



# Covey Consulting News

*Serving the industry for more than 20 years*

September 2010

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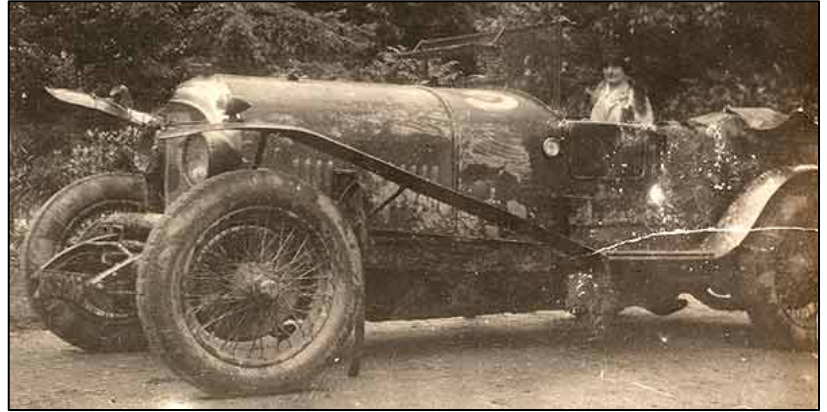
—*Le Mans 1927 with Geoff*

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and

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Dianne



**Old Number 7 after the race.**

## **Le Mans 1927**

**Geoff Covey**

Some time back this journal carried a piece about early Trans-Atlantic flights and in particular that of Alcock and Brown. This flight was described in the article and by several readers as like something out of “Boys Own Paper”. The following tale is one that, if not true, would have been rejected by that sadly defunct magazine as too fanciful.

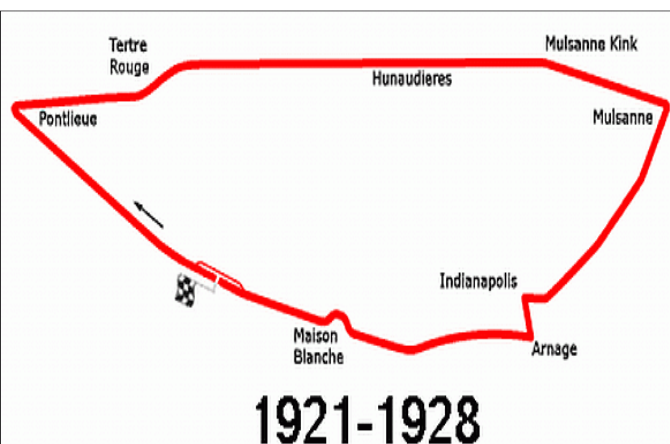
Bentley Motors was founded in 1919 and although it sold a lot of highly-regarded cars and won the Le Mans 24 hour race five times it was never on a sound financial basis and was eventually purchased by Rolls Royce shortly after its last Le Mans win. Its finances and racing activities were dependent on a number of wealthy young amateur drivers known as “The Bentley Boys”.

Bentley cars were powerful and strong but heavy, described by Bugatti, who built almost the exact

opposite type of cars as “the worlds fastest lorries”. This combination of power and strength made them very suitable for use in long-distance sports car races on fast circuits – particularly the longest of them all, the Le Mans 24 hour race.

Bentley first won this race in 1924, but the following two years saw a series of break-downs and crashes, with the race being won by Lorraine-Dietrich on both occasions. 1927 looked like a chance to gain revenge. Most of the large French cars were absent (mergers, financial failures etc) and the three-car Bentley team were firm favourites. They were to be driven by Dudley Benjafield/Sammy Davies, Andre d'Erlanger/George Duller, and Leslie Callingham /Frank Clement.

As expected, Bentley started well and for the first few hours occupied the first three positions in the race, but an Aries and a Théophile Schneider remained in close contention. Then at 9.30 as the evening faded, another Théophile Schneider got into a severe skid on the Whitehouse Corner and ended up stationary and side-ways across the road. This corner is now by-passed by the Porche Curves but in those days was almost blind for those entering it. The first such driver was Callingham in the leading Bentley. He took to the ditch and avoided hitting the stationary car, but the car rolled and the driver was thrown into the middle of the road. Close behind came the second Théophile Schneider which had no-where to go and collided with the two stationary cars. It was soon followed by Duller in the second Bentley and an Aries. Finally Sammy Davies appeared in the third Bentley. He had a



**The Le Mans Race Track from 1921-1928**

premonition that something was wrong (probably debris from the crashes spread on the track) and slowed slightly, but not enough. He managed to shed some more speed by putting the car into a side-ways skid and so hit the wreckage side-on. Davies jumped from the car and checked that all the other drivers were safe (remarkably there were no serious injuries). To his surprise he found that the car was still drivable, although badly damaged, and he slowly drove it on to the pits 1 ½ km away.



*After the Whitehorse Corner crash*

There he was able to inspect the car and determine the damage. It was not a happy sight! The chassis frame, one front wheel and the front axle were bent, the front wing and the running board were tattered and one headlamp was smashed (younger readers may need to refer to a dictionary to determine what these car parts are/were). The rules of the time only permitted the driver to work on the car, and then only using tools carried on it. Davies set to work. The remains of the wing was re-fixed using string and the remaining headlamp was supplemented with a torch strapped to the windscreen – not much (i.e. nothing) could be done about the bent chassis and axle. By the time Davies had finished, the leading 3-litre Aries had a substantial lead, nevertheless Davies set out to try to catch it. Despite his adventures, he continued to drive, to check how the car was behaving and drove for another hour before handing over to Benjafield who found the car handles well, except for a tendency to pull to the right on breaking! The solidity of the racing lorry paid off.

Driving through the night with only one headlamp was made worse by steady rain. The Bentley chased its rival, but in its damaged state could do little to gain on it. Then the Aries developed electrical problems and saw its four-lap lead reduced to just one lap before its electrics failed completely with just an hour and a half to go.

At last the Bentley (“Old Number 7”) could relax with a substantial lead over a pair of 1100 cc

Salmsons. Sadly for Laly and Chassagne their Aries was not classified as a finisher even though it had done 5 more laps than the first of the Salmsons. It is also an interesting thought that had Davies and Benjafield abandoned the car as hopeless after the crash, Le Mans would have been won by the smallest car ever.

As a finale, the *Autocar* held a celebratory dinner at the Savoy Hotel with the guest of honour being “Old Number 7” in the condition in which it won the race. How’s that for BOP stuff!

## **Biomass is Bioenergy**

**Graeme Bullock**

In many parts of the world, renewable energy production is proceeding at an accelerating rate. Global financial crises and carbon trading schemes notwithstanding, there is real investment occurring. Unfortunately, Australia continues to lag, hampered by uncertainty in government policies along with a number of other impediments. This article presents a discussion of those impediments and attempts to identify some areas of comparative advantage.

### **Costs of biomass**

Biomass costs can range all the way from a negative cost to a cost which reflects the most valuable component. An example of the former is municipal solid waste (MSW) at a landfill site, where the cost of establishing, maintaining operating and eventually replacing a landfill is reflected in the cost avoided per tonne or cubic metre of the MSW dumped. Typical of the latter is sugarcane, which has a production cost of \$25-35/tonne of billets harvested, all of which is recovered from the value of the sugar recovered. The most economical sources of biomass are the un-utilised or under-utilized biomass co-products, for example:

- Bagasse from sugarcane, to the extent it is not burnt for process energy or cogenerated electricity
- Sugarcane trash, which has a fertilizer and moisture retention value
- Cereal straws or stalk material, which have a fertilizer and soil-carbon value
- Forest residue (leaves branches, crowns of trees), again offset by their fertilizer value when burnt in the field prior to reforestation
- MSW and sewage sludge, which can have a negative cost as an input for bioenergy production, if such use reduces the cost for landfill or other disposal.

In all cases there are costs of retrieving, drying, densification, storage and handling which depend upon the nature of the biomass.

### Composition of biomass

Biomass ain't biomass – all biomass is not of equal value in bioenergy terms, as the following table shows:

% dry weight	Sugar-cane bagasse	Corn stover	Sew-age sludge	Euca-lyptus wood	Rice straw
Cellulose	35-40	36-38	-	40-45	-
Hemicel-lulose	25-27	26-28	-	15-17	-
Lignin	18-21	10-14	-	22-26	-
Ash	2.5-3	3-5	32-35	0.5	19
Energy content (dry), HHV, kJ/kg	18900	18100	15300	19400	15950

The **moisture content** of biomass critically affects its value, because of the cost impacts on transporting and drying, or on thermal efficiency in the case of wet biomass combustion. The bulk density of biomass is generally low, which results in high logistics costs if it is to be used at centralised locations remote from its origins

### Carbon impact of bioenergy from biomass

Bioenergy from different biomass also has differing value in terms of greenhouse gas abatement. This depends on many factors including fossil energy inputs to agriculture and logistics, biomass yield, the fate of crop residues and processing co-products, and soil emissions from fertilizer and tillage.

The following table provides examples:

	Ethanol from corn (USA)	Ethanol from sugar-cane (Brazil)	Biodiesel from canola (France)	Biodiesel from used cooking oil and tallow (UK)
Net green-house gas emissions reduction (%)	20-35	80-90	50-55	85

### Conversion technologies

Capital costs are high in Australia, primarily because the engineering fabrication sector does not have the scale economies of the US or Europe, or even Brazil, China and India, and nor does it have the low labour costs of the latter. Consequently, most complex componentry has to be imported and logistics impediments and high EPCM costs offset the lower prime cost.



*A modular duplicated distillery in Brazil: costs to establish a similar fermentation and distillation plant in Australia were about double the costs in Brazil, when benchmarked in 2005.*

### Logistics

Primary biomass production involves logistics costs for inputs (fertilizer, agricultural chemicals, fuel) and even higher costs for biomass harvest and transport, and storage at a central processing site. Post-production, there are the costs of transport of products to markets which in Australia will be in capital cities relatively remote from primary production locations. Logistics costs are often not given sufficient emphasis in project feasibility assessments, but they can make the difference between a project proceeding or failing. Innovative logistics solutions can be similarly impactful.



*Bagasse and other biomass stockpiled at Condong Mill (NSW Sugar) for cogeneration purposes. The low bulk density makes the size of these stockpiles*

*very large, and the high moisture absorption makes their protection from wet weather necessary and costly.*

### **Biomass conversion technologies**

By far the greatest, most immediate and most efficient utilization of biomass fibre is for the direct production of heat. This ranges from home heating all the way up to urban CHP plants providing distributed hot water and/or steam to surrounding homes and commercial premises. Heat generation is >80% efficient using dry biomass pellets, and the fuelling process can be fully automated. Already, there is widespread use of biomass pellets in northern Europe and northern America for these purposes.

The next immediate use is for co-firing with coal for electricity generation. Again, this is already happening in the same regions identified above. Trade in biomass pellets from Canada and the USA to Northern Europe exceeds 1 Mt/year and is increasing rapidly. Exports to the same market have commenced from Albany, WA. Thus, the value of biomass fibre for pelletising for export becomes the benchmark against which other potential uses must be assessed. Prospective future technologies for converting biomass to liquid fuels, using thermal and biochemical processes, will be the subject of a future article.

### **Prognosis**

There are significant opportunities for bioenergy production from biomass in Australia. Among the most favoured are those based on co-products or unutilized residues. Thus sugarcane bagasse, forest residues from timber harvesting, and other crop residues such as wheat and sorghum straw are the most obvious. Niche opportunities exist for bioenergy extraction from processing co-products such as pulp mill liquors.

The production of dedicated biomass crops for bioenergy production could be a very large opportunity if it is based on short-rotation forestry, and newly-emerging grass crops such as high-yielding, high-fibre "energy" sugarcane and sorghum, along with various hybrid grass crops based on miscanthus, sorghum, sudan grass and sugarcane. Fibre crops which have lower water demand, lower agricultural inputs, and can be grown quickly in dryer areas after seasonal rain will be most advantaged.

Conversion technologies will have to be carefully chosen because of relatively high capital costs and establishment costs. It may be that at least part of

the product mix has to be focused on biomass exports for bioenergy purposes elsewhere, reflecting the relative supply and demand situation in different regions, and the uncertain value proposition for bioenergy products in Australia.

### **About BioIndustry Partners:**

BioIndustry Partners is a specialist consulting group formed in 2008. The three principals are Prof Margaret Britz, Dr Graeme Bullock and Dr Les Edge. With a combined total of >100 years of experience in agribusiness, food science, industrial microbiology and bioenergy, this group provides consulting services which include technical and economic assessment of research and commercialization projects, mentoring of innovators, contract R&D management, and the provision of expert opinion.

The following are examples of projects successfully completed in recent years, or are ongoing:

- Assessment of options for pulp and paper production from sugarcane bagasse, for one of Australia's leading pulp and packaging production companies.

- Technical and economic potential of biomass pellet production in Australia, for an international commodity trading house.

- Review of methods and costs for forest residue collection (in collaboration with Covey Consulting), for a New Zealand company.

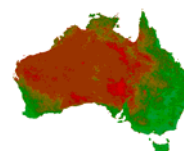
- Appraisal of status and prospects for algal biofuels, in collaboration with a US agency and under the sponsorship of the UN IEA.

- Managing a private R&D contract being executed at an Australian university into the production of high-value biochemicals from marine algae.

- Principals of BioIndustry Partners have acted as expert witnesses in matters heard in the Federal court in Australia.

- Advice and modeling input to a US-based company pursuing biomass-to-bioenergy projects.

BioIndustry Partners and Covey Consulting have complementary skills in biomass production, processing and composition on the one hand, and process design and engineering on the other.



## Confessions of a Cruise Novice

**Dennis Shore**

The development of jet passenger aircraft, particularly the Boeing 747 sounded the death knell for scheduled passenger ships for international travel. However rather than doom passenger shipping it spawned a whole new industry – cruising. The giant passenger liners of the transatlantic trade are almost like bath toys alongside the new leviathans of the cruise industry. Making her maiden voyage in December 2009, *Oasis of the Seas* measures 225,282 gross tons and is the largest passenger vessel ever built. Her displacement—the actual mass of the vessel—is estimated at approximately 100,000 tons, about the same as that of an American Nimitz class aircraft carrier and about twice as much as the Titanic, of 52,000 tons. All up she (why is that ships are identified as feminine?) can carry 6000 passengers.

It was because of my memories of that biopic of the Titanic, “A Night to Remember”, that I have resisted all thoughts of a cruise. Who could forget the fine British Actor, Kenneth More playing Second Officer Charles Herbert Lightoller as he bravely rescued passengers from the upended mortally wounded Titanic as the ship’s band played “Nearer my God to Thee” in the 1958 movie. My antipathy to boats, sorry ships, was reinforced in the more recent James Cameron movie 1997 “Titanic”.

However it seemed eventually that I was one of the few people to have never experienced the hedonistic delights of cruising so my wife Lynda and I decided that it must

have something going for it. In our annual Christmas letter we mentioned that we were vaguely thinking of doing a cruise to Alaska. We chose Alaska for our maiden cruise because most of the cruise takes place in sight of land and we figured we had a

fair chance of reaching the shore in one of the big lifeboats these ships carry if worse came to worse! This vague thought was quickly crystal-

lised when American friends said they were coming with us so before we could contemplate the wisdom of this adventure we had berths booked on the *MV Diamond Princess*.

Going back to concerns about sinking, these days a fire on board is probably a bigger risk than sinking and it was good that we did not know until after the cruise that the ship was originally built as the *Sapphire Princess* but was launched as the *Diamond Princess* when the original *Diamond Princess* suffered a huge fire in its decks during construction! That ship is now sailing as the *Sapphire Princess*! You may have to read this bit twice to comprehend the details!

Covey Consulting is a technical outfit so it is only fitting that this article should include plenty of technical statistics. Now the *Diamond Princess* is not in the same league as *Oasis of the Seas* but it still has pretty impressive vital statistics.

The *Diamond Princess* was built in Japan, completed in 2004 at a cost of US\$500m and tips the scales at 77745 net tonnes with a gross 115875 tonnes. Its displacement is 60636 tonnes. It has a length of 288 metres and a breadth of 41 metres. It can carry a bit over 3000 passengers, which requires a crew of 1240 to support. It has 13 decks above the waterline (15 in all) and a preponderance of staterooms (not cabins) with outside balconies. Gone are the days of the “Titanic” with different classes of passengers. All passengers have the run of the ship and it is the type of cabin that discriminates between passengers. Cheapest cabins (sorry staterooms) are interior rooms with no windows. They then proceed to Suites (outside Cabins) with or without balconies, progressing up to mini-suites



*MV Diamond Princess In Juneau – capital of Alaska:  
The diamond shopping is nearby*

and Grand Suites. Balconies are essential for bragging rights at cocktail parties if for no other reason. It must be said that it is sort of nice to sit outside, even if you do have to be rugged up as you head “North to Alaska” in far more salubrious conditions than enjoyed by those who featured in the song.

As big as these ships are they are surprisingly manoeuvrable. Diamond Princess is the first of the “Grand Class” ships to have a “pod” propulsion system installed. The ship employs an electric motor-drive propulsion system with the combined power source of a gas turbine (situated at the funnel with 2 decorative cigar-shaped pods resembling aircraft jet engines just for show) and four low emission type diesel engines, providing high output but low noise and vibration.

The diesel-generators consist of 2 x 9,450kW units and 2 x 8,400kW units. The diesel generators are Wartsilla 46 series common rail engines, two of the straight 9 cylinder configuration, and two of the straight 8 cylinder configuration. These engines are fuelled with Heavy Fuel oil (HFO or bunker c) and Marine Gas Oil (MGO) depending on the local regulations regarding emissions, as MGO produces much lower emissions but is much more expensive.

The aero-derivative GE 2500 gas turbine-generator produces 25,000kW fuelled by MGO. This generator is much more expensive to run than the diesel generators, and is used mostly in Alaska, where the emissions regulations are strict. It is also used when top speed is required to make it to a port in a short time period.

Employing the hybrid system allows the ship to run clean in environmentally sensitive destinations such as Alaska, where the ship operates a summer schedule of seven-day departures from May to September. Incidentally this ship operates out of Asian ports and then does the Australian circuit for the rest of the year. Visible emissions have been a source of friction with local residents in recent years, and several cruise lines have been fined for exceeding regulatory standards.

There are two conventional synchronous electric propulsion motors made by Alston Motors rated at 20,000kW which drive fixed-pitch, 6-bladed, inward rotating propellers. 6 thrusters can be used during manoeuvring; 3 at the bow (2200kW each) and 3 at the stern (1720 kW each). In addition there

are 2 rudders and the boat is stabilised by 2 fold-in fins, each 7.25m in length and with a surface area of 21.75m<sup>2</sup>.

This propulsion energy can provide a top cruising speed of 22 knots, although the average speed on our cruise was rather less due to pottering around fiords and glaciers as well as whale spotting and the like. Also some of the cruise destination ports are in difficult to access locations requiring careful navigation. The thrusters enable these ships to access very tight areas with great agility.

Naturally the ship is operated via state-of-the-art navigation and tracking computer integrated control systems. The NACOS Track Pilot System can hold the vessel to within 10m of her programmed track using GPS tracking.

Exhaust gas and various wastes on board the ship are disposed of by a flue gas treatment system, waste water treatment equipment based on next-generation bio technology, and other facilities. The large volume of waste is completely treated on board the ship without discharging into the sea.

Surprisingly the interior design of the ships is such that mostly you don't feel as though you are on a crowded ship as there are lots of different options on the ship to provide a feeling of exclusivity. It has to be said that you never know exactly where you are and you have to carry a pocket guide at all times to find your way around. Some people never found their way to many of the more secluded areas. In fact many people never found their way past the buffet bar. The girth of some passengers had to be seen to be believed. The quantities on their dinner plates gave more than a clue as to how they had achieved dimensions in keeping with these leviathans of the sea. Shipboard meals provide the basis of the popularity of cruises. Meals are included in the cruise price so for many it is a temptation too compelling to resist. Apparently for the Diamond Princess when carrying a full passenger compliment (as was the case with our cruise) some 18,000 meals a day are usually prepared. Our cruise averaged in excess of 20,000 meals a day. If you do the arithmetic it averages out at over 5 meals a day so it is surprising that the average weight gain on a cruise is only one pound per day! The buffet restaurant to us was the least appealing option when there were 7 other fine dining rooms. And fine dining they are, with meals and service as good as you would expect anywhere.

Unfortunately free inclusions did not include alcohol, which could be quite expensive. The cruise companies very quickly worked out that most passengers surrender with little complaint and say hang the expense in this regard. Of course dining is not complete without the opportunity for pre and post meal cocktails in any one of the many lounge areas, all of which are salubriously and exotically themed. There are more opportunities for alcohol consumption in the various entertainment lounges. There is a huge theatre that shows movies and presents stage shows that would not be out of place in Paris or Las Vegas. There are also variety shows, comedians and illusionists. Other money-making opportunities include the casino, shops and numerous stalls selling junk. And of course at every opportunity there are photographers to capture those precious moments on the cruise, each photo costing \$20.

The logistics of a cruise are significant. Generally all provisions are loaded at the point of departure, Vancouver in our case. Consider the provisioning for 150,000 meals and importantly the cellar – after all about 30,000 bottles are consumed on the cruise and about 60,000 cans or bottles of beer. Some of the food list makes for interesting reading: About 38,000 eggs, nearly 7 tonnes of beef, nearly 8 tonnes of fish and, importantly, half a tonne of lobster. All in all about 100 tonnes of food per 7 day cruise is prepared and served by 470 of the crew from 27 nationalities.

Cruise lines run a pretty sophisticated frequent cruiser program, which encourages repeat cruising. We had one couple on our cruise who were enjoying their 70<sup>th</sup> cruise, making a total of 473 cruise nights. Apart from a robust bank balance and assuming that average weight gain of 1 pound per day it is possible that they could no longer leave their cabin, which might explain their exalted status as triple platinum kryptonite members of the captains circle. One of the advantages you can rack up if you do enough cruises is unlimited free laundry but the big prize is free internet access. Satellite internet access is expensive at 75 cents per minute and slow to boot. Accordingly it could cost about \$20 to download your copy of Covey Newsletter. Still a bargain at that price but not what we are used to!

These days cruising is not just about lounging around the pool, although there were 7 of them on our boat. Most cruises have many optional day

tours at the various ports of call. Not only does it cost less to operate the ship when it is not going anywhere, the cruise companies make a poulitice on the land based tours as well. They also operate diamond shops at these ports of call, which is about as far as a significant part of the female passenger list seem to go when they disembark. Apparently when Alaska shuts for the winter, they pack up the staff and inventory and ship them to the Caribbean or some such place where they do the same thing for tropical cruise passengers.

Cruise companies have a business to operate and when you get over the shock of the rampant opportunities for them to exploit you, which only takes about the time required to consume your first cocktail, it is a pretty nice way to spend a week or so. Your bags are taken to your cabin from off-shore check in and once unpacked it is like staying in a luxury hotel. Attentive stewards take care of the rest. In addition to the aforementioned activities there are many things to do on the ship. They have a well stocked library, naturalists on board to spot flora and fauna and talk about what you are seeing, there are various other guest speakers, there are night clubs and discos, kids activities (if you are foolish enough to take kids on board), wine tastings, ice carving, bingo, art auctions (yes the ship has an art gallery about the size of the NGV – well pretty large anyway), cookery demonstrations and even a tour of the galley, which has to be seen to be believed – wall to wall stainless steel and clean beyond comprehension.

We could be convinced to go cruising again one day, perhaps a little wiser but probably as readily gullible.

*In the main atrium — at least the band was not playing “Nearer my God to thee!”*





Serving the industry for  
20 years  
1989-2009

1st Floor, 660 High Street, Kew East. Victoria



**Ph:** (03) 9859 4290



P O Box 99

**Fax:** (03) 9859 4630

Kew East Victoria 3102

**Email:** [enquiries@coveyconsulting.com.au](mailto:enquiries@coveyconsulting.com.au)

Australia

## Covey Team

<b>Dr Geoff Covey</b> 0417586735	Chairman	<b>Mr Reg Harvey</b> 0417383237	Process Engineer
<b>Mr Gerke Faber</b> 0419134659	Mechanical Engineer	<b>Mr Robin Johnson</b> 0412212557	Process Engineer
<b>Mr Dennis Shore</b> 0412332226	General Manager	<b>Mr Stephen Grist</b> 0414460729	Chemical Analyst
<b>Mr John Trewick</b> 0401177584	Information Consultant	<b>Mr Roger Canty</b> 0404659728	Chemical Engineer
<b>Mrs Dianne Jones</b> 0419521391	Information Consultant	<b>Dr Dennis Creasy</b>	Chemical Engineer
<b>Dr. Bruce Allender</b>	Environmental, Procurement & Project Specialist	<b>Dr Ajit Ghosh</b>	Chemical Engineer
<b>Mr David Allan</b>	Sustainable Outcomes	<b>Mr David Wood</b>	Electrical Engineer
<b>Mr Murray Orchard</b>	Mechanical Engineer	<b>Dr Alan Harvey</b>	Control Engineer
<b>Mr Eddie Blundstone</b>	Mechanical Engineer	<b>Mr Ross Patterson</b>	Mechanical Engineer

## Associates

<b>Mr William Springham</b>	OHS Consultant	<b>Peter Brett</b>	Electrical Engineer
<b>Dr Alan Farrington</b>	Chemist/Fibre Technologist	<b>Mr Norm Lasslett</b>	Process & Control Systems Engineer

## Covey Clean Tech Malaysia

<b>Kam (Charlie) Chan</b>	Commercial Associate	<b>Koh Hoo Beng</b>	Country Representative
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[www.coveyconsulting.com.au](http://www.coveyconsulting.com.au)