EQTEC
(EQT LN)

27 April 2022
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Price (p)	0.85
Shares in issue (m)	8,599
Mkt Cap (£m)	73
Net debt (£m)	-6
EV (£m)	67
BVPS (p)	0.5

Share price performance

1m	-22.7%
3m	-17.5%
12m	-56.4%
12 m high/low	2/0.7
Ave daily vol (30D)	23,152k

Shareholders

Altair Group	17.3%
Choksy K	7.8%
Capita Plc	6.0%
Amati	5.0%
Chelverton	2.8%
Premier Miton	2.1%
Mendez Yoel	2.0%
Majedie	1.1%
Joseph Mike	1.0%
Total for top 9	45.0%
Free float	79.4%
Source: Bloomberg	*26 Apr 22*

Next news Ints Q3

Business description
Technology innovation company producing clean syngas for baseload power and biofuels applications.

IT'S A GAS

EQTEC is delivering reliable projects in the waste and biomass gasification space with an unrivalled operating history with over 120,000 hours of operation under its belt. Demand is growing as alternative solutions to both waste disposal and biomass treatment gain support and the company is clearly gaining traction. We initiate coverage with a central valuation of 3.5p.

Operating experience and process knowledge

EQTEC has now operated a gasification project for over 120,000 hours and has built up an unrivalled knowledge base of the gasification technology and process. The latter is key to success and includes the company's proprietary kinetic modelling software and a library of over 60 feedstocks, fully analysed and available to de-risk new projects.

Transition to commerciality

The company is undergoing a major transition to commerciality with ten projects currently in construction and twelve under development. EQTEC has built strong partnerships to further develop opportunities, most recently through a collaboration with SEPS of France. The waste industry is seeing both landfill and traditional incineration under regulatory pressure with policy makers looking to advanced solutions. With EQTEC able to offer a negative emissions solution, it offers a genuine solution to the growing need for bioenergy and carbon capture technologies.

Central case valuation of 3.5p per share

Based on a conservative market sizing estimate we value the company at 3.5p per share under our central case. The shares are trading on an EV/Sales multiple of 2.2x against a median peer multiple of 3.5x and well below that of sector leaders. With a strong pipeline there is newsflow potential to create catalysts in the near and medium term in our view.

€,000 Dec	2020a	2021a	2022e	2023e	2024e	2025e
Sales	2,235	9,172	27,906	45,669	66,989	112,368
EBITDA	-4,566	-4,161	1,277	6,475	10,222	22,747
PBT	-5,839	-4,700	414	5,649	9,490	22,078
EPS	-0.1	-0.1	0.0	0.1	0.1	0.2
CFPS	-0.1	-0.2	-0.1	0.0	0.0	0.2
DPS	0.0	0.0	0.0	0.0	0.0	0.0
Net Debt (Cash)	-5,182	-6,189	-1,281	-3,658	-3,969	-18,061
Debt/EBITDA	1.1	1.5	-1.0	-0.6	-0.4	-0.8
P/E	-7.9	-14.4	197.8	14.5	8.6	3.7
EV/EBITDA	-14.9	-16.1	56.3	10.7	6.8	2.4
EV/sales	30.4	7.4	2.4	1.5	1.0	0.6
FCF yield	-11.0%	-24.3%	-6.0%	3.8%	0.5%	19.5%
Div yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

INVESTMENT SUMMARY

EQTEC is a world-leading technology innovation company which converts waste materials into high-quality synthesis gas "syngas", an intermediate fuel which can then be converted into low carbon biofuels (such as hydrogen, synthetic natural gas) or used to generate baseload electricity and heat. The company currently has 5 projects under construction and 12 projects at various stages of development in the EU, US and UK. As the market evolves it will follow a capital light licencing model allowing it to pursue significant demand opportunities without the need for major new investment.

Enviable operating history

EQTEC has one of the strongest operating histories in the advanced thermal treatment segment of the waste to energy/fuels sector. Its technical team, led by 4 PhDs has been developing the technology since 1997. It has an unrivalled operating history with over 120,000 hours of operation at its Movialsa project in Spain. Given the difficulties faced by rival gasification developers this demonstrates that the company can develop and operate successful projects for clients.

A company that is as strong on process as it is on technology

While EQTEC has a sector leading technology demonstrated by the operating performance we mention above, it also puts as much emphasis on process as on technology. We see this as key to creating and operating efficiently, maximizing uptime and economics at the company's projects.

A leading software solution

Key to delivering process excellence is EQTEC's proprietary kinetic modelling software and control monitoring software. EQTEC has used its experience of almost 60 different feedstocks to create optimal solutions which are fully modelled. The company can provide its clients with the capability to manage their equipment to deliver optimal outcomes with real time monitoring and control.

Targeting opportunities in a vast market

EQTEC can meet the needs of a large and complex market. The size of the opportunity for EQTEC is significant and the company can exploit key opportunities as a distributed solution capable of flexible production. Where projects are designed for power output this allows additional elements to be added to the revenue stack. Additionally, EQTEC can address the growing need for synthetic e-fuels with a syngas product that can be optimised for downstream needs.

Gaining traction with projects today

The recently published full year results show that EQTEC is gaining real traction with five projects under construction and twelve in various stages of development. Most recently the company has entered into a strategic collaboration agreement with French industrial waste company SEPS. A further six project opportunities are now being pursued in France.

BULL POINTS

- Significant opportunities in major markets
- Proven technology with strong operational history
- Proprietary technology and processes based on proprietary systems

BEAR POINTS

- Project funding and development will rely on customers
- Market is still relatively immature
- Other technologies in the sector have had a difficult history

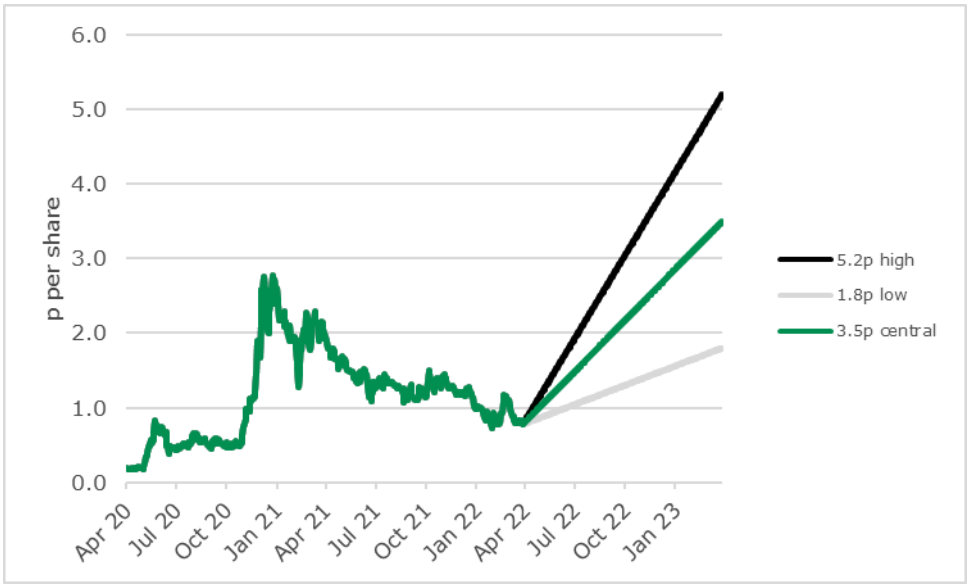
CATALYSTS

- Proving the business model with market development centres
- New project traction
- Further policy developments

VALUATION

Based on a conservative market sizing estimate and a 10% market share we value the company at 3.5p per share under our central case. A lower market share at 5% would give a valuation of 1.8p and 15% would take this to 5.2p. The shares are trading on an EV/Sales multiple of 2.2x against a median peer multiple of 3.5x and well below that of sector leaders.

Share price performance and valuation outlook



Source: Longspur Research, Bloomberg

RISKS

The key risks to our valuations are technology redundancy, competition, policy uncertainty including any stalling of the waste-to-energy economy. Rival technologies could threaten the company's Advanced Gasification Technology, but we do not see them materially displacing the solution. Competition exists but we see EQTEC as having strong defences in IP and historical operating experience. Policy support is favourable, yet can be unstable, and EQTEC's global portfolio of projects increases diversity against this.

EQTEC - COMPANY INTRODUCTION

EQTEC specialises in gasification technology processes which are defined as the thermochemical transformation of carbon rich material into a gas fuel, known as synthesis gas (syngas). EQTEC's Advanced Gasification Technology (AGT) has the capability in directly converting a wide variety of waste materials and feedstocks into an ultra-pure syngas with minimal environmental impact. This syngas can then be used to generate highly efficient baseload or decentralised electricity with gas engines, heat or steam for industrial processes, or produce low-emission biofuels.

EQTEC focuses on the design, development, integration and provision of gasification technology as well as operation and management services for waste-to-energy solutions. Project sizes are typically between 1MW and 30MW of electrical output (or equivalent) and have four defined types of feedstocks: Agri-food wastes, industrial wastes, forestry wastes and municipal solid wastes (including plastics).

STRONG KNOW-HOW BUILT ON A LONG HISTORY

EQTEC began developing AGT technology based on research going back to 1997. As a result, the company has developed extensive proprietary knowhow in syngas composition analysis covering a wide range of almost 60 waste feedstocks, gasification system designs, costing capability, syngas clean-up capability as well as a long history of operating and maintenance experience.

EQTEC has processes for almost 60 different feedstocks in four main categories

- Forestry arisings
- Agricultural waste
- Municipal solid waste
- Industrial waste

These vary in their characteristics with a broad overview shown below.

Feedstock characteristics

	Calorific value (MJ/kg)	Biogenic content	Moisture
Forestry arisings	20	100%	20%
Olive pomace dry residues	20	100%	8%
MSW	10	50%	20%
Industrial Waste	10	50%	20%

Source: Longspur Research

Key developments in EQTEC's history

Date	Announcement
1997	EQTEC Iberia started operations from Spain in 1997
2005	EQTEC PLC (formerly REACT Energy PLC and Kedco PLC) was founded as a developer of bioscience renewable energy projects in the UK and Ireland.
2008	Kedco floated on AIM of the London Stock Exchange on October 2008.
2011	EQTEC built a gasification plant at Movialsa in Ciudad Real, Spain, one of Europe's largest producers of olive products and wine.
2013	The company's name changed from Kedco PLC to REACT Energy PLC to reflect the company's changed business focus.
2017	REACT mergea its project development experience with the technology expertise of EQTEC Iberia and completed a reverse takeover in December 2017. The company was renamed to EQTEC PLC.
May 2019	EQTEC and Scott Bros. entered into an agreement to jointly develop the Billingham, UK project.
June 2019	EQTEC acquired an equity interest in North Fork Community Power LLC for the development of the North Fork, California forestry wood waste project.
Mar 2020	EQTEC entered into an agreement with Agrigas Energy, ECO Hellas and ewerGy at the site in Larissa, Thessaly, Greece, to be the technology, engineering design and installation provider for the Agrigas 1 project.
July 2020	EQTEC signed an exclusivity agreement with Logik to develop the Deeside, UK project. In 2021, a Collaboration Agreement with Logik is signed to develop other projects in UK.
Sept 2020	EQTEC and Rotunda entered into an agreement to jointly develop the Southport, UK project.
Jan 2021	EQTEC together with its German EPC partner ewerGy has signed a MoU with Nobilis Pro Energy for the collaborative development of Nobilis's pipeline of opportunities in Greece, starting with the Almyros Plant.
Jun 2021	Through a consortium with MetalNRG, a publicly-traded UK investing company, and two family offices, EQTEC became the co-owner, operator and provider of gasification technology at a site in Tuscany.
Nov 2021	The Belišće MDC project in Croatia was acquired in a joint venture with Croatian project development partner, Sense ESCO.
Nov 2021	Strategic partnership with Wood to pursue hydrogen and synthetic natural gas opportunities.
Dec 2021	Strategic partnership with H2 Energy Solutions targeting hydrogen opportunities.
Mar 2022	Formal launch of EQTEC business in France in collaboration with SPES

Source: EQTEC

EQTEC has had a slightly complex corporate history but its technology history goes back to 1997 and the company is one of the most experienced in the gasification space. It has a very strong operational track record, operating gasification since 2011 with high availability.

EQTEC IN THE MARKET

EQTEC now has a portfolio of eight projects in seven countries including in the EU, the UK and the USA. These cover a range of feedstock and product outputs although electricity generation dominates. The 5.9MW project at Movialsa in Spain has been operating successfully since 2011. 5MW of capacity are under construction including two market development centres in Croatia and Italy. The 2MW North Fork project represents the company's first deployment in North America. C. 50Mwe of capacity is under active development in twelve projects.

Project portfolio

Project	Location	Power	Waste	Status	Feedstock	Output
Movialsa	Spain	5.9	20,000	Operating	Biomass	CHP
Belisce MDC	Croatia	1.5	8,000	Construction	Biomass	CHP, Biochar
Italia MDC	Italy	1.0	7,000	Construction	Biomass	CHP, Biochar
Larissa	Greece	0.5	3,800	Construction	Biomass	CHP
North Fork	USA	2.0	17,550	Construction	Biomass	Power, biochar
Karlovac	Croatia	3.0	7,500	Development	Biomass	Electricity
Drama	Greece	5.0	25,000	Development	Biomass	CHP
Southport	UK	5.0	25,000	Development	MSW	H2
Deeside	UK	9.9	70,000	Development	MSW	CHP+H2
Billingham	UK	25.0	200,000	Development	MSW	CHP+H2
BMEC	USA	3.0	2,400	Development	Biomass	Power, biochar

Source: Company Data

EQTEC has also built up a track record and has now run the 5.9MW electricity and steam project in Movialsa, Spain for over 125,000 fully audited engine operating hours across a total of three engines.

EQTEC Operational Project Data

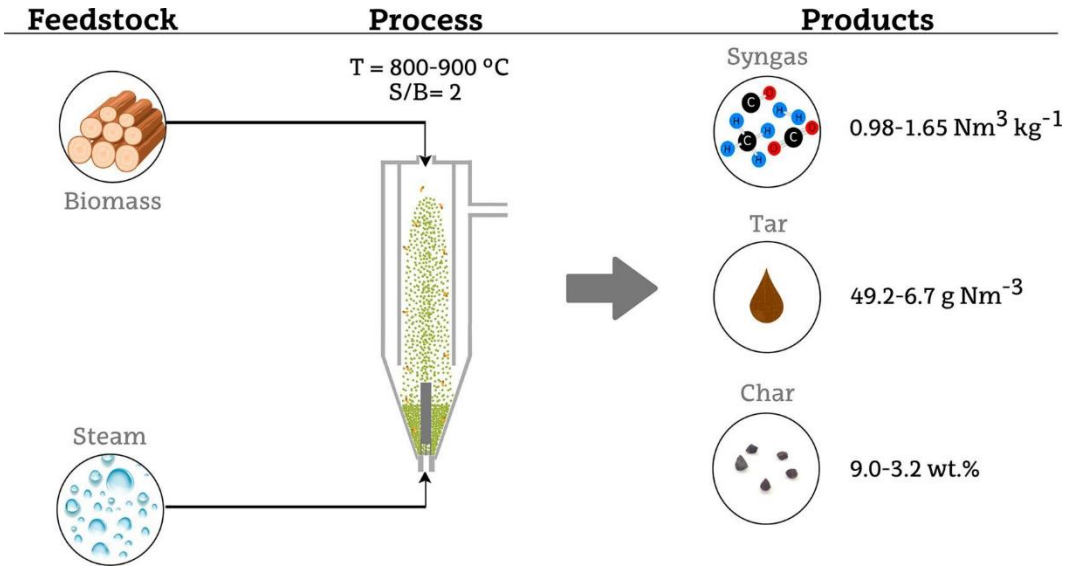
		2015	2016	2017	2018	2019	2020
	hrs/year	8600	7300	7060	7800	7314	8157
Plant availability	%	98	90	90	90	90	93
Plant utilisation	%	98	83	81	89	83	93
Equivalent electrical efficiency	%	45	39	38	39	38	38
Electricity/feedback ratio	kW/kg	1.4	1.4	1.4	1.4	1.4	1.4

Source: Company Data

GASIFICATION

Gasification is a thermochemical process which converts carboniferous fuel to syngas in a series of chemical reactions with the feedstock being heated to a high temperature. Because the syngas can be combusted at a higher temperature than in direct combustion of waste, the process can be more efficient than direct combustion.

Simple Gasification Process Outline



Source: TRI Technology Update & IDL R&D Needs. D. Burciaga Biomass Indirect Liquefaction Strategy Workshop. DOE, March 20, 2014

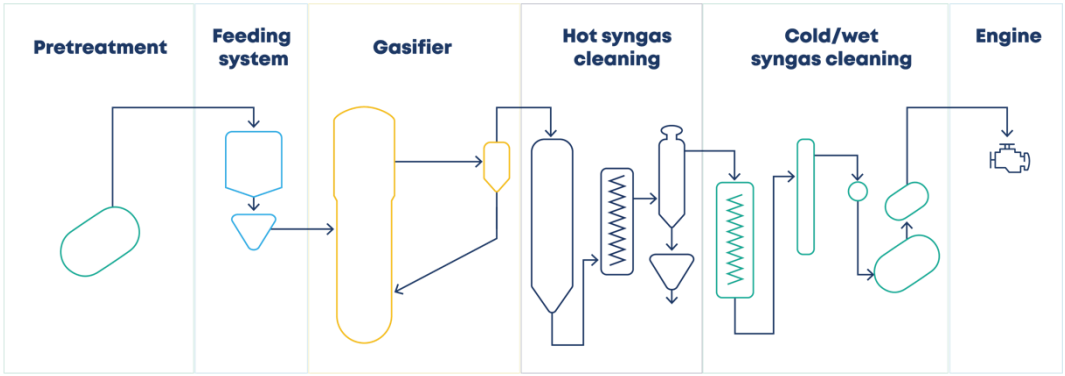
A number of gasification technologies exist reflecting a degree of immaturity in the market although there is now a subset which have delivered reasonable operating lives under commercial conditions. EQTEC's operating history puts it at the top of this group. We see the fact that some others are also beginning to see success as helpful to EQTEC as it gives investors comfort that there is a role for this broad technology.

In gasification, the feedstock materials are transformed entirely to a gas under a high temperature and a highly controlled supply of oxygen or steam,then purified to make a 'clean' syngas that can then be turned into energy sources such as electricity, heat, biofuels and more. This differs from incineration where materials are combusted in the open presence of oxygen.

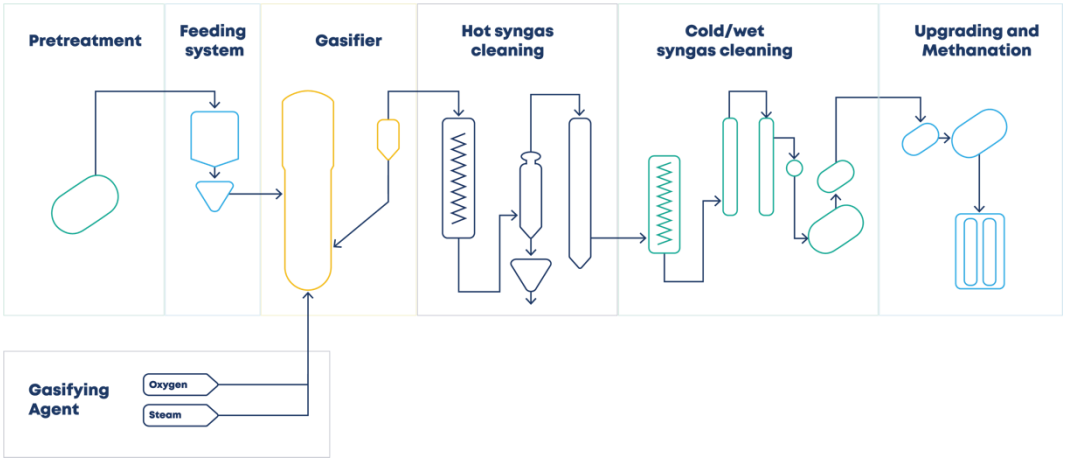
During the gasification process there are many chemical reactions, although the final result is a gas mainly composed of hydrogen (H2) and carbon monoxide (CO) but also including CO2, CH4, C2Hn, H2O, N2, a minority of tars and suspended solid particles. The raw syngas then goes through a hot gas conditioning stage which removes tars followed by cold gas conditioning which results in a very pure syngas. This can then be further processed according to the final application.

EQTEC Gasifier Technology

Biomass-to-power configuration



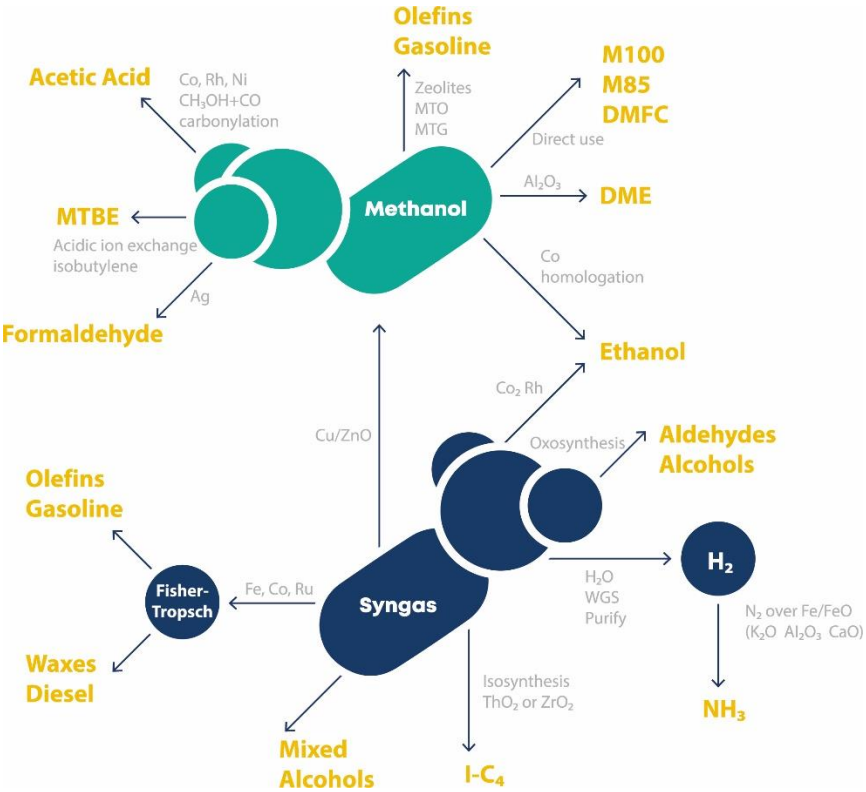
Biomass-to-biofuels configuration



Source: EQTEC

Applications are heat and the generation of electricity with the latter combusting the syngas in a gas engine connected to a generator. Syngas can also be processed into a range of biofuels including hydrogen and hydrogen carriers such as methanol and ammonia. Biomethane can also be produced.

Products available from EQTEC syngas



Source: EQTEC

THE IMPORTANCE OF THE PROCESS

LESSONS FROM OIL REFINING

Process is essential to the gasification process. We see a very appropriate analogy with the process in a petroleum refinery. Both take a variety of feedstocks. The oil industry has to deal with very different types of crude whose make up will affect the running of the refinery. The mix of different crude types in a particular refinery at any one time is referred do as its crude slate.

There is an initial separation phase where the crude is fractionally distilled and this process can be managed to optimise the resulting slate of intermediate products. These see further processing in a conversion stage with heavier distillation fractions in particular being cracked into lighter products using processes including hydrocracking, fluid catalytic cracking, alkylation and reforming.

Finally, finishing treatments including blending and the use of additives are completed to optimise the final products for their intended end use. The refinery will attempt to optimise its mix of products – the product slate – to meet market conditions

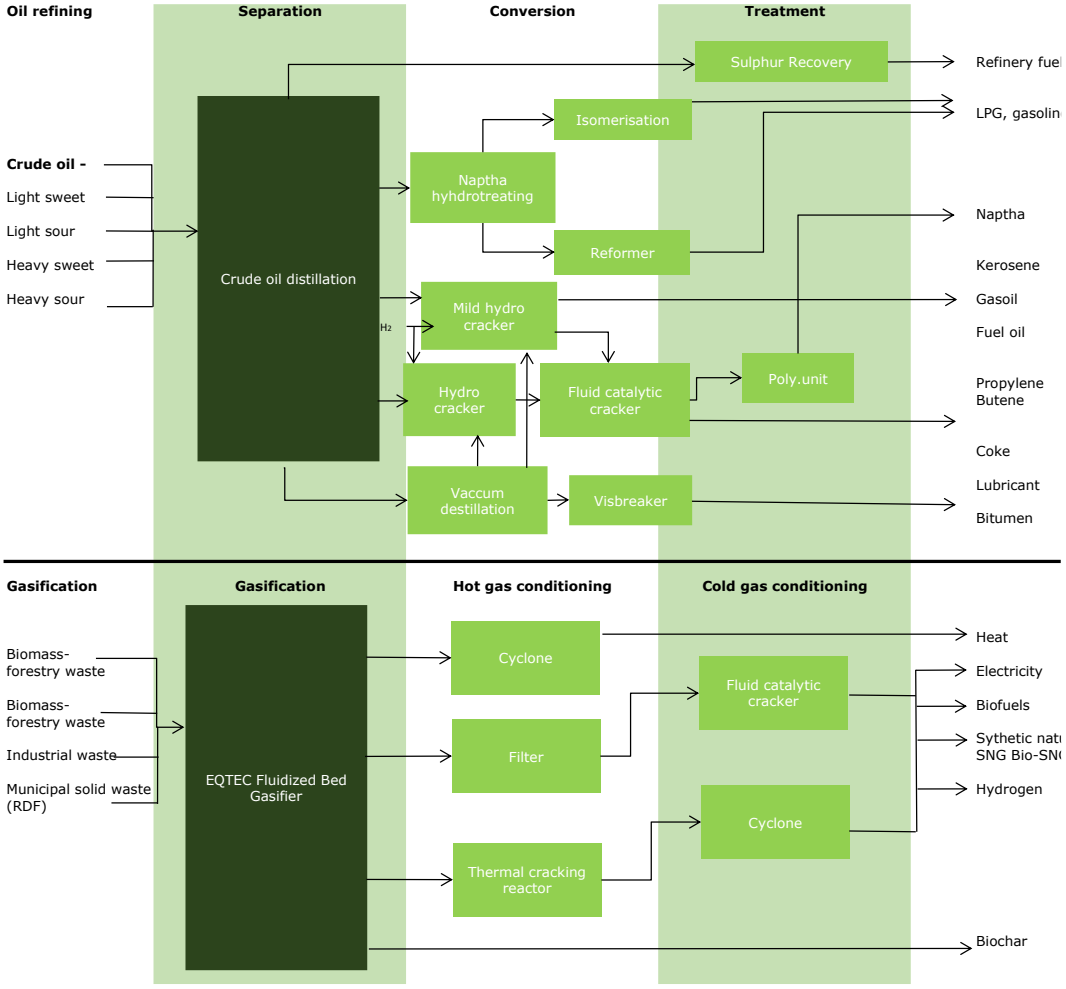
Designing a refinery for the likely crude and product slates is critical. Once constructed, being able to optimise the refinery to take the slate on offer and match it with product demand while maintaining an efficient operation are key to refinery management. Refineries will use a number of optimisation tools including linear programming, logistics scheduling models and process unit simulators.

Similarly the gasification process starts with the core gasification of a variety of feedstock. EQTEC now has processes for almost 60 different types of feedstock. After gasification, hot gas conditioning is similar to the conditioning stage of oil refining. This includes a cyclone filter and a chemical cracking reactor. Finally cold gas conditioning using scrubbing condensers optimises the syngas for its intended downstream use.

Just as with oil refining, optimisation for a particular feedstock and syngas specification can be achieved by active management. EQTEC has an advantage here using its experience and especially its proprietary kinetic simulation software and a proprietary modelling platform. EQTEC focuses on all stages including conditioning where thermal cracking and steam reformation ensure high quality syngas maximising CO and H2 as required.

In terms of project design, EQTEC can offer custom configurations to optimise the use of different feedstocks. The company now has a library of almost 60 fully analysed feedstocks, including thermo-gravimetric and differential scanning calorimetric analysis.

Oil refining and waste gasification compared



Source: Longspur Research

FEEDSTOCK SUSTAINABILITY

The gasification of biogenic material to generate electricity or biofuels can be a major contributor to decarbonisation but this needs some explanation.

Most people understand that if you grow a tree that removes one tonne of CO2 from the atmosphere and then burn it to release that tonne the net carbon impact is zero. Most people also understand that there will always be potentially significant issues of timing and emission losses in this system so that it can at best only ever be low carbon as opposed to zero carbon. This is also true of most decarbonisation solutions to a greater or lesser degree.

Losses

A lot of losses are assumed to come from shipping biomass. For gasification and the EQTEC solution in particular the technology is of a scale that can easily be sited near the source of biomass, nearly eliminating any shipping emissions.

This "proximity principle" is a key component of European waste legislation in Article 16, "Principles of self-sufficiency and proximity", of the revised Waste Framework Directive (2008/98/EC) and EQTEC's solution meets the principal perfectly.

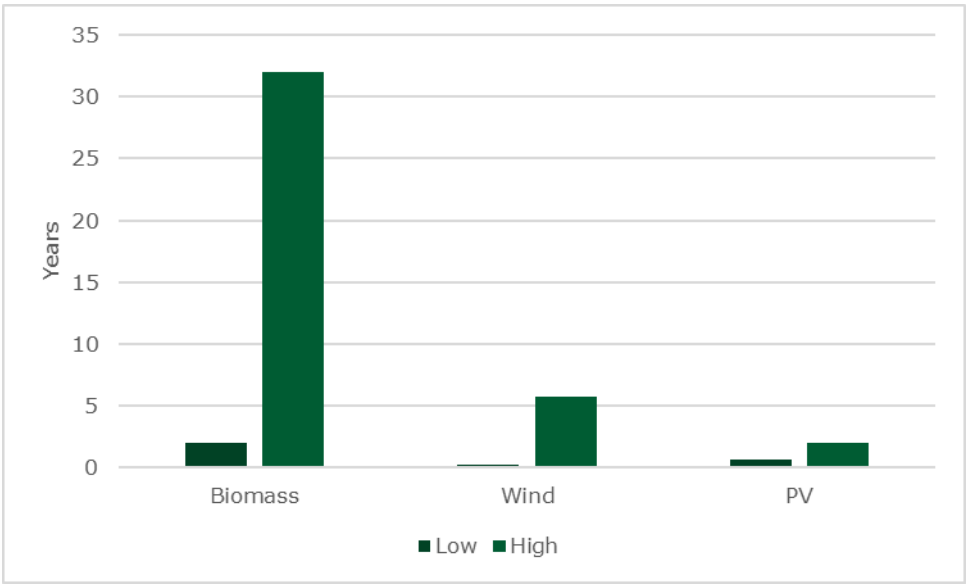
Timing issues

There is a very valid concern about biomass that it takes time to recapture the emissions from burning the tree in new forest growth. This results in a carbon debt, and there is a lot of opposition to biomass based on this concern. Much of this is derived from studies taking the perspective of a single tree of stand of trees. However, forested ecosystems are a system with continual cycles of planting, growing and harvesting.

Recent research (P. Dwivedi, M. Khanna, M. Fuller, Is wood pellet-based electricity less carbon-intensive than coal-based electricity?, Environmental Research Letters, 2019; 14), for a forest using loblolly pine, the carbon payback ranges from 2 to 32 depending on management approach, with the research concluding that convergent management perspectives with wood pellets relative to a no-harvest baseline show a break-even period of about three years.

When we look at the range of payback periods for other low carbon technologies, biomass can be shown to be as beneficial to a low carbon environment as any. Obviously, payback periods will vary from project to project. The values below are believed to be typical and are from a range of academic sources. While badly managed biomass has a long payback period, well managed biomass lies between the range of paybacks for other renewables.

Carbon payback periods



Source: Environmental Research Letters, Longspur Research

Put simply, well managed biomass project can have a lower carbon payback than a badly designed windfarm sited on an upland peat bog. Of course, management is critical.

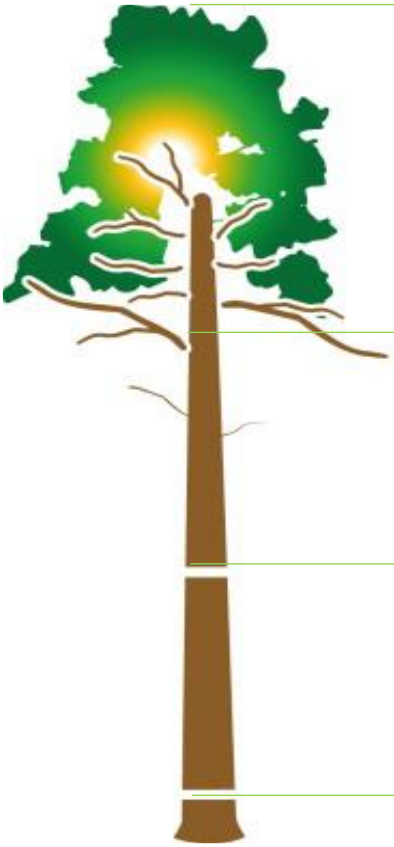
"Studies that assume there is little to no management response, or consider only use of the extensive margin, predict that bioenergy demand will increase carbon emissions (16, 17). Studies that allow efficient investments in forestry management find that bioenergy policies lead to a net increase in forest sequestration (18–22)."

(A. Favero, A. Daigneault, B. Sohngen, Forests: Carbon sequestration, biomass energy, or both? Science Advances, 2020; 6).

We see EQTEC's approach and locations as creating a competitive advantage by focusing on locations where forestry is well regulated and managed. And again, by taking only residual material there is no marginal impact on harvesting or carbon debt.

However even this low break-even period is based on the assumption that the forest is harvested for biomass. In the case of EQTEC this is never the case as only residual material from timber extracted for other industries or forestry clearance is used.

Only using waste biomass



Branches and tops
Low-grade wood
Low-value residual
Used in biomass

Small dimension
Low-grade wood
Low-value residual
Used in biomass

Large dimension
Sawlogs
Premium price, primary market
Used in construction and manufacturing

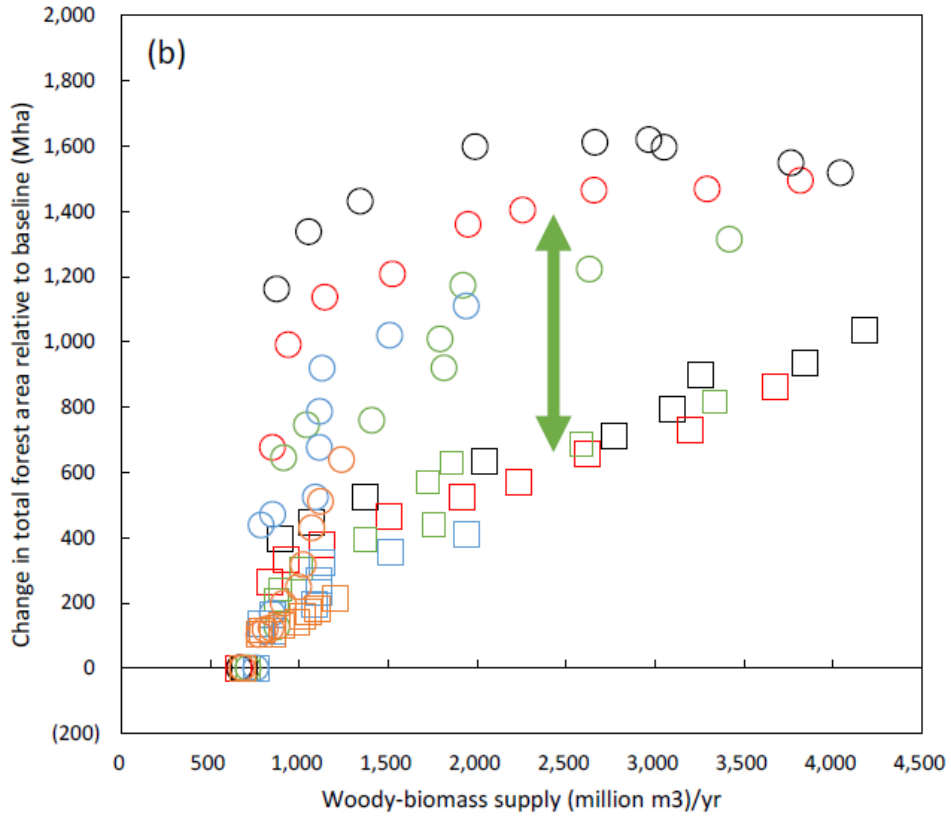
Stumps
Leave to support soil health

Source:Drax Group

MORE BIOMASS MEANS MORE CARBON STOCKS

Recent work has shown that increasing woody biomass supply can lead to an increase in forestland area globally with the amount of increase depending on policy support. (A. Favero, A. Daigneault, B. Sohngen, Forests: Carbon sequestration, biomass energy, or both? Science Advances, 2020; 6). The range of outcomes is from a slight decrease of carbon stocks of 33TgCO2/yr to a large increase of 2,300TgCO2/yr with some policy outcomes resulting in a 75% increase in land in forests.

Carbon sequestration and storage for managed loblolly pine



Source: A Favero, A Daigneault, B, Sohngen, 2020

WHY WASTE TREATMENT CUTS CARBON

When it comes to municipal waste the argument is complicated by the fact the biogenic content of any waste may be as low as 50%. However while gasification technology releases CO_2, it represents a potentially considerable reduction in CO_2 compared to other options for waste treatment – for EQTEC's technology this is typically 25-30% less. As such it is a key contributor through avoided emissions. The biogenic content of waste that goes to landfill will decompose and release methane with a greenhouse gas potential worth 28 times that of CO_2 when assessed over a hundred year period. Simple incineration of this waste is the most common alternative to landfill and by converting the waste into heat and CO_2 the GHG impact is reduced. However the gasification process goes further by also avoiding emissions from electricity and heat generation. If a downstream e-fuel process such as hydrogen production is added, the offset from vehicle emissions makes the CO_2 saving significant.

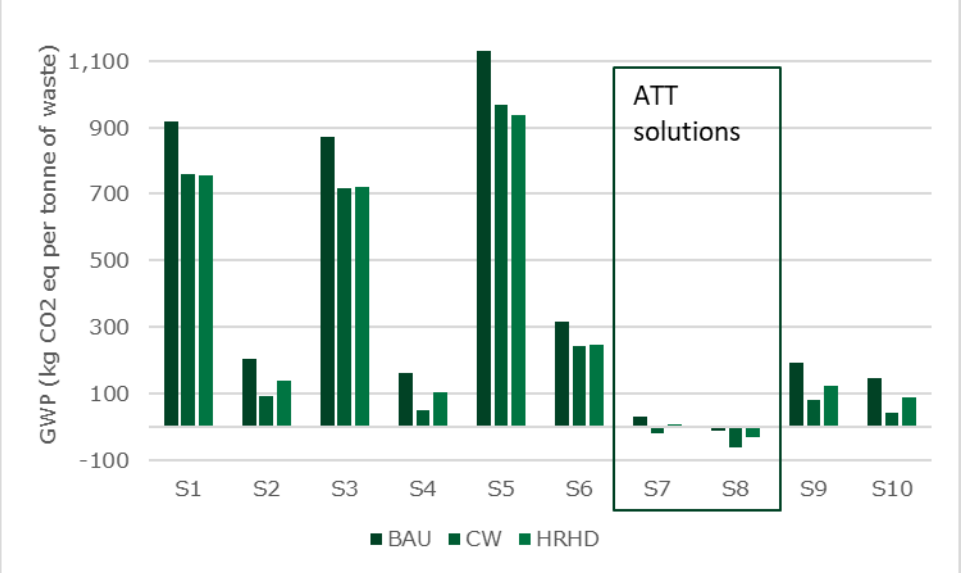
Avoided Greenhouse Gas Emissions

tCO2e per day	Power maximised	eFuel maximised
Emissions from gasification system	70.67	70.67
Emissions offset by electricity production	-33.75	-24.64
Emissions offset by heat production	-22.79	-22.79
Landfill offset	-15.8	-15.8
HGV offset	0	-36.08
Net daily emissions	-1.67	-28.64

Source: Engsolve for Powerhouse Energy

Research by University College London looked at a number of integrated waste management options for treating municipal solid waste arising from the 2012 London Olympics. The results showed that processes that used advanced thermal treatment (ATT) as a significant part of the process had the lowest greenhouse gas emissions in every case they considered. Gasification is one of the leading ATT technologies.

Global warming potential of different integrated waste solutions



Source: UCL

To quote the UCL research:

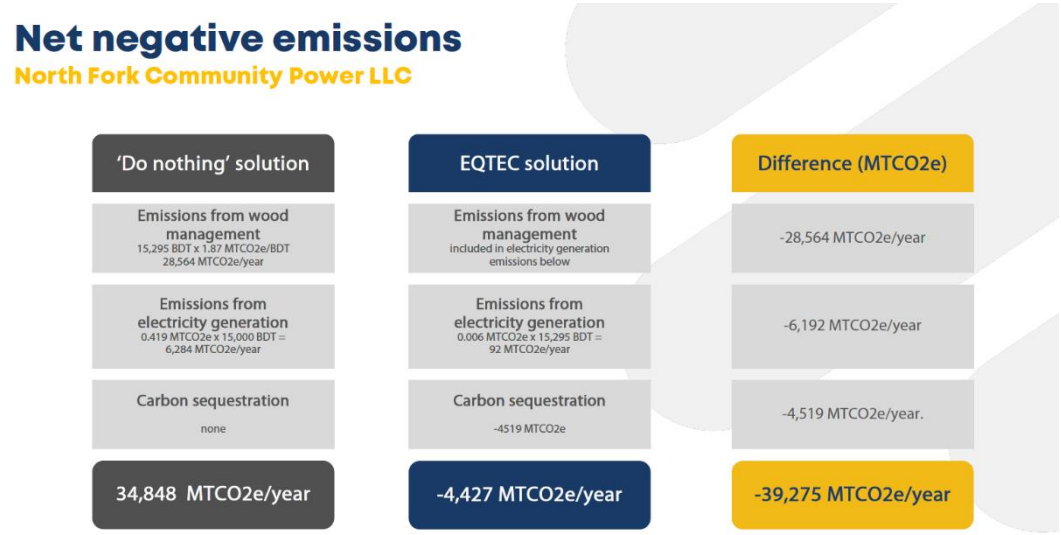
"it can be seen that [integrated waste management strategies] with landfill as the primary waste treatment technology have the highest direct and indirect burdens and the lowest avoided burdens. [Strategies] with Advanced Thermal Treatment as the primary technology have the lowest impacts regarding GWP. These results can be explained by the fact that the amount of electricity generated from landfill gas (0.369 MJ/tonne MSW) is significantly less than the amount of energy generated from the EfW or ATT plants (1.03 and 2.95 MJ/tonne MSW respectively). At the same time, the GHG emissions associated with landfill process are higher than those resulting from other waste treatment facilities."

Notably ATT was a better option than landfill or incineration. While incineration has been a solution in the UK waste industry for over a hundred years, cleaner solutions are likely to be favoured going forward. Additionally further opportunity is likely to be created when existing incineration plants come to the end of their working lives – which in the EU EQTEC estimates represents a potential opportunity of **€20bn** serviceable market for infrastructure replacement and globally of **€30bn** serviceable market for infrastructure replacement.

A NEGATIVE EMISSIONS SOLUTION

EQTEC can go beyond low carbon. It has the ability to configure projects to divert a proportion of their energy to the production of high quality biochar, which consists of 92% or more carbon. Biochar can be used as a soil additive, livestock bedding or stabilizing agricultural slurry. In these applications it represents a sequestration of carbon. EQTEC is pioneering this approach at its North Fork Community Power project in California. The 2MWe project is expected to sequester 4,519 tCO2e a year. We estimate that this represents a negative carbon intensity of -78g CO2e/GJ.

North Fork Community Power Emissions



Source: EQTEC

A BETTER GASIFICATION COMPANY

A number of gasification technologies exist reflecting a degree of immaturity in the market although there is now a subset which have delivered reasonable operating lives under commercial conditions.

Gasification projects in the UK

Site	Size (MWe)	Gasifier	Status
Ince Bio-power	26.5	Outotec fluidised-bed	Operational
Birmingham Bio-power	10.3	Nexterra	Operational
Welland Bio-power	10.6	Nexterra	Operational
Dartmoor Bio-power	4.3	Nexterra	Uncertain
EMR Oldbury	10.0	Chinook Science RODECS	Uncertain
Glasgow RREC	10.0	Energos	Uncertain
AmeyCespa MK	7.0	Energos	Uncertain
Full Circle Energy Facility	15.0	Biomass power step-grate	Uncertain
Energy Works Hull	24.0	Outotec fluidised-bed	Uncertain
Swindon Energy	2.0 (x3)	Refgas fixed-bed	Under construction
Derby RRC	7.5	Energos	Under construction
Advanced Biofuels Solutions	3.5	Plasma gasification	Under construction
Charlton Lane Eco-park	ND	Outotec fluidised-bed	Under construction
Hooton Bio-power	24.0	Kobelco Fluidised Bed	Under construction
Hoddesdon ATT	10.0	Biomass Power Step-Grate	Commissioning
Levenseat EfW	12.5	Outotec fluidised-bed	Commissioning
ETI/KEW Technologies	1.5	Frontline gasifier	Demonstration
Syngas Products Ltd	1.0	Pyrolysis	Demonstration
BAEF Riverside	80.0	Potentially Outotec	Under consultation
Altalto, Immington	-	APP gasifier with FT	Planning received
GoGreen Gas, Swindon	0.05	Plasma gasification	Pilot plant
Progressive Energy/Peel	35.0	Proprietory	Planning received

Source: Supergen Bioenergy

GASIFICATION ISSUES

Gasification of carbon feedstock to produce syngas is not a new technology but has had a difficult history with many projects having failed or been cancelled. Quite a few of these failures were due to factors not connected with the technology itself, with failure to secure reliable volumes of feedstock being a common issue. The main problem areas in the process itself are feedstock variability, operational availability and O&M issues.

Feedstock variability

Feedstock is naturally variable with changes in density, moisture content and calorific value, all potentially leading to problems in gasification. Different feedstocks can have very different compositions and it is important to design the gasification stage for this.

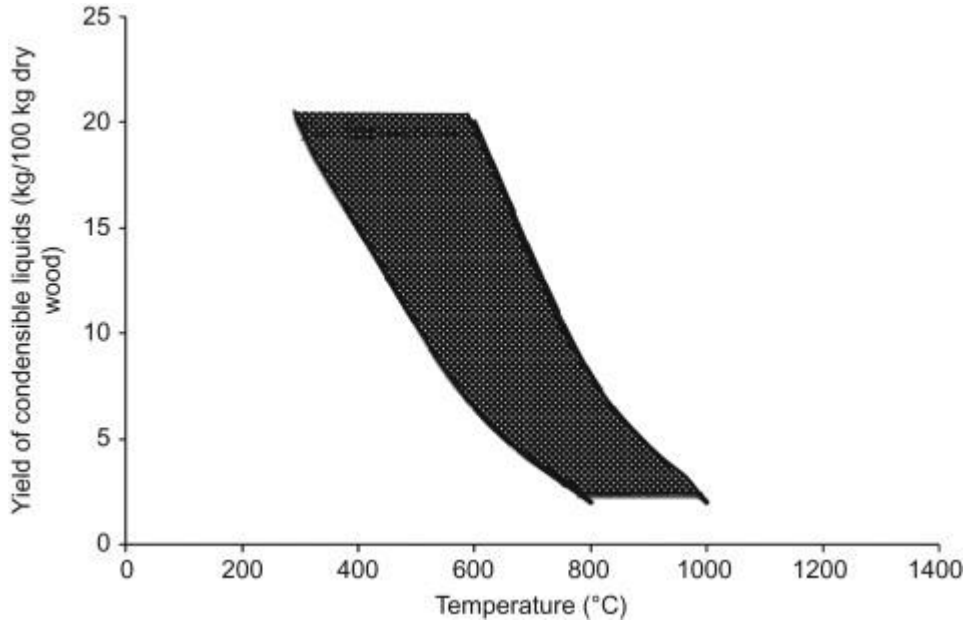
Operational availability

The main problem with gasification is that it needs to be hot enough to prevent the build up of tars but not so hot that any metals react with the sand to create slag. Either event can block up the system leading to considerable downtime dramatically reducing availability. Tar in particular has been the bane of many gasification technologies.

Tar is a complex mixture of hydrocarbons containing a wide range of aromatic substances including benzene, toluene and xylene (BTX) as well as polyaromatic substances. Many of these are carcinogenic. Tars generated by gasifiers of waste feedstock with plastic content may be notably high. BTX and tars can be present in between 1% and 10% of gas exiting the gasifier. Tars cool to form a liquid or semisolid substance that fouls the system.

Tar has been a the major cause of gasifier project failure although it can be managed and minimised by process design. Generally the higher the gasification temperature the less tar is an issue, although this has to be balanced against slag formation at higher temperatures.

Tar Yield by Temperature



Source: Baker, Brown, Elliott, Mudge, AIChE 1988 Summer National Meeting, Denver, CO.

Reactor design has also been a major cause of reduced availability with scaling issues common. Perhaps one of the most high profile gasification failures in the UK was the Air Products project in Tees Valley. While little is officially known about the reasons for the

decision by Air Products to write off this £1bn project, there appears to have been a number of factors including erosion of the gasifier walls and failure of the mechanical handling systems. More importantly the scale up of the system from a 10ktpa demonstrator to a 350kt project was well ahead of a normal experience recommendation of a 10x scale up factor. Other projects with less dramatic scale changes have still found this to be an issue.

O&M costs

The removal of ash and other waste has led to low availability and increased cost in some cases.

WHY EQTEC IS A BETTER SOLUTION

EQTEC's Advanced Gasification Technology has been developed over a long period and has several key characteristics that provide an advantage in the market, notably high operational efficiency, versatility in converting feedstocks and rapid installation characteristics. The EQTEC technology also focuses on proper integration across the process. This is designed as an end to end process with a number of key features.

Computational modelling

EQTEC has developed proprietary kinetic simulation software and a modelling platform. This is essential to allow individual projects to be designed for specific feedstock and product mixes. This also allows modelling of the gasification process in different sizes of gasifier, enabling scaling issues to be identified early and designed out of the final project.

Reactor design

EQTEC gasifiers can achieve carbon-to-gas conversions of around 95% and a very low tar concentration of c. 5 g/Nm3 of gas to the gasifier output, with 69% more energy efficiency overall. EQTEC projects have some of the highest efficiencies amongst waste-to-energy/fuels technologies and the lowest environmental impact.

Syngas conditioning

EQTEC can offer extensive versatility in successfully converting feedstock inputs into energy and fuel outputs. The syngas conditioning process is designed around the properties of the specific feedstock and the final application of the syngas so the most appropriate formulation of syngas can be produced. The company has proprietary technology in its thermal cracking and reforming reactor and this maximises production of CO and H2 and ensures high quality of the syngas.

Monitoring and feedback

Once a project is operational, EQTEC can provide real time monitoring allowing the plant to be run in the most efficient way and minimising down time. This enhances the potential for post completion earnings for the company.

Control system

Again end-to-end operations are critical and EQTEC projects have a control system to manage the full process and react to monitoring and feedback.

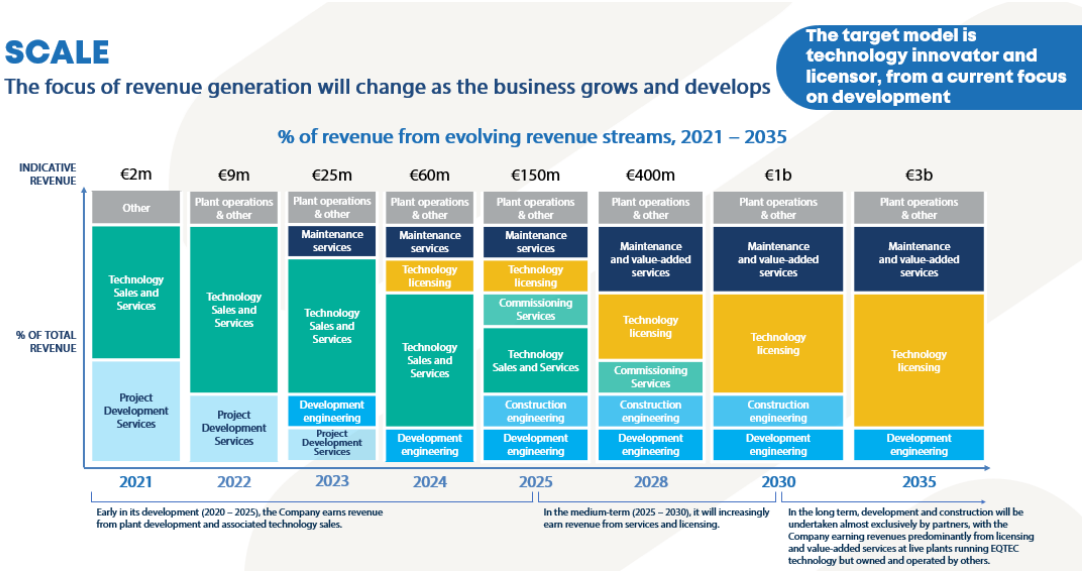
Feedstock library

EQTEC has now tested over 60 different feedstocks and has evaluated the behaviour of each inside the reactor and has learnt how to manage for feedstock variability.

THE EQTEC BUSINESS MODEL

EQTEC sees its long term business as a licencer of its gasification technology. However it is directly developing a number of projects to act as reference projects in key markets. These Market Development Centres (MDCs) allow potential clients to see an operating project in their own domestic markets. However once markets are more developed and there is full confidence in the model, it is expected that independent developers will take the busienss forward. Here EQTEC hopes to receive an up front development services fee during project development, a mobilistaion fee on financial close, technology delivery fees as the project is constructed and a commissioning fee when the plant becomes operational. Over the life of the projet EQTEC would also hope to receive an O&M fee and a monitoring fee based around the company's monitoring platform. As the business grows the company expects the technology sales and services fees to be replaced by a more straightforward licencing package.

EQTEC Business Model



Source: EQTEC

THE CUSTOMER PROPOSITION

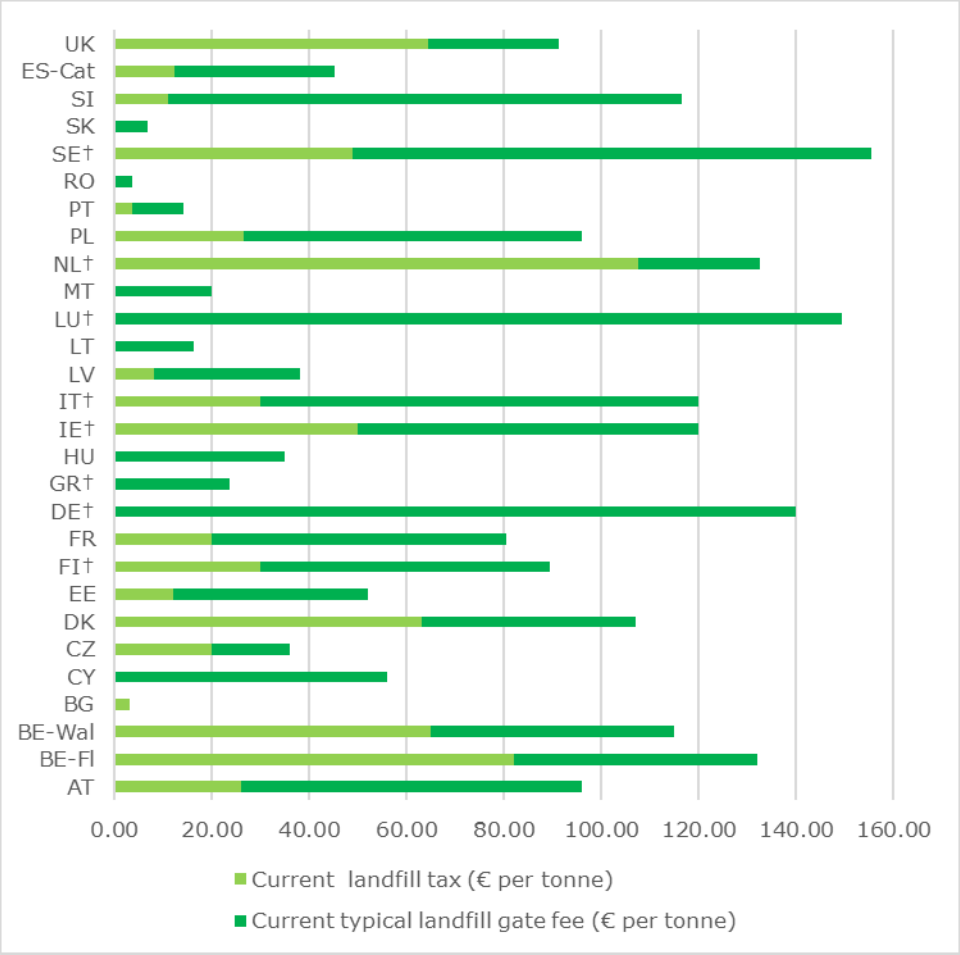
The appeal to a project developer is based on high potential returns from a combination of three revenue streams.

- Gate fee for accepting waste
- Power sales including flexibilty benefits
- E-fuel sales

GATE FEES

For waste to energy projects, a key element of revenue is received from fees for accepting waste for disposal, known as gate fees. For most EQTEC projects, the inputs are waste with an end-of-waste status and as such will attract a gate fee from waste providers looking to avoid paying landfill tax. The average landfill tax in the EU (including the UK) is €25/t and the average gate fee is €52/t, with an average combined level of €75/t.

Typical charge for legal landfilling of municipal waste

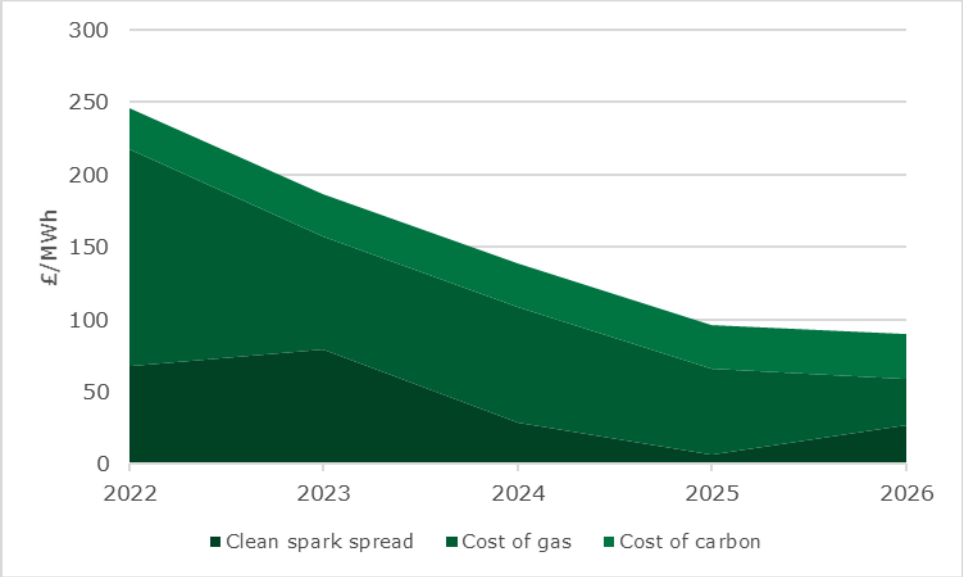


Source: European Environment Information and Observation Network (Eionet)

POWER PRICES

Electricity prices are high across Europe thanks to high gas and carbon prices. Taking the UK as an example, the forward curves, while not forecasts, tend to bear out an expectation of electricity falling two years out although still remaining high by historic standards at c. £90/MWh.

UK (GB) Electricity annual contract forward decomposed



Source: Bloomberg, Longspur Research

We think that this overall is a good picture of how average baseload prices may behave two years out. However, dispatchable units should achieve better pricing than average baseload and we see the average peak load (weekdays 7am to 7pm) pricing as more indicative for biomass. This averages a 9% premium, so we see the £90/MWh forward price for 2026 as closer to £100/MWh.

THE BENEFITS OF FLEXIBILTY

As electricity markets become dominated by intermittent renewable energy and as demand becomes more volatile due to heat pumps and EV charging, pressures start to build on the networks. These need to maintain a stable frequency and voltage in order to operate efficiently; or even to operate at all. Meeting the needs of frequency management especially requires generation that is flexible enough to add or remove supply at very short notice. The flexibility of gasification working with a fast responding generator can provide this. Demand for grid support is sometimes termed ancillary services and this demand looks set to grow as electricity systems decarbonise.

The need for flexibility was recently underscored by the recent IPCC Working Group III (WG3) part of its sixth assessment report (AR6).

"Flexibility technologies - including energy storage, demand-side response, flexible/dispatchable generation, grid forming converters, and transmission interconnection - as well as advanced control systems, can facilitate cost-effective and secure low-carbon energy systems (high confidence)."

Additional revenue streams for providing ancillary services to grid operators will vary from location to location but in most locales will add to the available revenue.

E-FUEL SALES

Most efuels are not yet being produced in sufficient volumes for price discovery to be particularly meaningful. However hydrogen is beginning to see demand rising and pricing information here can at least give a guide to the economic potential of these fuels. Current hydrogen refuelling stations charge between US$6/kg and US$11/kg with an average of US$10.4/kg.

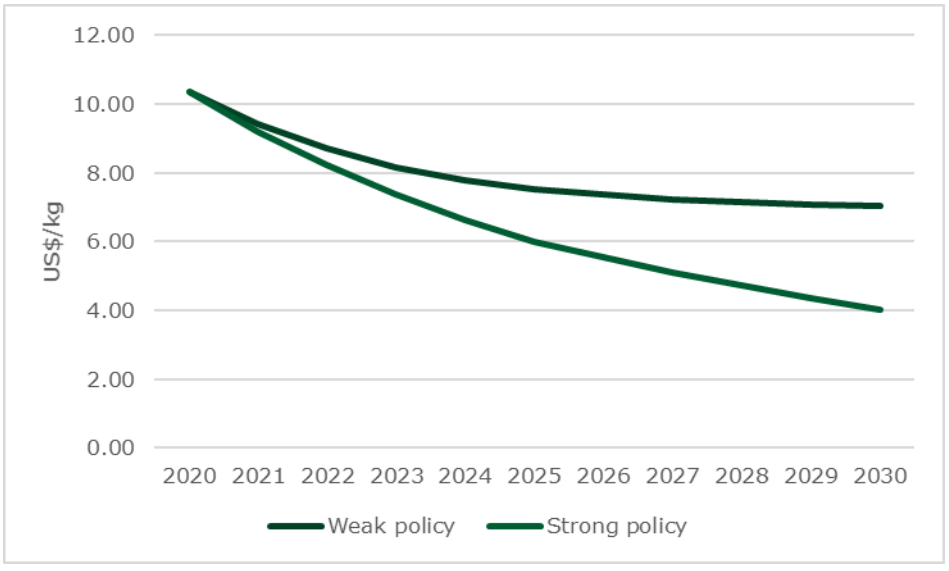
Hydrogen refuelling pump prices

Region	Average pump price ($/kg)
California	14
China	6
Germany	15
Japan	10
Korea	7
Average	10.4

Source: BNEF

The range is dependent on a number of factors including the sources of the hydrogen and transportation costs. BNEF forecasts that average prices will fall from US$10.4/kg to US$4.0/kg by 2030 assuming strong policies in favour of hydrogen. For evaluation purposes a current price of US$8/kg is conservative in our view when looking at early stage projects reflecting current pricing and immaturity of the market.

Average Hydrogen Pump Price



Source: BNEF

PUTTING IT TOGETHER

We have created a simple single period model to evaluate the proposition from the customers point of view. Using a gate fee of £75/t, electricity price of £100/MWh and a hydrogen price of £8/t we can deliver a simple 16% IRR on a first of a kind (FOAK) project.

Single period model of gasification plant

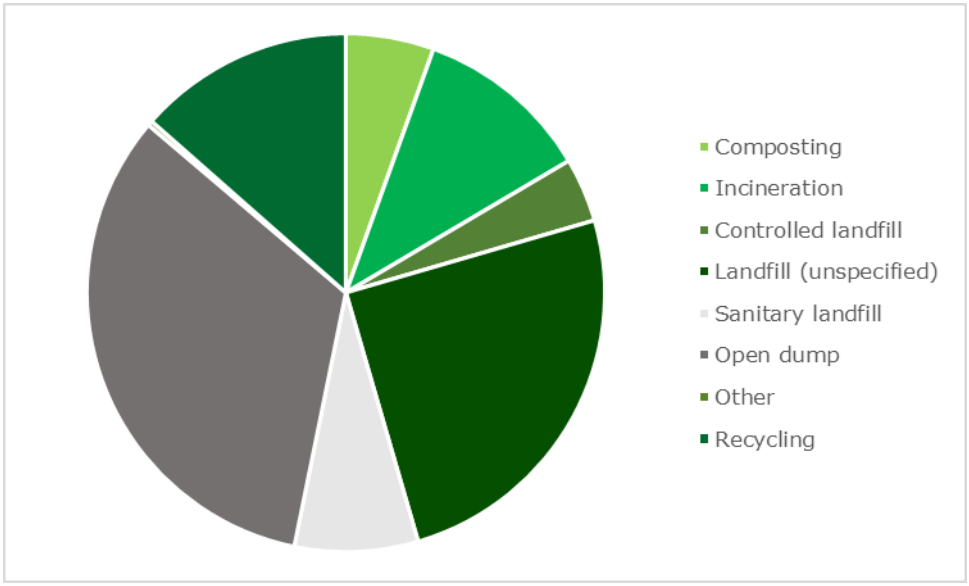
Rated power capacity (MW)	4
Max availability	90.0%
Electrical efficiency	28%
Total efficiency	65%
Plant life	25
Feedstock	Biomass
Feedstock CV (MJ/kg)	10
Waste input (tpa)	40,546
Energy input (MWh)	112,629
Power output (MWh)	11,765
Heat output (MWh)	41,673
Product	Hydrogen
Product CV (MJ/kg)	120
Product energy loss (MW)	2.51
Product output (tpa)	821.25
Power price (£/MWh)	100.00
Gate fee (£/t)	75.00
Heat price (£/MWh)	20.00
Product price (£/kg)	8.00
Capex	27,130
Revenue	
Power	1,177
Gate fee	3,041
Heat	833
Product	6,570
Total revenue	**11,621**
Depreciation pa	1,085
Opex	4,200
Total cost	**5,285**
Revenue	11,621
EBITDA	7,421
EBIT	6,336
Interest	0
PBT	6,336
Tax @ 25%	1,584
Net profit	4,752
Dividend	-4,752
Retained	0
Cashflow to equity	5,837
IRR	16%

Source:Longpur Research

WHY WE NEED A WASTE SOLUTION

There is a major need to deal with non-recylable waste including single use plastic. Left in landfill, this can decay to emit methane with a greenhouse gas potential of 22 times that of CO2. The world is still landfilling over a third of all waste, open dumping a further third and incinerating over 10%. Less than 20% is recycled or composted.

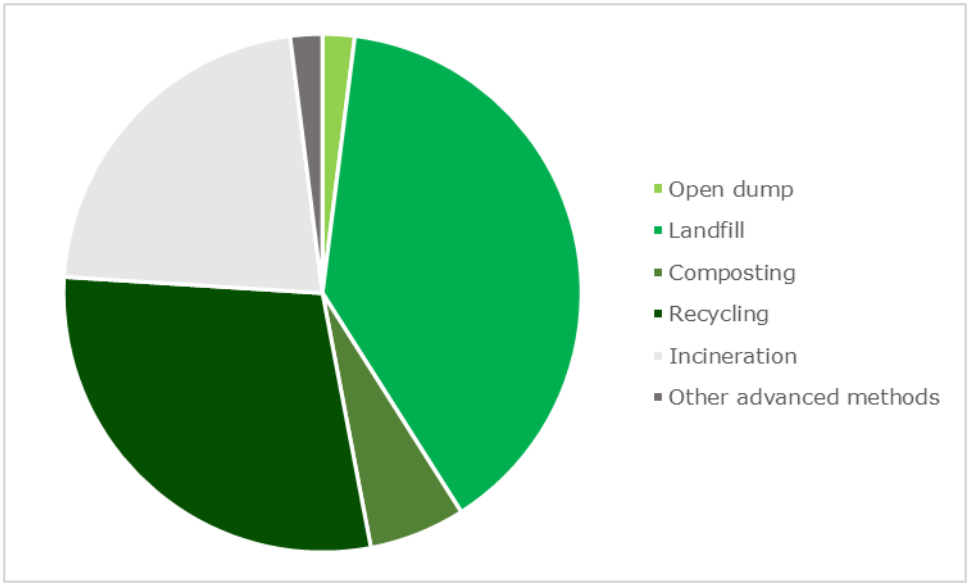
Waste Destinations



Source: World Bank

Even high income countries who can more easily affort to invest in advanced waste solutions still show high levels of landfill, with recycling at just around a third of waste destinations.

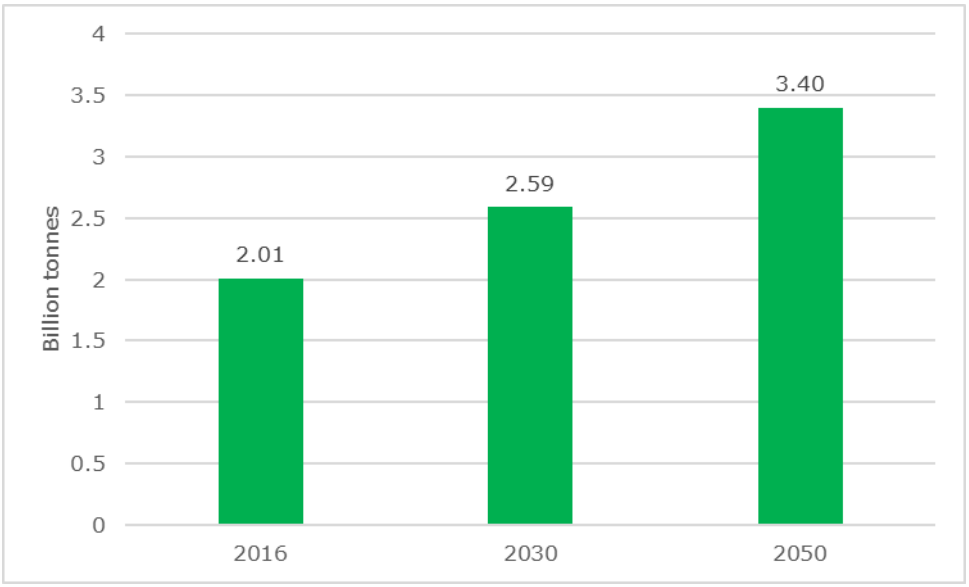
High income country waste destinations



Source: World Bank

Waste generation is also forecast to grow strongly into the foreseeable future.

Projected global waste generation



Source: World Bank

WASTE-TO-ENERGY POLICY IN KEY MARKETS

European Union

The EU has introduced five facilities that could benefit gasification even if only indirectly. Across these the key message is that waste to energy incineration has no place in the sustainability agenda with major EU institutions, excluding it from financial support. Waste incineration is a carbon-intensive process undermining the efforts to decrease carbon emissions and, thus, to reach carbon neutrality on time. As such, EU financial institutions have chosen to support alternatives that are less carbon-intensive

- **The Recovery and Resilience Facility (RRF)**

  Coming into effect in February 2021, the facility provides €723.8 billion in loans and grants that will support EU member states to build more resilient and sustainable economies, as well as help them to achieve a green and digital transition.

- **European Regional Development Fund and the Cohesion Fund**

  Two funds that provide €234 billion for allocation to strengthen the EU's economic, social, and territorial cohesion as well as promote sustainable development. The funds support investment activities in (1) additional capacity for waste recycling, (2) separated waste collection, and (3) waste reuse. However treatment of residual waste is excluded from financial support.

- **Just Transition Fund**

  A fund of €40 billion is one of the pillars of the Just Transition Mechanism, which sets the roadmap towards climate neutrality for 2050 in an effective and fair manner.

- **EU Taxonomy Regulation**

  Published in 2020, the Taxonomy regulation is a classification system with six environmental objectives that include climate change mitigation, the transition to a circular economy, and pollution prevention and control.

- **European Investment Bank (EIB)**

  The EIB created the Climate Bank Roadmap that provides the guidelines for climate and sustainable development finance while supporting the EU Green Deal.

USA

Currently, the US processes 14% of its waste in waste-to-energy (WTE) plants but is behind the European nations and the Asia Pacific region. In the waste to energy sector The United States Congress approved the Consolidated Appropriations Act, 2021. The recently adopted act includes a 26% investment tax credit (ITC) for "Waste Energy Recovery Property."

Since the introduction of renewable energy technologies such as solar and wind, investment tax credits have been successfully used to speed up development by lowering costs. With the recently passed Consolidated Appropriations Act, operators looking to implement waste heat recovery technologies will be able to do so with the help of an attractive ITC.

UK

1) Resources and Waste Strategy

The Resources and Waste Strategy was introduced in December 2018 and is the first major policy shake-up in this space in more than a decade. It outlines a national deposit return scheme, changes to extended producer responsibility requirements and measures to increase food waste collections.

Consultations on several key measures began in 2021. The consultation process was originally set to begin in early 2020 but was delayed by the best part of a year amid Covid-19. As such, the Department for Food, the Environment and Rural Affairs (Defra) confirmed that a UK deposit return scheme will be implemented in 2024 at the earliest, while a UK-wide weekly food waste collection service will only be launched in 2023.

We can expect further consultations and decisions in 2022. Defra's second progress report on the Strategy, published in November 2021, provides full information on what's to come.

2) Environment Bill

The Environment Bill is used to support the delivery of the UK's 25-Year Plan for the environment and to clarify how environmental protection frameworks will operate post-Brexit. The Bill is used to make provision about targets, plans and policies for improving natural environmental protection.

3) Plans for meeting new energy targets

October saw Prime Minister Boris Johnson confirming plans to end unabated fossil-fuelled electricity generation by 2035. There was already a 2024 deadline for ending all coal-fired electricity generation in the UK, so the new vision is primarily targeted at gas, which accounts for around 40% of the UK's electricity generation mix at present.

IS THERE ENOUGH FEEDSTOCK?

IMMEDIATE POTENTIAL - WASTE

Currently waste can be landfilled, incinerated, recycled or sent for composting and digestion. In an ideal world no waste would be incinerated or landfilled and it is the amount of waste which is going to these destinations that represents the size of the feedstock pool available to EQTEC.

We have detailed data for the top 25 recycling regions in Europe and the US. This shows that Germany has the highest recycling rate at 66.1% of total waste generated. As these countries already support recycling it is likely that they will also support envirionmentally sound treatments for waste that is not recycled. Totalling this figure gives us 283 Mt of waste per annum.

Recyling Rates and Residual Waste

	Total waste	Recycling Rate	Recycled	Landfill	Incineration	Market	Market
Germany	51.0	66.1%	33.7	4.8	16.0	20.8	20.8
Singapore	7.8	61.0%	4.8	3.0	0.0	3.0	2.7
South Korea	18.2	59.0%	10.8	3.1	4.6	7.7	6.2
Taiwan	7.5	58.0%	4.4	0.1	3.0	3.1	2.5
Netherlands	9.5	56.6%	5.4	0.2	3.6	3.8	3.2
Austria	4.8	55.9%	2.8	0.1	1.8	2.0	1.6
Slovenia	0.9	53.9%	0.5	0.2	0.2	0.4	0.3
Belgium	4.7	53.5%	2.5	0.9	2.0	2.9	1.6
Switzerland	6.0	52.7%	3.2	6.0	2.9	8.9	2.0
Italy	30.1	52.6%	15.8	7.4	5.9	13.3	10.2
Luxembourg	0.4	48.3%	0.2	0.1	0.1	0.2	0.1
Sweden	4.4	48.1%	2.1	0.0	2.2	2.3	1.5
Denmark	4.5	46.3%	2.1	0.1	2.4	2.4	1.5
UnitedKingdom	31.6	43.5%	13.7	7.4	9.9	17.3	10.7
Norway	2.2	42.8%	1.0	0.1	1.1	1.2	0.7
Poland	10.9	42.3%	4.6	4.9	1.4	6.4	3.7
Australia	13.3	41.6%	5.5	6.2	1.6	7.8	4.5
Finland	2.7	40.6%	1.1	0.3	1.3	1.6	0.9
France	33.4	39.6%	13.2	9.0	11.6	20.6	11.3
Hong Kong	5.6	36.5%	2.1	3.6	0.0	3.6	1.9
United States	234.5	34.6%	81.1	123.3	30.1	153.4	79.5
Total	484.0		210.5	180.9	101.6	282.5	167.6

Source: Eunomia for the European Environmental Bureau, Longspur Research

Of course these countries are likely to want to attempt to improve their recycling rates which would reduce the waste available for treatment. Germany's high recycling rate may repressent a reasonably acheiveable maximum globally. We can apply this rate to the other countires to estimate the amount of waste that cannot be recycled and is therefore available as waste-to-energy feedstock. This comes to 168Mt per annum.

IMMEDIATE POTENTIAL – BIOMASS

US forestry biomass

EQTEC's initial targetting of projects using forestery waste is based in the USA. The USA has over 750m acres of forest land representing 35% of its total landmass. It currently supplies more than 25% of global industrial wood production. The forest resource has been growing annually since the 1950's and is protected by statutes, regulation and certification with best practice in forest management and sustainability.

USA Forestry Overview

Type of land	United States	Conterminous United States
Total land	2.3 billion acres	1.9 billion acres
Forestland	751 million acres	623 million acres
Timberland	514 million acres	475 million acres

Source: USDA US Forest Service

The southeast is a key fibre basket with vast resources of sustainable forestry. Inventories have increased by at least 50% since 1950 and the commercial forestry industry is well established.

The US Department of Agriculture Forest Service estimates that at a price of US$60/dry ton, there will be 61.6m available dry tons on non-federal land in the USA in 2030.

Forecast Wood Biomass Availabilty at $60/t

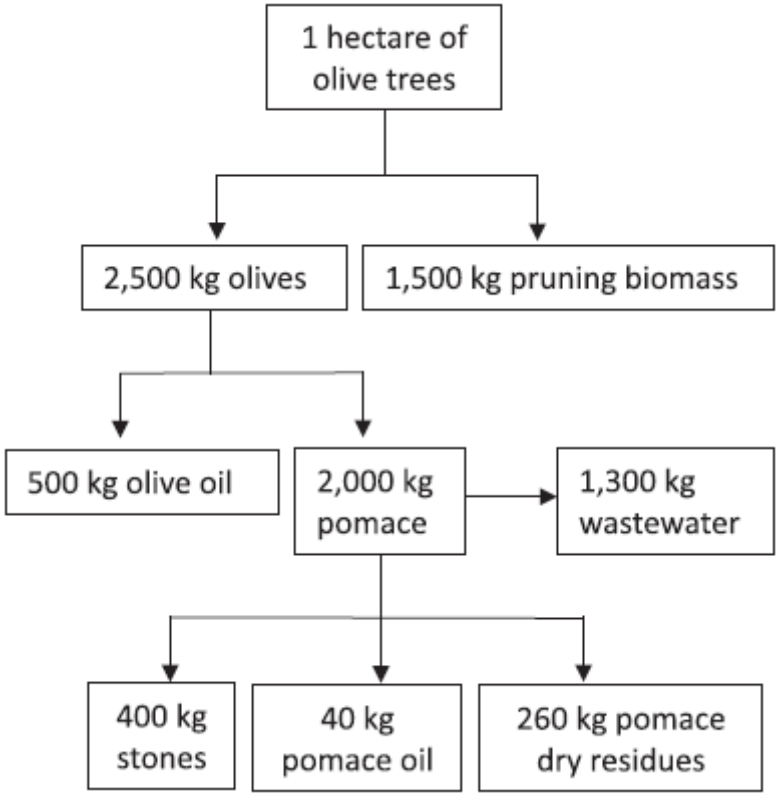
	2017	2022	2030	2040
All land				
Logging residues	17.9	19.4	21.4	20.7
Whole-tree biomass	69.9	73.7	59.8	60.7
Federal land excluded				
Logging residues	15.7	17.1	18.8	18.4
Whole-tree biomass	52.3	55.4	42.7	46.1
Total: Baseline (all land)	87.8	93.1	81.1	81.5
Total: Baseline (no federal)	68.1	72.5	61.6	64.5

Source: USDA US Forest Service, Forest biomass and wood waste resources 2016

OLIVE OIL POMACE

Pomace, the residue of pulp, stones and seeds left after olive oil has been extracted from olives. On average 260kg of dry pomace residue is generated for every 500kg of oil.

Typical cultivation procedure in Spain



Source: Biosource Technology

Using this ratio of 260kg of dry pomace residue for every 500kg of olive oil allows us to estimate the total resource worldwide at 1.6m tonnes per annum.

Global olive oil production and pomace estimates

Thousand tonnes	**Olive oil production**	**Dry pomace residues**
Spain	1300	3405
Italy	315	825
Greece	225	589
Portugal	178	466
Tunisia	240	629
Turkey	215	563
Morocco	155	406
Syria	120	314
Others	368	964
Total	3116	8161

Source:EU Committee for the Common Organisation of Agricultural Markets, Longspur Research

WIDER POTENTIAL

Waste

The wider global potential is more signficant. If we take the World Bank forecasts for waste generated out to 2050 and again assume the German recycling rate as a maximum then we currently could have a market of 680Mt, rising to 880Mt in 2030 and to over 1bn Mt in 2050.

Global waste available for treatment

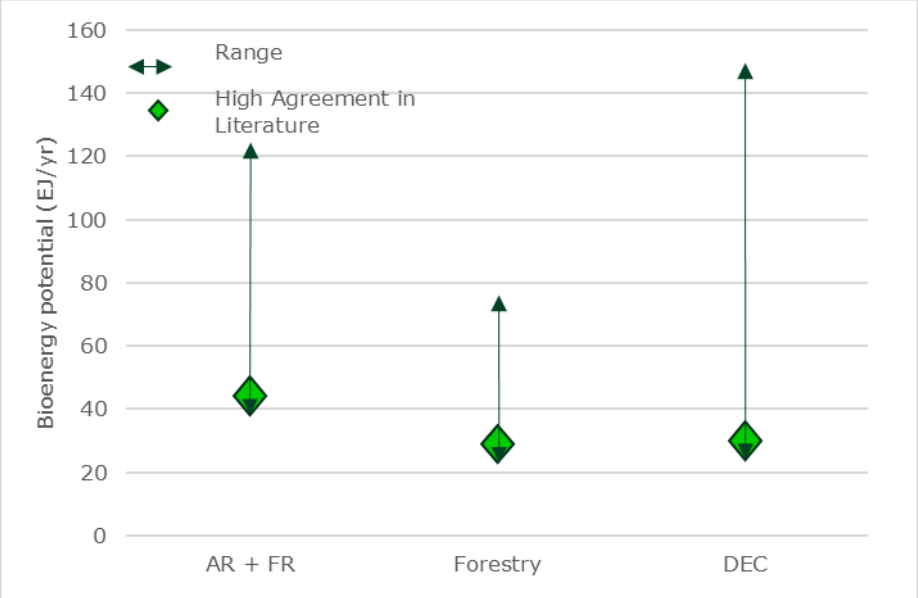
Billion tonnes	Waste generation	Waste available for treatment
2016	2.01	0.68
2030	2.59	0.88
2050	3.40	1.15

Source: World Bank, Longspur Research

Biomass

One of the main criticisms of biomass is based on concerns that there may be insufficient biomass that can be harvested in a sustainable fashion to make the process genuinely low carbon. A great many assessments of sustainable global bioenergy potential have been published with a large range of outcomes. However, the availability figures with a high level of agreement in scientific literature point to a figure of about 100 EJ of sustainable biomass available annually.

Ranges/high literature agreement on sustainable bioenergy potential



Source: Grantham Institute

Just using the figure for agricultural and forestry arisings of 50EJ, if we assume a utilisation of 90% this would need gasification capacity of 1,762GW. Using the largest EQTEC unit size of 25MW this would equate to demand for over 70 thousand units.

Further comfort is given in the recent (October 2021) study by Imperial College London Consultants on European biomass which concludes that "the potential availability of sustainable biomass, with no harm to biodiversity, could support an advanced and waste-based biofuel production of up to 175 Mtoe in 2050."

The study itself appears conservative as the following quotation shows.

"It is important to highlight that the biomass potential availability estimated in this study are based on very conservative assumptions. [ ] Therefore, it can be concluded that the biomass potentials in 2030 and 2050 would most probably be higher than those estimated by this study."

ADDRESSABLE MARKET

We have taken the IPCC 1.5 degree report as our basis for analysis of all decarbonisation opporutnities. This assessed over 6,000 recent accademic papers including 90 mitigation pathways, developed with integrated assessment models, and consistent with delivering a 1.5 degree temperature rise by 2050.

We have used the median low overshoot data as we see this as the most useful in identifying active net zero investment opportunities and representing the likely thrust of policy and rewards over the next ten years. If it becomes apparent that we are heading for a high overshoot, we do not see policy changing other than creating additional incentives for carbon removal.

The median energy breakdown for these scenarios across the key energy sectors is shown in table 2.6 of the IPCC report.

Median primary energy supply for <1.5°C and low-OS pathways

EJ	2020	2030	2050
Total primary energy	565.33	464.5	553.23
Renewables	87.14	146.96	291.33
Biomass	60.41	77.07	152.30
Non biomass	26.35	62.58	146.23
Wind and PV	10.93	40.14	121.82
Nuclear	10.91	16.26	24.51
Fossil	462.95	31.36	183.79
Coal	136.89	44.03	24.15
Gas	132.95	112.51	76.03
Oil	197.26	156.16	69.94

Source: IPCC Special Report; Global Warming of 1.5°C

Biomass is the key area where EQTEC can see demand.

Table 2.7 gives additional data on electricity supply. The difference in biomass demand between these two tables shows non-electricity biomass supply which includes hydrogen and biofuels from gasification. For electricity alone the 2050 figure of 20.5EJ can be translated using a 90% availability figure into demand of 717GW or over 28 thousand 25MW gasification projects.

Median primary electricity supply for <1.5°C and low-OS pathways

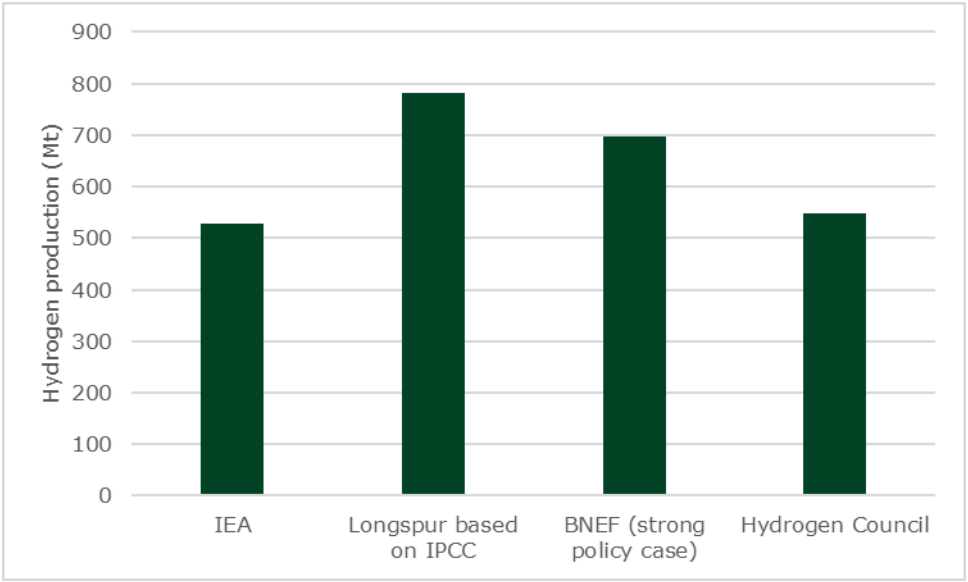
EJ	2020	2030	2050
Total generation	98.45	115.82	215.58
Renewables	26.28	63.30	145.50
Biomass	2.02	4.29	20.35
Non biomass	24.21	57.12	135.04
Wind and PV	1.66	8.91	39.04
Nuclear	10.84	15.46	21.97
Fossil	59.43	36.51	14.81
Coal	31.02	8.83	1.38
Gas	24.07	22.50	12.79
Oil	2.48	1.89	0.10

Source: IPCC Special Report; Global Warming of 1.5°C

E-FUELS

Our analysis of the IPCC 1.5-degree report suggests that, in order to meet Paris climate change goals, we will need to use hydrogen fuelled energy equal to 781Mt per annum by 2050. This includes hydrogen itself but also hydrogen carriers such as methanol and ammonia. Checking against other forecasts with the Hydrogen Council at 549Mt, BNEF at 697MT and IEA at 528Mt, this seems reasonable for a full net zero solution with the use of hydrogen gas turbines and with nuclear explaining the higher outcome in our forecast.

Hydrogen demand forecasts in 2050



Source: Hydrogen Council, BNEF, Longspur Research

This represents 110EJ of energy. If we assume a 60% green/blue split in line with the Hydrogen Council, this leaves 67EJ available for both electroysis and gasification. Converting to gasificaiton capacity results in potential demand of 1,406GW or over 56 thousand 25MW units.

This suggests a total addressable market slightly above the supply available from agricultural and forestry arisings but not significantly so. If we take the latter as the effective total addressable market it remains significant at 1,762GW of capacity or over 70 thousand 25MW projects.

Total addressable market and feedstock supply

Product demanded	EJ	TWh	Utilisation	GW	25MW units
Electricity	20.35	5,653	90%	717	28,680
Hydrogen/biofuels	39.90	11,084	90%	1,406	56,234
Total demand				2,123	84,914
Agricultural and forestry arisings	50.00	13,889	90%	1,762	70,466

Source: Longspur Research

IMMEDIATE MARKET OPPORTUNITY

In line with the findings above we think the immediate market opportunity will be determined by the limitations of feedstock rather than any lack of demand for product, whether electricity, heat or biofuels. The energy supply situation resulting from the war in Ukraine means that demand for any locally sourced energy is likely to be high and likely to remain so as policy moves in favour of local sourcing.

We have therefore based our assessment of the near term total addressable market on the feedstock we have identified in developed world MSW, US forest arisings and pomace.

Immediate feedstock opportunities

Feedstock	Mt	CV	Availability	MW	25MW units
MSW	168	10	90%	16,534	661
Forest arisings	56	20	90%	11,024	441
Pomace	8	20	25%	5,797	232
Total	225			28,709	1,334

Source: Longspur Research

From TAM to SAM

The Bass Diffusion model is a well-established model for estimating how a new product diffuses into an existing market. In this case the market is the waste to energy market, and we want to estimate how advanced gasification will diffuse into it. The model uses a coefficient of innovation to represent the propensity of innovators to buy an unknown product and a coefficient of imitation to represent the rest of the market to follow the innovators. We have chosen coefficients that fit with certain other market estimates. We combine these with our total addressable market estimate of 28,709MW to derive demand out to 2030. We have showed this as growth in licenced capacity where EQTEC has no project ownership receiving licence revenue. In addition to this we have added the immediate project pipeline of projects currently in development. We have not assumed any more projects with ownership beyond this group which leads to a drop in new capacity additions in FY24 as this initial group passes through.

Capacity reaching financial close

MWe	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e
Market demand	258	282	307	333	361	390	421	453	486
Market share	5%	10%	10%	10%	10%	10%	10%	10%	10%
EQTEC demand	12.9	28.2	30.7	33.3	36.1	39.0	42.1	45.3	48.6
Licenced	7.9	13.2	20.8	33.3	36.1	39.0	42.1	45.3	48.6
Owned	5.0	15.0	9.9	0.0	0.0	0.0	0.0	0.0	0.0

Source: Longspur Research

FINANCIALS

EARNINGS OUTLOOK

Using the assumptions above we have modelled the amount of capacity coming through the company with revenues derived from an initial development services fee which is paid on financial close. The company should then receive revenue from equipment sales during the build out of the project. Finally, EQTEC will benefit from O&M revenue over the initial years of project operation. From FY24 we have assumed a more straightforward licencing agreement to replace the development services fee.

By the end of FY 22 EQTEC hopes to commission two MDCs and two other projects under construction for third party owner-operators. The company also expects to see financial close on a number of additional projects. As we expect revenues to grow substantially in FY 22, we see this driving a small operating profit resulting in positive earnings. We expect further strong growth in FY 23 leading to meaningful earnings in that year with further strong earnings growth beyond.

BALANCE SHEET

EQTEC was ungeared at year end 2021 with the only debt on the balance sheet being leases related to the company's offices in London and Barcelona. This follows the repayment of outstanding debt to Altair Group in June 2021. However in March 2022, EQTEC agreed an unsecured facility of up to £10m. The company raised €19m in new equity before expenses in May 2021 and at 31 December 2021 had cash of €6.4m with much of the raise proceeds going to investment in projects. Further investment in FY 22 and FY 23 will erode this but strong positive cashflow from FY24 and onwards leaves the company looking healthy financially. This does depend on projects finding external funding both in equity and debt but we think the track record so far suggests that this should be achievable.

VALUATION

Advanced waste treatment remains a new area and most of companies in the sector will be loss making for some time as the market evolves. This makes PE and EV/EBITDA multiples unusable leaving EV/Sales as the main metric on which to make comparisons. These vary widely. As a result, we think a valuation approach should concentrate on a well-constructed DCF valuation.

We have used a weighted average cost of capital of 10.0%. This is based on the high end of the most recent UK's Competition and Markets Authority assessment on cost of capital. We see this as one of the best contemporary estimates based on thorough work that if required must be able to stand the scrutiny of a judicial review. This gives a risk-free rate of -1.0% which with a 2.5% inflation assumption gives 1.5%. The market premium is 8.5% based on historical ex-post market returns going back to 1900. Our comparator companies group has a median beta of 0.9. We think it prudent to use a beta of 1.0. With no debt this gives us a WACC of 10.0%.

Weighted average cost of capital

Risk free rate	1.5%
Market premium	8.5%
Loan margin	3.0%
Marginal tax rate	25.0%
After tax cost of debt	3.4%
Debt/total capital	0.0%
Beta	1.0
Cost of equity	10.0%
Weighted cost of capital	10.0%

Source: Longspur Research, CMA

We have forecast cashflows to 2030 based on our discussion under earnings outlook above. We then calculate a terminal value in 2030 based on Gordon's growth model and assuming that long-term cashflows are flat in nominal terms. The terminal EV/EBITDA on this basis is 8.7x which is slightly high but we think justifiable given the long term growth potential of the company.

DCF Valuation – central case

€'000	2022e	2023e	2024e	2025e	2026e	2027e	2028e
Operating cash inflow	1,069	5,505	9,207	20,532	28,073	33,525	45,054
Cash from associates	-343	80	-158	183	1,127	1,275	1,275
Tax paid	0	-52	-706	-1,186	-2,760	-3,705	-4,405
Interest tax shield	0	0	0	0	0	0	0
Capex & investments	-5,382	-2,723	-8,149	-5,382	-10	-10	-10
Free cashflow	-4,655	2,810	194	14,146	26,430	31,085	41,914
Terminal growth	0.0%						
Terminal valuation	602,161						
Terminal EV/EBITDA	8.7						
Implied enterprise value	344,686						
Implied market cap.	350,874						
Implied share price	**4.2**						
in GBP =	**3.5**						

Source: Longspur Research, (*explicit forecasts go to 2030)*

This gives a base case valuation of 3.5p per share.

SCENARIOS

While we think, given EQTEC's leading gasification technology, it should be able to command a 10% share of our narrowly defined market, we have undertaken valuations at a 5% market share and a 15% market share.

DCF Scenarios

Market share	€/share	p/share
5%	2.1	1.8
10%	4.2	3.5
15%	6.2	5.2

Source: Longspur Research

COMPARATIVE MULTIPLES

Comparative multiples are fairly meaningless as the industry is in early stages with companies still developing business models and jostling for market share. We believe EQTEC is extremely well placed against the competition both in terms of its offering and also the advantages of building capacity early. EQTEC is trading below the median in terms of forward EV/sales and EV/EBITDA.

Comparative multiples

	EV/sales 2022	EV/sales 2023	EV/EBITDA 2022	EV/EBITDA 2023
Eqtec Plc	2.7	1.7	41.0	11.5
Envitec Biogas Ag	na	na	na	na
Agripower France Sa	2.6	1.4	48.1	13.5
Bion Plc	na	na	na	na
Methanor Sca	na	na	na	na
Quantafuel As	22.4	10.9	na	70.8
Cropenergies Ag	1.1	1.2	6.7	7.5
Cortus Energy Ab	na	na	na	na
Velocys Plc	22.0	37.4	na	na
Active Energy Group Plc	na	na	na	na
Verbio Vereinigte Bioenergi	3.2	3.7	14.2	20.3
Powerhouse Energy Group Plc	55.4	12.5	na	130.5
Mean	15.6	9.8	27.5	42.3
Median	3.2	3.7	27.6	16.9
Max	55.4	37.4	48.1	130.5
Min	1.1	1.2	6.7	7.5

Source: Bloomberg

MANAGEMENT

Chief Executive Officer – David Palumbo

David Palumbo is an experienced entrepreneur with over 20 years of experience in private equity, venture capital and asset management. Since 2006, he has founded and co-founded a number of companies in various industries such as cleantech, digital technology and real estate. David is also the Founding and Managing Partner of Origen Capital LLP, a private investment firm representing family offices and private consortia in Europe, CIS and Latin America. He holds a BSc and an MSc in Electrical Engineering.

Chief Technology Officer – Dr. Yoel Alemán Méndez

Yoel Alemán is an experienced chemical engineer with over 20 years' experience in Biomass Gasification. He has designed, built and operated gasification facilities of various industrial capacities. He is the author of three technology patents related to speciality power generation, has been a University Associated Professor and researcher at three universities, and holds a PhD in chemical engineering. Prior to his appointment to the senior management of the company in June 2019, Yoel was Chief Technical Officer of EQTEC Iberia from April 2010.

Chief Financial Officer – Nauman Babar

Nauman has almost 20 years of international experience within corporate finance, audit and finance function transformation with a track record of scaling up growth companies and working in private equity-backed businesses. He has predominantly worked within the Energy & Utilities space with a focus on renewables and cleantech. Nauman initially worked with international accountants, PwC and has gained experience with Accenture, EY and Mott Macdonald and most recently served as Finance Director at Woodlands Energy Services. Nauman is a Fellow of the Institute of Chartered Accountants in England & Wales and holds a Bachelor's degree in Finance from University of Essex.

Chief Operating Officer – Jeff Vander Linden

Jeff's 25-year career in operational performance and organisational change includes five years building global scale in leading, consumer products businesses and 16 years designing and delivering business strategy, process and technology transformation as a business consultant and programme director at PwC, IBM and Capgemini. He has worked with both private- and public-sector leaders on matters of business strategy, operations strategy, organisation design and large-scale execution of major projects. His dozens of clients include NTT, NEC, AT&T, Motorola, BAE Systems and National Grid. Jeff spent 10 years based in Japan, also working in Korea, Taiwan, Hong Kong and Singapore; he has worked predominantly in the UK and Europe since 2001. He received a Bachelor of Arts in Social Studies (Economics, Politics, History, Philosophy) from Wesleyan University in Connecticut, USA.

Non-Executive Chairman - Ian Pearson

Ian was the chairman of AIM-listed OVCT2 for five years. OVCT2 invested in a variety of renewal energy companies and was successfully merged into Apollo VCT plc in 2019. He is currently a Non-Executive Director of Thames Water Utilities Limited, the UK's biggest water company. He is also a senior adviser to BAI Communications plc and has previously been a member of the UK Advisory Board of the accountants PwC. Between 2001 and 2010, Ian held a number of ministerial positions in the UK government, including Minister for Trade & Foreign Affairs, Minister of State for Climate Change and the Environment, Minister for Science, and Economic Secretary to the Treasury. He graduated from Balliol College, Oxford and has a Master's degree and a Doctorate in Industrial and Business Studies from the University of Warwick.

Non-Executive Director - Tom Quigley

Tom Quigley has had an executive career spanning over 25 years, mainly at board level, as Managing Director, CFO and CIO. This included being a Managing Director of Close Brothers Corporate Finance; a Managing Director and Head of the Retail, Hospitality and Leisure sector investment banking at ING Barings, London; and a Director of Terra Firma Capital Partners. Tom originally qualified as a Chartered Accountant at Price Waterhouse in London and has amassed considerable financial and management experience across multiple sectors. Through his executive and non-executive positions, Tom has worked in real estate, financial services, healthcare and banking, and across a number of jurisdictions.

RISK

The key risks to our valuations are technology redundancy, competition, policy uncertainty including any stalling of the waste-to-energy economy.

Technology redundancy

Gasification sits amongst a range of solutions for waste disposal and biomass utilisation. In a perfect world all waste would be reused or recycled. However the ubiquity of certain difficult to recycle materials makes this unlikely even in the long term. We have already seen a rise in the consumption of single use plastics as the COVID 19 pandemic has increased demand for disposal, hygienic packaging. Other biomass solutions, notably biomass energy with carbon capture and storage (BECCS) are a threat but these are large scale solutions best suited to central industrial clusters and we see the distributed solution offered by EQTEC as having a strong role to play.

Competition

Other gasification technology providers are in the market. As we have shown it is a potentially very large market indeed and there is room for several players. We have already noted that wider industry success with the technology is likely to create confidence with investors. But most importantly the early mover advantage, the process focus and the systems support all create a competition beating offering in the market place.

Policy risks

Policy support is favourable, yet can be unstable. While waste incineration faces growing policy barriers, concerns over energy security could reverse these. However we do not see incineration as such a significant part of the energy mix for this to be likely. Other forms of policy support can be helpful for EQTEC and while there is risk around them we see the sustainability agenda as moving in one direction and this is likely to benefit EQTEC. Also the company's portfolio of projects increases diversity against any specific policy changes.

FINANCIAL MODEL

Profit and Loss Account

€,000, Dec	2020a	2021a	2022e	2023e	2024e	2025e
Turnover						
Gasifier technology	2,235	9,172	27,906	45,669	66,989	112,368
Gasifier projects	0	0	0	0	0	0
Other	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	2,235	9,172	27,906	45,669	66,989	112,368
Operating profit						
Gasifier technology	-4,650	-3,841	1,463	6,238	10,223	22,408
Gasifier projects	0	0	0	0	0	0
Other	0	0	0	0	0	0
Other	0	0	0	0	0	0
Operating profit	-4,650	-3,841	1,463	6,238	10,223	22,408
P&L Account	**2020a**	**2021a**	**2022e**	**2023e**	**2024e**	**2025e**
Turnover	2,235	9,172	27,906	45,669	66,989	112,368
Operating Profit	-4,650	-3,841	1,463	6,238	10,223	22,408
Investment income	0	-476	-343	80	-158	183
Net Interest	-1,189	-383	-706	-669	-576	-513
Pre Tax Profit (UKSIP)	-5,839	-4,700	414	5,649	9,490	22,078
Goodwill amortisation	0	0	0	0	0	0
Exceptional Items	0	0	0	0	0	0
Pre Tax Profit (IFRS)	-5,839	-4,700	414	5,649	9,490	22,078
Tax	0	0	-52	-706	-1,186	-2,760
Post tax exceptionals	71	0	0	0	0	0
Minorities	5	0	0	0	0	0
Net Profit	-5,763	-4,700	362	4,943	8,304	19,318
Dividend	0	0	0	0	0	0
Retained	-5,763	-4,700	362	4,943	8,304	19,318
EBITDA	-4,566	-4,161	1,277	6,475	10,222	22,747
EPS (p) (UKSIP)	-0.11	-0.06	0.00	0.06	0.10	0.23
EPS (p) (IFRS)	-0.11	-0.06	0.00	0.06	0.10	0.23
FCFPS (p)	-0.09	-0.21	-0.05	0.03	0.00	0.17
Dividend (p)	0.00	0.00	0.00	0.00	0.00	0.00

Source: Company data, Longspur Research estimates

KEY POINTS

- FY 22 sees growth in sales from order book start to ramp up
- Company profitable from FY22
- Owned project investment income development costs replaced by profit from FY25
- Revenue grows strongly across period as project pipeline develops

Balance Sheet

€,000, Dec	2020a	2021a	2022e	2023e	2024e	2025e
Fixed Asset Cost	418	834	845	855	865	876
Fixed Asset Depreciation	-230	-389	-545	-702	-858	-1,015
Net Fixed Assets	188	446	300	153	7	-139
Goodwill	0	0	0	0	0	0
Other intangibles	15,283	17,703	17,703	17,703	17,703	17,703
Investments	5,951	12,631	18,003	20,716	28,855	34,226
Stock	0	0	0	0	0	0
Trade Debtors	895	6,877	9,174	15,015	22,024	36,943
Other Debtors	986	6,456	6,456	6,456	6,456	6,456
Trade Creditors	-3,184	-6,922	-9,174	-15,015	-22,024	-36,943
Other Creditors <1yr	0	0	0	0	0	0
Creditors >1yr	0	0	0	0	0	0
Provisions	0	0	0	0	0	0
Pension	0	0	0	0	0	0
Capital Employed	20,119	37,191	42,461	45,028	53,021	58,246
Cash etc	6,395	6,446	11,338	13,709	13,015	26,203
Borrowing <1yr	1,106	201	6	1,005	905	814
Borrowing >1yr	106	57	10,051	9,046	8,141	7,327
Net Borrowing	-5,182	-6,189	-1,281	-3,658	-3,969	-18,061
Share Capital	24,356	25,977	25,977	25,977	25,977	25,977
Share Premium	62,897	83,611	83,611	83,611	83,611	83,611
Retained Earnings	-61,876	-66,177	-65,815	-60,872	-52,568	-33,250
Other	2,148	2,354	2,354	2,354	2,354	2,354
Minority interest	-2,224	-2,384	-2,384	-2,384	-2,384	-2,384
Capital Employed	20,119	37,191	42,461	45,028	53,021	58,246
Net Assets	25,301	43,380	43,743	48,686	56,989	76,307
Total Equity	25,301	43,380	43,743	48,686	56,989	76,307

Source: Company data, Longspur Research estimates

KEY POINTS

- Stable cash position following fund raisings in FY 20 and FY 21
- Initial project revenue improves cash in FY 22
- Investment in owned projects grows from FY 23
- Working capital grows with sales
- £10m borrowing assumed drawn down in FY22

Cashflow

€,000, Dec	2020a	2021a	2022e	2023e	2024e	2025e
Operating profit	-4,650	-3,841	1,463	6,238	10,223	22,408
Depreciation	83	157	157	157	157	157
Provisions	0	0	0	0	0	0
Other	1,255	1,800	0	0	0	0
Working capital	-233	-5,658	-550	-889	-1,173	-2,033
Operating cash flow	-3,544	-7,543	1,069	5,505	9,207	20,532
Tax paid	0	0	0	-52	-706	-1,186
Capex (less disposals)	300	0	-10	-10	-10	-10
Investments	-1,821	-8,881	-5,372	-2,713	-8,139	-5,372
Net interest	-22	0	-706	-669	-576	-513
Net dividends	0	0	111	315	535	642
Residual cash flow	-5,086	-16,424	-4,908	2,376	311	14,093
Equity issued	12,099	18,240	0	0	0	0
Change in net borrowing	-7,720	-1,006	4,907	-2,376	-311	-14,093
Adjustments	707	-810	0	0	0	0
Total financing	5,086	16,424	4,907	-2,376	-311	-14,093

Source: Company data, Longspur Research estimates

KEY POINTS

- Working capital outflow grows in FY 23 as sales start to grow
- Investment in owned projects strong to FY 25

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