

Solid Waste to Energy

Capability Statement

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION



About GHD

The infographic is a grid of 10 rows and 4 columns. Each row features a central grey box with a statistic, surrounded by images illustrating various GHD services and projects. The statistics are: 135+ countries, 200+ offices worldwide, 90+ years in operation, 10000 people, 2018 revenue: AUD 1.9 billion, serving 5 global markets, and 75+ service lines.

providing engineering, architecture, environmental and construction services

services to **135+** countries

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For more information, visit www.ghd.com

Introduction



Two of the world's key sustainability issues are managing waste and minimising climate change. This necessitates improved waste management and developing energy sources with lower greenhouse gas emissions. Waste to energy contributes to addressing both.

As waste generation continues to rise there has been an increasing emphasis on management of waste and prioritising actions in line with the waste hierarchy. This change in perspective underpins efforts to divert waste otherwise destined for landfill and drives effort towards increased recycling and more efficient waste management.



With renewed focus on pollution reduction and resource conservation comes acknowledgement of the need to reduce the amount of waste ending up in landfills where the embodied energy and utility value of many useful resources are lost.

Climate change is a key driver for consideration of cleaner energy generation to replace fossil fuels and lower carbon emissions. Waste can generate renewable energy for power or heating, displacing fossil fuels.

It is clear that waste to energy technologies will continue to play an important role in an evolving and more efficient waste management industry, aligned with international emission reduction obligations and the need to meet national greenhouse gas targets.

At GHD we have extensive experience in designing and implementing energy projects across Australia and overseas. Our experience covers early strategic options assessment, through project development, design and construction services, to end-of-life engineering. Specialist services include energy resource evaluation, regulatory approvals, plant design, grid connection and project management.

GHD provides innovative approaches to energy from waste, biomass and cogeneration plants, as well as other renewable and hybrid energy projects.

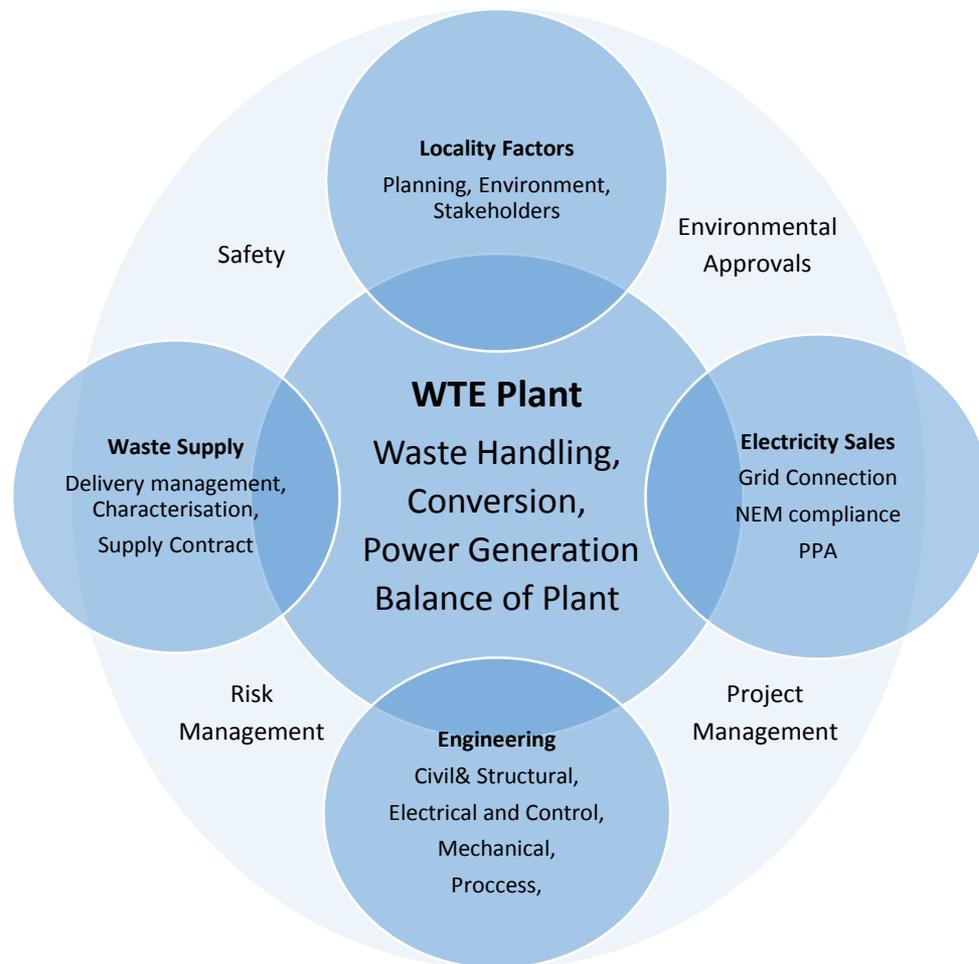
GHD offers whole of life and whole of asset capability over the following three waste to energy sectors:

- Solid waste to energy (thermal conversion for electricity or heat)
- Biogas utilisation (digester gas, landfill gas)
- Waste to fuel preparation and handling (RDF, SRF, PEF, etc)

Whole of Plant Capability

GHD provides services in many different areas relevant to WTE projects. These include but are not limited to:

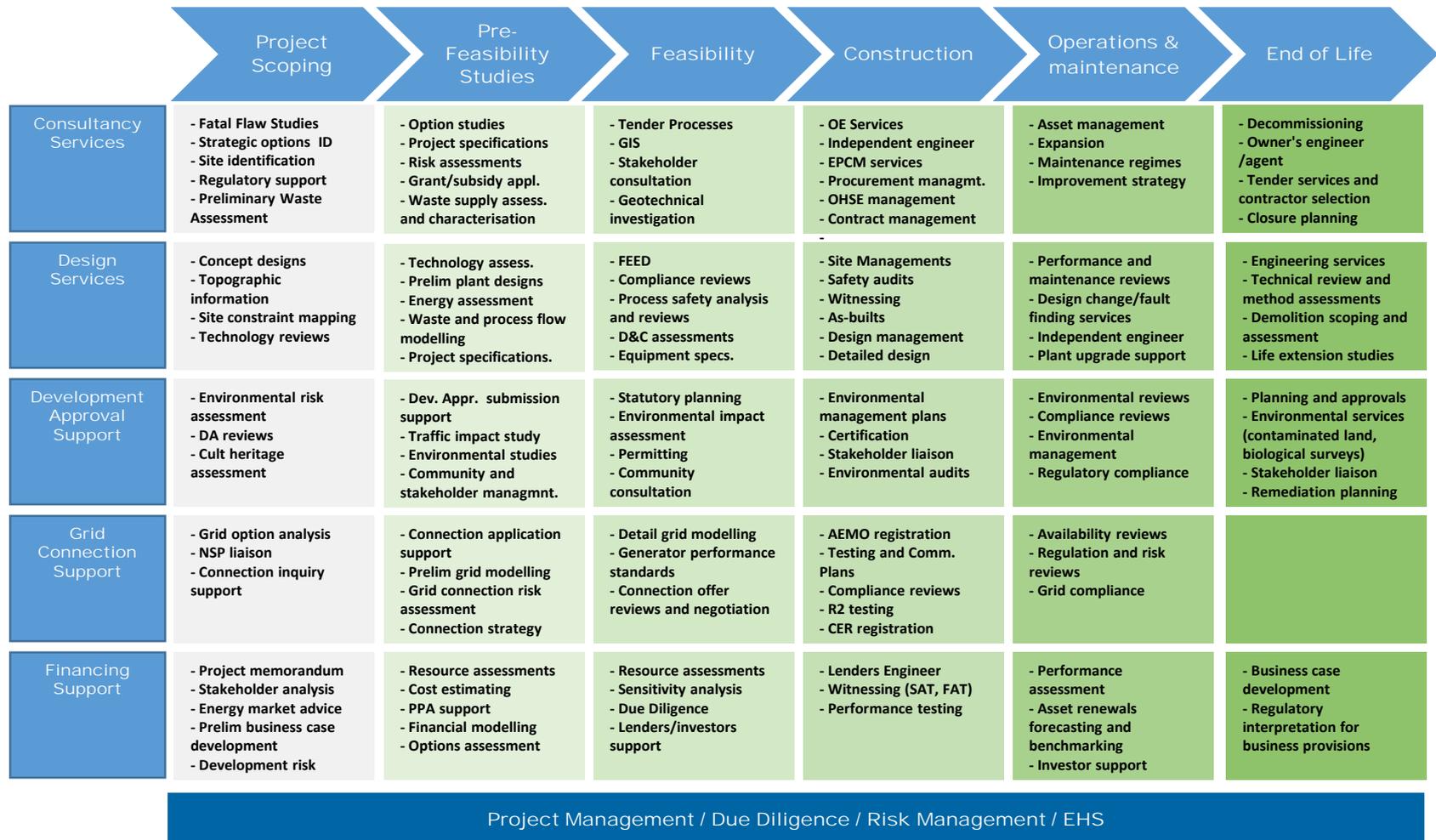
- Air & Noise
- Asset Management
- Building Services Engineering
- Construction Contracting
- Contamination Assessment and Remediation
- Decommissioning, Closure & Rehabilitation
- Design Documentation
- Geotechnical
- HSE Systems & Industrial Hygiene
- Impact Assessment & Permitting
- Instrumentation & Control
- Investment, Policy & Economics Materials, Process & Plant Engineering
- Power Distribution and Industrial
- Power Generation
- Project and Construction Management
- Risk & Assurance
- Stakeholder Engagement & Social Sustainability
- Structures Transportation Planning and Traffic Engineering Waste Management
- Wastewater and Stormwater Collection Systems



For more information visit <https://www.ghd.com/en-au/services/services.aspx>

Whole of Life Services

From market studies and strategic advice, network connection through to construction-phase services and technical due diligence, GHD has the capability and experience to support WTE companies throughout the full life cycle of their projects



WTE Experience



	Project	Job Scope
	<p>Hull Gasification Project, Galliford Try</p>	<p>Galliford Try were appointed D&C contractor for three fast track Waste to Energy plants, currently under construction in England and Wales. Using gasification as an advanced conversion technology, the plant will process wood chip biomass waste and steam produced will drive a turbine to generate 11.6MW of electricity with an export capacity up to 10MWe. Similar projects are being completed in the UK for the same client at Barry (South Wales) and Boston(Lincolnshire). GHD were retained by GT to provide detail design of the three plants. GHD has completed multi-disciplinary design for all aspects including waste reception, foundations, buildings, building services, steam plant and balance of plant.</p>
	<p>Ferrybridge Multifuel 1, SSE / Wheelabrator, Knottingley, West Yorkshire (UK)</p>	<p>Ferrybridge Multifuel 1 (FM1) is a £300 million thermal power plant located at Ferrybridge Power Station in West Yorkshire. The plant is capable of generating around 68 MWe using a range of fuels sources, including waste-derived fuels from various sources of municipal, commercial and industrial solid waste. GHD services included concept development, specification, tender assessment, support for negotiations with shortlisted contractors, owner's engineer, secondment of engineers, specialist engineering support throughout the construction and commissioning phases.</p>
	<p>WtE Technology Comparison - Confidential Client, Vic</p>	<p>GHD was engaged by a confidential client to undertake technology comparison for a large scale WtE project in Victoria to process MSW for steam and 35 MW of electricity. The WtE options compared were circulating fluidised bed, bubbling fluidised bed and moving grate technologies.</p>
	<p>WtE Tender Design - Confidential Client, Victoria</p>	<p>GHD was engaged to provide design services to an EPC contractor to assist with tender preparation for a large WtE project in Victoria. Based on moving grate technology, the design covers balance of plant and power block.</p>
	<p>Alternate fuels project – Confidential client, Melbourne Vic</p>	<p>GHD was engaged to evaluate feasibility of converting a food industry business in Victoria from gas-fired boilers to a 30 Mwt biomass fuelled steam generation system. The study required sourcing a range of alternative fuels, and modelling capital and operating costs, from waste-derived shredded wood, solid recovered fuel (SRF) and agricultural residues.</p>

WTE Experience



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	<p>Devonport EfW CHP Facility, Plymouth - Kier / MVV Energie / South West Devon Waste Partnership</p>	<p>Galliford Try were appointed D&C contractor for three fast track Waste to Energy plants, currently under construction in England and Wales. Using gasification as an advanced conversion technology, the plant will process wood chip biomass waste and steam produced will drive a turbine to generate 11.6MW of electricity with an export capacity up to 10MWe. Similar projects are being completed in the UK for the same client at Barry (South Wales) and Boston(Lincolnshire). GHD were retained by GT to provide detail design of the three plants. GHD has completed multi-disciplinary design for all aspects including waste reception, foundations, buildings, building services, steam plant and balance of plant.</p>
	<p>Derby & Derbyshire Waste Treatment Facility - Interserve / Resource Recovery Solutions</p>	<p>GHD was lead designer for this Private Finance Initiative energy from waste plant comprising materials receipt, bio-drying, recovery and treatment, odour control, dust control, waste gasification and steam turbine. Our design for the site, buildings and infrastructure is to BIM Level 2 and includes fire detection and protection, noise control, and the integration of process designs for bio-oxidation, mechanical pre-treatment and gasification plant</p>
	<p>Runcorn Thermal Power Station - MWH / Viridor</p>	<p>This combined heat and power facility uses pre-treated Refuse Derived Fuel produced from non-recyclable wastes. It generates up to 70MW of electricity and up to 51MW of heat for exclusive use by nearby chlorine and PVC manufacturing plants. GHD carried out dynamic analysis of turbine bases and designed critical substructure elements including cooling tower basins and culverts, transformer pens and substations, and a 17m high 70m long fire wall.</p>
	<p>Confidential Client Lenders technical advisory services</p>	<p>GHD is providing technical advisory services to the lender of three operating energy from waste plants. As part of our services, we review and advise on all aspects of each of these plants, including health and safety management on site; commercial aspects of waste supply and energy sale (electricity and heat); the technical aspects of planned and unplanned outages; plant performance and capital improvements; regulatory compliance and public interface. A key element of our work is to advise on the projects' financial models, so helping with ongoing management of the loan agreements.</p>
	<p>Biochar WTE Technology Vendor Identification – Ballina Shire Council</p>	<p>Global identification, evaluation and shortlisting of suitable technology providers for a plant to convert 18,000 tpa of council waste into 7,000 tpa biochar and produce 1MW of electricity.</p>

WTE Experience



Project	Location	Job Scope
Cayman Waste PPP Project	Grand Cayman, Cayman Islands	TA support for 25 integrated waste management contract including 80,000tpa WTE facility
Coventry and Solihull Waste Disposal Company - WTE	Coventry, UK	Rebuild valuation of plant and equipment for 300,000tpa WTE facility including electricity and local district heating network supply
DSEAR compliance review, Dundee Energy Recycling Limited	Dundee, UK	TA support relating to DSEAR compliance, including management of recommendations implementation
Hertfordshire Waste PFI Project-Shanks Wheelabrator Consortium	Hertfordshire	TA support for 25 year residential waste management contract including 320,00tpa WTE facility
Leeds Residual Waste Treatment Project – Veolia Environmental Services and Leeds City Council	Yorkshire, UK	IC of an integrated waste treatment facility including WRF and WTE plant, which went into commercial operation in 2016
Margam Waste Wood Energy Recovery Project	South Wales, UK	Development-phase technical advisor, supporting both the investor, and ultimately, the developer in the final stages of development of this nominal 40MWe waste wood ERF
Newport WTE Facility - Veolia Environmental Services	South Wales, UK	Technical DD of a proposed WTE facility in support of the bidder's commercial proposal to the local authority
Philippines WTE	Manila, Philippines	Technical/engineering review of the proposed advanced conversion technology for the recovery of energy from a range of waste feedstock
Port Clarence Waste Wood Energy Recovery Facility	Teesside, UK	TA support to the investor and developer during the final stages of development of a nominal 40MWe waste wood ERD
Saudi Aramco Eastern Province Waste Project	Dhahran, Saudi Arabia	Technical and commercial feasibility study of multi-site WTE solution for Saudi Aramco Eastern Province
SELCHP	London, UK	Lender's technical advisor in operational phase, supporting the ongoing management of the projects financial model through review of plant operation, maintenance and capital works
Wolverhampton and Dudley EfW facilities	Various, UK	Lender's technical advisor in operational phase, supporting the ongoing management of the projects financial model through review of plant operation, maintenance and capital works

For More Information



Steve Bond

Service Group Manager – Power

Steve brings with him over 27 years of international engineering and project management experience across many configurations and phases of power generation projects. Following an initial 11-year period holding several roles with a major international EPC / Boiler Contractor delivering power and steam generation projects across Europe and Asia, Steve has been providing consultancy services to the global Power industries associated with project development; concept, feasibility and detailed studies; life extension assessments; plant enhancements; technical due diligence and modification works associated with changes in operation.

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Paul Wootton

Waste to Energy Specialist - Australia

Paul has over 30 years' experience in process industries, the last 19 of which were in the development, design and implementation of both fossil fuel and renewable power projects. His primary role has been engineering management of multi-discipline project teams, but also has experience in project development, project management, environmental licensing, project approvals and technical development of innovative technology.

Paul has particular experience with non-utility applications, including power from waste biomass sources such as landfills, biodigesters and thermal plants. He worked with the waste management industry for over 10 years.

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David Maunder

Waste to Energy Specialist - UK

David has an extensive track-record in the power generation, renewable energy and waste management sectors. He has substantial commercial experience that is built on an engineering background. He has worked in capital project development, in manufacturing industry, in policy support for governments, and in the management of research, development and demonstration programs.

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