Snapshot report

AUSTRALIAN MEAT PROCESSOR CORPORATION

DiVA Platform for Transport Emissions

Data-integrated Visualisation and Analytics (DiVA) Platform for Transport Emissions, Efficiency and Sustainability

Project code
2023-1005

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Date submitted
31/06/2024

Project description

The aim of this project was to develop a Data-integrated Visualization and Analytics (DiVA) platform for Transport Emissions to investigate vehicles owned and operated by AMPC members being used for heavy duty long distance transport tasks and determine a means for obtaining representative baseline Scope 1 Greenhouse Gas (GHG) emissions for their operations. An Internet of Things (IoT) based telematics system linked to cloud server was developed to collect data from on-board diagnostics, Global Positions System (GPS) data, environmental and emissions sensors from where it was processed and analysed to deliver results via a cloud dashboard.

To complement this objective, a survey and assessment of the available alternate low carbon transport technology options was developed to provide an evaluation of immediate, medium term and long-term options for AMPC members to consider what may be suitable for their transition from today's transport scenario to a net zero target.

Project content

The stages of this project were:

1. Consultation with AMPC and their members to identify the requirements for the development of the DiVA Platform.
    a. Workshops were conducted to determine the functional and data requirements, understand the current sustainability practices and to identify any risks associated with running a trial.
    b. Investigation of available IoT sensor choices and determine the data requirements.
    c. Selection of the most suitable IoT sensors for the development of DiVA.

2. Design of the DiVA Platform which included:
    a. Design of the IoT box was undertaken considering the operating conditions for capturing data on vehicle performance, GPS location, environmental conditions and emissions to deliver an integrated solution.
    b. Design of the data pipeline architecture to perform data acquisition using the IoT box including mechanisms for edge processing and efficient transmission to cloud.
    c. Design of the DiVA cloud platform to deliver informative analytics such as vehicle route mapping, GHG emission rates and journey events.

3. Developing and testing the DiVA Platform which included:
    a. Develop and test the system with sensors on light and heavy duty vehicles to validate performance
    b. Develop the data pipeline architecture of the DiVA platform collect and send data to the cloud.
    c. Develop a dashboard for data visualisation of the analytical components identified.

4. Conduct real world trials and analyse collected data:
    a. Conduct initial field trial by deploying the DiVA system in a heavy-duty transport vehicle to capture GPS and vehicle related data only.
    b. Report data analysis performance via the DiVA dashboard.
    c. Conduct a final field trial by deploying the DiVA system with all IoT and emissions sensors in a heavy duty transport vehicle to capture and vehicle performance and emissions data.
    d. Report data analysis of performance along with GHG emissions baseline from the DiVA system.

5. Dissemination of outcomes, opportunity discovery and recommendations
    a. Deliver results of research survey and assessment for future clean fuel alternatives and alternative energy choices to minimise Scope 1 GHG emissions of transport vehicles for AMPC members.
    b. Identify sustainability opportunities for AMPC and its members that have been derived from this process.

Project outcome

In this project a software and hardware solution was developed, a system built and tested in real world situations. The system was able to be configured in a modular format to collect vehicle performance data, GPS data and later environmental and emissions data to implement a mini Portable Emissions Measurement System (PEMS) solution when advanced sensors were added. Furthermore, the IoT hardware integrated into the system allowed successful uploading of data to cloud computing services.

The result provided real time insight into the heavy duty transport vehicle performance, with development of an initial then progressively improved GHG emissions results along with indicative environment pollutant emissions being verified by the mini PEMS sensors. The system delivered verifiable results that allowed determination of Scope 1 GHG emissions for each load being delivered to clients. Results were calculated and available to users via a cloud delivered dashboard tool (Figure 1).

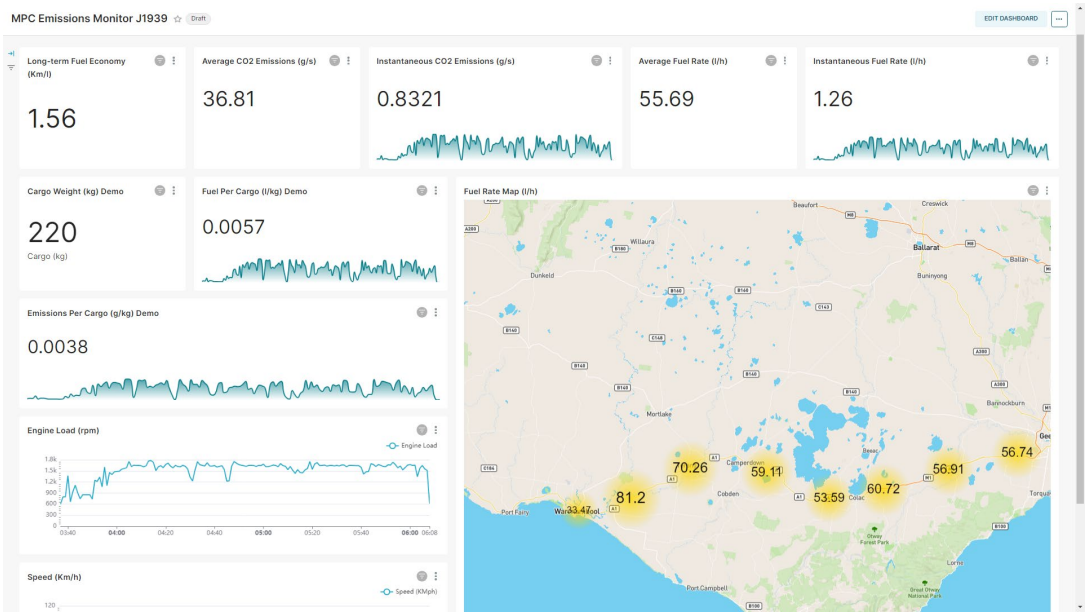

Figure 1. DIVA user dashboard (Sample only)

As a first of its type implementation, it has been determined from the results that further improvements can be realised if greater integration of user logistics, sales and operations data are enabled. This will provide opportunities for delivering the best accuracy to deliver with confidence the Scope 1 GHG emissions figures that will be demanded of the red meat industry moving forward in the next few years. There is the opportunity to apply this technology application in a modular form across the logistics fleets operated by AMPC members at reasonably low costs for equipment if further development of the system were to be undertaken. The Data-integrated Visualisation and Analytics or DiVA platform has proved effective for determining mini PEMS validated transport emissions, efficiency, and sustainability for measuring the journey to achieving net zero carbon emissions of transport task within the industry. Further assessment and strategic roadmap for potential low and zero emissions transport solutions was also developed, as part of the project (Figure 2).

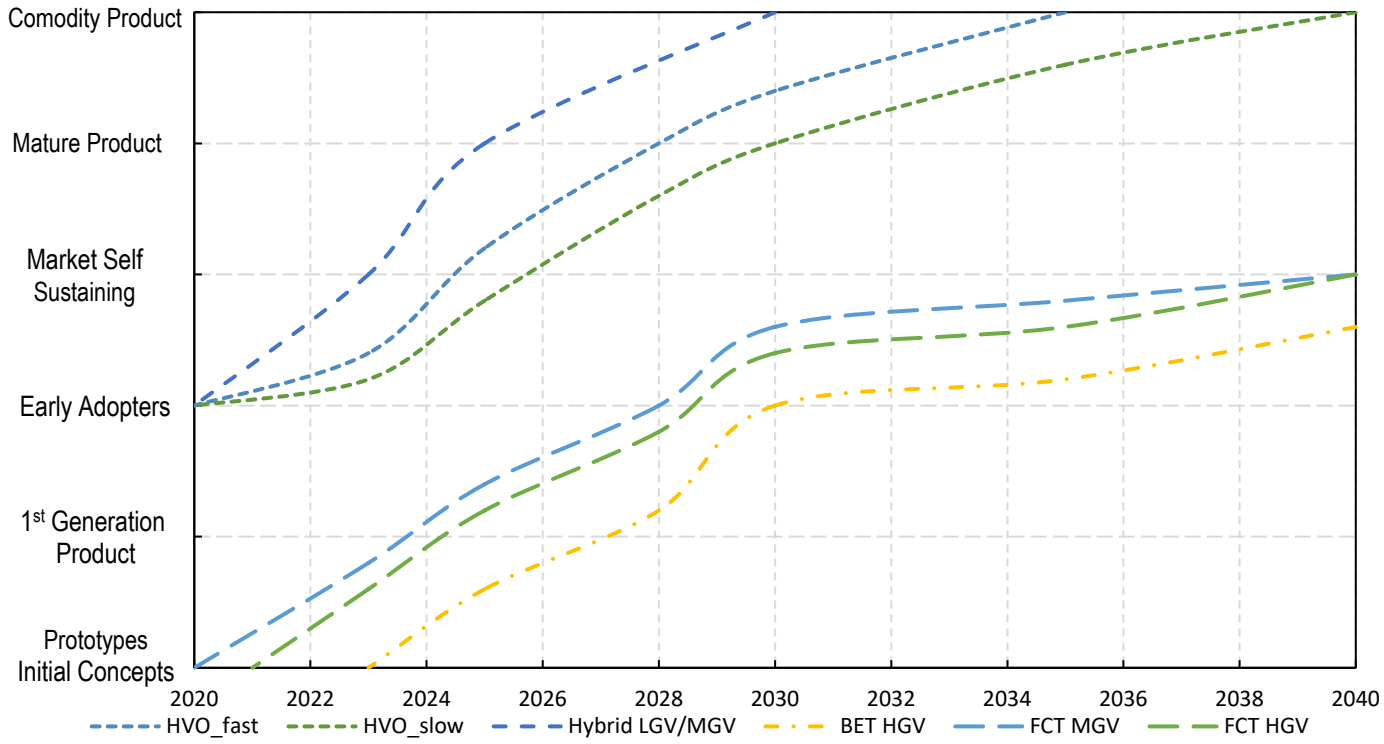

Figure 2. Long haul heavy duty - Timelines for vehicle technologies and fuels

Note: HVO Fast – indicates a potential policy accelerated or fast development timeline for HVO adoption & HVO slow is representative of a market driven, slower potential timeline.

Benefit for industry

The DiVA system can deliver a successful solution for achieving the transport task emission reduction for AMPC and its members. Potential benefits include:

- Estimation of transportation, that has been validated with mini PEMS of Scope 1 GHG emissions for individual deliveries to clients.
- Profiling deliveries for identification of the most efficient performance loading configurations achieved.
- Understanding the emission profile of various delivery routes and the impact on overall Scope 1 GHG emissions impacted by traffic, congestion, weather and time of day.
- Providing a tool that can deliver indications of vehicle performance and/or deterioration and tracking for improved focus of maintenance planning.
- Providing information for driver feedback and opportunities to enhance and improve the eco-driving performance and efficiency of individuals to the benefit of member companies and the individual drivers.
- Providing a simple to install and modular IoT technology option for delivering the benefits outlined.
- To compliment the above, assessment of technologies available for future low and zero carbon transportation choices available now and in the medium to long term for AMPC members.

Abbreviations: BET, Battery Electric Truck; DiVA, Data-integrated Visualisation and Analytics; FCT, Fuel Cell Truck; GHG, Greenhouse Gases; HVO, Hydrogenated / Hydrotreated Vegetable Oil; HGV, Heavy Goods Vehicle; IoT, Internet of Things; LGV, Light Goods Vehicle; MGV, Medium Goods Vehicle; PEMS, Portable Emissions Measurement Systems.