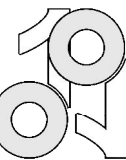# Practical challenges in predicting energy generated by utility-scale solar plants

DataGlen Technologies Private Limited

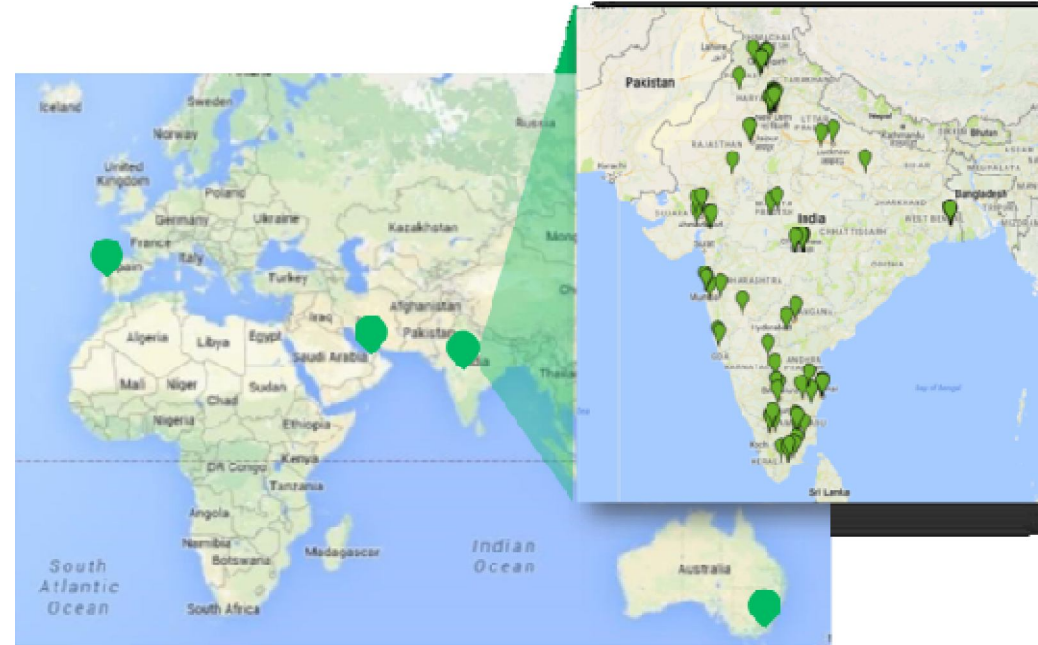Empowering Distributed Energy Resources

Primary Challenges

○ Key challenges for providing day-ahead predictions for the large-scale (>5 MW) power plants

❖ **Data issues**

❖ Unpredictable failures
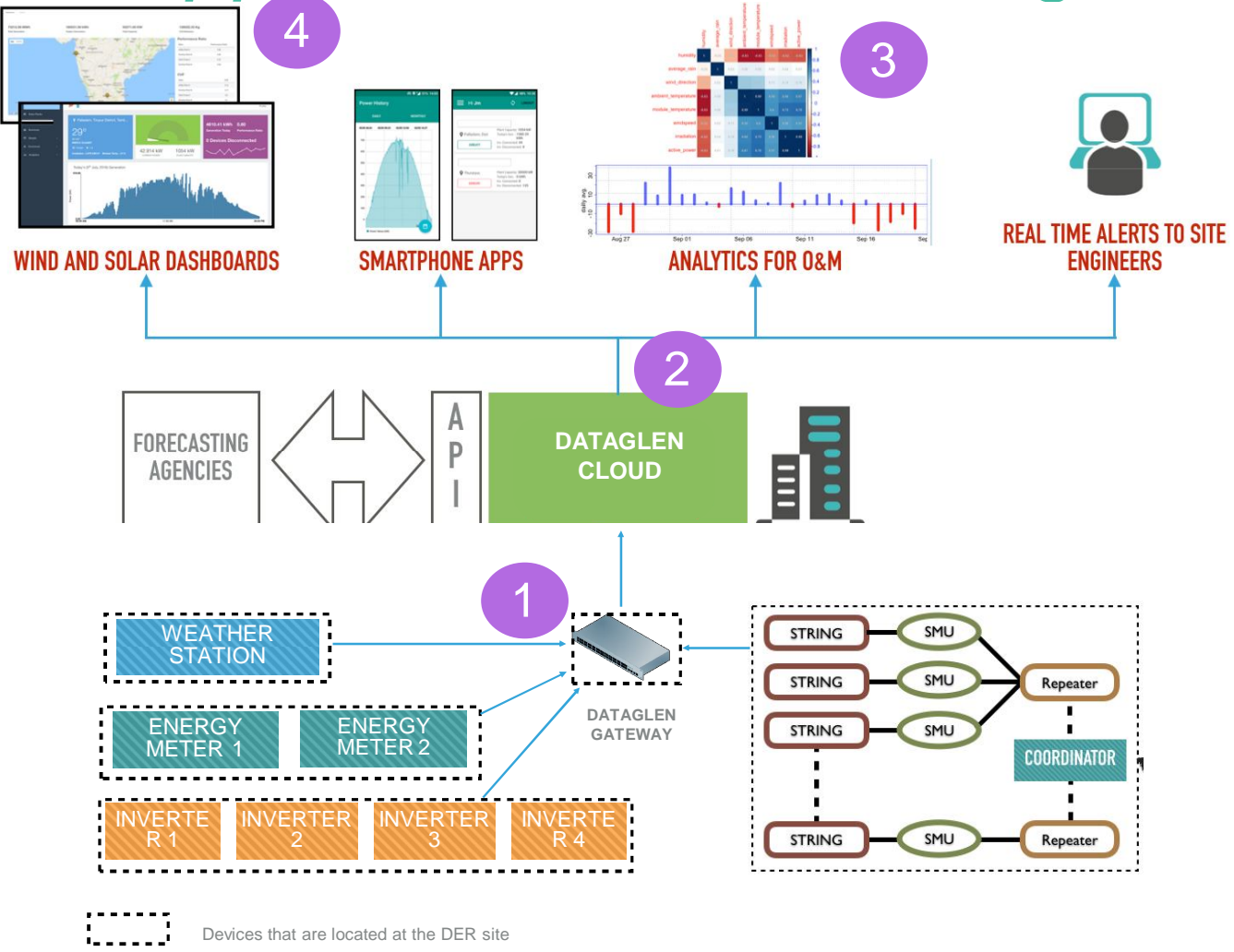
❖ Lack of reliable weather prediction services

❖ Lack of sufficient data

Challenge 1- Data Issues

- Noisy data
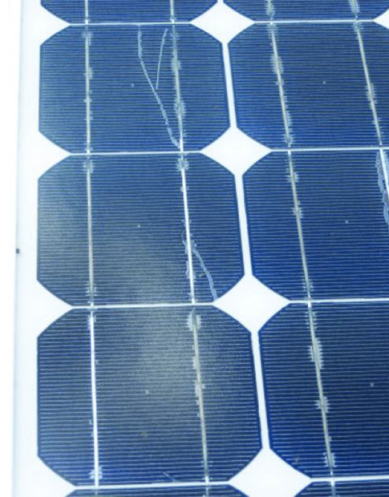
- Missing data

- Lack of real-time low-latency data

Our Approach for Addressing Challenge 1

WIND AND SOLAR DASHBOARDS

SMARTPHONE APPS

ANALYTICS FOR O&M

REAL TIME ALERTS TO SITE ENGINEERS

FORECASTING AGENCIES

A P I

DATAGLEN CLOUD

WEATHER STATION

DATAGLEN GATEWAY

ENERGY METER 1

ENERGY METER 2

INVERTER 1

INVERTER 2

INVERTER 3

INVERTER 4

STRING — SMU

STRING — SMU

STRING — SMU

Repeater

COORDINATOR

STRING — SMU

Repeater

Devices that are located at the DER site

Challenge 2A- Equipment Issues

Burnt
Circuit Breaker

Cracked Panels

Inverter Issues

Challenge 2B- Atmospheric Constituents
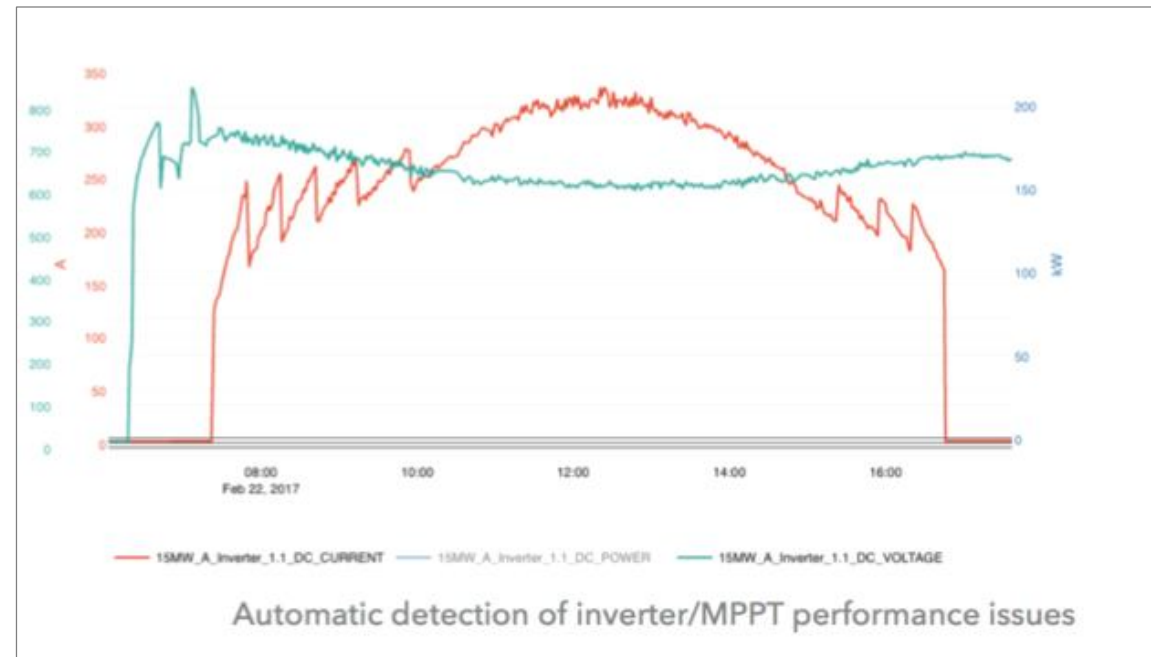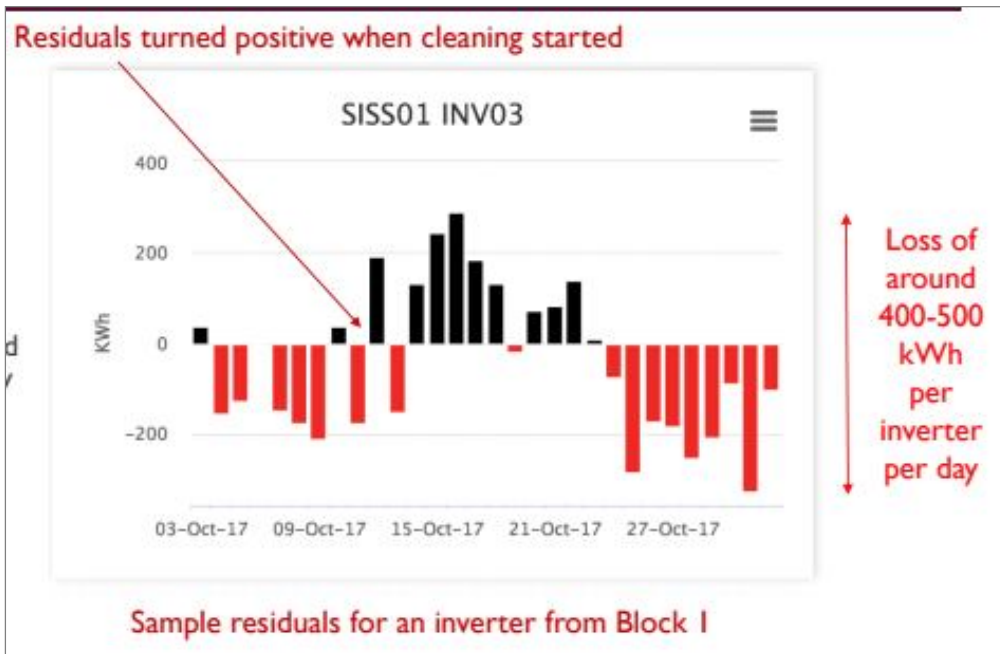

Birds and Animals

Dust

Our Approach for Addressing Challenge 2

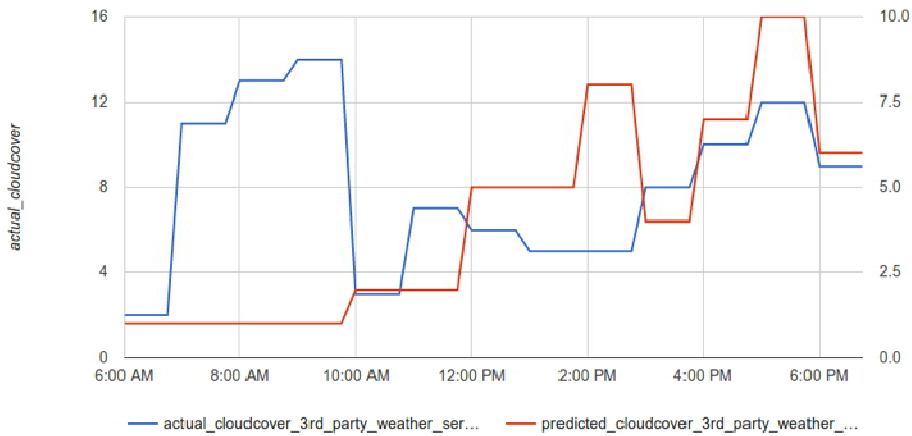- Condition-based maintenance

Cleaning Recommendations
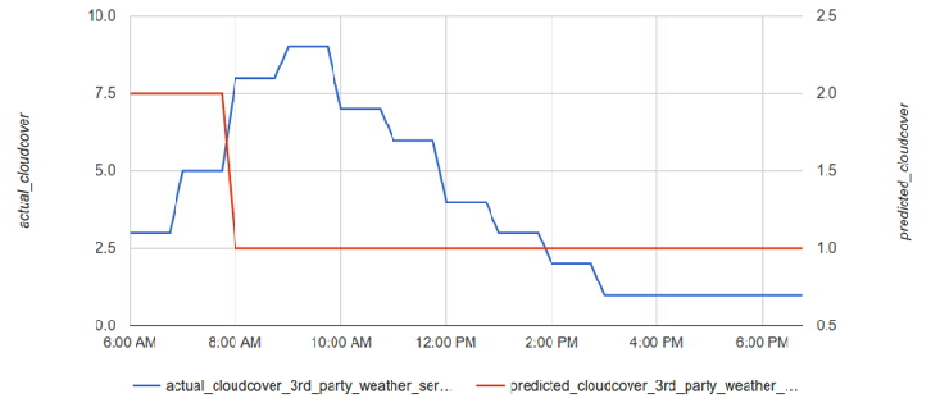

- Detecting undesirable fluctuations in MPPTs current

Challenge 3 - Unreliable Weather Prediction

predicted and actual cloudcover values by 3rd_party_weather_service1
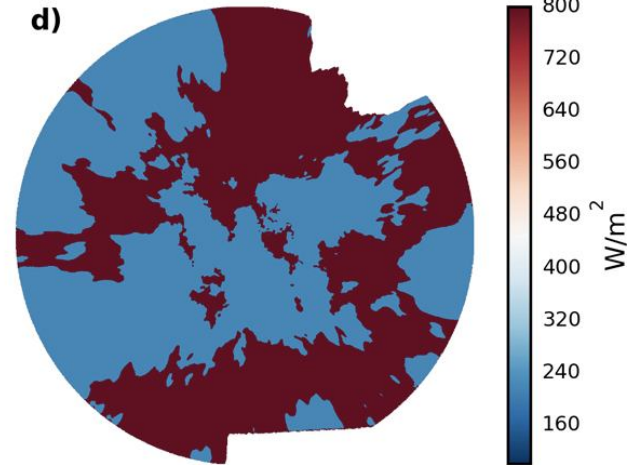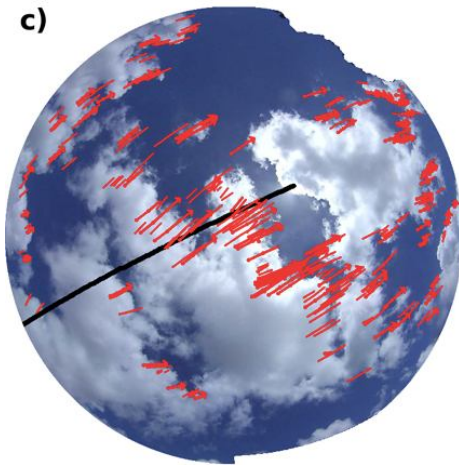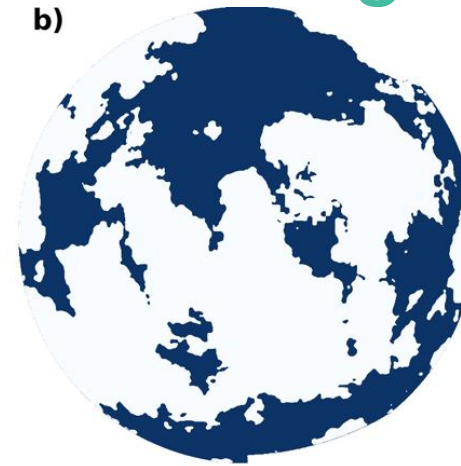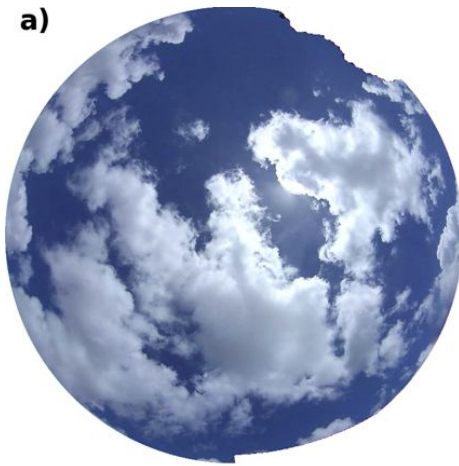

predicted and actual cloudcover values by 3rd_party_weather_service2

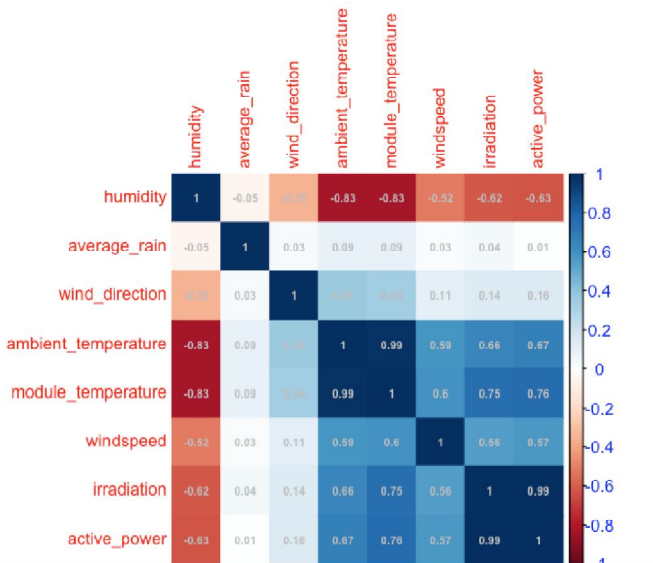# Approaches for Addressing Challenge 3

Challenge 4–Insufficient data for modelling

- ⊙ Less historic data available

- ⊙ Historical seasonal variations are not available

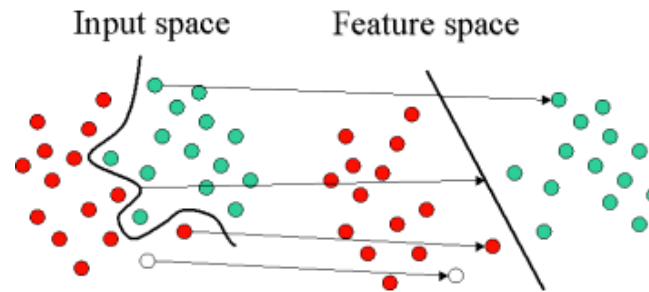- ⊙ Requires combination of modelling approaches depending upon availability and reliability of data

Our Approach for Addressing Challenge4
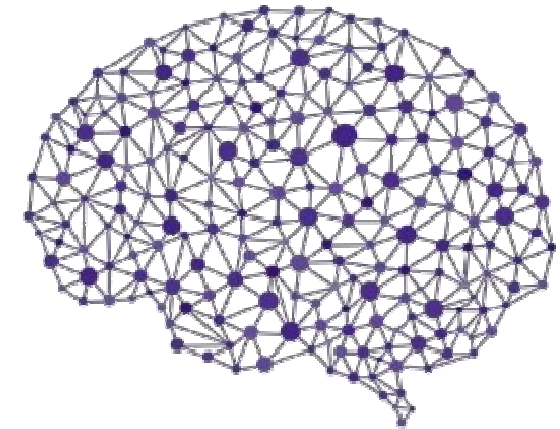
Statistical modelling

- Relatively less data
- Effectiveness dependent on modeler judgement and intuition

Machine Learning

Input space   Feature space

- Sufficient data available for a reliable prediction
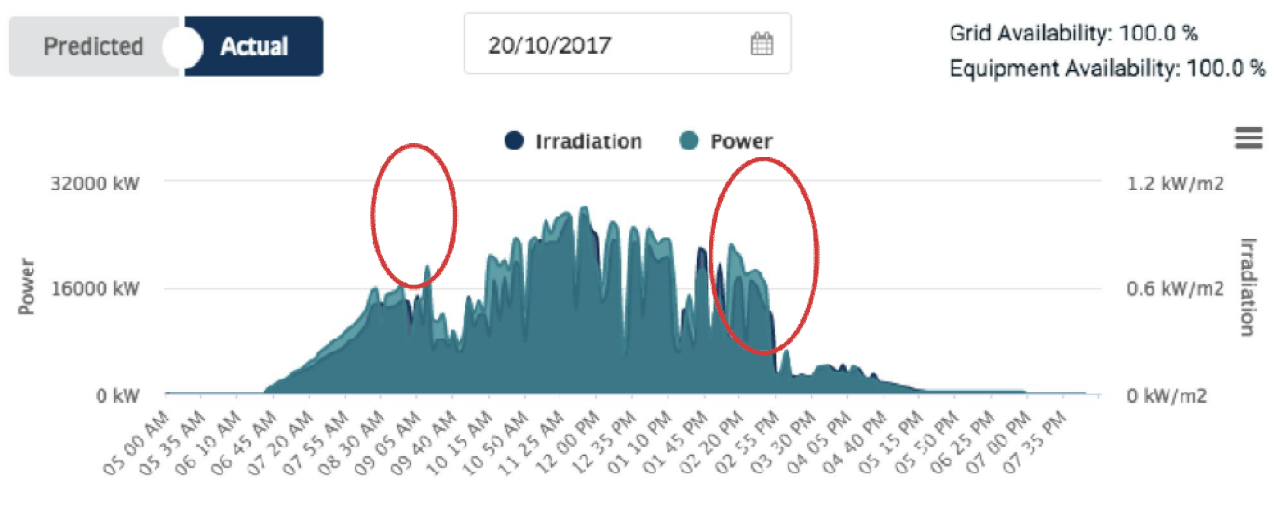- Uncertainties still have some impact

Deep Learning

- A past history and lots of data can handle uncertainties to provide reliable prediction
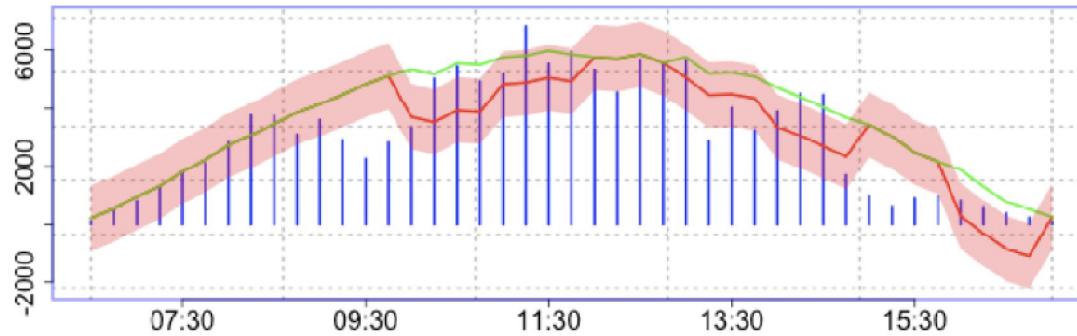
Overall Results

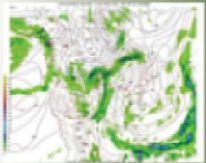*It's difficult to make predictions, especially about the future*

Future is looking bright and accurate

May the Sun be with You!!