Using smart technologies to monitor deep well pumping stations

Hendrik Tómasson

Smart System Development

EBV-159-01

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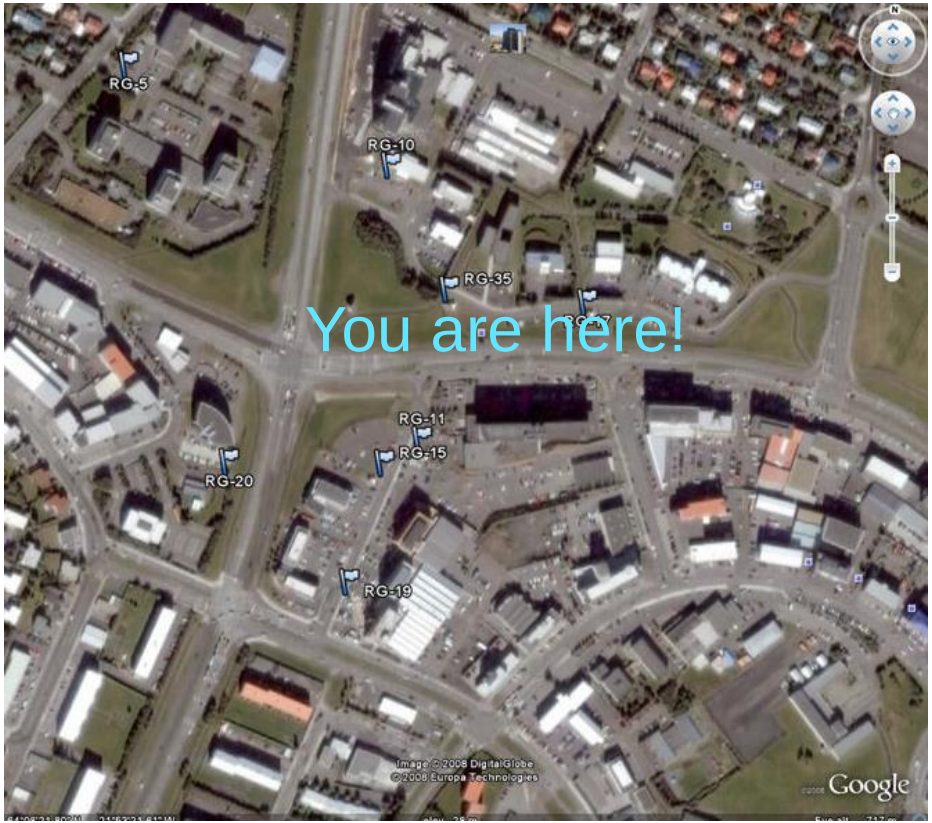

RG-11
-850 m deep
-Drilled 1962
-Temperature ~130°C

RG-35
-2900 m deep
-Drilled 1979
-Temperature ~120°C

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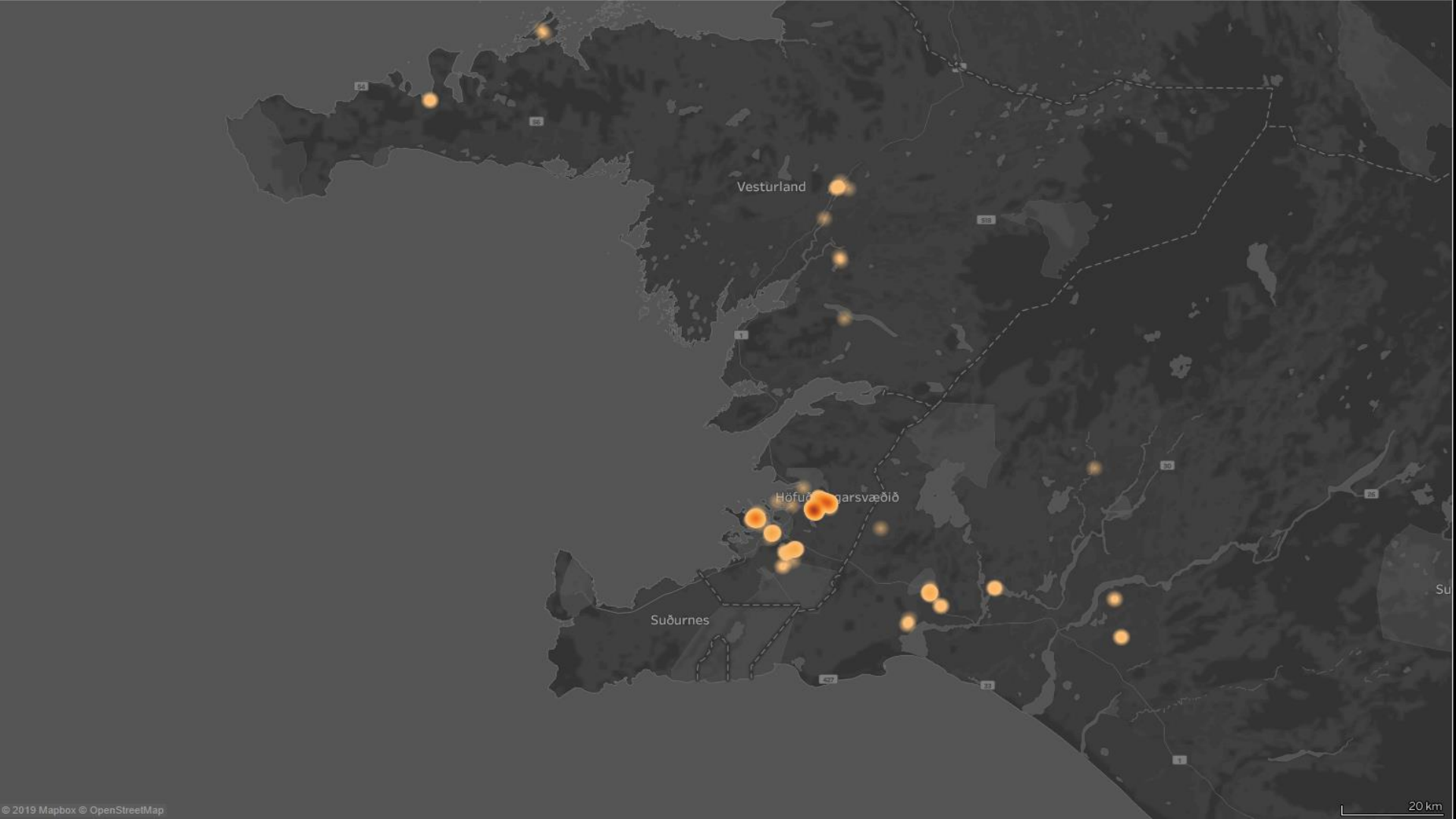
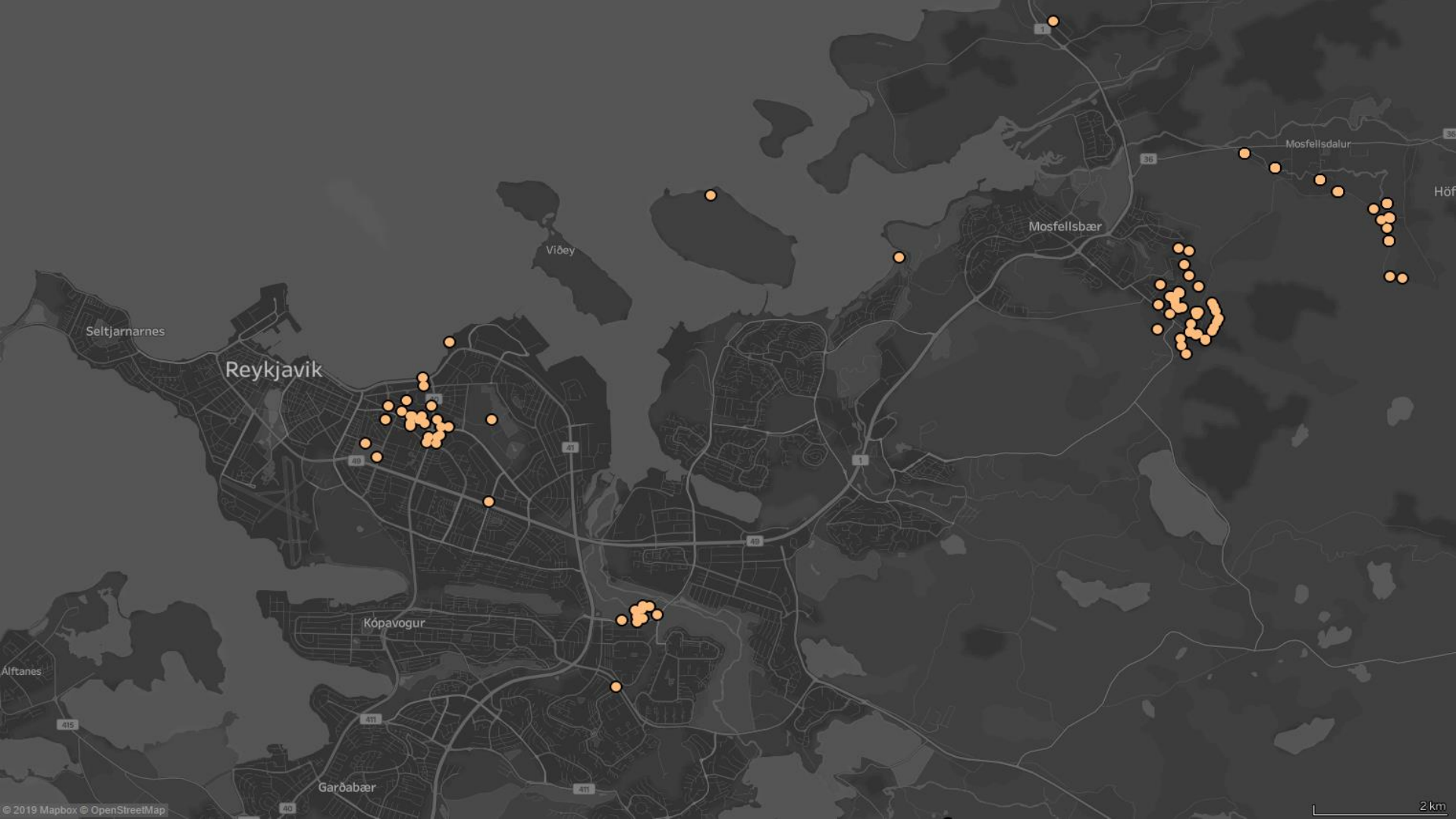
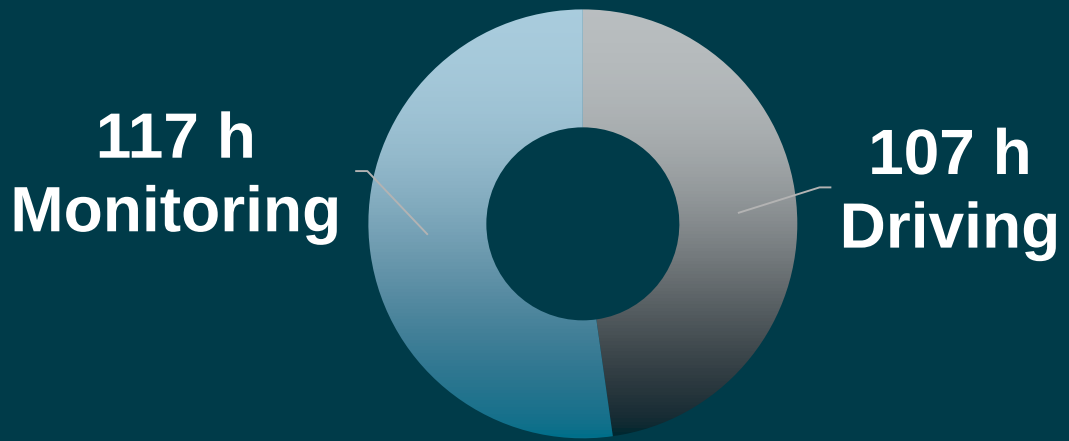



Seltjarnarnes
Reykjavik
Viðey
Mosfellsbær
Mosfellsdalur
Kópavogur
Álftanes
Garðabær
© 2019 Mapbox © OpenStreetMap
2 km

Deep well is monitored every two weeks…

Hours/year – Capital area (224 h)



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Smart systems

- “Functions of sensing, actuation, and control in order to describe and analyze a situation, and make decisions based on the available data in a predictive and adaptive manner …” – Wikipedia

- “Those who do not know the lay of the land cannot maneuver their forces“- Sun Tzu

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Operational security

- Safety of staff
- Old infrastructure.
- “The Plan” following the financial collapse in Iceland
- Better analysis of equipment

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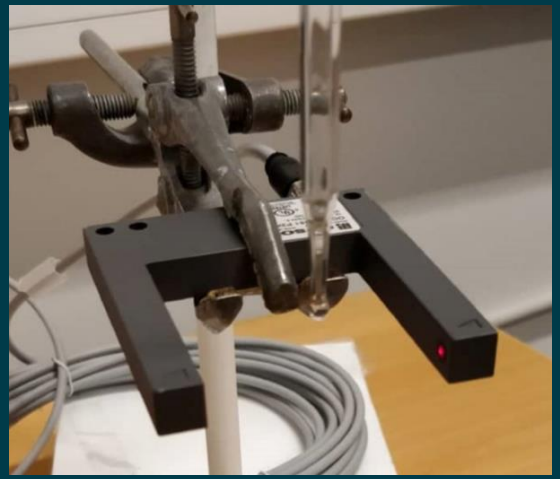
What is new (in our system)

- Cameras
- Sensors for oil level
- Water sensor on floor
- Room temperature sensor
- Electrical cabin temperature sensor
- Light sensor for the mechanical seal



- Engineers can start and stop the motors from a safe distance
- ABB smart sensor – live condition monitoring of motors
- Water level sensors. Vibrating wire technology

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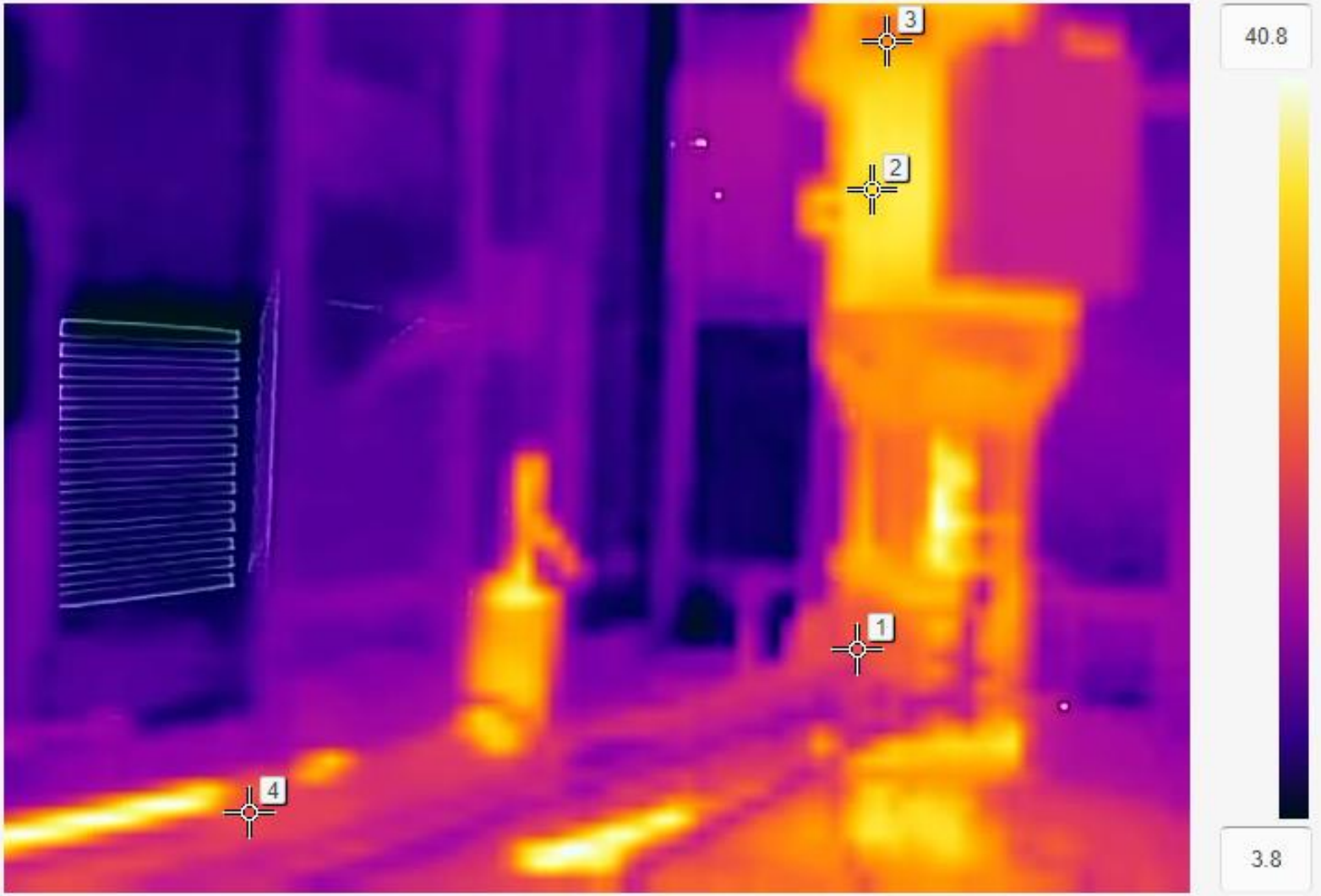
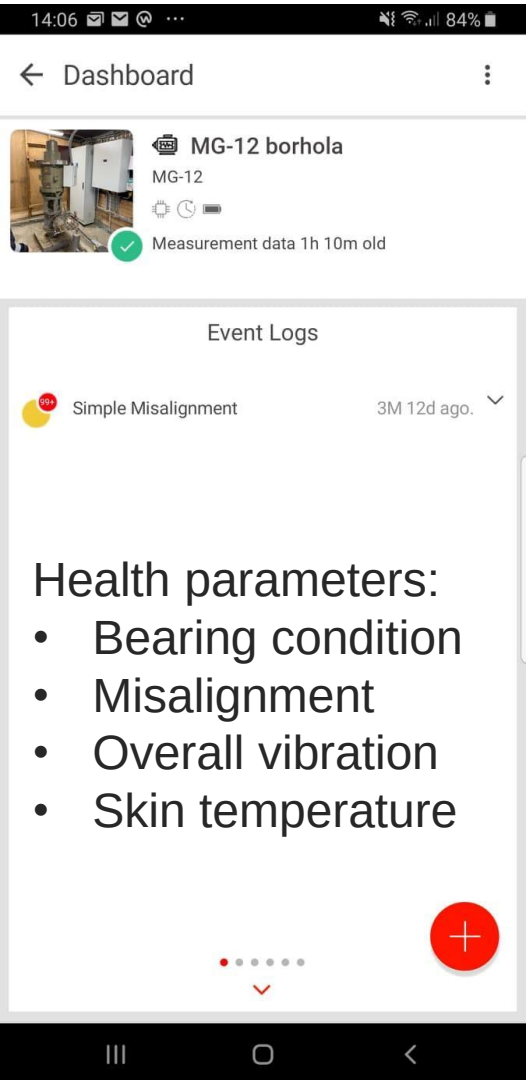
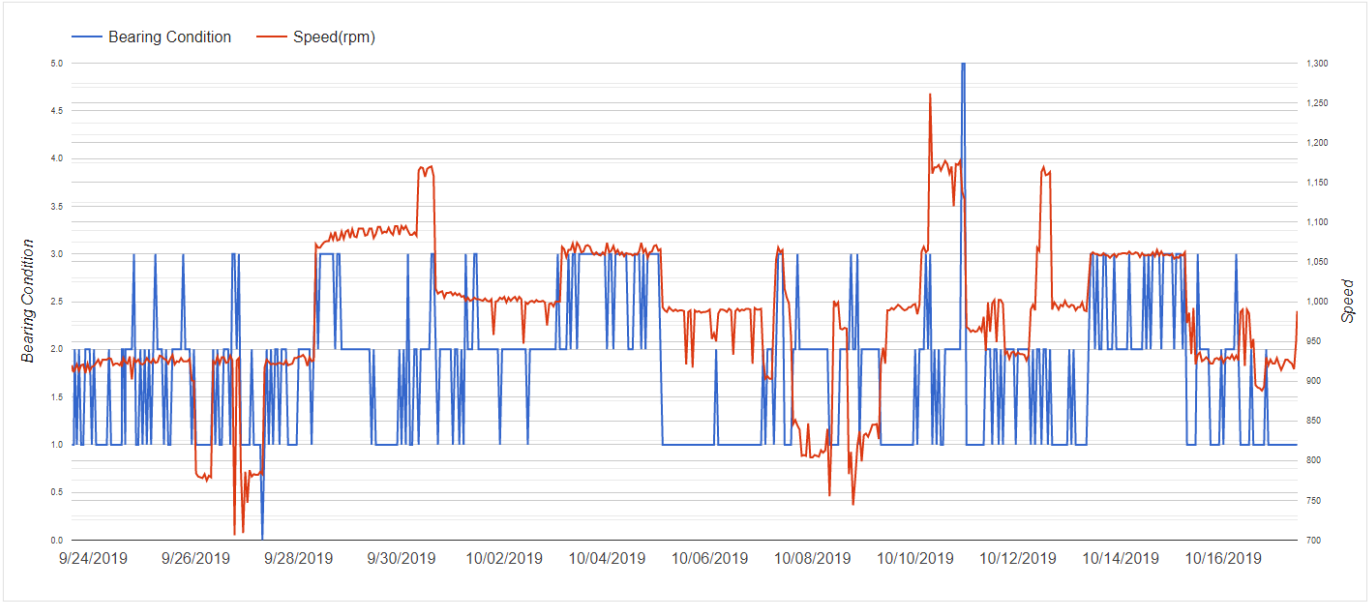
10-21-2019 Mon 13:15:25
MG-12


3
2
1
4
40.8
3.8



Health parameters:

- Bearing condition
- Misalignment
- Overall vibration
- Skin temperature



Is this smart?

- Some of it is. Mostly this is an operational upgrade.
- Data makes this smart…
  - Is the oil level decreasing?
  - Is the temperature rising to much?
  - What is the efficiency of the well?
  - How is the water reservoir behaving?

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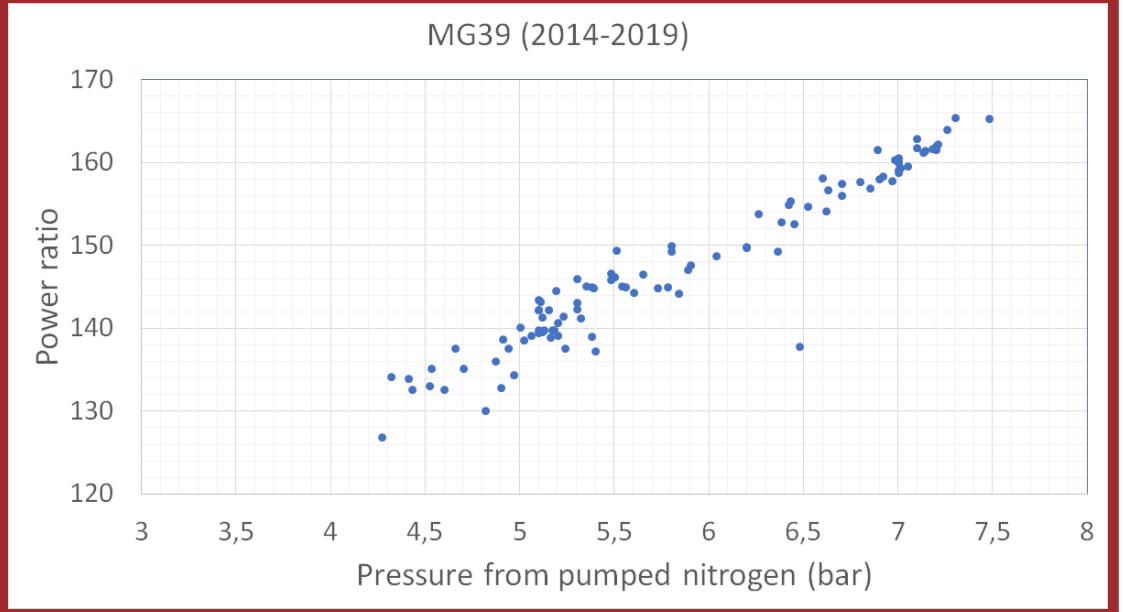
Correlation between power proportions and height of water

- More water above pump = easier to pump water from borehole.



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Optimized control

- Optimize which well is chosen at each time based on:
  - Energy efficiency = $
  - Sulphuric level, more sulphur less oxygen.
  - Flow and temperature
  - Water reservoir

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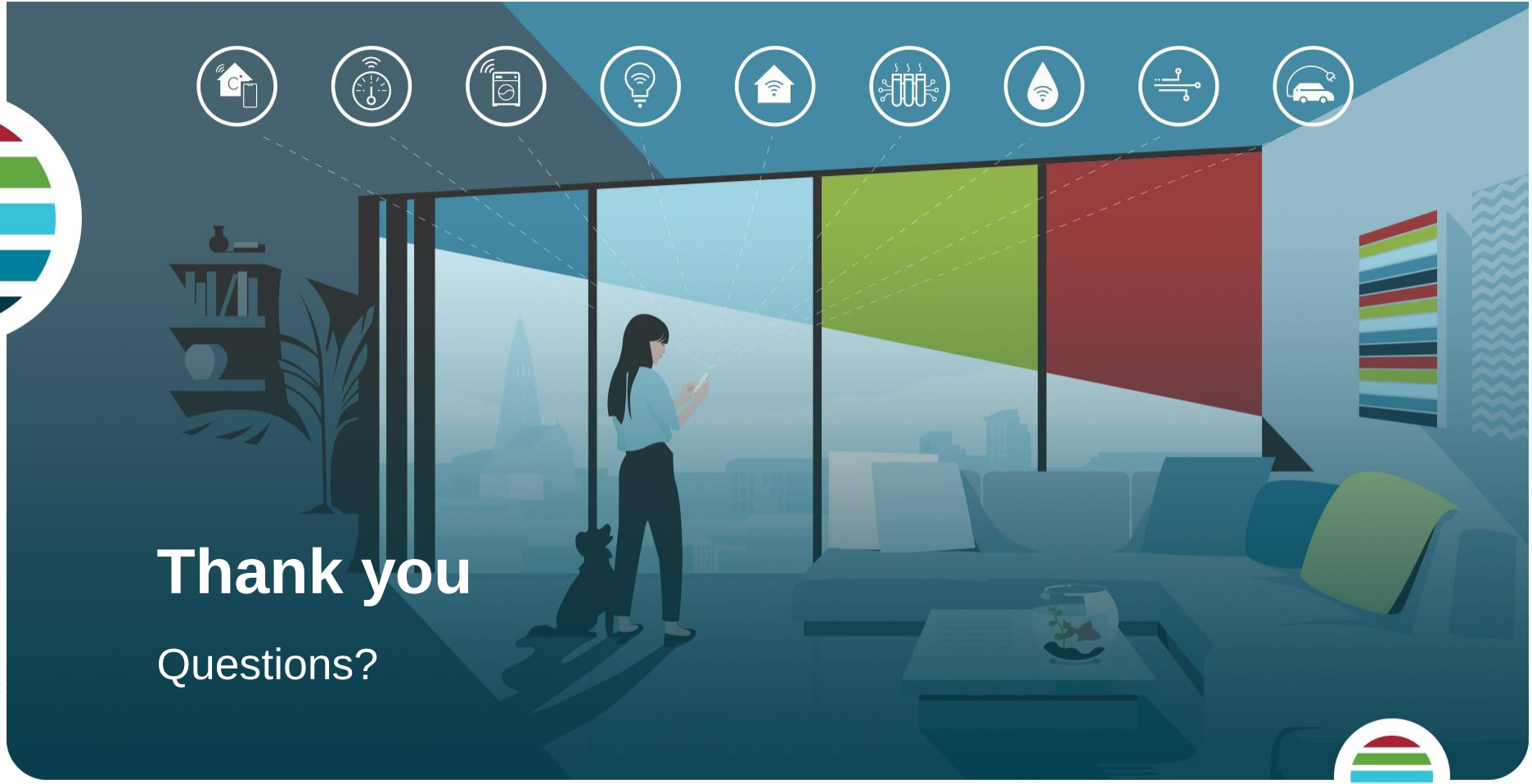

Thank you

Questions?

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