

## ITP THERMAL PTY LTD PREVIOUS PROJECTS

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Project	Client	Description	Year
Hydrogen substitution for natural gas use for chemical feedstock	DISER	The Department of Industry, Science, Energy and Resources (DISER) commissioned ITP to carry out this investigation of opportunities and implications of hydrogen substitution for natural gas use as an industrial feedstock. The team compared the competitiveness of electrolytic based green hydrogen production with natural gas SMR based hydrogen.	2022
Hydrogen and Biochar from Cereal Straw using the ECHO2 Pyrolysis	Grains Research and Development Corporation	This feasibility study report is the outcome of the combined ITP / RBE team's investigation of the BRII challenge posed by the Grains Research and Development Corporation for "Turning farm crops into a renewable hydrogen source"	2021
Large scale hydrogen storage in vertical shafts	The Environment, Planning and Sustainable Development Directorate (EPSDD) - ACT REIF	ITP Thermal working together with Abergeldie Complex Infrastructure are progressing a business initiative to develop and commercialize a low-cost approach to storing large volumes of hydrogen. This technology takes advantage of established mining techniques and is based on the concept of vertical shaft blind boring. The scope of work is centered on the advancement of the detailed design of a pilot storage system and its commercialization	2021
Green Gas Trading - a tool for a zero emissions ACT	The Environment, Planning and Sustainable Development Directorate (EPSDD)	This report was commissioned by the ACT Environment, Planning and Sustainable Development Directorate. It provides an analysis and review of Green Gas (specifically, biogas and renewable hydrogen) trading mechanisms and their applicability in the ACT.	2020

Integrating Solar Thermal to the Bayer process	University of Adelaide / ARENA	This project will enable concentrating solar thermal (CST) energy to be integrated into the energy-intensive 'Bayer' refining process. With a consumption of almost 160 PJ/a, the Bayer process is Australia's largest consumer of natural gas for process heat. CST offers the sector the potential to reduce exposure to rising prices of gas, a higher quality product and access to new markets for low-carbon products	2020
Pre-Feasibility Study for CSP Plant at Wentworth, NSW, Specification and procurement assistance of AWS, Preparation of public document	Quasar Energy Pty Ltd	Preparation of the pre-feasibility study for a 100 MW CSP plant to be constructed in South-West NSW. The study included the analysis of the evolution of the electricity market in the next 30 years in order to better assess future revenues for the plant.	2020
Renewable Energy Options for Asphalt Mixing Plant	Southern Asphalt Services Pty Ltd	Analysis of the renewable energy options for the substitution of natural gas as source of heat (12 MW) for an asphalt mixing plant. The options analysed include biomass, solar thermal, solar PV and green hydrogen.	2020
ARENA R&D Synthesis (A270)	Australian Renewable Energy Agency (ARENA)	This document is the public summary report of the Solar R&D Synthesis review which examined ARENA's portfolio of solar research and development as well as pilot-scale demonstration projects.	2019
Design and cost optimization of Underground gas (hydrogen) storage, Advancing solar energy storage with ammonia	Environment, Planning and Sustainable Development Directorate, ACT	The project was focused on underground gas storage (in particular hydrogen). This technology is based on the storage of compressed hydrogen in underground vertical shafts, taking advantage of an established drilling technology from the mining industry. Using the rock surroundings as the pressure bearing element, high pressures can be	2019

		achieved without the use of costly materials and technologies.	
Energy Efficiency and Renewable Energy Options for food manufacture	Snack Brands Australia	The Snack Brands Australia (SBA) Blacktown site is a large user of gas and electricity for the manufacture of potato chips and other snack products. SBA alongside the Australian Renewable Energy Agency (ARENA) jointly engaged Out Performers, with the support of IT Power and Balance Energy, to assist with improving energy productivity on the site. The overall objective of this study was to look for a step change reduction of greater than 30% in energy costs for the Blacktown site, with a simple payback of 7 years or less.	2019
LCOE forecast for CSP in comparison with other technologies	Australian Solar Thermal Research Institute	This report was prepared for the Australian Solar Thermal Research Institute (ASTRI) to compare some relevant dispatchable options to CSP systems using the previous ITP analysis and also to consider the comparison with the results from GenCost 2018.	2019
Renewable Energy Options for Industrial Process Heat	Australian Renewable Energy Agency (ARENA)	ITP in conjunction with Pitt & Sherry, the Institute for Sustainable Futures, Sustainability Advice Team and Beyond Zero Emissions analysed the opportunities for industrial users to switch to renewable energy alternatives to provide process heat. Technologies analysed include renewable hydrogen, bioenergy, geothermal, solar thermal	2019
Review of Aalborg-CSP study of solar thermal cogeneration plant for Tatura milk industries	Vic govt Development, Environment, Land, Water and Planning	The Victorian state government Department for Development, Environment, Land, Water and Planning ("DELWP") has entered into a funding agreement with Aalborg CSP, to explore the feasibility for concentrated solar thermal power to provide 100% renewable energy for large scale food processing sites in Victoria. One of the sites the Victorian government has engaged	2019

		with is Tatura Milk Industries processing facility in the town of Tatura, Victoria.	
Solar driven combined cycle power system with thermochemical energy storage (A0164)	Australian National University	Techno-economic analysis of an advanced thermochemical energy storage system based on Manganese / Iron oxides for application to combined cycle power blocks	2019
Techno-economic review of distributed renewable ammonia production	Grains Research and Development Corporation	This report was commissioned by GRDC. The aim is to analyse the techno-economic feasibility of distributed renewable ammonia production via electrolysis and biomass gasification. It provides technology and cost overviews and resulting levelised costs of renewable ammonia for conditions pertinent to grain growing regions in Australia.	2019
Comparison of dispatchable Renewable Electricity Options	Australian Renewable Energy Agency (ARENA)	The Australian Renewable Energy Agency (ARENA) commissioned a team led by the ITP working with The Institute of Sustainable Futures and ITK Consulting to examine the various options for providing dispatchable renewable electricity generation. ITP investigated hydrogen storage as an option for competitive dispatchable energy storage when integrated with variable renewable generation and identified a pathway of integration of hydrogen production with the national electricity market	2018
Concentrating Solar Thermal Power Technology Status	Jeanes Holland and Associates / Australian Renewable Energy Agency	ITP prepared a comprehensive review of Concentrated Solar Power technology to inform a CSP Roadmap for Australia. The report covers both technology status and trends as well as market related topics including cost and deployment developments key commercial players, services, and benefits of CSP and performance simulations for Australia.	2018

Hydrogen research & development in South Australia	South Australian Department for Industry and Skills (DIS)	ITP was commissioned by the Chief Scientist in the South Australian Government to provide a public report on existing hydrogen R&D capability in South Australia and opportunities to maximise this capability given local, national and international expertise and current and future hydrogen project and industry developments. ITP demonstrated internal subject matter expertise on the hydrogen sector, including local hydrogen market and industry development	2018
Interface Solar Thermal Feasibility Study	Interface Australia Pty Ltd	Previous analysis funded by the NSW Clean Energy Strategies for Business Program conducted by ITP provided an overview of renewable energy options including onsite solar PV, bioenergy options (including gas offsets) and onsite thermal options. The feasibility study for the design, specification and costing of integrating a roof mounted solar thermal system into the carpet production process.	2018
TMI Solar Thermal Feasibility Review	Outperformers Pty Ltd	Aalborg CST have made a proposal to supply solar process heat to Tatura Milk Limited (TMI). They presented TMI with a cost proposal (August 2017) and a financial proposal (2018) as justification. TMI engaged Out Performers, in partnership with technical experts ITP, to assess its viability.	2018
Integrated Renewable Energy Technology (IRET)	Integrated Renewable Energy Technology Pty Ltd	Integrated Renewable Energy Technology (IRET) has plans to develop a solar thermal facility with storage for research and demonstration purpose. The client has a Compact Linear Fresnel System partly installed within the project site.	2017
Assessment of solar thermal collector suppliers	QER Pty Ltd	QER Pty Ltd are developing a shale to liquids project at a site near Gladstone in Queensland. The as-mined oil shale has a high moisture content that is in excess of that required at the	2016

for application to shale drying		inlet to the high temperature pyrolysis process. In a previous investigation, ITP has examined a range of solar thermal options and a concept of low temperature shale drying within a covered stockpile was suggested. This report collates and analyses information from potential solar thermal collector suppliers.	
Concentrating Solar Fuels Roadmap (A0118)	CSIRO	ARENA supported study that examines solar thermal production of renewable and hybrid substitutes for oil and gas.	2016
Renewable Thermal Energy for Victorian Industry	Victorian Government Department of Economic Development, Jobs, Transport and Resources	This report was commissioned by the Victorian Department of Economic Development, Jobs, Transport & Resources, to provide insight into the barriers to, and opportunities for, renewable thermal energy uptake in Victoria. The outcomes of the study are to be the basis of a program to remove barriers and encourage uptake.	2016
Thermochemical storage with Anhydrous Ammonia (A0145)	University of California and Los Angeles (funded by DOE)	Working in partnership with University of California on progressing the ammonia based thermochemical energy storage system to meet the SunShot cost target	2016
Kogan Creek Solar Boost Prefeasibility	SMEC	The Kogan Creek Solar Boost project is a project by the Queensland based electricity generator CS Energy Pty Ltd that is intended to provide 40MWe of equivalent solar thermal power generation via injection of superheated steam to an existing coal fired power station.	2015
Optimisation of economic return for a Molten Salt Tower CSP Plant (A0137), Assistance with	Alinta Energy	Assistance with Alinta's ARENA funded study of a tower plant for Pt Augusta.	2015

weather station purchase			
Renewable Energy Options for Industrial gas users	Australian Renewable Energy Agency (ARENA)	A major study of options for substitution of natural gas use for process heat and feedstocks motivated by projected increases in gas prices. Gas use by temperature and industry segment is used to set the boundary conditions of the opportunity for renewable energy solutions. The study analyses in depth; Solar Thermal, Biomass, Geothermal and Heat pump options. Capital costs and performance are investigated leading to results for levelised cost of process energy. The non-technical barriers and concerns of gas users are also examined in detail.	2015
Solar thermal options for an industrial process	QER Pty Ltd	Queensland Energy Resources Pty Ltd (QER) are developing a major project for processing shale oil to transport fuels at a mine site near Gladstone in mid-north Queensland. QER hired IT Power to carry out an initial screening of options for employing solar thermal technologies. The cost, land area requirements and annual performance of the systems needed to meet the loads of up to 100MWth have been considered.	2015
Pathways to Solar Thermal Electric cost reduction (A0151)	Abengoa Solar Power Australia Pty Ltd	Abengoa Solar received funding from the Australian Renewable Energy Agency to carry out a detailed feasibility study for a 20MWe molten salt tower plus heliostat Concentrating Solar Power system. The site chosen was a fringe of grip location near the Western Australian town of Perenjori. The study produced an accurate cost estimate of a first of a kind below optimal sized system. IT Power was engaged to interpret this figure and project the implications for larger Nth of a kind project in Australia	2014

Solargas India Study	CSIRO	CSIRO has worked for many years on the development of a technology for steam reforming of natural gas using solar energy. Their technology employs a catalytic high temperature reactor at the focus of a tower system with a heliostat array. The product gases are a mixture of hydrogen and carbon monoxide (syngas) which is a valuable energy enriched gas mix used for a range of industrial applications. This project is a feasibility study that examines applications, solar resources, and techno economic performance of applying the technology in India.	2014
Technical Assessment of Ripasso Energy Dish Stirling Technology	Ahlstrom Capital	Technical and business assessment of technology for potential investor	2014
Assessment of Vast solar CSP technology	Vast Solar	Independent assessment of the techno economic potential of new CSP tower plus energy storage technology. The prototype system was assessed, performance modelling investigated, manufacturing processes examined, and overall economic models audited.	2013
Australian Companion Guide to SAM for CSP (A0103)	AUSTELA	Produce a set of project files and cases, solar data files and user guide so that first time Australian users can use SAM to best advantage to demonstrate and investigate the technical and economic performance of CSP systems in Australia.	2013
Background paper on Solar conversion of Brown coal (A0102)	BCIA	This high-level scoping study examined the techno-economic plausibility of using solar energy to convert Brown Coal to syngas for the production of synthetic crude oil.	2012

Background paper on value proposition of CSP systems with storage (A092)	Solar Reserve LLC	A major provider of tower-based CSP system with molten salt energy storage commissioned a back ground review of the various sources of revenue value that such a system could potentially access.	2012
Realising the Potential for CSP in Australia (A079)	Australian Solar Institute	A comprehensive review and strategy for the uptake of Concentrating Solar Power in Australia	2012
Concentrating Solar Power in India	Department of Climate Change and Energy Efficiency	Opportunities, Barriers and Policy Options for Concentrating Solar Power in India	2011