



**UIG Task Force
Machine Learning Next Steps**

DESC 22nd July 2019

Options and Considerations

What is Machine Learning?

- Machine Learning is a subset of artificial intelligence
- Machine learning algorithms build a mathematical model based on sample data, known as "training data", in order to make predictions without being explicitly programmed to perform the task
- For example, our analytics partner trained their Neural Network model on historic consumption and demand data, and it learned to predict gas demand

Overview

- The UIG Task Force and the UIG Analytics Partner have demonstrated that using advanced Neural Network Machine Learning models can reduce Base Level UIG by up to 70% and Volatility by up to 30%
 - See Investigation Item [13.2.6: NDM Algorithm - Advanced Machine Learning](#)
- We have tested this on EUC 01 for 12 LDZs
- There are options for where we can go next with this line of investigation

Task Force Next Analysis Steps

- Xoserve could produce a Machine Learning Video to highlight the benefits, considerations and implementation challenges of using Machine Learning algorithms to allocate NDM Energy
- We are currently discussing options with our Analytics Partner:
 - Rerunning the Neural Network performance comparison against the existing NDM algorithm for more recent Gas Days for EUC 01 only (propose 01/06/2018 – 31/05/2019).
 - Develop improved estimation models for EUCs 2-8 to demonstrate whether the ML benefit can be seen across the whole market.
 - Explore using the models and findings developed to date to look at building a UIG predictive model.
 - Continue modelling work, focussing on reducing modelled volatility further.

Machine Learning Benefits

- Machine Learning algorithms can identify relationships in data that might not be obvious
- The algorithms generally get better the more data they have to work with
- The algorithms learn from their own performance to make better predictions over time
- The model is generally used through a web service so we could make it available to customers

What do we want to do

- The UIG Task force think the industry should consider moving from the current NDM allocation model towards Machine Learning based prediction
- As the custodians and experts of the NDM model, we want DESC's input in to how the industry can move forward

Machine Learning Implementation Considerations

- As DESC are custodians of the NDM Algorithm, implementing ML based Allocation will require your support.
 - Is there an appetite for implementing ML from your organisations and the wider market?
 - Is there anything more that DESC want to see from the Task Force to support the case for change?
- This will need broader industry change than the remit of DESC can deliver. As well as your expertise and oversight, it would need:
 - Approved UNC Modification(s)
 - Engaging Industry Change forums: ChMc, CoMC, DSG etc.
 - Changes to the UK Link systems
 - Impact assessments and consequential changes to downstream processes
- We'll discuss potential implementation costs for the ML system with our analytics partner: they have implementation capability and expertise.

Machine Learning Implementation Considerations

- Options for moving the industry forward with implementing ML:
- DESC to lead on this program
 - what do you need as a Task Force output to carry this forward?
 - When could this be incorporated in to DESC's work plan?
- Xoserve lead with DESC involvement
 - How would DESC want to input?
- New Industry Review Group to progress this
 - Or additional DESC meetings? What would this look like?