

Deinove

Commercial revenues expected 2018

Management believes that Deinove now has the necessary financial resources to continue with its work until the end of FY17 without recourse to further equity funding. Deinove will continue to progress towards commercialising its technology in both the Deinochem and Deinol projects, with first commercial revenues expected by 2018. Based on the assumption that it can successfully deploy its technology, we believe Deinove could be worth c €8/share (previously €10).

Year end	Revenue (€m)	PBT* (€m)	EPS* (c)	DPS (c)	P/E (x)	Yield (%)
12/14	0.2	(6.6)	(94.9)	0.0	N/A	N/A
12/15	0.5	(7.3)	(66.8)	0.0	N/A	N/A
12/16e	0.5	(8.1)	(79.3)	0.0	N/A	N/A
12/17e	0.5	(8.4)	(73.1)	0.0	N/A	N/A

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

FY15: Financial, scientific and industrial progress

Deinove strengthened its financial position in 2015, in part via an equity issue, and cash resources should be sufficient to fund the business until the end of FY17. It signed important agreements with industrial partners (eg Flint Hills Resources and Tyton) and passed a number of significant scientific milestones triggering payments from public funding bodies. Deinove aims to produce its first commercial revenues in FY18 and during the course of 2015 it strengthened its management team, partly to assist with the process of scaling up its technology to commercial levels.

FY16: Working towards commercialisation in FY18

The strategic focus of Deinove's business has shifted increasingly towards green chemistry, although Deinove continues to work towards commercialising its technology in both the Deinol and Deinochem projects. We expect the Deinochem project to achieve its second milestone in 2016 and for Deinove to seek to increase the scale of production of carotenoids later in 2016. The project will also work towards developing its extraction and purification processes and securing regulatory approval of the strains shortlisted for production. Testing with industrial partners will continue and we expect the final selection of molecules for industrial production to be made in 2017 (accompanied by further scale up). The Deinol project will work on optimising yield and productivity and consistency of production in FY16. Further work is also scheduled on a broad range of industrial substrates with a view of developing a competitive proposition by 2018.

Valuation: Upside on successful deployment

We value Deinove's business using a DCF approach assuming successful commercial deployment of Deinove's technology in both biofuels and green chemistry. However, we have refined our valuation to take a more cautious view on the timing and scale of biofuels deployment. The valuation remains sensitive to the timetable for commercial deployment of technology but, based on our current assumptions, Deinove could now be worth c €8/share (previously €10).

Long-term outlook

Alternative energy

10 June 2016

Price €3.70

Market cap €32m

Net cash* (€m) at 31 December 2015 12.4
*Company definition

Shares in issue 8.6m

Free float 65%

Code ALDEI

Primary exchange Alternext

Secondary exchange N/A

Share price performance



% 1m 3m 12m

Abs 9.5 2.8 (47.7)

Rel (local) 7.8 2.7 (42.6)

52-week high/low €7.9 €2.90

Business description

Deinove designs, develops and markets technologies in biofuels and biochemical by harnessing the properties of the *Deinococcus* bacterium.

Next event

H116 results September 2016

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Investment summary

Company description: Green chemistry and advanced biofuels

Deinove possesses a collection of more than 6,000 strains of the *Deinococcus* bacterium and other UV-resistant strains. The company is seeking to develop industrial applications and processes by utilising the properties of the bacteria. Deinove's research is focused on two specific markets: second-generation biofuels (Deinol) and green chemistry (Deinochem). The business model is based on selling operating licences for its applications to technology and industrial groups.

Valuation: DCF suggests upside for the shares

In our view, given the absence of short-term profitability, DCF remains the appropriate method for providing a valuation framework for Deinove. In order to construct a long-term DCF for the company it is necessary to make assumptions regarding the success or otherwise of the technology, the scale and timing of commercial deployment and the appropriate discount rate. We continue to assume successful deployment of Deinove's technology in both biofuels and green chemistry, but we now adopt a more cautious projection for the timing and scale of the rollout in biofuels, leading to a reduction in our valuation. We examine the sensitivities of the valuation to varying assumptions in following sections of this report but under a central case scenario, and using a discount rate of 11%, we estimate the company could be worth c €8/share (previously €10).

Financials: Resources sufficient until the end of 2017

We assume that Deinove does not generate commercial revenue from its technology in either FY16 or FY17 and that the company continues to record losses for the next two years. However, following a successful capital raising in FY15 (€10.7m gross via the issue of 2.37m new shares at €4.5 per share), we forecast no further equity issuance in either FY16 and FY17, despite c €10m of unused capacity in an equity drawdown facility. Deinove has stated that it has sufficient financial resources to maintain its business until the end of FY17 and this accords with our projections. It is worth noting however that, under this scenario, by the end of FY17 Deinove will be operating with negative shareholders' funds.

Sensitivities: Price competitiveness and timing key sensitivities

Predicting revenues so far into the future requires making assumptions which remain highly uncertain. As a result, there are a number of risks which surround our projections. The principal risk remains that the technology is insufficiently robust or price competitive for commercial deployment. Other risks include: that the timing of commercialisation falls behind the expected timetable; the incentive programmes/mandates, eg for biofuels, are abolished or made less generous; and a permanently lower oil price undermines the economic justification for replacing oil-based products.

Exhibit 1: Changes to forecasts since our last published note (29 March 2016)

	Revenue			PBT			EBITDA		
	Old	New	% chg	Old	New	% chg	Old	New	% chg
2016e	0.4	0.5	+20	(8.3)	(8.1)	+2	(7.5)	(7.4)	+1
2017e	0.5	0.5	N/A	(8.5)	(8.4)	+2	(7.5)	(7.5)	N/A

Source: Edison Investment Research

Company description: Financing commercialisation

The main emphasis of Deinove's business is now directed towards the development of the green chemistry project. However, exploration of the metabolic pathways of the deinococcus bacterium will continue across both biofuels and green chemistry and Deinove will pursue scientific, commercial and industrial partnership agreements for both businesses. In preparation for commercial deployment, Deinove will also focus on scaling up its technology and to this end has strengthened its management team. Deinove aims to generate its first commercial revenues in FY18 which it expects to come from Deinochem (carotenoid platform).

Industrial applications of the Deinococcus bacterium

Deinove is seeking to exploit the properties of the Deinococcus bacterium to develop industrial applications. In order to best achieve its business aims Deinove has separated its research and commercial operations. The research side is responsible for screening Deinove's collection of more than 6,000 strains of bacteria, the implementation of tests on a variety of biomass substrates and fermentation and optimization tests in the laboratory. Although R&D requires investment in laboratory equipment and facilities, Deinove's intention is to utilise a capital-light business model. As such, the scale-up of promising technology is sub-contracted to commercial partners (including biofuel and biomass producers, chemical and other industrial companies). Income generation is targeted from two separate sources: R&D and marketing. R&D seeks income in the form of grants and conditional advances from public finance bodies (eg Bpifrance) and additional financing from project partners. Marketing attempts to generate revenue from technology licences and the sale of finished products. Deinove is seeking to generate its first commercial revenue in 2018.

Strategic focus on green chemistry

In the last two years Deinove has shifted the focus of the business from biofuels towards green chemistry. Indicative of this strategic shift is the intention to deploy the proceeds of the recent capital-raise in the ratio of 60% to Deinochem and 40% to Deinol. Of the Deinochem share, c 30% will be devoted to developing the muconic acid platform, with the rest slated for carotenoid/speciality chemical projects (animal feed/cosmetics with Avril and Flint Hills Resources among others). The split of financial resources seeks to promote alternative revenue streams to the original assumption of the predominance of biofuel-related revenue. It is now anticipated that the carotenoid platform will produce the first revenues.

Strengthened managerial team

Emmanuel Petiot continues as CEO, a position he has held since 2013. Since his appointment, Mr Petiot has expanded the scale of the research side of the business and forged a number of partnerships (research and commercial). During the course of FY15 Deinove strengthened its management team with the appointment of Marie Bézenger (Director of Operations) and Dennis McGrew (Chief Business Officer). Marie Bézenger will focus on the scaling up of Deinove's technology and its downstream processing as it moves towards commercialisation. Dennis McGrew will seek to develop research industrial and commercial partnerships in the North American market.

Commercialisation expected in 2018

2015 was a year of progress for Deinove, with the company reinforcing its financial position while signing partnership agreements and passing scientific milestones. Cash resources are now sufficient to fund the business until the end of FY17 and Deinove aims to produce its first commercial revenues in FY18. While the strategic focus of the business has shifted to green chemistry, Deinove continues to work towards commercialising its biofuels offering despite a less favourable macro outlook. We value the business using a DCF approach assuming successful commercial deployment of Deinove's technology in both biofuels and green chemistry; however, we now take a more cautious view on the timing and scale of biofuels deployment. Based on our assumptions, we believe Deinove could now be worth c €8/share.

FY15 results meet expectations

The net loss for FY15 of €6.4m (-2% vs FY14) was in line with our forecasts (Edison -€6.4m). Better than expected revenue of €492k (Edison estimate €220k), due to a mixture of grants and research service-related revenues, and marginally lower costs than forecast, were offset by slightly higher financing costs than anticipated and a lower income tax credit than forecast (€1.6m vs Edison €1.8m). The net cash position of €12.4m was also ahead of our forecast (€12.1m).

Exhibit 2: Deinove financial performance 2015 vs 2014

(€m)	2014	2015	% increase
Revenue	0.2	0.5	+150
Operating costs	-7.2	-8.5	+18
Income tax credit	1.4	1.6	+14
Loss for the year	-6.4	-6.5	+2
Net cash*	2.2	12.4	N/M

Source: Deinove, Edison Investment Research Note: *The net cash figure takes no account of the conditional advances of €6.5m in 2015 (€4.6m in 2014), which Deinove considers to be total shareholders' equity.

Financing secure to the end of 2017

The year-end 2015 net cash position of €12.4m marked a significant improvement on the €2.2m at year-end 2014. In addition to a small amount of commercially-generated revenue, Deinove's financial position also benefitted from grants, milestone payments, tax credits and equity issuance. Deinove received €2.2m in total from public bodies ADEME and Bpifrance for passing milestones in the Deinochem (1st) and Deinol projects (3rd). As already noted, Deinove received an R&D tax credit of €1.6m. However, by far the most important source of funding in FY15 was derived from equity issuance. During the year Deinove raised €4.6m from utilising drawdowns on the Kepler-Cheuvreux facility and currently has c €10m of additional capacity to issue equity as part of the original €15m agreement originally put in place in December 2014. In addition, in December 2015, Deinove also raised substantial additional funds (€10.7m gross, €10.0m net) via the issue of new equity (2.37m new shares at a price of €4.5). The capital-raising completed during FY15 resulted in increasing the total number of shares outstanding to 8.55m. Deinove now considers it has sufficient resources "to ensure its financing through the end of 2017" without further equity issuance under the terms of the Kepler-Cheuvreux facility. Should Deinove choose to activate further drawdowns it would have sufficient financial resources to continue the development of its major business lines into 2018.

Progress: Scientific, commercial and operational

As we have highlighted, during 2015 both the Deinol project and the Deinochem project passed important research milestones triggering payments. Towards the end of 2015, the Deinol project also achieved the production of ethanol at 300L scale and Deinove reached the first milestone of the animal nutrition project with Avril. Investment made by Deinove during 2015 allowed it to

automate the genetic and metabolic engineering platform, install new fermenters and establish a new R&D platform for the production of muconic acid. The automation of the metabolic engineering platform now allows Deinove to generate up to 300 different strains of bacteria a month increasing the breadth of its research and shortening timeframes to proof of concept.

Alongside scientific progress, Deinove signed new partnerships agreements with Flint Hills (animal nutrition) and Tyton (tobacco biomass) in 2015 and post year end with Arbiom (biomass) and Toulouse White Biotechnology. Deinove also issued 12 new patents during 2015. We examine the progress and outlook of the various projects in more detail in the following sections of the note.

Deinochem

The aim of the Deinochem programme is to produce chemical compounds using Deinococci bacteria, which can be substituted for compounds that are traditionally sourced from oil or extracted from plants. Deinove is currently focusing its efforts on three major markets/applications: carotenoids, aromatic isoprenoids and muconic acid.

The carotenoid and aromatic isoprenoid platform are funded under the umbrella of the ADEME-sponsored 'Investments for the future programme'. In November 2013, the Deinochem project secured funding of €5.9m from ADEME (the French Environment and Energy Management Agency), and the General Investment Commission (CGI). The three-and-a-half-year programme received an initial payment of €1.48m and then the first instalment of funding of €1m in January 2015, having passed the first milestone of the project: the modification of the genome to make the strain produce isoprenoids. Deinove plans to bring at least two isoprenoid compounds to a pre-industrial validation phase within three and a half years. Under the terms of the programme Deinove has the potential to earn a further €3.4m in repayable advances from reaching project milestones.

Isoprenoids are a large (more than 22,000 compounds) and diverse family of compounds. Carotenoids form part of the isoprenoid family, are yellow/reddish in appearance and are commonly used in food, cosmetics and animal feed for their antioxidant qualities. Naturally occurring Deinoxanthin ($C_{40}H_{54}O_3$) has been extracted from biomass and Deinove has successfully produced five different carotenoids in laboratories (produced by genetic engineering). Deinove estimates this market will reach \$1.8bn in 2019.

The market for aromatic isoprenoids is estimated to be the largest of the three markets (c \$2bn pa and growing at 3% pa). Aromatic isoprenoids include linalool, geraniol and isoprene itself. These compounds are used in industrial applications such as cosmetics, fragrances, food, feed and rubber. Linalool, geraniol, bisabolol and myrcene are used in perfumes, cosmetics or household products and this is the area of specific focus for Deinove.

The market for muconic acid ($C_6H_6O_4$) is somewhat smaller (\$100m pa) but is regarded as an important platform molecule for the production of consumer plastics derived from renewable biomass sources. In particular, Deinove is focusing on three by-products of muconic acid; Caprolactam, Terephthalic acid and Adipic acid. Adipic acid is a derivative of benzene and its main application remains as a co-monomer for nylon 66 production. However, Adipic acid is also used as a food additive, which is the area of Deinove's particular interest. Almost all of the output of Caprolactam is utilised in the production of Nylon-6, widely used in fibres and plastics. Terephthalic acid $C_6H_4(COOH)_2$ is used for making the polyester PET, which in turn is used to make clothing and plastic bottles. The global market value of these end products is thought by Deinove to be worth "several tens of billions of dollars."

Deinove's scientific work is complemented by alliances with industrial partners. In 2014 Deinove launched the COLOR2B project with Avril to develop additives for animal feeds and has thus far identified 20 (non-GMO) strains of the bacterium (milestone 1), which could be of interest in terms

of animal nutrition and health. In late 2015 Deinove signed an R&D partnership with Flint Hill Resources (FHR) and this (designed to conclude by mid-2017) also focused on the development of producing additives for animal feed. Deinove also has a partnership with Tyton BioEnergy Systems (started in 2015) which aims to explore the use of energy tobacco as a raw material in biochemistry. A strategic partnership, concluded with POS Bio-Sciences of Canada, will investigate opportunities for its carotenoid platform and regulatory approval proceedings have been launched.

The Deinochem project continues working towards key milestone 2 which the company expects will be validated later in 2016. Deinove will seek to increase the scale of production of Deinoxanthin and other carotenoids during 2016, develop its extraction and purification processes and secure regulatory (FDA) approval of the strains shortlisted for production. Deinove will also endeavour to increase the quantity of biomass material for Avril on which to carry out tests. Strain screening for FHR will continue, as will work with Tyton to increase the scale of its testing to monitor how Deinococcus assimilates the Tyton tobacco substrates. We expect the final selection of molecules for industrial production to be made in 2017, accompanied by further scale up. By 2018, Deinove is targeting the production of industrial batches of carotenoids (several tonnes per year) and its first commercial revenue. Indications from the company suggest a sales price (depending on the molecules produced) of between \$300/kg and \$3,000/kg. Production costs are expected to lie in the region of €200-600/kg. Beyond carotenoids, Deinove will work to increase the production yields on its muconic acid platform and will attempt to forge alliances with industrial partners for this project.

Exhibit 3: Deinochem: Projects and progress

Project/Status	Country	Partnership	Products	Stage	Year of anticipated revenues	Funding
ADEME	France	R&D	Isoprenoids/ Carotenoids	Lab Pilots 1 to 2L	2018	Co-financed by ADEME (€6m)
Avril (COLOR2B)	France	Comm. R&D	Speciality Ingrid	R&D	2018	Co-financed by Avril
Flint Hills Resources	USA	Comm. R&D	Speciality Ingrid	R&D	2018	Financed by FHR
POS Bio-Sciences	Canada	Tech. Ind.	Carotenoids	R&D	-	Own funds
Tyton BioEnergy Systems	USA	Comm. R&D	Yet to be defined	R&D	2020	Own funds
Discussions (Various)	Eur/USA	Comm R&D	Muconic Acid	R&D	2020	Own funds

Source: Deinove, Edison Investment Research

Biofuel outlook

Biofuel and ethanol production has expanded rapidly over the medium term according to figures from the OECD (17% CAGR growth 2000-12), benefitting from a combination of factors including high oil prices, commitment to cut greenhouse gases and security of supply considerations. The advent of shale gas in the US and the decline in the oil price has however reduced the recent growth trajectory. Output in the US, the world's largest ethanol market, rose by only 3% in 2015 compared to 2014.

Low oil prices present a clear obstacle to growth in the ethanol market and industry players such as DuPont claim an oil price of US\$70bbl is required for economic production of second generation biofuels. Other energy economists have concluded that crude oil needs to be at \$140bbl for most cellulosic biofuels to be economic without subsidies or mandates. Despite the challenging pricing environment, bodies such as the OECD continue to forecast growth in global biofuel output, mostly thanks to government mandates. Growth projections are, however, now more modest. In its '2015 Outlook', the OECD estimates global ethanol production will increase from c 114bnL in 2014 (30.1bn gallons), to 134.5bnL (35.5bn gallons) by 2024, equivalent to a CAGR of c. 2%. Previously, the OECD had forecast ethanol output of 158bnL by 2023 (CAGR of 4%) and in its 2013 Outlook was forecasting production of 167.4bnL by 2022.

Second generation (2G) ligno-cellulosic ethanol is now expected to reach 1.7bnL (c 450m gallons pa) by 2024 compared to previous predictions of 8bnL by 2023. The OECD expects cellulosic ethanol to be available on a large scale only in the last years of the projection period. While the

outlook is clearly less favourable than was previously the case, this appears a conservative estimate given that, in the US alone, capacity capable of producing 75m gallons per year (mgy) was commissioned in 2015 (Exhibit 4). In addition to the new purpose built 2G facilities, several existing facilities were modified to allow for the production of 2G biofuels. Pacific Ethanol began production of cellulosic ethanol at its Stockton (California) plant in late 2015 with a production capacity of c 1m gallons of cellulosic biofuel per year.

Exhibit 4: US 2G facilities commissioned in 2015

Company	Location	Capacity (mgy)
Abengoa	Hugoton, Kansas	25
DuPont	Nevada, Iowa	30
POET/DSM	Emmetsburg, Iowa	20

Source: Renewable Fuel Association

The pricing environment is also expected to remain flat. The OECD predicts that in the short term weak crude oil prices and biofuel feedstock prices will lead to price softness, but subsequent recovery is expected to lead a price recovery. For the forecast period as a whole, the OECD expects biofuel prices to stay broadly flat in nominal terms at c \$60/hl.

Deinol

Launched in 2009, the DEINOL project aims to develop a consolidated 'all in one' industrial process for the production of 2G (cellulosic) bioethanol using the *Deinococcus* bacterium. Despite the uncertain macro outlook, the Deinol project made further progress in 2015. In July Deinove announced that it had reached the third milestone of the project, receiving a payment of €1.2m as a result. During the year Deinove also produced ethanol using glucose and xylolse in 20L fermenters and in November announced that a 300L test, conducted at the premises of partner, VTT, had been successful, producing ethanol at 7.3% v/v (industrial standard).

In 2016 the project is expected to take further steps towards commercialisation, with work optimising yield and productivity and consistency of production. Further work is also scheduled on a broad range of industrial substrates. Deinove expects to transfer technology to its partner MBI's facilities in order for additional work on strain optimisation to be carried out and to assess the potential savings to be garnered by using *Deinococcus* versus conventional enzymes. Deinove has stated that its goal is to deliver a technologically and economically competitive solution by 2018 although the current low oil price makes this more challenging.

Exhibit 5: Deinol project progress during in 2015

Date	Landmark
H115	Installation of new cloning robot connected to the CAD4Bio software allowing an acceleration of strain production
July 2015	The Deinol project passes 3 rd (penultimate) milestone triggering a payment of €1.2m from Bpifrance
H215	Installation of 20 new fermenters to speed up testing of different strains/substrates
November 2015	Successful production of ethanol (7.3% v/v) at the 300L scale

Source: Deinove, Edison Investment Research

Deinobiotics

The Deinobiotics programme seeks to develop from the *Deinococcus* bacterium, antibiotics able to fight infections that have developed resistance to currently available antibiotics. In March 2013 Deinove established a dedicated company, Deinobiotics, to which it contributed the intellectual property rights associated with its research on antibiotics and the transfer of research funding. Deinove retains 49% of the new entity with the other major shareholder, Holding Incubator Green Chemistry (51%). Deinove retains the right to buy back, at a predetermined but undisclosed price, all the shares sold to Holding Incubator Green Chemistry. The business remains in the research and development stage, and Deinove's participation is now limited to operational monitoring. We assign no value to this business in our DCF valuation of the company.

THANAPLAST

Deinove is a participant in a collaborative project, known as THANAPLAST, aimed at improving the life cycle of plastics. The project, which commenced in 2012, is a five-year programme estimated to cost €22m, of which €9.6m will be funded by OSEO. The THANAPLAST project includes a number of partners including Carbios, a green chemistry company, other industrial partners (Barbier Group and Limagrain), and a number of academic institutions.

During the last year Carbios has achieved important success with the first time full depolymerisation of commercial PET (polyethylene terephthalate) material. The company has depolymerised 100% of sample PET material and regenerated original monomers that display characteristics and quality identical to those obtained by fossil energy base processes. For Carbios, the most recent achievement of successful depolymerisation of PET material into original monomers is an important step towards scaling up its plastic recycling and sustainable plastics production technology. PET is the most advanced of the company's processes and a very important future end-market. For more details see Edison's note ([Acceleration of development visible in results](#), 11 April 2016).

Deinove retains c 2% of the capital of Carbios and a number of warrants that may allow it to triple its shareholding. Carbios listed on the Alternext in December 2013 and at its current share price of c €11.1, is capitalised at c €42m. With Carbios priced at €11 per share Deinove's holding is worth c €1m. We do not assume any revenue from the THANAPLAST project in our modelling of Deinove, nor do we include any value related to its holding in Carbios.

Management

Deinove strengthened its management team during the course of FY15 with the appointment of Marie Bézenger (Director of Operations) and Dennis McGrew (Chief Business Officer). Marie Bézenger will focus on the scaling up of Deinove's technology as it seeks to move towards commercialisation. Dennis McGrew is to focus on the forging of research industrial and commercial partnerships in the North American market. There were no other significant changes in the composition in the management team during the course of the FY15 and we do not expect further senior appointments in FY16.

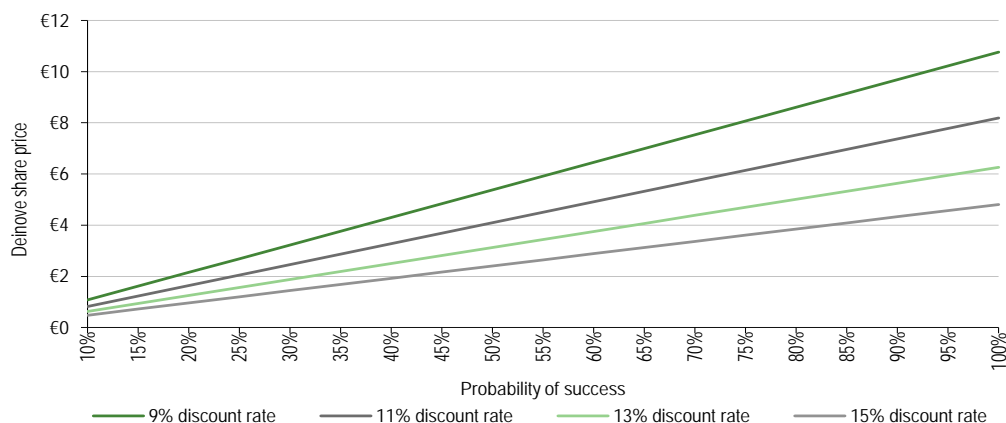
Valuation & sensitivities

Deinove does not yet generate commercial revenue and is likely to continue to report net losses for at least the next two years. Given the absence of short-term profitability, we continue to use long-term cash flow forecasts as our principal valuation tool. We have revised our assumptions (following the publication of the 2015 accounts) for long-term cash flow, in particular taking a more cautious approach to the timing and scale of deployment of Deinove's biofuels technology. This has led to a decrease in our valuation from €10 per share to €8 per share. Our valuation analysis, as always, remains dependent on the assumptions used which we set out in more detail below. We also however cross reference Deinove's market valuation and our cash flow analysis against a range of peers (Exhibit 7). The assumptions used in our DCF include:

- We assume that both Deinol and Deinochem successfully deploy their technology and generate commercial revenue.
- We do not include revenue from Deinobiotics or THANAPLAST, nor do we ascribe any value to Deinove's holding in Carbios.
- **Deinol:** We assume that the technology is deployed in three average-sized (65mgy) ethanol plants by 2025 and an additional six by 2035. We assume an ethanol price of \$2/gallon and licensing revenues equivalent to 5% of partner revenues.

- **Deinochem:** We assume that commercial revenue will commence in 2018 generated by the carotenoid platform. We do not forecast significant revenue from the muconic acid platform before 2020.

Exhibit 6: Deinove DCF valuation (discount rate vs probability of success)



Source: Edison Investment Research

Using a discount rate of 11%, our DCF analysis indicates a price of c €8.2/share (assuming a c 100% probability of success). At the current share price and using our long-term assumptions and a discount rate of 11% the market appears to be assuming a c 45% chance of success. If we were to reduce our assumption for the ethanol price from \$2/gallon to \$1.5/gallon, defer the operational ethanol plant schedule by one year and reduce the licence revenues from 5% to 4%, for both Deinol and Deinochem, then the overall valuation would reduce to c €3.1 per share.

Sensitivity

Given that commercial revenues and profitability lie some way into the future, there are a number of risks and sensitivities to our forecasts. The principal risk remains that the technology is insufficiently robust or price competitive for commercial deployment. Other risks include: that the timing of commercialisation falls behind the expected timetable; the incentive programmes/mandates, eg for biofuels, are abolished or made less generous; and a permanently lower oil price undermines the economic justification for replacing oil-based products.

Peer group analysis

Below, for reference, we list a small number of bioenergy/chemicals companies focusing on some of the same markets as Deinove. Inevitably, this is a subjective list and one that is likely to vary as companies either succeed or exit specific areas. We would caution in ascribing too much validity to the data in arriving at a valuation for Deinove.

Exhibit 7: Comparable company universe

Company	Country	Currency	Mkt cap (m)	Sales (m) (Hist)	Sales (m) (FY1)	Sales (m) (FY2)	EV/Sales (Hist x)	EV/sales (FY1 x)	EV/sales (FY2 x)
Deinove	France	€	32	0.5	0.4	0.7	40.2	49.4	26.9
Amyris	US	\$	113	34.2	86.0	123.0	7.8	3.2	2.2
Global Bioenergies	France	€	76	2.0	3.2	6.2	36.1	36.5	22.1
Metabolix	US	\$	17	2.6	3.5	18.7	4.4	3.3	0.6
Gevo	US	\$	27	30.1	36.6	51.6	1.9	1.5	1.1
Aemetis	US	\$	49	N/A	N/A	N/A	N/A	N/A	N/A
BioAmber	US	\$	90	2.2	19.3	53.2	48.3	8.2	3.0
Metabolic Explorer	France	€	46	N/A	1.5	4.5	N/A	28.7	9.6

Source: Edison Investment Research. Note: Prices as at 9 June 2016.

Financials

We make the following assumptions in producing our estimates for the forecast period (2016 and 2017).

- **Revenue** We do not forecast any commercially generated revenue in either 2016 or 2017. We expect that Deinove will continue to generate some revenue (c €400-500k pa) from the provision of research services and from grants.
- **Costs** The scale of the business expanded significantly in 2015 with a consequent rise in operating costs (albeit less than we had assumed). For 2016 and 2017, we expect more modest rises of c 2%.
- **Capex** We expect relatively modest capital expenditure after the significant investment of 2014. We forecast capex of €500k for both 2016 and 2017.
- **Tax credits** Deinove should continue to receive tax credits in 2016 and 2017. Based on an assumption of R&D comprising 78% of total operating costs, we forecast tax credits of €1.3m for 2016 and €2.1m for 2017.
- **Financing** Deinove has stated that it has sufficient resources to finance the business until the end of 2017 without utilising further equity drawdowns. We now construct our forecasts on the basis that Deinove does not issue further equity in either 2016 or 2017, although the company has an unused €10m facility under the terms of the Kepler-Cheuvreux agreement. While the financial resources should be sufficient to last until the end of 2017 (as claimed by Deinove), shareholders' equity will be negative by the end of 2017.

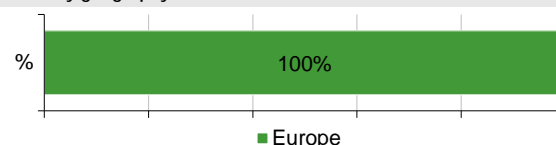
Exhibit 8: Financial summary

	€'000s	2014	2015	2016e	2017e
Year end 31 December		IFRS	IFRS	IFRS	IFRS
PROFIT & LOSS					
Revenue		156	492	509	469
Cost of sales		0	0	0	0
Gross profit		156	492	509	469
EBITDA		(6,515)	(7,309)	(7,419)	(7,531)
Operating profit (before amort. and except.)		(6,520)	(7,331)	(8,074)	(8,286)
Intangible Amortisation		540	634	37	37
Exceptionals		(735)	(10)	0	0
Other		0	0	0	0
Operating profit		(6,715)	(6,707)	(8,037)	(8,249)
Net Interest		(37)	(14)	(32)	(89)
Profit before tax (norm)		(6,557)	(7,345)	(8,106)	(8,376)
Profit before tax (FRS 3)		(7,832)	(7,989)	(8,143)	(8,413)
Tax		1,374	1,633	1,319	2,118
Profit after tax (norm.)		(5,183)	(5,712)	(6,786)	(6,258)
Profit after tax (FRS 3)		(6,458)	(6,356)	(6,824)	(6,295)
Average number of shares outstanding (m)		5.5	8.6	8.6	8.6
EPS - normalised (c)		(94.9)	(66.8)	(79.3)	(73.1)
EPS - (IFRS) (c)		(98.5)	(59.5)	(78.9)	(72.7)
Dividend per share (c)		0.0	0.0	0.0	0.0
Gross margin (%)		100.0	N/A	N/A	N/A
EBITDA margin (%)		N/A	N/A	N/A	N/A
Operating margin (before GW and except.) (%)		N/A	N/A	N/A	N/A
BALANCE SHEET					
Fixed assets		2,303	1,968	1,776	1,485
Intangible assets		99	117	80	43
Tangible assets		1,407	1,055	900	645
Investments		797	796	796	797
Current assets		4,650	15,359	11,461	7,193
Stocks		-	0	0	0
Debtors		2,110	2,393	2,463	2,290
Cash		966	11,932	7,964	3,869
Other		1,574	1,034	1,034	1,034
Current liabilities		(2,203)	(2,719)	(2,564)	(3,067)
Creditors		(2,203)	(2,719)	(2,564)	(3,067)
Short-term borrowings		0	0	0	0
Long-term liabilities		(4,555)	(6,512)	(9,400)	(10,632)
Long-term borrowings		(4,550)	(6,497)	(9,385)	(10,617)
Other long-term liabilities		(5)	(15)	(15)	(15)
Net Assets		195	8,096	1,273	(5,021)
CASH FLOW					
Operating cash flow		(7,691)	(7,324)	(7,466)	(7,309)
Net Interest		(37)	(14)	(32)	(89)
Tax		1,374	1,633	1,142	2,571
Capex		(1,338)	(289)	(500)	(500)
Acquisitions/disposals		1,307	756	0	0
Financing		4,051	14,257	0	0
Dividends		0	0	0	0
Net cash flow		(2,334)	9,019	(6,856)	(5,327)
Opening net debt/(cash)		1,250	3,584	(5,435)	1,421
HP finance leases initiated		0	0	0	0
Other		0	0	0	0
Closing net debt/(cash)		3,584	(5,435)	1,421	6,748

Source: Company accounts, Edison Investment Research

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Revenue by geography

Management team
Chairman: Dr Philippe Pouletty

Dr Pouletty is co-founder of Deinove and is also founder of Truffle Capital, which remains the largest single shareholder in Deinove. Dr Pouletty is recognised as the inventor of 29 patents. He is founder of three biotech companies in France and the US and sits on the board of a number of biotechnology companies.

CEO: Emmanuel Petiot

Before joining Deinove as CEO at the beginning of 2013, Emmanuel Petiot was commercial director of Novozymes North America. Mr Petiot spent nine years (2004-13) at Novozymes and held a number of executive positions in marketing, sales and the development of industrial partnerships in Europe, the US and Asia. Prior to joining Novozymes, Mr Petiot worked in sales and marketing roles at Air Liquide and Dow Chemical.

Director of Finance & Administration: Julien Coste

Julien Coste has experience of working for large corporate and smaller start-up companies. Mr Coste was director of finance and administration at biotechnology company Neuro3d and held the same position at Publicis Healthcare Communications Group. Mr Coste holds Masters degrees from ESC Grenoble and the University of Paris Dauphine.

Principal shareholders

	(%)
Truffle Capital	32.98%
Tereos	1.38%
Talence Gestion	1.05%

Companies named in this report

Amyris, Global Bioenergies, MEtabolix, Gevo, Solazyme, Aemeis, BioAmber, Metabolic Explorer, Tylon bioenergy Systems, Flint Hill Resources, Carbios, Abengoa, DuPont, VTT.

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