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Greenhouse gas emissions tracking: Making it count

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Greenhouse Gas Emissions Tracking: Making it Count

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Abstract

Climate change and the energy trilemma – affordability, security and sustainability – have become increasingly important concerns that affect all sectors of the economy. As governments tighten regulations in a bid to keep alive a 1.5°C pathway aligned with the Paris Agreement, the focus for many energy companies has been on addressing and complying with environmental policies, including greenhouse gas (GHG) emissions accounting and reporting. Traditionally, operators have developed tools in Microsoft Excel to perform the calculations to comply with National Greenhouse and Energy Reporting (NGER) scheme. Due to the flexibility and accessibility of Excel, these have become large, unwieldy, poorly documented and hard to maintain. In this paper, we discuss the benefits of having a Greenhouse Gas Emissions and Energy application aligned with the Production Allocation system in a centralised and structured database. Various implementations across Australia have shown that key factor such as transparency, auditability, data management and validation, as well the intrinsic relationship between production allocation and emissions, make the Production Allocation system the best place to calculate and report GHG emissions and energy.

Introduction

GHG emissions consist of several sources across the oil and gas production chain, including emissions associated with exploration and development, oil and natural gas production, refining/processing, transportation/distribution, retail and marketing. Fig. 1 shows a graphical overview of the industry as well as the emissions of the primary species of GHG relevant to oil and gas operations (CH_4, CO_2, N_2O).

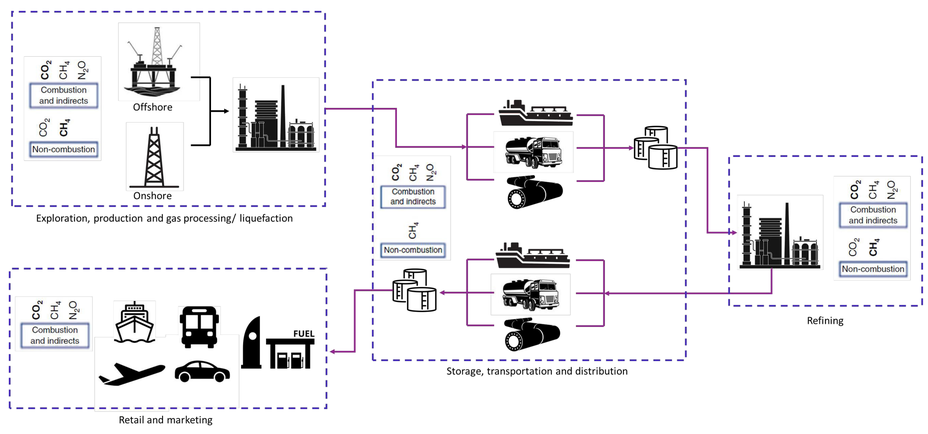

FIG 1. Oil and gas industry GHG emissions schematic.

In this paper we discuss the implementation of a GHG application in EnergySys, a cloud-based low-code platform, for GHG emission and energy reporting in compliance with The National Greenhouse and Energy Reporting Act 2007 (NGER Act).

The GHG application forms part of a suite of applications developed and deployed by Elite Energy, referred to as Elite Production Management Framework (ePMF), on the EnergySys platform.

Discussion

A Production Allocation (also referred to as hydrocarbon accounting) system is a centralised and structured data source that covers the entire production process of an oil and gas company. Elite Energy Consultants have implemented both the production allocation and GHG application on the EnergySys cloud platform, for various operators. This has proven to be a great place to track and report emissions and energy, due to the intrinsic relationship between the two applications. The key reasons are listed below:

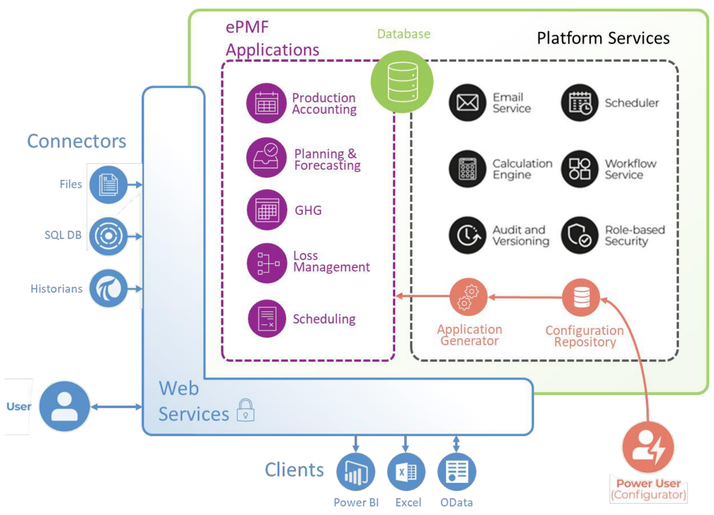

FIG 2. Example of a solution architecture.

1. Integrated with the Production Allocation application. The input data to both applications overlap, and some of the inputs required for the calculation of GHG emissions are calculated as part of the allocation process. The validation of the input data as part of the complete production allocation process provides both applications with trusted data.

2. Emissions and energy must be reported by the operator of the facility. When operating on behalf of joint ventures and/or third parties, commercial allocation (i.e. assigning production to each company may also be installed on the same platform). The operator may wish to inform each company of their share of the emissions. So, the ownership data used for assigning production, or the results of this commercial allocation, can also be used for assigning emissions.

3. Storing all the validated production data, and emissions based on this validated data set provides a single source of truth for the whole company.

Discussion

4. Fully transparent and auditable, not requiring coding knowledge. The platform provides an audit trail of changes made to values, who made them and when. It also provides screens for viewing and maintaining all values in the database, and also uses Microsoft Excel as a tool for configuring calculations, algorithms and logic rules. This makes it very easy for the user to maintain the system in a controlled and auditable fashion.

5. Forecast and budget data is often stored as part of ePMF to be used for reporting production against plan, and the availability of forecast and actual production and emissions gives an excellent insight into the efficiency and effectiveness of plans and processes to reduce emissions.

6. The GHG methodology is easily maintained in the system. The Regulator updates factors annually and the calculation methods from time to time. A lot of thought has been put into the data structure, so that when additional emission sources are introduced, factors change or different methods are selected, it is easy to do so via the screen in a controlled manner. This configuration is applied with a date range, so that data can be edited and calculations re-run retroactively, using the configuration effective for that period.

Data Analysis & Visualisation

Once the production allocation and the GHG emissions calculations are carried out, corporate reports can be generated and distributed to key stakeholders/partners. Reports and dashboards, as shown in Fig. 3, are crucial for the business to understand the areas of increased emissions as well as comparing different facilities and emission sources.

It is important to point out that the values displayed in Fig. 3 have been modified and do not represent the emissions and energy of any operator. It should be used for illustrative purposes only.

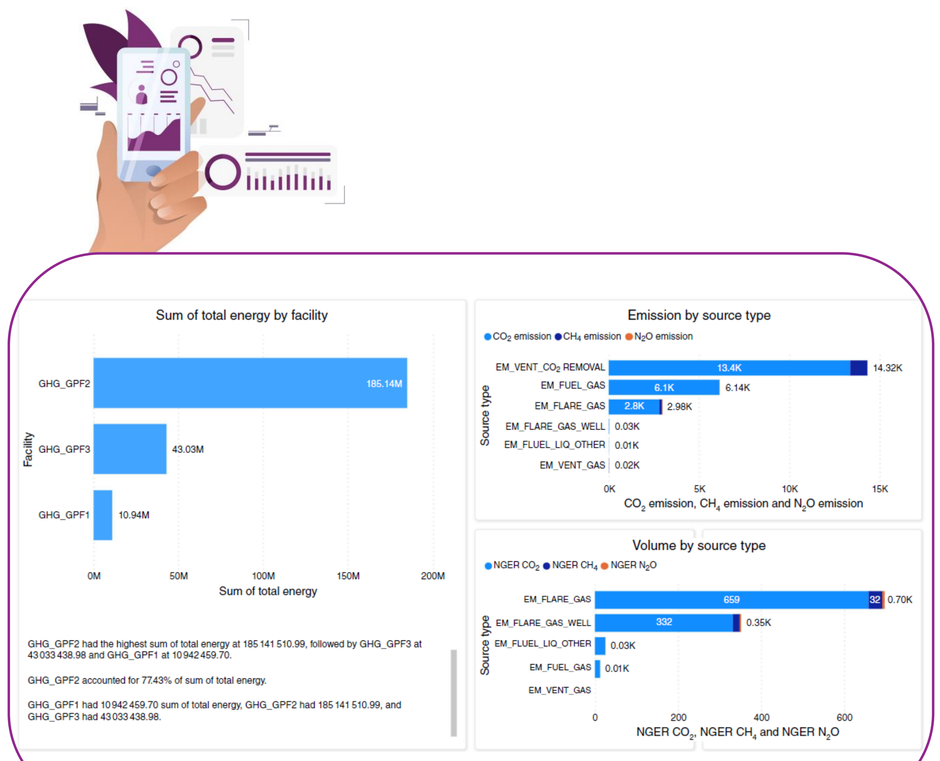

FIG 3. Greenhouse gas emissions dashboard example.

Summary

The primary objective of this paper, as stated in the Introduction section, is to discuss the recommendation of performing all the GHG emission and energy calculations on the same platform as the Production Allocation system. It was shown that the Production Allocation system is the recommended place to carry out the GHG emission calculations, since it stores all the relevant calculated and validated inputs required in compliance with the regulations. Moreover, the Production Allocation system provides a transparent and auditable source of truth which can be used to report crucial information to the business.