EPC+ CASE STUDY: ECONOMIC IMPACT ANALYSIS

EXECUTIVE SUMMARY

Empire Carbon and Energy (EmpireCaE) has prepared this analysis and case study for GreenTECH, the Australian importer of EPC+.

EPC+ diesel additive represents a breakthrough solution for diesel fleet operators seeking to optimize fuel efficiency and emissions, while reducing costs. Tests in labs and live fleet test data shows 2-5% fuel consumption reduction. Our economic analysis demonstrates strong return on investment of >300%, with a payback period of less than 5 months for most applications. EPC+ delivers clear economic benefits while simultaneously improving engine performance and reducing emissions.

The risk profile is low, given modest capital investment required, multiple benefits contributing to the economics, and extensive safe usage of the additive in Europe. There is additional upside not included in the economic model, most notably less engine fouling and engine wear, leading to reduced maintenance cost.

INTRODUCTION & PRODUCT OVERVIEW

Diesel fleet operators face challenges including changing fuel prices, stricter emissions regulations, and rising maintenance costs. EPC+ has been developed by TotalEnergies, the only major energy company with in-house R&D capability, developing specialty fuels, oils and lubricants for all levels of oil exploration, production, industry and motorsport. Excellium concentrates with more than 12,000,00km of testing and validation are produced to blend TotalEnergies Excellium premium fuel sold through their networks of 17000+ service stations worldwide. EPC+ now available in Australia through licensed distributor GreenTECH. Assisting companies to reduce cost and emissions from diesel.

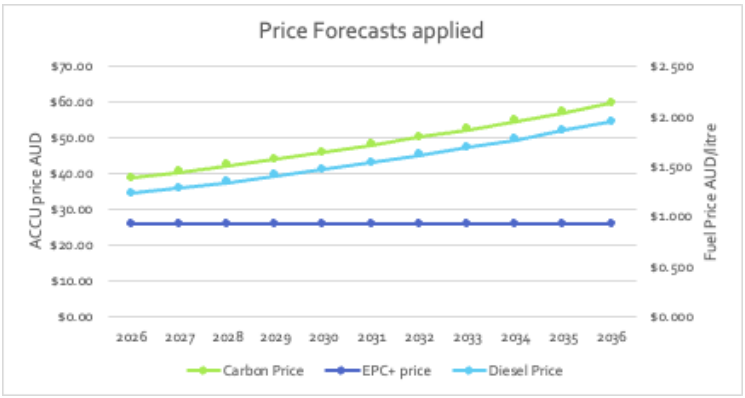
EPC+ is a concentrated, patented premium diesel fuel additive, unique in the additives market (see **Error! Reference source not found.**). Its key benefits are:

- Improved fuel efficiency.
- Improved emissions footprint.
- Improved engine efficiency & protection.
- Improved fuel durability.

The concentrate is blended into diesel via GreenTECH's automated blending system, as pictured here. The installation of this plug and play kit is the only capital outlay required to start using EPC+, costing approximately AU$50,000 and usually online within 3 months.

PERFORMANCE BENEFITS

FUEL EFFICIENCY is one of the key attractions of EPC+, with 3.3% proven benefit in independent laboratory tests. 12 global fleet tests across large numbers of engines and hours have been undertaken, and in these less controlled, real-life settings, improvements ranged from 2.4-4.1%. Australia has slightly different fuel specifications, weather profile and fleet engines from other countries: GreenTech's fleet analysis data showed that here, our benefits are around 4.1%.



Our economic analysis uses 4% as a base case, with 2% as a sensitivity. It also has multiple diesel price forecasts built in.

EMISSIONS REDUCTION is a significant benefit, and in a mining context the avoided emissions can generate carbon credits, either for trading as ACCUS or to meet the Safeguard mechanism liabilities. Given the emissions reduction can happen within a few months, this may provide a transition strategy until other carbon offset or avoidance projects can be put online.

Our model uses a standard assumption of 0.268 t/CO_2-e per litre of diesel and a variety of carbon price forecasts.

OTHER ADDITIVE COST: As fuel efficiency and cleaner engine combustion are achieved, AdBlue use can be reduced by 7%. Not all diesel engines in Australia currently use AdBlue, and given the specific setting of a mining company, this benefit has not been included in the base case but can be run on demand.

There are more upsides, both as direct cost and as future enablers. These are discussed in the Risks and Upside section below.

COST AND PRICING ASSUMPTIONS

As discussed in the introduction, the only capital outlay is AU$50,000 for each blending unit. Most facilities require only one, linked to their diesel fuel tank.

The ongoing cost is the purchase of the EPC+. This is blended at 700ppm, or 0.7 litres per 1000 litres of diesel, as per manufacturer's recommendation. A litre of EPC+ costs AU$25.71 and minimal price increases are assumed.

The cost of diesel is rising based on a 2.2% increase per year. ACCU pricing is based on the market forward curve as of January 31st, 2025.

BUSINESS CASE APPLICATION

HYPOTHETICAL IMPLEMENTATION: MID-CAP MINER

We present a hypothetical case study for a mid-sized mine using a total of 40 million litres of diesel per year. By comparison, FMG's public record of FY24 results indicate the use of about 450 million litres across their operations. According to EREA, the total Australian mining diesel use is approximately 5 billion litres, so our hypothetical mine represents 0.8% of the industry.

This mine is a single point use and hence only needs one blending facility, and no AdBlue usage in our base case. Our mine, like all mines, can generate ACCU's through avoided emissions. As most mines are somewhat remote, a AU$0.20/litre delivery charge was added onto the diesel pricing forecast.

The model uses a 7.5% (real) WACC with no further discounting. It analyses a 10-year value window only. A full list of all assumptions and pricing forecasts used are in **Error! Reference source not found.**

BASE CASE OUTCOMES

The results table shows an overview of the value of EPC+ over a 10-year period.

EPC+ saved a stunning nearAU$30million and over 47 kt of CO_2-e emissions.

The project payback time is under 5 months, which means it can be done within an annual budget.

GreenTECH Value Assesment Model
Portfolio: Mining Company with Safeguard

Active Price Scenarios

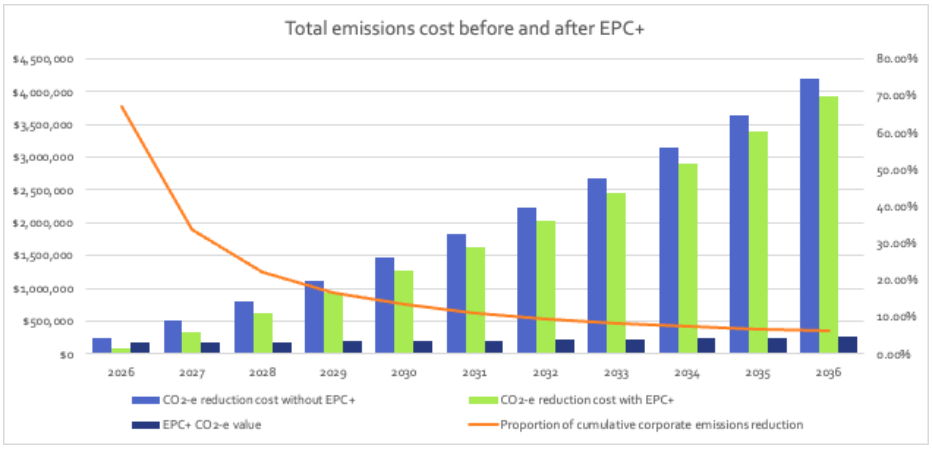
Diesel Price	Rising Diesel Price Forecast
Carbon Price	ACCU Price | Forward Curve

Fuel volume to which ECP + applied (average pa)	40,000,000	litres
Fuel savings (average pa)	1,600,000	litres

Summary Table

Success Measure	Unit	Value
Fuel Savings: litres	litres	17,600,000
Total Savings: $ (all sources)	$	$29,690,697
Average Annual Fuel Savings	litres	1,600,000
Total emissions avoided	tCO2-e	47,168
Total Average Annual Savings: $ (all sources)	$	$2,699,154
Project NPV	**$**	**$13,791,255**
Project RoI (10 years)	%	373%
Project RoI year 1	%	277%
Project RoI year 2	%	309%
Approximate payback time	months	4.3

The business case becomes stronger when considering the cost of offsets for those facilities under the Safeguard Mechanism. These facilities have to surrender Australian Carbon Credit Units (ACCU's) to comply with a year-on-year reduction target. Without other initiatives to reduce emissions, these ACCU's would have to be bought at market prices. The graph below highlights the difference – the cost to abate carbon emissions using EPC+ is only AU$0.06 per per litre of EPC+, with total savings of AU$2.3million.

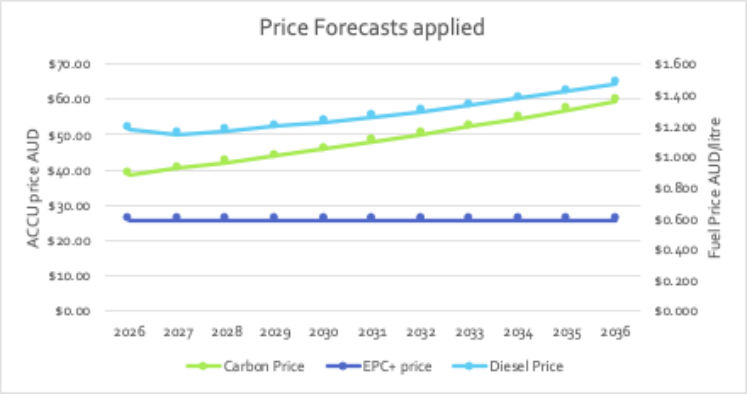


Given the strong economic results, we undertook the checking the strength of these outcomes. We stress tested them against various risks and sensitivities.

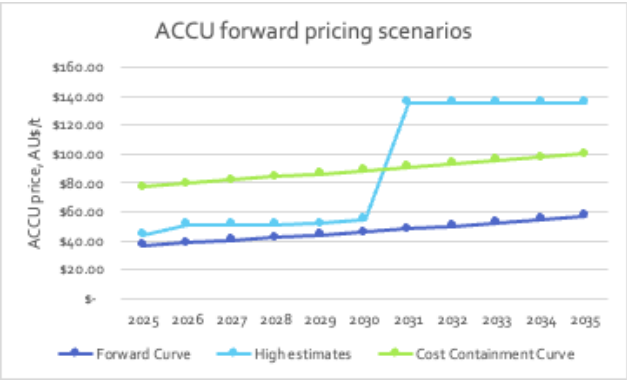
RISKS AND SENSITIVITIES

The following risks to the economics have been identified, and run as sensitivities:

- **Fuel efficiency**. As per the section on benefits, 4.1% has been measured in fleet trials in Australia. This was rounded down to 4%. However, the lowest field trial outcome was 2.4% and the lowest laboratory outcome was 2%. Therefore, a scenario where 2% fuel efficiency is achieved was run.
- **Capital costs overrun**. Sadly, it is not uncommon for capital projects to overrun. The blending system is 'plug and play' and readily transportable by road so this risk has been reduced by design. However, it is possible that custom requirements would need to be added on. This has been run as a scenario with a 50% increase in capital costs.

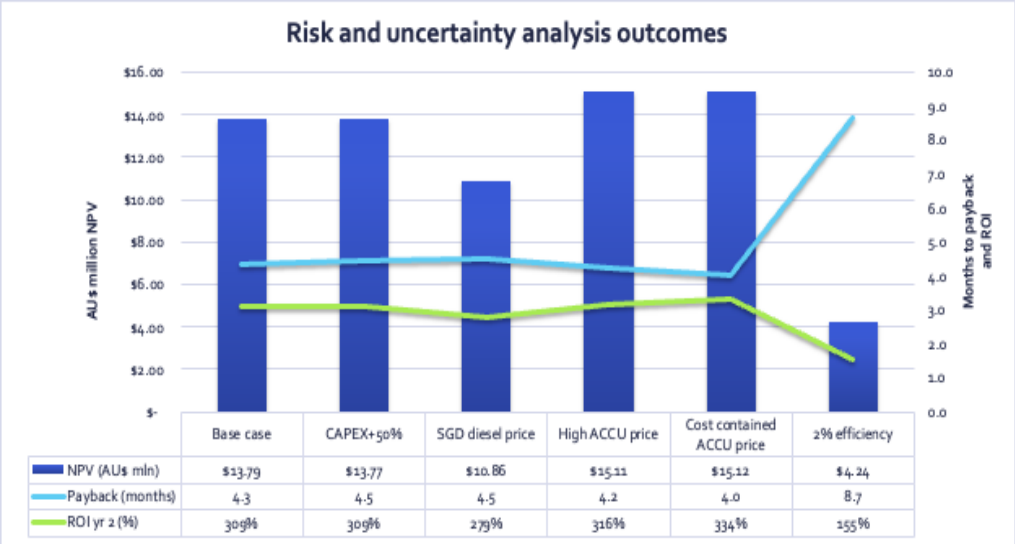


- **Diesel pricing**. The base case assumed a steadily rising diesel cost, as per price graph above. This is in line with historical macro-trends; however, it is possible that lower growth, or even temporary drops in diesel price occurs. The SGD Futures model is representative of this and is displayed here. Note both the shape of the curve and the absolute cost of diesel is substantially below the base case.
- As the Safeguard mechanism and reporting requirements have started to affect business from this year for the first time, **ACCU pricing** is also uncertain. With a large range of forecasts available, the default used is the forward curve as of January 31st, 2025. A sensitivity on the high side was run based on CSIRO 2024 analysis of cost to serve prices. Similarly, a sensitivity was run based on cost containment as per current legislated formula.



- **Break-even and payback time** analysis – the faster a project breaks even, the lower the overall risk to the economics, as the commercial, legislative, social and technical environment has less time to change. For all scenarios run, the payback time has been reported. Also, a goal seeking scenario was run to find the minimum diesel usage that would justify the AU$50k capital outlay.

The results of the risk and sensitivity runs are summarised in the graph below. Most notable is that the NPV never gets close to being negative, the payback time never goes



over 9 months and the ROI over just the first two years does not drop below 150%. The breakeven volume of diesel to reach a zero NPV is 134,450 litres per year, which is a >99% reduction in volume.

Physical risk assessments were not done for this case study. It is however worthwhile noting that over 12 million kilometres worldwide have been driven on diesel enhanced with EPC+ for 20 years. No issues or 'black swan' events have been reported over this period, which makes any physical risk associated with the use of EPC+ low. Physical risk to the capital exposure (e.g. SimOps) have been captured in the 50% capital overrun scenario.

UPSIDE

There are additional benefits from the use of EPC+ that have not been taken into the economic model. The most notable ones are maintenance reductions, refuel and compatibility with biofuels.

Maintenance cost reduction: EPC+ has been proven in laboratory tests to reverse existing fouling by >93% and prevent future fouling by >95%. These tests were performed in a controlled, independent laboratory setting (XUD9 test). It has also been proven to improve HFRR wear reduction in TotalEnergies laboratories. This may lead to higher uptime, lower maintenance and lower lube oil costs.

The EPC+ additive also positively impacts foaming of the diesel, with defoaming time reduced by 88%. These tests were performed to NG M 07-075 standard at TotalEnergies in-house laboratories in France. This means that tank filling is faster, and the tank can be filled fuller.

EPC+ is fully compatible with biofuels, with FAME-based biofuel ranges tested from 7% to 100%. This allows further decarbonisation to take place without giving up fuel efficiency benefits.

CONCLUSION & NEXT STEPS

EPC+ diesel additive delivers excellent economic and performance benefits across all measured parameters. With its rapid payback period and high ROI, EPC+ represents a rare opportunity to significantly reduce operational costs while simultaneously improving environmental impact and associated compliance costs.

Recommended implementation approach:

1. Establish baseline metrics and monitoring protocols
2. Where applicable register an ACCU project
3. Implement EPC+ treatment across the full fleet
4. Track and document benefits

Contact our technical team today to discuss how EPC+ can be adapted to your specific operational requirements and to arrange a demonstration of our economic modelling tool tailored to your fleet profile.

APPENDIX 1 – EPC+ COMPARISON WITH MAIN COMPETITORS

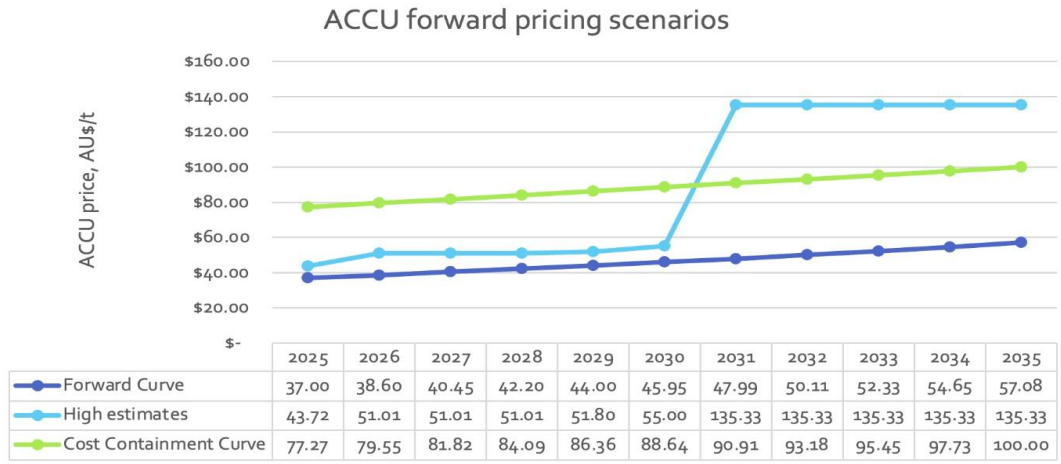
Active ingredients	TotalEnergies Excellium	SHELL V-Power	BP Ultimate	AMPOL Amplify	711 / Mobile Diesel Efficient	Caltex Techron® D
Deposit control – preventing injector fouling and removing deposits.						
Cetane improver – improving combustion efficiency						
Friction modifiers – improving lubricity, while reducing friction and wear.						
Corrosion inhibitors – protecting against rust and extending life.						
Antioxidant – slowing fuel degradation and increasing stability.						
Demulsifier – separating water and reducing risk of microbial growth.						
Antifoaming agent – saving time on fuelling by up to 62%.						

APPENDIX 2 – CASE STUDY ASSUMPTIONS

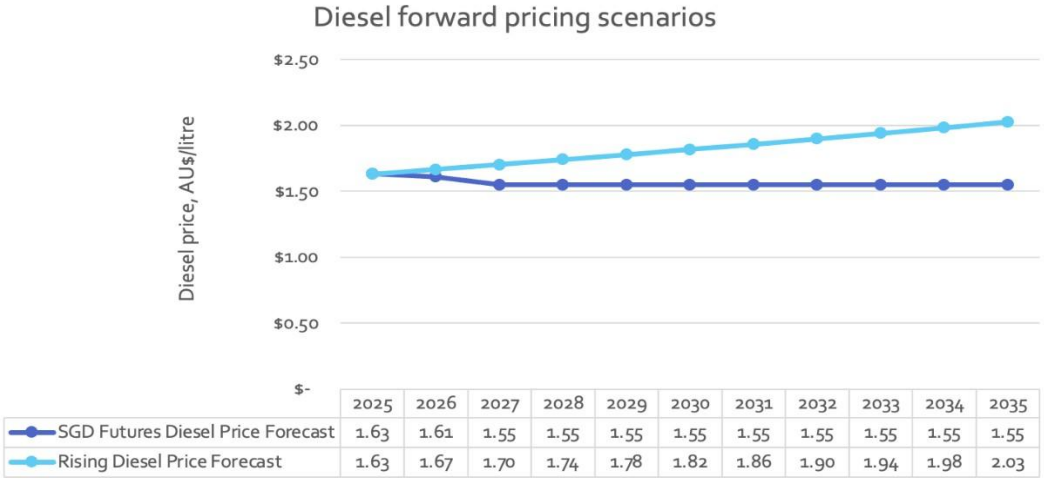
Scenario data

Mining – Safeguard			
single install (fuel farm)		1	
AdBlue		no	
Annual Volume Diesel	litres	40,000,000	
Diesel price discount achieved by customer		0%	
Site transport cost	$/litre	0.20	
Baseline emissions	t/CO2-e	106,530	
Voluntary emissions requirement (% pa target, Scope 1 & 2)		0.9%	excluding safeguard requirement

EPC+ Data		
Diesel Economy improvement	4%	
Dispensing capital cost	50,000	$
Usage efficiency	0.002680	t/CO2-e per litre of Diesel
Adblue used?	no	(default = yes)
AdBlue savings (as applicable)	105,000	$/litre
AdBlue usage	1,000,000	
AdBlue fleet proportion	0.50	%
Blend Ratio per 1000 litres of diesel	0.70	



	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Forward Curve	37.00	38.60	40.45	42.20	44.00	45.95	47.99	50.11	52.33	54.65	57.08
High estimates	43.72	51.01	51.01	51.01	51.80	55.00	135.33	135.33	135.33	135.33	135.33
Cost Containment Curve	77.27	79.55	81.82	84.09	86.36	88.64	90.91	93.18	95.45	97.73	100.00



	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SGD Futures Diesel Price Forecast	1.63	1.61	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
Rising Diesel Price Forecast	1.63	1.67	1.70	1.74	1.78	1.82	1.86	1.90	1.94	1.98	2.03