

Supporting upstream energy efficiency and decarbonisation goals

Overview

One of the largest independent crude oil and natural gas producers in the world partnered with ERM's OPEX team in support of their energy efficiency and decarbonisation goals for their UK upstream facilities:

1. Maximise energy efficiency
2. Minimise fuel and carbon costs
3. Proactively manage GHG emissions from combustion and operational flaring
4. Deliver positive contribution to ESG commitments

Existing Approach

Until recently, energy consumption and operational emissions were analysed manually and periodically using Microsoft Excel. The existing approach focused on limited variables without full consideration of underlying complexities which directly impact consumption. Improvements and corrective actions were often implemented too late to realise the benefit and performing the analysis more frequently using this approach would have become too resource intensive.

Context

The upstream oil and gas industry is particularly energy-intensive and emits greenhouse gases and as such is subject to stringent legal and environmental constraints. Energy performance and emissions management are key issues, however, many of the processing facilities are complex and the fuel and power requirements depend on many factors: production output, operating modes, well configurations, configuration of the plant and equipment, operations crews, weather conditions, choice of power generations units and fuel types. These factors together with changing variables within dynamic operating processes can complicate the challenge of fully understanding the associated impact on energy consumption and emissions.



Customer Needs

- Be able to demonstrate best achievable energy and emissions performance across all facilities
- Reduce the effort involved in collating energy and emissions compliance data
- Access to subject matter expertise to support related initiatives

How can digital and AI help ?

At its core, the AI within emissions.AI analyses plant operation and identifies the best achievable energy and emissions performance for the target facility. This is compared to current performance, constraints and equipment availability, so that any deviations are automatically highlighted. It does this continuously, every minute, every hour, every day and self-learns from new scenarios, plant configurations or modes of operation as they arise.

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Solution

An energy and emissions digital twin was created for each offshore production facility using available engineering information (such as P&IDs, OEM manuals, lab data, etc.) before using 12 months of historic operational data to enable the system to understand and learn the operation. emissions.AI was configured to recognise each facility's production and water injection rates as constraints against which to reference any deviation from the best achievable energy and emissions performance.

Impact

Before the introduction of emissions.AI, it took several engineer days every quarter to analyse the situation at a high level. Leveraging the automation within the solution, the company can now monitor live energy flows over a much larger scope boundary and with much more detailed granularity without any manual or time consuming processes.

Operational teams are now able to establish and visualise their best achievable performance target for every possible operating configuration, mode and scenario. The target is dynamic and constantly adapting to changing operational constraints and parameters on each production facility. This dynamic baseline target is compared against actual performance in order to highlight deviations. The solution is effectively answering the question (continuously) can the facility achieve the same production output (and water injection output) but with lower energy use and lower emissions.

Onshore support teams and offshore operators are automatically alerted to deviations, actionable insights and the source of the deviation – such as turbine efficiency, individual equipment efficiencies, configuration and mode, run states, operational constraints and the impact of maintenance. This allows for corrective action to be planned or taken.

Identification of the best configuration for every operational scenario and constraint allowed the company's teams to fully understand their energy and emissions profile, the positive and negative consequences of operational decisions and for their HSE team the solution was able to provide crucial compliance data at the touch of a button. Additionally the detection of consumption anomalies in the plant has enabled the company to adjust and refine certain operating and maintenance practices and procedures for more efficient and sustainable operations.

This project has enabled the company to develop an energy and emissions performance strategy at both operational and strategic levels. In doing so creating visibility of its energy consumption and emissions profile, helping to establish a carbon aware culture across the whole organisation.

Over the first year of adoption, the company was able to demonstrate best achievable energy and emissions performance across its operations. By optimising energy management across the plant, they were able to minimise fuel spend, make CO₂ tax savings as well as realise productivity savings.

“ERM and their solution emissions.AI is helping us to continuously adjust energy consumption and take action on possible deviations, drifts and suboptimal operating conditions in order to operate more sustainably and to save on costs. In the same way daily, weekly monthly operational procedures and practices can be adjusted and problems such as over-consumption can be corrected. By identifying the effects of individual actions on the overall production process, this solution helps us ensure we are operating as efficiently as we can at all times”.

Operations Manager, Independent Upstream Company

