



**HAC**

Smart Solutions for a  
Carbon Constrained Future

## **Our Capability**

**In the fields of:**

**Technology development and commercialisation**  
(particularly energy efficiency, and renewable and sustainable energy technologies)

**Technology assessment**

**Business case assessment**

**Due diligence**

**Investment and Venture management**

**SEPTEMBER 2009**

# Our Overall Capability

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*Energy efficiency, and a new generation of Sustainable and Renewable technologies will offer solutions for a carbon and energy constrained future. They will also offer the opportunity for rewarding and profitable investments - but there will be many pitfalls along the way.*

*The development, implementation and commercialisation of new technologies has always had risks and challenges.*

*HAC Consulting has the expertise and experience to help smooth the pathway and manage the challenges to optimise your return on investment.*

## **HAC Consulting Pty Ltd**

Founded by key leaders of the team that managed Perth's Hydrogen Fuel Cell Bus Trial, HAC Consulting was established in 2007 to help industry and Government prepare for a carbon constrained future.

Our combination of engineering expertise, commercial acumen and policy experience enables us to serve both corporate clients and government with equal insight.

With experience covering many sectors of the economy, HAC assists with:

- strategic planning,
- risk analysis,
- technology assessment,
- business case assessment,
- technology commercialisation,
- project delivery,
- energy management,
- emissions auditing and reporting.

Corporate and government clients rely on HAC for the tools and analysis they need to prepare for, and to thrive in, Australia's low-carbon future.

HAC's principle offices are located in Melbourne, Perth and Kalgoorlie. We have considerable experience working as individual consultants or contractors, through to leading large project teams comprising consortium partners and/or significant subcontractors.

**This capability review focuses on our skills in the area of technology commercialisation.**

# Technology Commercialisation Capability

## Typical technology commercialisation pathway



*Challenges at every step ...*

*HAC can help smooth the way ...*

HAC has experience in the assessment, development, management and commercialisation of new technologies.

We have an in-depth understanding of:

- energy efficiency, sustainable and renewable energy, and other low carbon technologies;
- the commercial and legislative environment that these businesses will exist in i.e. the impact and opportunities presented by carbon pricing, RET, CDM etc;
- the opportunities for intellectual property protection, licensing and assertion;
- funding alternatives and corporate structures for businesses;
- the commercial and financial interests of investors and the business case and due diligence requirements prior to investment, IPO or acquisition;
- the barriers to entry that companies face, ie the attitude of consumers towards technical risk in different sectors, the investment uncertainty associated with new and or higher capital cost and lower running cost equipment;
- how these barriers can be overcome in different industries and applications;
- the importance of cross functional strategy development; and
- the challenges facing management as they progress from inventor to businessman.

Assessment of the features and merits of new technologies (particularly low carbon technologies)	IP protection, portfolio management, licensing and assertion	Development and assessment of business models and commercialisation strategies	Financial modelling and development and assessment of feasibility studies and business cases	Experience with the funding life cycle (Capital raising, grants, working capital needs, IPO's, trade sales)	Assessment of investment opportunities, including due diligence	Marketing, business development and contract negotiation	Implementation of commercialisation strategies. Mentoring management, staff training and development
✓	✓	✓	✓	✓	✓	✓	✓

# Our people

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## *Core skills, qualifications, experience and performance...*

### **Colin Cockroft - Director**

Colin holds a Bachelor of Electronics and Communications Engineering (Honours) degree, a Masters of Engineering Science in Systems and Control from the University of New South Wales, and has Postgraduate qualifications in Renewable Energy, Energy Economics and Energy Policy from Murdoch University.

He is a member of the Western Australian Sustainable Energy Association (WA SEA), and the Chamber of Commerce and Industry of Western Australia (CCI WA).

Colin has strong engineering skills and proven experience in the management of complex, high value projects, through various stages of development. In particular, Colin has been responsible for project costing, financing, risk management and strategy development.

Projects undertaken or managed by Colin include;

- an international multidisciplinary writing team during the preparation of a \$90M Defence communications tender;
- the technical and strategy review of a \$200M Defence communications tender;
- transport technology trials (hydrogen and CNG vehicles and infrastructure);
- cost-benefit and health-effects models for government and corporate clients; and
- high-level strategic advice on climate change science and abatement opportunities.

Colin is the Principal consultant at HAC's Melbourne office and is responsible for all Australian East Coast accounts. He manages the economics practice, the corporate financial practice, and the systems engineering practice.

### **Rob Davis – Non executive director**

Rob holds a Bachelor of Mechanical Engineering (with Distinction), a Graduate Diploma in Business Management and a Graduate Certificate in Applied Finance and Investment. He is the inventor or co-inventor of 7 patents and is a member of the Australian Private Equity and Venture Capital Association (AVCAL), the Australian and New Zealand Licensing Executives Society (LES ANZ), the Australian Institute of Company Directors (AICD) and the Western Australian Sustainable Energy Association (WA SEA)

Rob has worked extensively on the development, financing and international commercialisation of new technologies, both within and beyond the energy efficiency field.

He has 16 years' direct operational experience with mining and technology companies and a further 11 years experience providing corporate advisory, management consulting and technology commercialisation services across a range of industries (including manufacturing, timber milling, child care, aged care, and mining services). He has advised public, private and start-up companies; assessed technologies under the AusIndustry COMET program; worked on cross border joint ventures; business model, strategy and industry development; leader the acquisition and divestment of businesses; and advised on the protection, licensing and assertion of intellectual property.

Rob's achievements include;

- Significant contribution at senior technical and managerial levels to the early and mid stage development and commercialisation of low emissions / fuel efficient direct injection technology by Orbital Corporation. (used by Mercury Marine and others in volume production for over 10 years);
- Managing the financial, corporate and licensing activities as general manager of Kinetic Suspensions Systems - winner of the AVCAL 1999 Best Early stage investment award for Quadrant Capital. (Variants of Kinetic's energy efficient – passive / reactive suspension technology are now in volume production on Toyota Landcruiser vehicles. Late stage investors received around 50% pa ROI after 4 years in.);

- Leading the intellectual property protection, international business development and trade sale activities of a large scale, energy efficient pumping technology within the mining industry. (The business, APEXS pumps, was acquired in 2008 by its largest competitor, Weir Minerals. Investors received around 40% ROI after 8 years in.); and
- Coordinating and leading the assessment, due diligence and negotiations for the acquisition of a business manufacturing CO<sub>2</sub> emissions-reducing hardware for the automotive industry. (Next generation, liquid injection LPG technology, planned to be manufactured by Orbital and released by Ford Australia in 2010.)

### **Jamie Ally - Director**

Jamie holds a BAsc degree in Mechanical Engineering (Mechatronics) and is pursuing a PhD part-time at Murdoch University researching the Life Cycle Assessment (LCA) of hydrogen, electricity, natural gas, diesel, and other energy chains. Jamie is one of the few engineers in Australia with experience in all stages of development and commercialisation of novel low-carbon transport technologies.

He is a registered professional engineer in Canada, a member of the Association of Professional Engineers and Geoscientists of British Columbia (APEG BC), a member of the Western Australian Sustainable Energy Association (WA SEA) and sits on the Innovation Committee of the Chamber of Commerce and Industry of Western Australia (CCI WA). He has published articles in the Journal of Power Sources, the Renewable and Sustainable Energy Reviews, and he is a reviewer for the International Journal of Hydrogen Energy.

Jamie's strong reputation in the sustainable fuels and vehicle technology industries is based on his:

- technical research and development skills combined with a comprehensive understanding of life cycle and product development impacts;
- responsibility for systems design (incorporating mechanical, electrical and control theory) and hydrogen drivetrain development and optimisation at Ballard Power Systems in Vancouver; and
- delivery of many lectures and seminars on fuels and energy technologies, including presentations on the 'state of the art' and the technical and economic barriers to alternative energy commercialisation.

As a Director of HAC, Jamie works with Government and corporate clients in the fields of energy, climate change, and sustainability. His previous projects include greenhouse forecasts for industrial-scale facilities, abatement cost calculations, offset strategies, energy efficiency engineering and process control.

### **Raoul Abrutat**

Raoul holds a Master of Engineering (Utilities & Infrastructure) degree and is a member of the Western Australian Sustainable Energy Association (WASEA) and the German Wind Energy Association (BWE). He has extensive experience in the design and installation of grid-connected wind farms and solar electric (photovoltaic) systems. He independently initiated some innovative and successful renewable energy projects and project teams in Western Australia, including the Perth Solar City bid to the Australian Greenhouse Office.

- In 1989 he was exposed to the German feed-in tariff legislation for renewable energy and has over 16 years of first-hand experience in international wind energy markets.
- He worked in the USA, Brazil and Germany for the leading wind turbine manufacturer Enercon.
- He was invited to be an industry representative of the WA Electricity Reform Implementation Unit's (ERIU) Balancing & Ancillary Services Expert Team assisting in the design of WA's Wholesale Electricity Market. He also was an industry member of the Renewable Energy Access Working Group to design the grid access rules for renewable energy power stations.
- Raoul also initiated the proposed Coronation Wind Farm adjacent to Coronation Beach 25 km north of Geraldton, WA.

As a Senior Engineer with HAC, Raoul is leading renewable energy and energy management projects, greenhouse gas abatement initiatives, and carbon and environmental offset strategies.

*Further depth of skills, qualifications and experience ...*

**Glen Head - Director**

Glen holds a Bachelor of Science degree in Sustainable Development, specialising in Renewable Energy and Public Policy, from Murdoch University. Glen has extensive hands-on experience with strategic management, policy development, risk analysis and climate change related services.

Glen recently held the position of Director of Sustainable Transport for the Government of Western Australia and acted as a Senior Policy Adviser to the Western Australian Minister for Planning and Infrastructure. He now sits on the Board of the Western Australian Sustainable Energy Association (WA SEA) and the Climate Change Committee of the WA Chamber of Commerce and Industry (CCI WA).

**Tristy Fairfield**

Tristy holds a Bachelor of Commerce degree from UWA, a Master of Science (Renewable Energy) degree from Murdoch University and is a member of the Australian Institute of Energy (AIE),

Tristy has managed projects for the Western Australian Office of Climate Change where she was responsible for the development and implementation of strategic greenhouse gas abatement initiatives.

**Margaret Gollagher**

Margaret completed her PhD on corporations and sustainability at Murdoch University's Institute of Sustainability and Technology Policy, Australia's premier sustainability research institute. During her time at Murdoch, Margaret lectured and tutored in sustainability, and was a key member of local and international sustainability research programs.

As Principal Policy Adviser for Sustainability to the Western Australian Minister for Planning and Infrastructure, Margaret provided state and national level advice.

**Greg Benvenuti**

Greg is an experienced Minerals Processing Engineer with a Bachelor of Science in Chemical Engineering and post graduate qualifications in management from the University of the Witwatersrand - Johannesburg, South Africa. He is currently completing a Certificate of Training in Greenhouse Gas Accounting and Management.

Greg has extensive process engineering experience that enables him to make sound decisions regarding possible energy savings and efficiencies, and to conduct the necessary engineering and project analysis to put those savings into effect. He brings a sound understanding of the end-user perspective to technology assessments.

He also has experience with the execution of large capital projects in the processing sector from the design phase to commissioning, having held key process engineering positions in various projects including large brown-field capacity expansions and new processing capability.

# Smart solutions

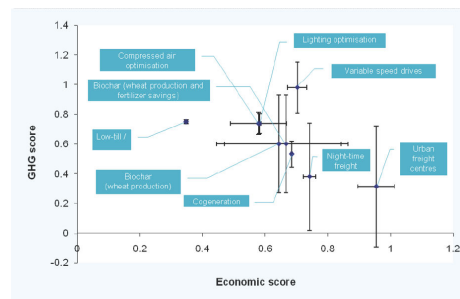
*The combined expertise of our people provides “smart solutions” in low carbon innovation projects...*

**Client: State Government of New South Wales**

- Review and assessment of low-carbon innovations (unique multi criteria analysis tool)
- Identification of methods to overcome barriers to commercialisation

HAC was commissioned in partnership with RARE Consulting to identify and analyse greenhouse gas abatement options across the transport, agriculture and manufacturing sectors of the NSW economy. The purpose was to determine which had the potential to deliver an economic and greenhouse gas benefit, understand any barriers that were preventing successful implementation, and determine if there was a role for Government in overcoming the barriers. The project team recommended a set of policy mechanisms that would help enable the successful commercialisation of selected innovations.

Several hundred innovative greenhouse gas abatement options were identified across the three sectors. HAC filtered these using a two stage elimination process incorporating a unique two-axis multi-criteria analysis technique developed for the project. This presented the options in a format that enabled comparison of the economic and greenhouse benefits of each innovation.



Short-listed innovations were studied in detail to determine the barriers to implementation. This involved an audit of NSW and Federal Government policy to determine what measures were already in place, plus extensive stakeholder engagement to determine where new measures were required or where current measures could be improved. The final results were presented to Government in a format that enabled them to update the analysis as technology and economic factors changed.

**Client: AngloGold Ashanti Australia**

- Assistance with Financial modelling and Business case development assessment
- Solar Thermal Grant application (Renewable Energy Demonstration Program)

AngloGold Ashanti is developing the Tropicana Gold Project, a new mining operation located approximately 330km North East of Kalgoorlie. The site is isolated from the grid, the natural gas pipelines and all other energy infrastructure. The conventional and well-proven way to provide reliable electricity for such an application would be the use of diesel-fired generators.

Alternative energy sources were investigated. The most suitable renewable generation technology was concentrating solar thermal using a power tower, with molten salt as an energy storage medium. This solution could potentially provide power on demand, 24 hours per day, for the entire site.



HAC worked with AngloGold Ashanti and their project partners to undependably assess the business case and commercialisation strategy, and prepare a grant application for the Australian Government's Renewable Energy Demonstration Program (REDP).

The application of solar thermal technology to mineral processing could trigger a step change in Australia's mining industry. The project would be largely insulated from oil price volatility, and a source of abundant relatively low-cost electricity would enable the processing of lower-grade ores, thus improving the lifetime and profitability of the site.

# Contact details

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