CASE STUDY

NO: 006

Date: January 2015

Turf Queensland

Grow Green

DELIVERY VEHICLE ANALYSIS

Australia Lawn Concepts Case Study

Australian Lawn Concepts (ALC) has grown a proud reputation for providing high quality instant lawns and Landscaping Supplies to Brisbane, Gold Coast, Ipswich and Sunshine Coast over the last 15 years. During this time we have worked with residential home owners, landscapers, builders, and landscape architects as well as Local and State Government. We pride ourselves on providing quality turf accompanied with excellent service so you get the best results the first time!

Australian Lawn Concepts are an Accredited Turf Producer and our caring Turf Consultants are genuine everyday people who believe in listening to you, our customer to assist you in finding the right solution for your individual situation. Our Project Consultants can provide obligation free quotes, in order to better understand your requirements so that the solution which we provide meets and exceeds your turfing needs, it is specifically for YOU! No job too big or too small. We have an on-site Agronomist who is available to provide you with additional assistance when required post installation.

Turf Queensland Eco-Turf Project

ALC have been pleased to participate in the Turf Queensland Eco-Turf Project, funded by the Queensland Government Department of Environment and Heritage Protection. The team at ALC have been embarking on the sustainability journey for over 3 years and pride themselves on continually improving operational processes to better understand their greenhouse gas implications.

Analysis

The most common measure of fuel economy is kilometres per litre, although it obscures the value of measures taken to reduce the amount of fuel consumed per unit of work completed (m^2 turf). Fuel consumption is inversely related to fuel economy, and more directly ties to the goal of decreasing the amount of fuel used to travel a given distance.

Consuming over 90,000 litres of diesel each year, ALC decided to analysis the fuel use of their 3 delivery vehicles.

Identifying the vehicles as DAF1, DAF2 and Mitsu, Table 1 outlines:

- Total kilometres travelled
- Total fuel consumed
- Total cost of fuel

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- Total volume of turf delivered (m2)

The following efficiency indicators were developed and are also represented within Table 1:

- Average kilometres travelled per m2 of turf delivered
- Average litres of diesel consumed per m2 of turf delivered
- Average cost of fuel per m2 of turf delivered
- Efficiency (represented as a percentage) – total litres consumed by total m2 of turf delivered

Table 1 – Breakdown of Fuel Usage and Cost per Sqm of turf delivered

Vehicle	Total Kms	Total Fuel (litres)	Total Cost of Fuel ($)	Total Sqm Delivered	Avg Kms/Sqm	Avg Litres/Sqm	Avg Cost/Sqm	% Efficiency
DAF1	65,372	33,206	$45,195	184,406	0.36	0.19	$0.26	5.6%
DAF2	81,591	37,390	$50,053	237,547	0.35	0.16	$0.22	6.4%
Mitsu	56,919	20,984	$28,174	137,717	0.44	0.17	$0.22	6.6%
TOTALS	**203,882**	**91,580**	**$124,322**	**559,670**				

Finding

Using the calculations above, it has been determined that the Mitsu is the most efficient vehicle operating within the fleet and represents one of the most cost effective of the vehicles, though it delivers the least volume of turf

Further Consideration

As part of the analysis, a month-by-month comparison of litres consumed per m_2 turf delivered. This analysis is represented in the Graph 1 below.
The fluctuations between show the efficiency of the delivery operations between the months, based on litres of fuel consumed and the volume of turf delivered.

Graph 1 – Monthly Efficiency Indicator – Delivery Vehicle DAF1

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Impacting factors include:

- Volume of turf per delivery
- Distance vehicle travels to make the delivery

Improving Truck Efficiency

Trucks play an important role in the Australian economy. Short haul trucks provide timely door-to-door delivery of turfgrass, operating under the widely used just-in-time business model. Whilst delivery trucks are only one element of diesel fuel consumption for a turf production enterprise,, trucking in general is an energy-intensive form of freight transport and the industry's fuel consumption is growing.

Generally, heavy duty trucks used for longer trips, operating continuously at highway speeds with high annual miles travelled, have the lowest fuel economy but since they transport the greatest amount of freight over longer distances, the efficiency measured is much higher than for medium duty trucks (which are what makes up the majority of delivery vehicles in the turf industry).

Energy Losses

Energy losses in engine and driveline are significant in converting energy from liquid fuel into mechanical energy, as well as in powering auxiliary engine accessories essential to engine operation. Aerodynamic draft and rolling resistance constitute the next largest source of losses and potentially the greatest opportunity for fuel consumption gains.
Every unit of energy saved at the wheels saves 3 units of energy that need not be used to deliver traction power. Lower tractive loads also can lead to reducing horsepower in engines with further potential for cost and weight savings with the use of smaller engines.
The following list outlines the breakdown of energy losses in truck freight movement

Engine horsepower – 55%

- Aerodynamics – 20%
- Idle time – 12%
- Tyres – 9%
- Transmission – 2%
- Driveline – 1%

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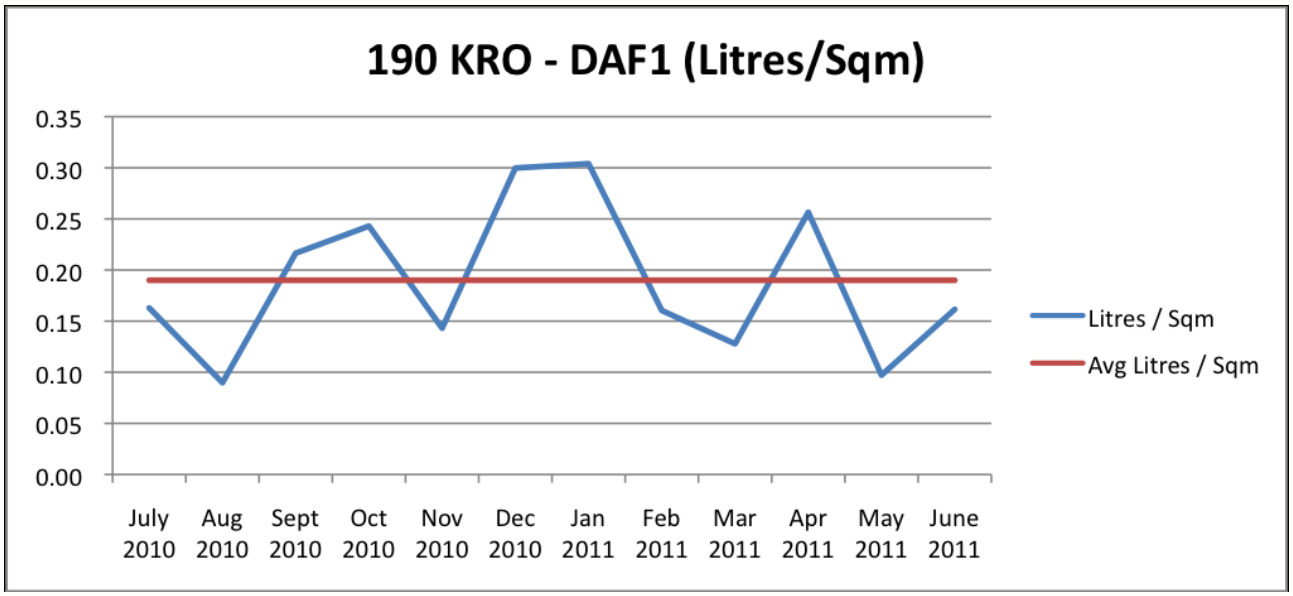

Opportunities for Efficiency Improvements

The majority of turf production enterprises offer product delivery, though some choose to engage trucking services via sub-contractor agreement rather than purchasing and operating the vehicles internally. For those companies with their own internal delivery fleet, the following items are considerations for improving vehicle efficiency and cost reductions:

- Purchase vehicles that suit the needs of the business (consider delivery quantities, delivery distances)
- Train operators for improved economy, safety and driver fatigue
- Monitor with GPS to establish efficient routes and loads
- Consider truck and trailer aerodynamics
- Reduce idle times
- Optimise tyre type and maintenance for grip, noise, energy use, durability, etc
- Think about fuel types for the task (hybrid, natural gas, LPG, assisted diesel)
- Increase pay-load and decrease non-essential freight weight

Horticulture Innovation Australia

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