Global Bioenergies

Initiation of coverage

Edison investment research

Proving the case for isobutene

Alternative energy

Global Bioenergies (GBE) is developing unique biological processes for converting renewable feedstocks into hydrocarbons, which can then be produced on an industrial scale. The next phase of its development will involve building an industrial pilot for isobutene over the next two years, to prove the proprietary process is scalable. If this is successful, the unique patented technology, for a cost-efficient, single-step fermentation process, will be licensed out to industrial partners, producing licence fees and ongoing royalties for GBE. The intention is then to replicate this process for other olefins, where technological progress has already been made.

Year end	Revenue (€m)	PBT* (€m)	EPS* (€)	DPS (€)	P/BV (x)	EV/sales (x)
06/12	0.3	(3.9)	(2.1)	0.0	12.6	193.8
6M12	1.8	(0.7)	(0.3)	0.0	N/A	N/A
12/13e	5.0	(3.8)	(1.5)	0.0	7.1	11.0
12/14e	7.0	(7.4)	(2.3)	0.0	4.2	7.8

Note: *PBT and EPS are normalised, excluding intangible amortisation and exceptional items.

Growth profile: Huge market potential in each olefin

GBE has proved the concept for isobutene at a laboratory level and intends to prove the industrial case over the next two years. If successful, management will license out the technology and, for isobutene alone, expects to develop a business generating sales of €500m within 10 years. This could then be replicated with other olefins, like butadiene and propylene, which are at earlier stages of development. In December, GBE announced it had discovered a direct biological route to butadiene, triggering a €1.5m milestone fee, with millions more to come, from its industrial partner Synthos.

Financials: Funding required for industrial pilot

The current financial performance is largely irrelevant to the long-term potential and value of the business, except for the ability of the company to finance itself. We project that with our current cash estimate of €6m GBE can fund itself, at current rates of expenditure, for approximately a year, but will need to raise capital for the industrial pilot, which is expected to require c €20m of investment and operating expenditure over two years. Further details of the industrial pilot and how it will be funded are expected to be released in H113.

Valuation: We estimate €69m for isobutene alone

We have valued GBE's potential isobutene business as a proxy for the value of the company as a whole; using a DCF methodology, as traditional valuation metrics are of little use for a company at such an early stage of development. Similarly, appropriate comparatives are difficult to find, given the different business models and varying stages of development among the peers. To offset the forecasting risk we have used a discount rate of 16%, with a range of sensitivities and we have probability adjusted the cash flows. For the isobutene business alone, we estimate an equity NPV of €69m and our sensitivity analysis points to a range of €58-85m.

21 February 2013

Price	€30
Market cap	€55m

Shares in issue	1.8m
Free float	13.4%
Code	ALGBE
Primary exchange	NYSE Alternext Paris
Other exchanges	N/A

Share price performance

%	1m	3m	12m
Abs	(1.0)	36.7	49.3
Rel (local)	(1.0)	26.4	37.6
52-week high/low		€31.9	€18.6

Business description

GBE is in the fourth stage of developing an industrial-scale process for converting carbohydrates into the first of a number of olefins, which will be licensed out to partners once proved in an industrial pilot in 2013-14.

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Investment summary

Company description: Olefins from carbohydrates

GBE was established by two experienced microbiologists to develop unique biological processes for creating olefins from carbohydrates via fermentation, which could be scaled up to industrial levels of production. Although upstream there are companies converting biomass into sugars, there are few companies attempting to convert sugars to chemicals and fuels, despite a market of over US$400bn.

The company's strategy is to develop the industrial case for isobutene, then license out the technology to industrial partners, which have the resources to build a production facility. To fund R&D on several light olefins simultaneously, it has secured grants from government agencies (eg OSEO in France) and industrial partnerships, the best example being the butadiene programme, in partnership with Synthos.

Business model: Licensing out the technology

GBE is focusing on licensing as the most effective business model, as it allows the company to develop faster without investing in its own industrial operations, by transferring a limited right to use the technology to an industrial partner. As a result, a number of separate exploitation licences are possible for each olefin, with a variety of prospective licensing partners from various industrial sectors.

For each plant under licence GBE expects to generate two sources of revenue:

- A €10m upfront payment per 100,000 tonnes of capacity on construction of the production facility.
- Royalties of 2-5% per annum, (equivalent to €3-8m per annum per 100,000 tonnes).

Valuation: Long-term prospects can only be captured in a DCF

The stock is currently trading on 11x 2013e sales and 7x 2013e book value, so it is clear that traditional valuation metrics are of little use in valuing GBE. As GBE is a growth stock in the very early stages of its development, we have valued the company using a DCF model predicated on the potential cash flows of the isobutene process alone, as a proxy for the whole company.

As it is essential to focus on the longer-term outlook we have tried to address the additional forecasting risk in our DCF model by applying a discount rate of 16% and using probability adjusted cash flows, which can be revised over time as they become more predictable. This produces a current NPV/equity value of €69m (assuming no debt funding) in a range of €58-85m and an IRR of 38%.

Financials: Profitability now three or four years away

GBE is in the fourth phase of its development of isobutene, which involves developing an industrial pilot for the olefin over the next two years. This is expected to cost c. €20m in capital and operating expenditure. If this is successful, it will be licensed out to industrial partners in exchange for an upfront payment and ongoing royalty payments, at which point profitability should be reached.

- GBE reported a loss of €3.5m in FY12 owing to an increase in personnel and laboratory costs, which more than offset revenue of €0.28m. However, the company still had €4m of cash on the balance sheet, which would fund its operations for a year at current levels after the raise last year.
- With another €3m raised in July 2012, the company will be able to fund its R&D for longer, although it will need to raise further capital in 2013-14 to fund development of the industrial pilot.
- Despite the €10m spent as of June 2012, the company is not expected to reach profitability over the next two years, as it invests in the industrial pilot for isobutene. However, it should still be able to generate revenue from further licensing options in the meantime.

Company description

The concept: Hydrocarbons from carbohydrates

GBE was formed in 2008 by two industrial biologists, Marc Delcourt and Philippe Marlière, who had previous experience of start-up companies in this area, to develop a unique biological process for creating olefins from carbohydrates via fermentation, which could be scaled up into industrial levels of production. Upstream a number of processes already exist, with a variety of companies converting biomass into sugars. However, there are only a few companies attempting to convert sugars to chemicals and fuels, despite a market size of hundreds of billions of dollars, because of the technological barrier of improving natural metabolic pathways, or developing synthetic ones.

The opportunity: Bio-production of olefins from renewables

Classic industrial biology techniques cannot be applied to light olefins, so no direct biological process had been developed for the bio-production of light olefins, before the creation of Global Bioenergies. The company, therefore, targeted this opportunity, as management believed the scientific community had overlooked a market with huge potential. Given the market opportunity there are competitors in certain olefins, including Genomatica for butadiene, and Gevo and Butamax for isobutanol, but neither is developing a process capable of directly producing isobutene.

The reason it was so attractive to management is that these olefins are the main building blocks of the petrochemical industry and the current market size of the six main olefins is c. US$333bn (see Exhibit 1). However, there are huge new markets for these products in plastics, elastomers and fuels. The potential market size for isobutene alone in tyres, fuels and organic glass, as detailed below, is estimated at over US$400bn. What was needed, therefore, was a breakthrough innovation to overcome the technical barrier for the biological production of olefins.

Exhibit 1: Petrochemical markets

	Existing market US$bn	Potential market US$bn	Main applications
Ethylene	144		Polyethylene (60%)
Propylene	88		Polypropylene (65%)
Linear butenes	37-74		Co-monomers in various plastics
Isobutene	29	>400	Tyres, organic glass, fuels
Butadiene	15		Tyres, nylon, coating polymers
Isoprene	2	10	Tyres, adhesives
Total	**333**		

Source: ICIS Statistics, SRI reports

The rationale: Start with Isobutene

Four clear reasons

The decision to start with isobutene was partly driven by chemical prices. The prices for ethylene, over half of which is used for polyethylene production, have been falling since 2008, owing to the development of shale gas and natural gas crackers. Meanwhile the prices of other olefins have been increasing, owing to reduced Naphtha cracker capacity. As a result the prices of n-butene, propylene and butadiene are either seeing an adjustment, or are expected to, as new methods are developed to derive them from ethylene. However, isobutene cannot be produced from ethylene, so a correction in price is less likely and the market appears ready for an alternative method of producing isobutene.

Secondly, the product tree for isobutene is huge and ranges from liquids including gasoline, jet fuel and diesel, to solids, including plastics, organic glass and rubber, with a current market size of up to

US$30bn (as in Exhibit 1). Thirdly, the costs of production are expected to be lower than for chemical production, depending on the sourcing of feed stocks, which tend to be more expensive in Europe, but cheaper where recycling is more prevalent. Current market conditions would, therefore, produce an increasingly profitable bio-isobutene process for commodity chemical applications.

Finally, there should also be bio-fuels applications, although their profitability will be dependent on the fuel price, which is linked to crude. Nevertheless, the production of biofuels remains attractive, as oil prices are close to their peaks, global demand continues to rise and there are currently no satisfactory alternatives to liquid fuels. As a result the market will adapt and new technologies are likely to emerge.

There is also a European regulatory target for 10% of fuels to come from biofuels by 2020, which cannot be reached with current technologies. There are similar targets for 2020 in the US (36bn gallons of biofuels) and China (10m tonnes of bio ethanol). Using second generation biomass and waste would be less expensive than other renewable feed stocks and would allow the development of biofuels on a greater scale. Indeed, the recent collaboration between GBE and Lanzatech is intended to develop a process for the bio-production of isobutene from domestic and industrial waste.

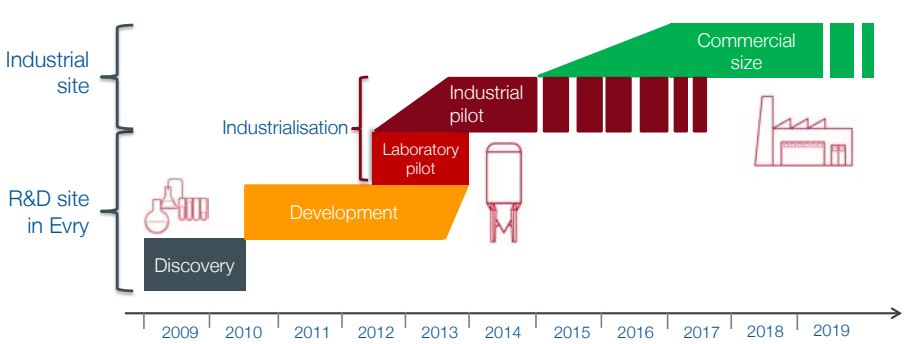
The science: A four-stage process to creating a prototype

The technological breakthrough sought by GBE was to identify in nature a micro-organism that produces traces of the molecule required, then to improve the yield and productivity via genetic engineering. However, as there is no organism producing isobutene naturally, this was a three stage process:

- Creating an artificial metabolic pathway: identifying enzymes catalysing reactions and introducing them into a micro-organism via synthetic biology.
- The pre-industrial strain: optimising the enzymes and the strains in incremental steps, via metabolic engineering, using standard genetic engineering tools.
- Creating a prototype: validating the principle of the process for producing high-purity gaseous isobutene, with no toxicity and no distillation.
- A laboratory pilot to scale up production to 42 litres.

Patents: The process is protected by nine unopposed applications for 20-year patents, filed since 2008, for different aspects of the technology, which are owned by GBE, or Philippe Marlière/co-owned and assigned to GBE by licensing agreement. The benefits of GBE's direct fermentation process are that it is a single step and therefore less costly and complex than the indirect method requiring liquid fermentation, purification and thermo-chemical dehydration, all of which are more energy intensive.

Exhibit 2: Industrialisation schedule



Source: Global Bioenergies

The next step: The industrial pilot

The next phase of GBE's industrialisation strategy is to build an industrial pilot for isobutene. This is expected by management to cost c €20m over the two financial years FY13 and FY14. This will cover both capital expenditure and operating expenses. The purpose of the pilot is to scale up the fermentation process by up to 100 times, from the 42 litre capacity in the laboratory pilot. A similar scale-up was achieved by DuPont for propanediol in the 1990s and more recently by several companies for succinic acid and fatty acids. More detail is expected to be announced in 1H13, along with details of the required capital raising.

Strategy: One molecule at a time

As mentioned above, the strategy is to develop the industrial case for one olefin at a time, then license out the technology to industrial partners, which have the resources to build a production facility to exploit the technology on a larger scale. The advantages of this product development strategy are that it is possible to install a production facility close to an industrial plant using isobutene or butadiene as a feedstock, of which there are a significant number worldwide, which have already built the storage and distribution infrastructure.

Business model: Licensing out the technology

GBE has decided to focus on licensing as the most effective operating model for the business, as it allows the company to develop faster without the constraints of investing in and developing its own industrial operations. The process will transfer a limited right to use the technology to an industrial partner: for one olefin, for one final product, for one market and in just one geographical zone. As a result, a number of separate exploitation licences are possible, even just for isobutene. GBE expects to generate two sources of revenue:

- A €10m upfront payment per 100,000 tonnes of production capacity on construction of the facility, which would equate to just a 10-13% additional cost for the industrial partner to build the plant.
- Royalties of 2-5% per annum (equivalent to €3-8m per annum per 100,000 tonnes, or a GBE stake of 10-25% in the profits of the plant), a similar level to that already stipulated in an existing partnership agreement.

GBE believes there are a number of prospective licensing partners from various industrial sectors and has had discussions with approximately 100 groups, of which several are interested in licensing:

Examples of possible industrial partners

- **Biomass transformation industries:**
  Sugar: Tereos, Cristal Union, Tate & Lyle and SudZucker
  Starch: Roquette, ADM and Cargill
- **Fuel companies:**
  Oil companies: Total, Exxon, Chevron, BP and Shell etc
  Fuel distributors: independents and retails chains
- **Petrochemical industries:** Dow, BASF, Evonik, Mitsubishi and Arkema
- **Producers of downstream products:** Cosmetics, packaging and tyre producers

Isobutene business model

Licences are expected to be granted from 2014 when the results of the first industrial pilot are due to be obtained. Until that point licence options can be granted, which can comprise, for example, the right of first refusal for an application of an olefin. As a result revenues could expand sharply with no

relation to operating costs from 2014. A number of licence options are under negotiation and one has been signed with a US Fortune 500 company in 2010. A collaboration with a German car manufacturer was signed last year and discussions over a number of further licence options have been held this year.

Exhibit 3: Isobutene production facility illustrative business model

	US$m
Volumes (tonnes)	100,000
Assumed price (US$/t)	2,000
Revenues	**200**
Feedstock costs	140
Operating costs	10
Amortisation	10
Operating profit	**40**
Margin	20%
Production cost/tonne (US$)	**1,400**

Source: Global Bioenergies

Other molecules: Butadiene and propylene

To enable GBE to conduct R&D programmes on several light olefins at the same time, it has secured dedicated funding from government agency grants (including OSEO in France) or industrial partnerships, as the company would not have the financial resources to expand alone. The first example of this is the butadiene programme.

Collaboration with Synthos

The intention is to use GBE's technology to develop a bio-production process for a second olefin, which has a market size of US$15-30bn. The R&D will be undertaken by GBE, part financed by Synthos, which is co-financing the company, after investing €1.4m in September 2011 for what is now a 3.3% stake. Industrialising the process will be financed and developed by Synthos, while royalties from the rubber applications granted to Synthos will be paid to GBE. GBE will also retain exclusive rights on all other applications. Management believes there is a butadiene market of US$20bn in rubber tyres, pipes and joints, but also another US$10bn in nylon, plastics and latex, so the application can be used well beyond the Synthos collaboration. GBE announced in December it had discovered a direct biological route to butadiene, triggering a €1.5m milestone fee from Synthos and several million euros of further income to follow in subsequent years. This was followed in February by the announcement of working fees of €1.17m from the agreement.

Propylene pathway discovery

On 9 October the company announced that it had discovered a new metabolic pathway to allow the direct conversion of renewable resources to propylene. Propylene is the second-largest petrochemical by volume, which is used to manufacture polypropylene plastics for the automotive and packaging industries and currently has a market size of US$93bn. GBE has filed several patent applications for the process, for which it holds exclusive rights. As there was no known natural pathway to propylene in micro-organisms, GBE needed to create an artificial pathway based on previously unknown enzymatic reactions for the direct bio-production of propylene. GBE will now focus on engineering more active enzymes and implementing them into microbial strains, which can then be industrialised. This proves that the process used for isobutene can be replicated for other olefins and GBE plans to find an industrial partner to develop a propylene bioprocess.

Management structure

GBE has an experienced executive management team supported by a large scientific advisory board, a supervisory board, to represent shareholder interests, and a strategy committee. The executive team of CEO, CFO and Head of business development; manages the research, development and industrialisation teams, which comprise a number of experienced professionals. The scientific advisory board is presided over by co-founder Philippe Marlière and contains eight eminent scientists from both academia and industry.

Management boards

Members of the supervisory board

- Marc Delcourt, CEO, co-founder
- Philippe Marlière, co-founder
- Sébastien Groyer, representing investor Seventure Partners

Strategy committee

Marc Delcourt chairs the strategy committee composed of:

- Patrick Langlois, former CFO of Aventis
- Pierre Lévi, chairman of the board and CEO of the Salins Group
- Michel Marlière, former COO of Tank & Rast
- Sébastien Groyer, investment director at Seventure Partners

Valuation: DCF and comparatives

We have valued the company using two methods: a DCF model for the isobutene process alone and comparative analysis, but as GBE is a growth stock in the very early stages of its development, we have focused on the DCF. The stock is currently trading on 11x 2013e sales and 7x 2013e book value, so it is clear that traditional valuation metrics are of little use in valuing GBE. It is possible that the company could continue growing its business through licensing options, until these valuations become more reasonable, but the real story for GBE is the licensing out of the technology to industrial partners in return for upfront payments and annual royalties. These are further out in the forecast period and therefore less predictable, but represent the true value potential of the stock. Also, we do not believe the comparatives in Exhibit 4 are particularly helpful, as they are generally at a more advanced stage of development. We believe the best way to identify value for the company is, therefore, via a DCF model.

Exhibit 4: Comparatives

	Market cap	EV/sales (x)			P/BV (x)		
	local	2012	2013e	2014e	2012	2013e	2014e
Amyris (USD)	186	2.8	1.2	0.6	2.0	2.8	N/A
Metabolic Explorer (€)	82	13.7	N/A	N/A	1.2	1.2	N/A
Gevo (USD)	82	1.5	1.0	0.2	0.7	0.7	2.3
Solazyme (USD)	528	7.4	3.7	0.9	2.4	2.9	4.5
Average		**6.3**	**2.0**	**0.6**	**1.6**	**1.9**	**3.4**

Source: Bloomberg. Note: Priced as at 20 February 2013.

Valuation method: DCF

The DCF model is predicated on the potential cash flows of isobutene alone, the first olefin likely to be developed to an industrial scale, as if it were a stand–alone project, rather than the company as a whole. The company is not expected to reach profitability until 2016, so most other valuation methods are not appropriate and it is essential to look at the longer term outlook. However, this is harder to predict and therefore more risk laden. We have tried to address this in our DCF model. Firstly by applying a high discount rate of 16% within a wider range and secondly using probability adjusted cash flows, to try to reflect the greater risk attached to longer term cash flows.

Our discount rate of just under 16% is a function of a 16% cost of equity and a 5% after tax cost of debt. However, as there is only a 5% debt weighting, the weighted average cost of capital is barely reduced by the current capital structure. This is not surprising given the early stage of the business and lack of interest cover, which necessitates funding the operations with equity. We have assumed a 10 year forecast period and a 3% terminal growth rate, which is a nominal rate, so assumes minimal GDP growth from FY23 onwards.

There are expected to be two main drivers of cash flows in our forecast period. Firstly licensing payments from industrial partners and secondly, royalties from those partners when they start production. These are expected to be 5% for chemical partners and 2% for fuel partners, assuming an isobutene price of €1,600 per tonne. We have taken the company's assumption for the number of chemical and fuel factories that are expected to be signed up, as applying our own assumptions would be too subjective. However, we have steadily reduced the probability assumption of the cash flows materialising, from 75% to 5%, over the forecast period, to try to reflect the risks associated with signing up partners and the lack of clarity at this stage. We believe it makes more sense to be punitive in our assumptions until the first partnerships are signed and the probabilities of meeting the company's forecasts become clearer, after which we can improve the probability assumptions.

Exhibit 5: DCF valuation for isobutene production licences (€m)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	TV
Chemical royalties and licensing payments			5	15	38	69	96	111	120	120	
Fuel royalties and licensing payments					5	15	58	120	228	455	
Total revenues	**0**	**0**	**5**	**15**	**43**	**84**	**154**	**231**	**348**	**575**	
Cash for OPEX and capex	5	20	20	10	13	17	22	29	37	48	
Operating cash flow	**(5)**	**(20)**	**(15)**	**5**	**30**	**67**	**132**	**202**	**311**	**527**	
Tax	0	0	0	(2)	(10)	(22)	(44)	(67)	(104)	(176)	
Cash flow after tax	**(5)**	**(20)**	**(15)**	**3**	**20**	**45**	**88**	**135**	**208**	**351**	**2,701**
Probability	100%	100%	100%	75%	65%	55%	45%	35%	25%	15%	5%
Probability adjusted cash flow	**(5)**	**(20)**	**(15)**	**3**	**13**	**25**	**40**	**47**	**52**	**53**	**135**
Discount factor	0.86	0.74	0.64	0.55	0.48	0.41	0.35	0.31	0.26	0.23	0.20
Discounted probability adjusted cash flow	**(4)**	**(15)**	**(10)**	**1**	**6**	**10**	**14**	**14**	**14**	**12**	**26**

NPV ranges									
Terminal growth		**1%**	**3%**	**5%**	**Probability**		**10%**	**25%**	**100%**
Discount rates	**15%**	73.7	78.2	84.5	**Discount rates**	**20%**	38.2	96.3	386.6
	16%	65.3	**68.8**	73.6		**25%**	21.7	**55.1**	222.0
	17%	57.8	60.6	64.4		**30%**	12.9	33.1	133.7

Source: Edison Investment Research estimates

We believe this is a better way of estimating value than trying to predict a valuation two to three years out, although value is likely to increase as the business grows and the development expenditure is in the past. This gives us a current NPV of €69m (and a range of €58-85m at discount rates of 15-17%), which equates to the equity value, as it assumes no debt funding. The advantage of this model is that the terminal value represents just 38% of the NPV, which would be much higher without the probability adjustments, as a result of the expected growth rate. Excluding the terminal value, the IRR of the 10 year forecast period is 38%, which would obviously increase as the probability adjustments are reduced. Another point to remember is that this valuation is for isobutene only. Other olefins developed in the same way would potentially produce a similar DCF model and a further valuation uplift for GBE.

Another way of assessing the valuation is to estimate what probability of success is assumed by the current share price. In Exhibit 5 we show that the current valuation assumes approximately a constant 25% probability, at a 25% discount rate, which equates to a constant probability of less than 10%, at our 16% discount rate. Valuing growth stocks before they reach profitability is by necessity a subjective process. To counter this we have tried to show our assumptions and sensitivities clearly, so they can be further adjusted if required, especially as there are currently no industrial partnerships signed.

Financials

GBE is currently reliant on small-scale licensing option revenues from development partners, including Synthos. It has also benefited from grants and reimbursable loans from institutions like OSEO, the French agency for innovation. Generally GBE does not chase grants and subsidies, as it is reluctant to share its intellectual property with outside agencies, although it expects to use some grants for the industrial pilot. However, the sources of revenue are likely to expand from FY15 when the first upfront payments from the industrial pilots are expected to be received.

Earnings: Into the fourth phase of growth

The company is into the fourth stage of its growth plan (after the discovery of the process, optimising the enzymes, the strains and the laboratory pilot), which will involve establishing an industrial pilot for the production of isobutene. The fourth stage will see industrial factories set up by licensed partners. GBE should then have four sources of income.

- Licensing options: these are research and development partnership deals, as with Synthos for butadiene (although it also took an equity stake) and a German car producer. The investment generally covers the shared risk during the discovery phase. The main revenue driver in FY13-14.
- Grants: from the government and its agencies, including OSEO. These will become less significant over time, although they are expected to continue in FY13-15, to partly fund the industrial pilot. We have forecast a total of €9m spread over three years.
- Licensing upfront payments: from FY15 the company expects to generate income from licensing the unique patented technology to industrial partners, which can then build production facilities of c 100,000 tonnes per annum. GBE expects to receive upfront payments of €10m, spread over two years for each licence it signs, with a potential partner in each olefin and in each region.
- Royalties: from FY15 the company anticipates starting to receive royalty payments from the industrial partner, once production starts, of 5% of revenues for chemical production and 2% of revenues for fuel production.
- Projected growth trends: thereafter the growth profile is a function of how many industrial partnership licences can be signed.
- Tax concessions: on top of the tax losses built up over the past few years, there may also be tax concessions available for developing the industrial pilot.

Costs

On the cost side management expects the industrial partner to fund the costs of all research and development during the discovery process, in exchange for the right to exploit the process in one area. However, no profit is expected on the option agreements, so the costs of managing the discovery completely offset the revenue generated by them. The cost escalation starts with the development of the industrial pilot in 2013, which is anticipated to cost €20m, including both capital and operational expenditure. More detail on the cost of the pilot is expected to be released this quarter, along with details of how it will be funded, which could include grants, partnerships and subsidies. We have included new equity of €20m in our forecasts as below. As the company does not intend to build its own factories, the forecast growth in the cost base is expected to cover further laboratory costs.

Sensitivities

There are many sensitivities in this business, ranging from macro-related issues concerning fuel, chemical and biofuels prices, as well as EU targets, to technical issues including the in-house enzyme engineering used to develop the new metabolic pathways. The company has tried to minimise them by signing partnerships and out-licensing the technology to industrial partners, which will bear the majority of the development risk. This does not mitigate the cyclical risks, which could reduce the attractions for a partner of developing an industrial facility, nor the regulatory issues, which can determine the demand for biofuels. The EU, US and China all have biofuels targets for 2020, as discussed on page 4. For GBE, the main sensitivities are how many partnerships can be signed and whether the assumptions are realistic: both the number that can be achieved and the terms that can be agreed.

Cash flow: Four capital raisings in four years

GBE has raised capital four times in the past four years, raising over €14m on the way, as it has progressed from each stage of the development process. The first in February 2009 brought in Seventure Partners as a strategic financial investor, which took a 43% stake. This has since been diluted slightly to 40% as GBE raised €6.6m at its IPO in June 2011, adding Cristal Union to the shareholder list and €1.4m from Synthos, which took a 3.3% stake in 2011. A further capital increase in July last year raised a further €3m. This capital is sufficient to fund the laboratory pilot for isobutene, which is currently underway. GBE is expected to announce details of the industrial pilot in 1H13, which will require a significant amount of further capital to be raised. In our forecasts we have included two capital raises of €5m in 2013 and €15m in 2014 to fund the industrial pilot, assuming the equity is raised at the current share price and at the end of each financial period.

Exhibit 6: Capital raising history

	Date	Shares	Price (€)	Issue size (€m)
Seventure Partners	Feb 09	506,500	6.25	3.2
IPO (Public)	Jun 11	333,675	19.85	6.6
Synthos Investment	Sep 11	59,625	23.48	1.4
Capital increase	Jul 12	153,459	19.8	3.0

Source: Global Bioenergies

Balance sheet

As at June 2012 GBE had €4m of cash on the balance sheet, after the capital raisings in June and September 2011. However, it also raised €3m in July 2012, to augment the cash resources and offset the cash burn in the second half of CY12. There is a tiny amount of reimbursable debt on the balance sheet (€0.66m) and management does not intend to increase that in the short term. At current levels of operating expenditure GBE has enough cash to fund the business for at least a year.

GBE is expecting to raise up to €20m in CY13-14 to fund the industrial pilot over two years and although management believes straight debt may be available, as both the laboratory and industrial pilots are unproven processes, it believes there a number of other potential funding sources:

- Raising equity from industrial partners, but foregoing the upfront licensing payments (eg oil company corporate investment vehicles).
- A capital increase from international investors (ie beyond France).
- Grants and loans from the EU, or French government agencies.

Exhibit 7: Financial summary

€m	Jun 2010 FGAAP	Jun 2011 FGAAP	Jun 2012 FGAAP	*Jul-Dec 2012 FGAAP	Dec 2013e FGAAP	Dec 2014e FGAAP	Dec 2015e FGAAP
PROFIT & LOSS							
Grants	0.02	0.18	0.03		2.00	4.00	3.00
Fees/other revenue	0.00	0.23	0.25	1.78	3.00	3.00	9.00
Revenue	**0.02**	**0.41**	**0.28**	**1.78**	**5.00**	**7.00**	**12.00**
Operating Expenses	(0.81)	(1.19)	(2.34)	(1.41)	(5.42)	(7.62)	(9.72)
Gross Profit	**(0.79)**	**(0.79)**	**(2.06)**	**0.37**	**(0.42)**	**(0.62)**	**2.28**
EBITDA	**(1.55)**	**(1.94)**	**(3.86)**	**(0.72)**	**(3.02)**	**(5.64)**	**(3.49)**
Operating Profit (before amort. and except.)	**(1.55)**	**(1.94)**	**(3.86)**	**(0.72)**	**(3.02)**	**(5.64)**	**(3.49)**
Amortisation	(0.02)	(0.04)	(0.09)	(0.04)	(0.77)	(1.82)	(2.19)
Exceptionals	(0.00)	(0.00)	(0.04)	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Profit	**(1.57)**	**(1.98)**	**(3.99)**	**(0.76)**	**(3.79)**	**(7.46)**	**(5.68)**
Net Interest	0.00	(0.01)	0.08	0.04	0.01	0.07	0.08
Profit Before Tax	**(1.57)**	**(1.99)**	**(3.91)**	**(0.72)**	**(3.79)**	**(7.40)**	**(5.61)**
Tax	0.27	0.41	0.41	0.16	0.80	1.55	1.18
Minority interests	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net income (Adj NP)	**(1.55)**	**(1.95)**	**(3.46)**	**(0.67)**	**(2.99)**	**(5.84)**	**(4.43)**
Net income (Reported)	**(1.30)**	**(1.58)**	**(3.50)**	**(0.67)**	**(2.99)**	**(5.84)**	**(4.43)**
Average Number of Shares Outstanding (m)	1.2	1.2	1.6	1.8	2.0	2.5	2.5
EPS - adjusted and fully diluted (EUR)	**(1.24)**	**(1.56)**	**(2.11)**	**(0.31)**	**(1.51)**	**(2.35)**	**(1.78)**
EPS - (Reported) (EUR)	**(1.04)**	**(1.27)**	**(2.14)**	**(0.31)**	**(1.51)**	**(2.35)**	**(1.78)**
Gross Margin (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBITDA Margin (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operating Margin (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BALANCE SHEET							
Fixed Assets	**0.15**	**0.17**	**0.47**		**2.40**	**9.63**	**12.84**
Intangible Assets	0.01	0.01	0.01		0.01	0.01	0.01
Tangible Assets	0.11	0.12	0.38		2.31	9.54	12.75
Investments	0.03	0.04	0.08		0.08	0.08	0.08
Current Assets	**0.24**	**6.67**	**5.33**		**12.73**	**13.06**	**6.04**
Stocks	0.03	0.06	0.11		0.57	0.90	1.22
Debtors	0.00	0.08	0.08		0.92	1.28	2.17
Cash	0.09	5.75	4.09		9.94	9.40	1.00
Other	0.12	0.78	1.05		1.30	1.48	1.66
Current Liabilities	**(0.23)**	**(0.30)**	**(0.96)**		**(5.09)**	**(4.03)**	**(5.45)**
Creditors	(0.23)	(0.30)	(0.96)		(5.09)	(4.03)	(5.45)
Short term borrowings	0.00	0.00	0.00		0.00	0.00	0.00
Long Term Liabilities	**(0.45)**	**(0.49)**	**(0.88)**		**(1.83)**	**(1.29)**	**(0.49)**
Long term borrowings	(0.33)	(0.33)	(0.66)		(0.66)	(0.36)	0.14
Other long term liabilities	(0.12)	(0.16)	(0.22)		(1.17)	(0.93)	(0.63)
Net Assets	**(0.30)**	**6.05**	**3.95**		**8.21**	**17.37**	**12.94**
CASH FLOW							
Operating Cash Flow	(1.03)	(2.27)	(2.95)		1.30	(6.19)	(2.50)
Net Interest	0.00	0.00	0.00		0.00	0.00	0.00
Tax	0.00	0.00	0.00		0.00	0.00	0.00
Capex	(0.13)	(0.14)	(0.55)		(2.70)	(9.05)	(5.40)
Acquisitions/disposals	0.00	0.08	0.17		0.00	0.00	0.00
Financing	0.94	7.93	1.40		8.04	15.00	0.00
Dividends	0.00	0.00	0.00		0.00	0.00	0.00
Net Cash Flow	**(0.23)**	**5.60**	**(1.93)**		**6.64**	**(0.24)**	**(7.90)**
Opening net debt/(cash)	**0.47**	**0.24**	**(5.42)**		**(3.43)**	**(9.28)**	**(9.04)**
Other	0.00	0.06	(0.06)		(0.79)	0.00	0.00
FX adjustments	0.46	(0.00)	0.00		0.00	0.00	0.00
Closing net debt/(cash)	**0.24**	**(5.42)**	**(3.43)**		**(9.28)**	**(9.04)**	**(1.14)**

Source: Edison Investment Research, Global Bioenergies. Note: *GBE is changing its financial year to December from 2012.

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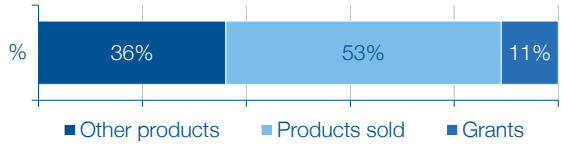
Revenue breakdown



CAGR metrics		Profitability metrics		Balance sheet metrics		Sensitivities evaluation	
EPS	N/A	ROCE	N/A	Gearing	N/A	Litigation/regulatory	◖
EPS	N/A	Avg ROCE	N/A	Interest cover	N/A	Pensions	○
EBITDA	N/A	ROE	N/A	CA/CL	N/A	Currency	◖
EBITDA	N/A	Gross margin	N/A	Stock turn	N/A	Stock overhang	◖
Sales 2010-12	276%	Operating margin	N/A	Debtor days	N/A	Interest rates	○
Sales 2012-14e	397%	Gr mgn / Op mgn	N/A	Creditor days	N/A	Oil/commodity prices	●

Management team

Co-founder, CEO and chairman: Marc Delcourt

Marc Delcourt is a molecular biologist and specialist in enzyme engineering. He has been a founder and CEO of industrial biology companies since 1997.

CFO: Liliane Bronstein

Liliane Bronstein has been CFO in fast-growing listed European companies in the high tech and IT sectors since 1997, and joined Global Bioenergies at the end of 2010.

Co-founder: Philippe Marlière

Philippe Marlière is president of the Scientific Advisory Board, he has pursued his scientific work in biotechnology companies he has founded since the 1990s.

Head of Business Development: Thomas Buhl

After a biotech-focused MBA, Thomas Buhl started his career in the technology transfer office of the CEA and joined GBE in October 2010.

Principal shareholders	(%)
Seventure Partners	39.7%
Marc Delcourt	19.7%
Philippe Marlière	19.7%
Cristal Union	4.2%
Synthos	3.3%
Public	13.4%

Companies named in this report

Synthos (SNS), Amyris (AMRS), Gevo (GEVO), Metabolic Explorer (METEX), Solazyme (SZYM)