and snow management

Project under Interreg V A Nord EU-program

Total Budget 1.2 M€

Project time frame  
1.10.2019 – 30.9.2022

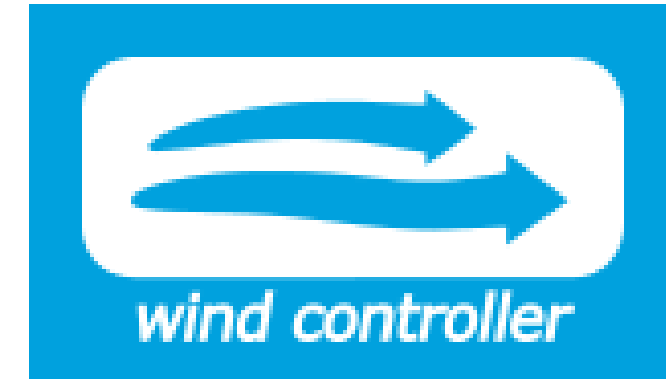




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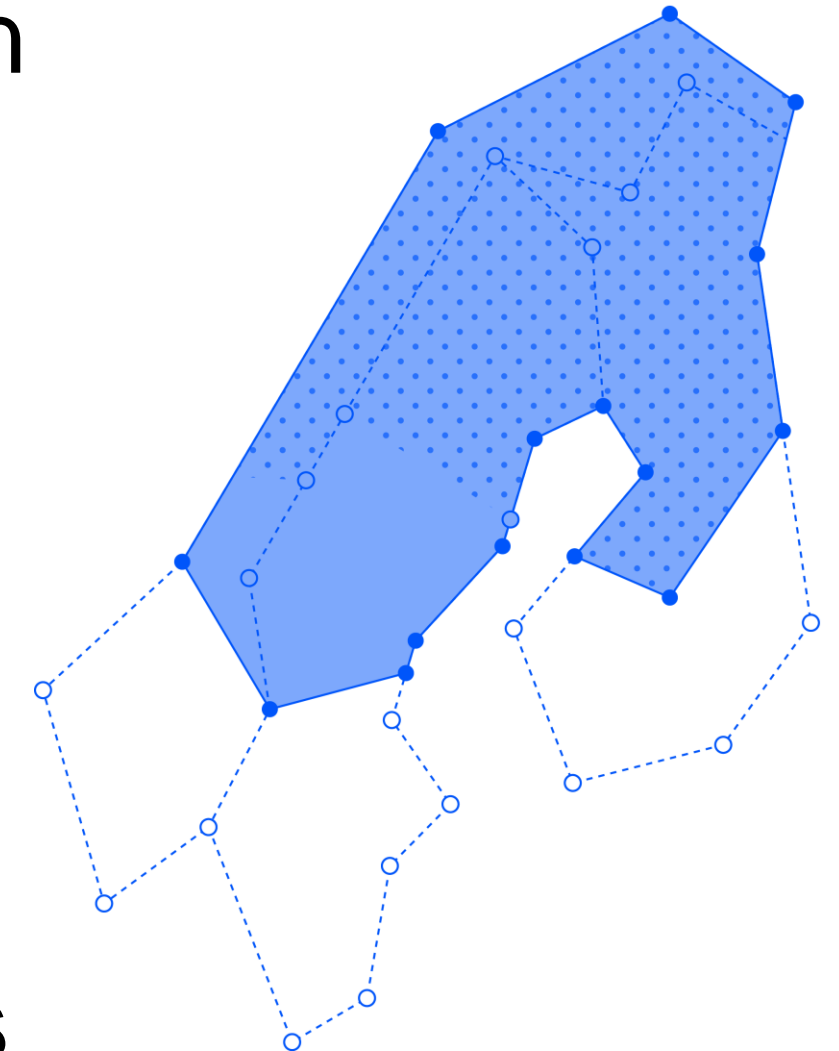
**UiT The Arctic  
University of Norway**

# Ice Proof Arctic - Innovations for ice and snow management

Promotes the cross border activities and collaboration in the field of ice and snow management in northern territories in Sweden, Finland and Norway

**Aim to evaluate multiple new innovations for**

- **Icing management of wind turbines**
- **Icing management of power transmission lines**
- **Management of snow loads on roofs of buildings**



# Innovations – Ice load sensor (University of Oulu)

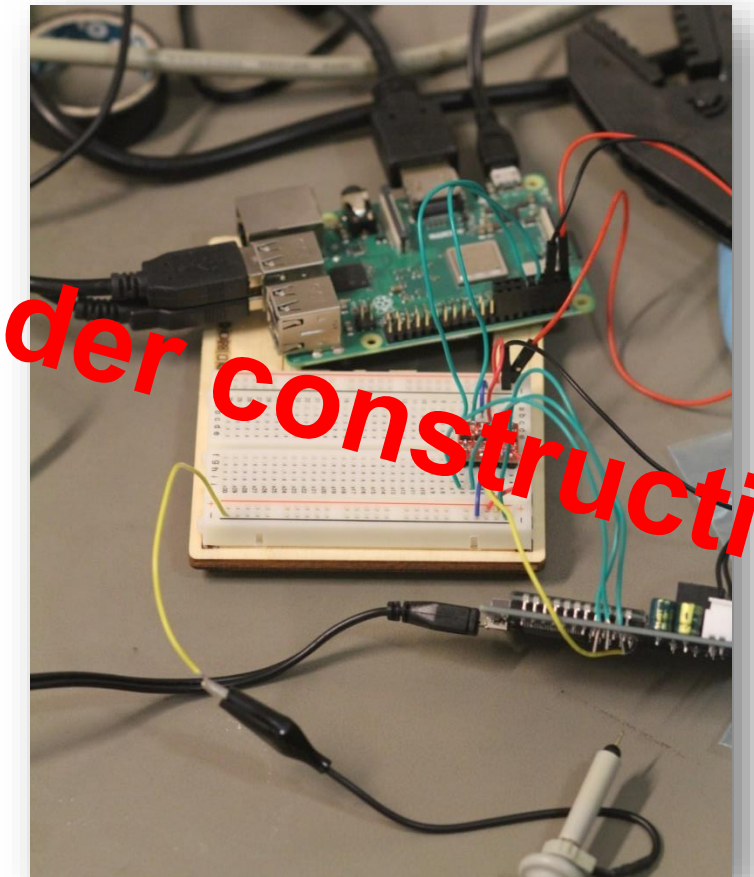
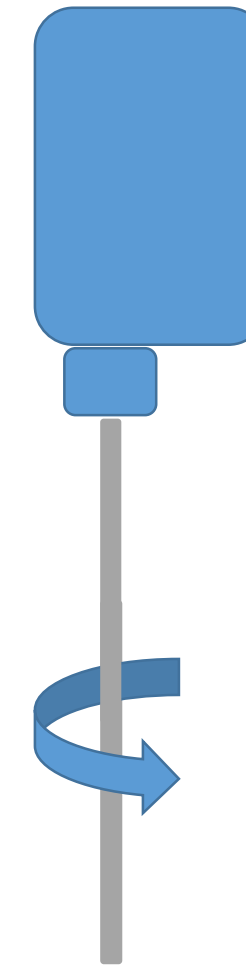
A high sensitivity ice load sensor, based on the ISO 12494 icing standard rotating cylinder structure.

De-icing of the cylinder to "reset" the ice load measurement

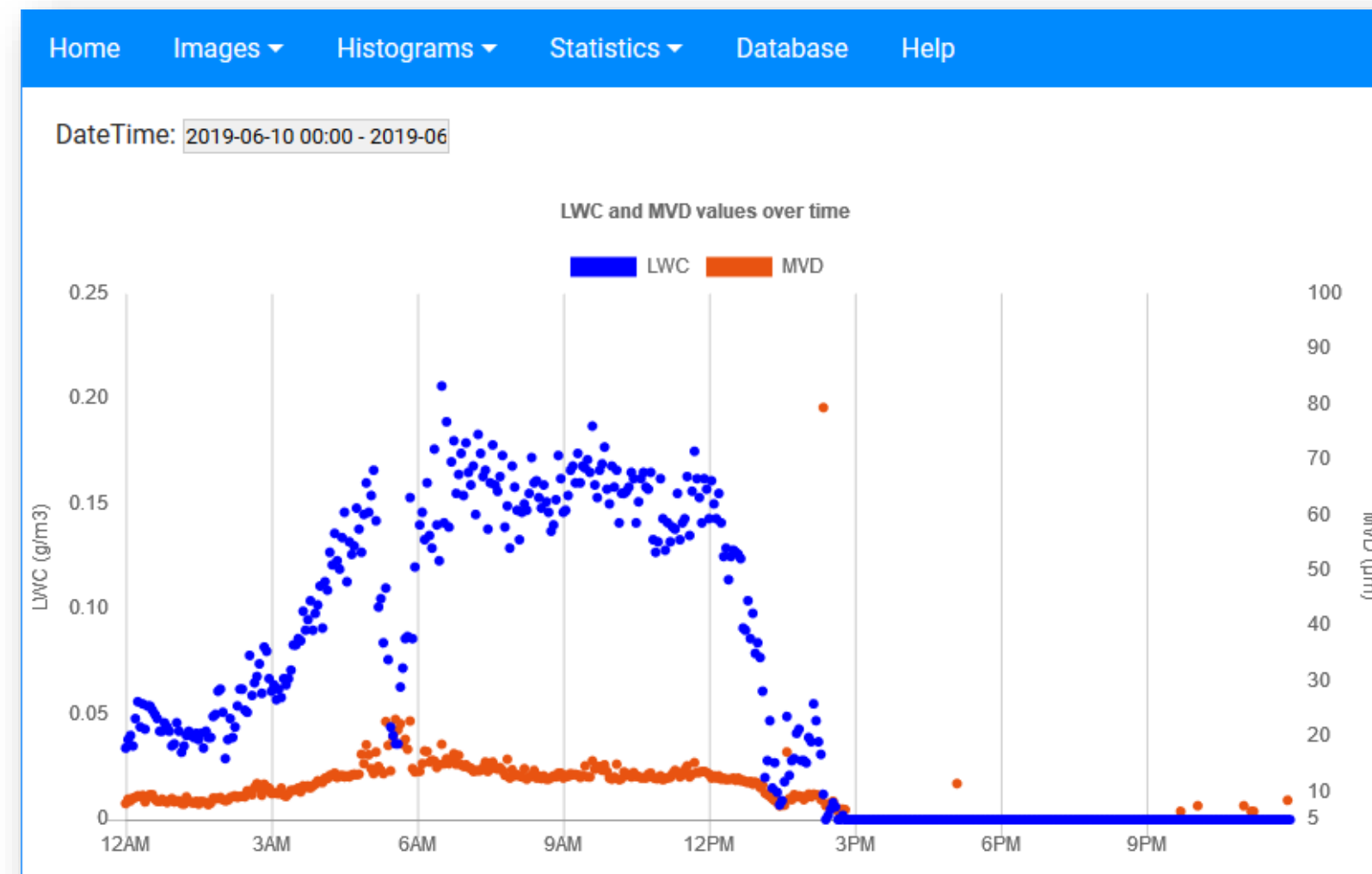
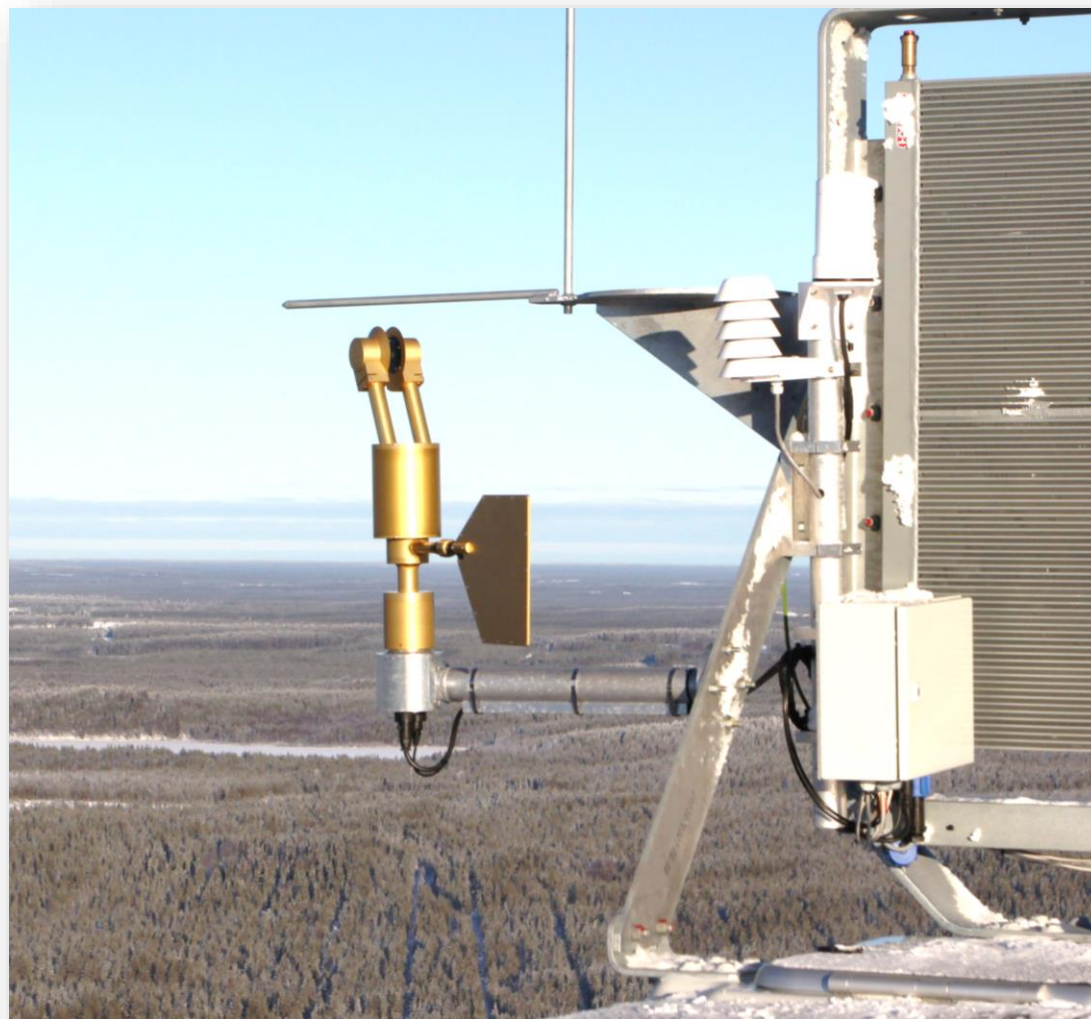
Preliminary specifications:

- Ice load: <1 Kg
- Icing rod: 30 mm diameter, 0.5 m length
- Ice load resolution/sensitivity: 2-5 grams targeted

Possibility to combine testing with the new coatings from LTU



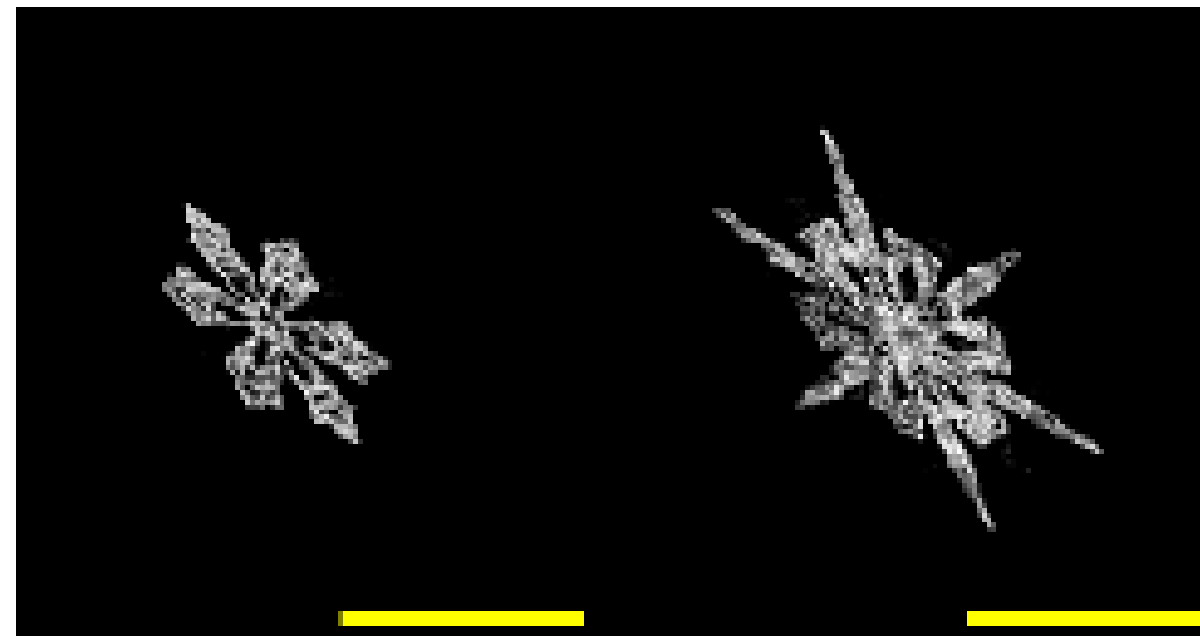
# Innovations – Icing condition sensor ICEMET (University of Oulu)





# Innovations – Snow Pile-Up (University of Oulu)

- Uneven snow pile-up on buildings
- Monitor system for detecting blowing (old) snow



Stellar crystals

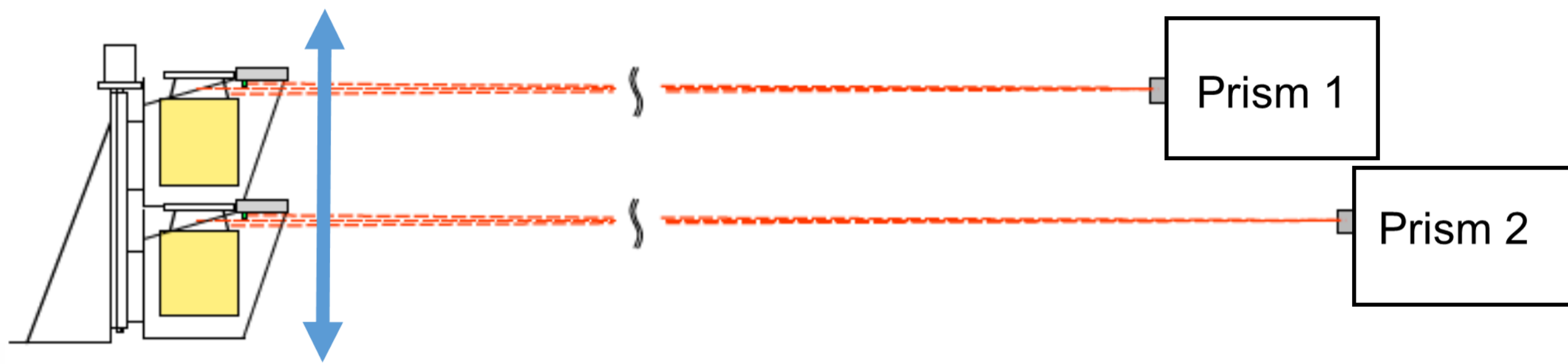


# Innovations – Roof-top Snowload Monitoring (University of Oulu)

Optical measurement, based on a rotating laser and reflectors to measure bending of large buildings roof support structures



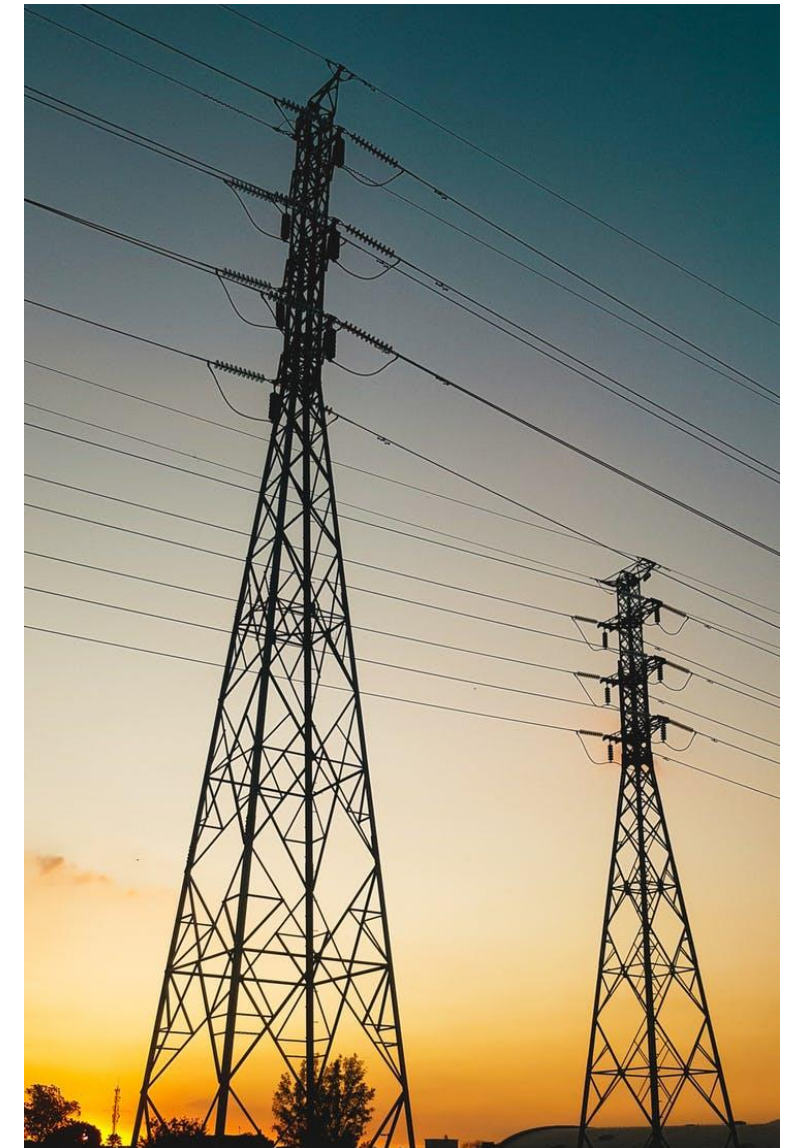
## Combined testing with drones (Lappland UAS)



# Innovations – Power Line De-icing System (Lappland UAS)

## Prototype of a overhead power line de-icing device

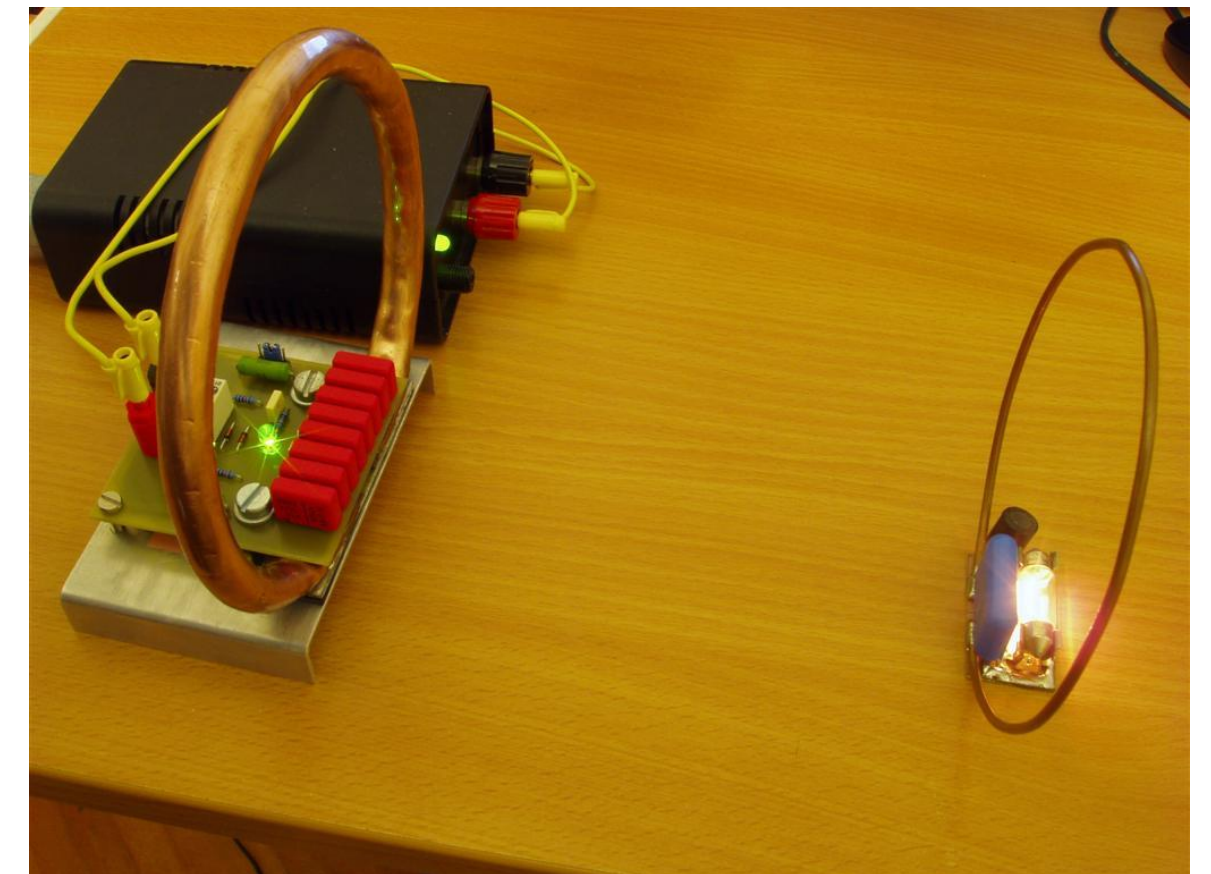
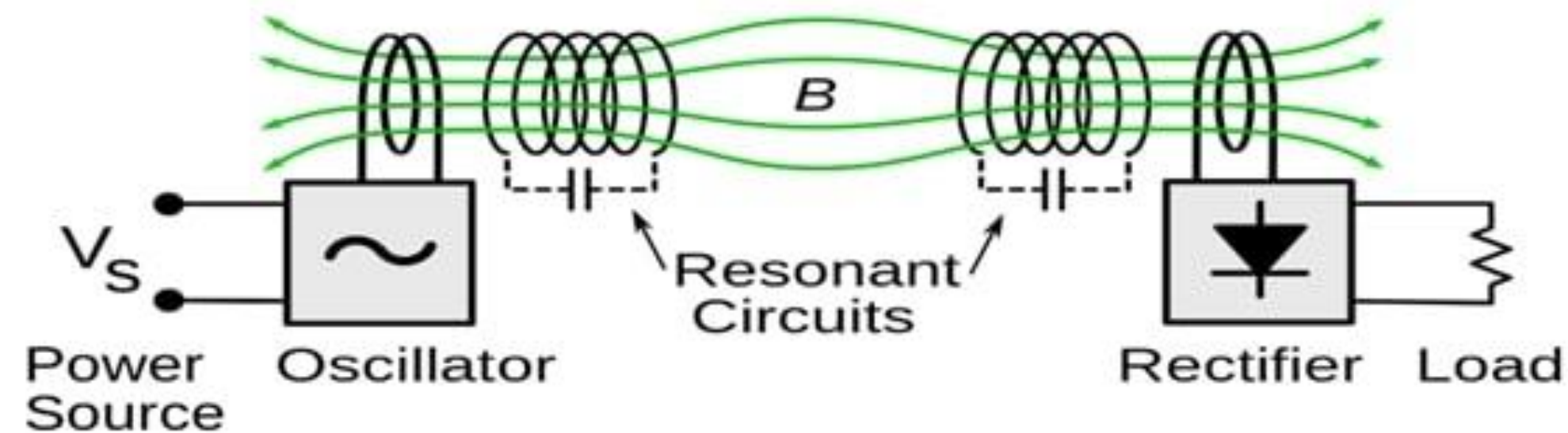
- De-icing process
- Laboratory testing for functional parts
- Prototype manufacturing and laboratory testing
- Field testing



# Innovations – Energy Harvesting (University of Oulu)

## Energy harvesting for overhead power line de-icing

- Kinetic energy harvesting
- Wireless power transfer



# Innovations – Ice load sensor (UiT)

- **Development of new ice load sensors for overhead power lines**
- **Both passive and active solutions evaluated**



# Innovations – Drones for Ice/Snow Measurements (Lappland UAS)

- IR & visible light imaging used for wind turbine blade icing detection
- Drone assisted point cloud calculation for rooftop snow load measurements



# Innovations – Coating technology (LTU)

- Working on a novel coating technology that will combine anti-icing and de-icing.
- The solution has the potential to be more efficient and cheaper to apply than commercially available solutions

More to come on this innovation in WinterWind 2021?...

Meanwhile, follow the progress on [www.iceproofarctic.eu](http://www.iceproofarctic.eu)

# Summary

- **Multiple different new technologies from research units and local small and micro companies will be tested**
- **All innovations will be evaluated and the most promising ones taken towards commercialization**
- **Cross-border exchange of knowledge on snow and ice management between research units and companies**
- **Open workshops for all will be arranged**



# Thank for your attention!

<http://iceproofarctic.eu>

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