Deinove (= vs +)

Updated report

Opinion	NEUTRAL vs BUY
Target price	€9.1 vs €8.7
Upside	+1%

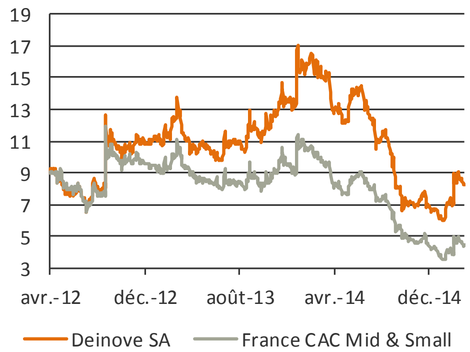
€ / share	2014	2015e	2016e	2017e
Diluted EPS	-0.78	-0.58	-0.74	-0.20
var. 1 an	*n.s.*	*-25.2%*	*+26.4%*	*n.s.*
Changes	*n.s.*	*n.s.*	*n.s.*	*n.s.*

ISIN	FR0010879056
Ticker	ALDEI-FR
Secteur DJ	Process Industries

Price	$9.0
Nb shares (m)	5.460
Nb shares FD (m)*	8.167
Capitalization (€m)	49.1
Free float (€m)	22.8

* included equity line

	1m	3m	1 an
Change	+7.0%	+45.2%	-29.4%
Relative change	+5.2%	+29.7%	-49.7%



au 31/12	2014	2015e	2016e	2017e
PE	n.s.	n.s.	n.s.	n.s.
EV/CA	n.s.	n.s.	n.s.	11.21x
EV/EBITDA	n.s.	n.s.	n.s.	n.s.
EV/EBITA	n.s.	n.s.	n.s.	n.s.
FCF yield*	n.s.	n.s.	n.s.	n.s.
Rendement	n.s.	n.s.	n.s.	n.s.
ND/EBITDA	n.s.	n.s.	n.s.	n.s.

* Operating taxed FCF before WRC / EV

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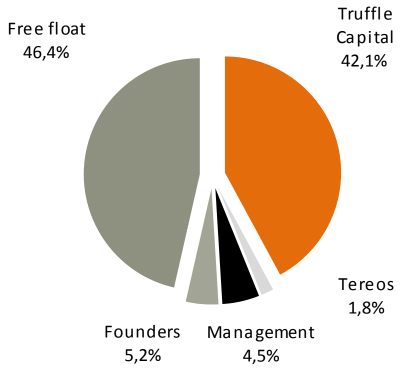
2015 and 2016: into the home stretch

Deinvoe's net loss widened to -€6.5m in 2014 (vs. -€3.4m in 2013) due to the acceleration in the company's development (29% increase in operating charges to €7.2m, with R&D making up 76%). Additionally, the net loss was affected by a one-off charge linked the cancelled capital increase last July and a negative accounting variation in the research tax credit. The company currently indicates that it has financing up until Q3 2016. The most recent developments involving the Deinol and Deinochem projects now lead us to anticipate the first significant revenues in 2017 instead of 2016. Our new target price nevertheless equals €9.1 (vs. €8.7) due to a favourable change in the risk premium and a more promising 2G market for Deinol. We have lowered our rating from BUY to NEUTRAL following the recent rally in the share price (+45.2% in 3 months).

- The 2014 net loss equalled -€6.5m (vs. -€3.4m in 2013) due to the acceleration in the company's development (29% increase in operating charges to €7.2m, with R&D making up 76%). The difference between the reported net loss and our forecast resulted from:
  - higher external charges (-€3.5m vs. -€2m expected) linked to the Deinochem project (notably reflecting the company's collaboration with a Finnish research institute)
  - higher employee charges (-€3m vs. -€2.7m expected), with the company having reinforced its R&D teams (+10 equivalent full-time positions)
  - a one-off charge (-€0.7m, cost of the cancelled capital increase)
  - a negative accounting variation involving the research tax credit (-€0.6m)
- As of 31/12/14, the cash position equalled €2.2m following the receipt of a research tax credit of €1.6m, a €1.5m advance from the ADEME and €4.2m from the equity line. The company has subsequently received €3.1m (€1m from the ADEME and €2.1m from the equity line). The cash position as of 28/2/15 equalled €4.1m. The company currently estimates that it has financing through Q3 2016 as a result of the possibility to draw down its equity line further (three tranches remain for a cumulative amount of €11.5m).
- The investments made in 2014 will enable the company to accelerate the development of the Deinol and Deinochem projects: i) move into new laboratories (1,000m²) with the hiring of ten new researchers, ii) reinforcement of the metabolic engineering platform (robotising of the cloning platform and reinforcement of fermentation and analysis capacities) and iii) multiplication of in-house and outsourced trials. Finally, the company was awarded six new patents in 2014 (notably in China and the United States), with the number of patents rising to 18.
- These results have led us to adjust our estimated cash burn in 2015 and 2016 and to push back the first significant revenues to 2017 (2016 revenues of €0.5m vs. €5.5m previously and 2017 revenues of €4.5m vs. €14.4m previously). Our revised EBITDA forecasts are now -€8m (vs. -€5.4m) for 2015 and -€5.1m (vs. -€0.7m) for 2016. Our EPS estimates have similarly been changed (-€0.54 vs. -€0.42 for 2015 and-€0.46 vs. €0.13 for 2016). In contrast, we have upgraded the potential of Deinol starting in 2021 (re-orientation in favour of the more promising 2G).
- The 2015/2016 newsflow should be substantial, with three major objectives: i) obtaining of financing (repayable advances, subsidies, equity funding), ii) the signing of new partnership agreements (concerning Deinol and/or Deinochem), notably in the United States, and iii) major progress in terms of R&D (functioning of the bacteria with the Suez biomass, qualification of compounds for Avril and MS3 for Deinol).
- Our DCF valuation (cost of capital of 13.3%, perpetual growth rate of 0.5% and normative operating margin of 60%) is €9.1 per share (vs. €8.7). However, the share's recent rally (+45.2% in 3 months) has led us to change our Rating from BUY to NEUTRAL.

Financial data

Shareholders*	
Truffle Capital	42.1%
Tereos	1.8%
Founders	5.2%
Management	4.5%
Free float	46.4%



*FD excluding equity line

Next event
H1 2015 results : 24/09/15

Per share	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
EPS	-0.40	-0.68	-1.20	-0.90	-1.13	-0.32	0.07	0.96	1.75
Diluted EPS	**-0.24**	**-0.42**	**-0.78**	**-0.58**	**-0.74**	**-0.20**	**0.06**	**0.66**	**1.19**
Vs consensus	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
Net asset	1.08	0.51	0.04	0.44	0.49	0.17	0.24	1.20	2.94
Dividend	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Valuation ratios	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
P/E	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	142.0x	13.7x	7.6x
VE/CA	n.s.	n.s.	n.s.	n.s.	n.s.	11.21x	6.84x	3.40x	1.94x
VE/EBITDA	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	9.9x	3.8x
VE/EBITA ajusté	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	11.1x	4.0x
FCF yield op. avt BFR	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	1.7%	12.7%	27.7%
FCF yield opérationnel	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	1.3%	11.6%	26.5%
Yield	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0%	0.0%	0.0%

Entreprise Value (€m)	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Price in €	*11.4*	*11.9*	*9.7*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*	*9.0*
Capitalization	60.2	62.8	51.2	47.5	47.5	47.5	47.5	47.5	47.5
Net debt	2.0	1.2	2.3	-0.8	0.3	2.8	2.6	-2.1	-11.2
Value of minority interests	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provisions/ debts & equival.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+/-corrections	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Enterprise value (€m)	**62.2**	**64.1**	**53.5**	**46.7**	**47.8**	**50.3**	**50.1**	**45.4**	**36.3**

Profit & Loss (€m)	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Sales	0.7	0.1	0.2	0.2	0.5	4.5	7.3	13.3	18.7
var.	*n.s.*	*n.s.*	*n.s.*	*0.3*	*1.5*	*8.0*	*0.6*	*0.8*	*0.4*
EBITDA	-3.5	-5.2	-6.5	-6.3	-7.1	-3.4	-1.1	4.6	9.6
Adjusted EBITA	**-3.9**	**-5.5**	**-7.1**	**-6.9**	**-7.8**	**-4.0**	**-1.6**	**4.1**	**9.1**
var.	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***
EBIT	-3.3	-5.5	-7.8	-6.9	-7.8	-4.0	-1.6	4.1	9.1
Financial result	0.4	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
Taxes	0.9	2.0	1.4	2.0	1.6	2.3	1.9	1.1	0.4
Equity acc. Comp. & min. int.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Declared net earnings	-2.0	-3.4	-6.5	-4.9	-6.2	-1.8	0.4	5.2	9.5
Adjusted net earnings	**-2.0**	**-3.4**	**-6.5**	**-4.9**	**-6.2**	**-1.8**	**0.4**	**5.2**	**9.5**
var.	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***	***n.s.***

Cash flow statement (€m)	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
EBITDA	-3.5	-5.2	-6.5	-6.3	-7.1	-3.4	-1.1	4.6	9.6
Theorical taxes/EBITA	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Capital expenditure	0.4	0.4	1.3	1.5	1.5	0.5	0.5	0.5	0.5
Op. FCF before WRC	**-2.4**	**-3.1**	**-5.9**	**-4.3**	**-5.5**	**-1.2**	**0.9**	**5.7**	**10.0**
Change in WCR	-0.9	-0.2	0.8	1.8	-0.6	-0.8	-0.2	-0.5	-0.4
Operational CF	**-3.3**	**-3.3**	**-5.1**	**-2.5**	**-6.0**	**-2.0**	**0.6**	**5.2**	**9.6**
Acquisitions/sales	3.5	3.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Change in capital	0.1	0.7	4.1	7.1	6.5	0.0	0.0	0.0	0.0
Dividends	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Declared FCF	**0.0**	**0.8**	**-1.1**	**3.1**	**-1.0**	**-2.5**	**0.1**	**4.7**	**9.1**

Assets (€m)	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Non current assets	6.6	2.8	2.3	3.2	4.0	3.9	3.9	3.9	3.9
incl. intangibles/GW	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
WRC	0.8	1.0	0.2	-1.6	-1.0	-0.2	0.0	0.5	1.0
Shareholder's equity	5.3	2.6	0.2	2.4	2.7	0.9	1.3	6.5	16.1
Minority interests	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Provisions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net debt	**2.0**	**1.2**	**2.3**	**-0.8**	**0.3**	**2.8**	**2.6**	**-2.1**	**-11.2**

Financial ratios (%)	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
EBITDA/Sales	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	34.5%	51.4%
EBITA/Sales	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	30.8%	48.7%
Adj.net earnings /Sales	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	5.1%	39.3%	51.1%
WCR/Sales	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.4%	3.9%	5.1%
ROCE excl. Intangibles/GW	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	95.1%	191.5%
Adjusted ROE	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	28.8%	80.1%	59.3%
ND/Shareholder's equity	n.s.	n.s.	n.s.	n.s.	10.0%	298.9%	201.5%	-32.5%	-69.8%
ND/EBITDA (in x)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	-2.4x	-0.5x	-1.2x

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Index

1 – Focus on Deinol, the 2G ethanol

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1 – Focus on Deinol, the 2G ethanol

Bioethanol is the most developed biofuel segment and is currently the principal biofuel market. Deinove is targeting this market through its Deinol project. In effect, bioethanol dominates the biofuel market, representing 75% of total world production of biofuels (113 billion litres in 2013). This is essentially due to the fact that the United States and Brazil produce 84% of bioethanol and have vehicle fleets that predominately use gasoline (petrol). At the same time, the European Union has opted for biodiesel, producing over half of total worldwide production and reflecting the structure of its own vehicle fleets. The objective of the Deinol project is to open the way for the production of lignocellulosic ethanol (2nd generation ethanol) in existing industrial installations and without major investments.

1.1 Summary overview of biofuels

Classification of biofuels

We have chosen a classification based on an objective criterion: the part of the plant used to produce the fuel.

Three generations of biofuels…

	Portion or category of plants used	Materials transformed
First generation Already in industrial phase	- Storage organs of cultivated plants (seeds for cereals and oleaginous plants, sugar beet roots, sugar cane stems, oil palm fruits etc.)	- Sugars (sucrose, glucose, xylose) - Starch - Oils
Second generation Start of industrial phase	- Principal plant parts (straw, stems, branches, leaves, trunks etc.) - Green or organic waste (wood chips or sawdust, municipal waste etc.)	- Lignin - Cellulose - Hemicellulose
Third generation Pre-industrial phase	- Algae (can directly produce different sugars or even certain fuels)	- All types

Source : Invest Securities

Biofuel production technics

First and second generation biofuels principally come from two production processes: the oil process and the alcohol process. There is no production process yet for third generation biofuels.

Oil process

The oil process leads to two products: raw vegetable oil (also called pure vegetable oil) and biodiesel (called diester in France).

…of which two come from oil and alcohol production processes

- ✓ **Raw vegetable oil (RVO)** can be used as a fuel for diesel motors following a modification in the motor to heat the oil. More simply and without any modification in the motor, RVO can be used as an additive to ordinary diesel fuel up to 30% (or even 50% in certain cases).
- ✓ **Biodiesel (VOEE and VOME)** can be used as a fuel in a modified diesel motor. Alternatively, it can be used as an additive to conventional diesel fuel (between 5% and 30%) without any modification to the motor.

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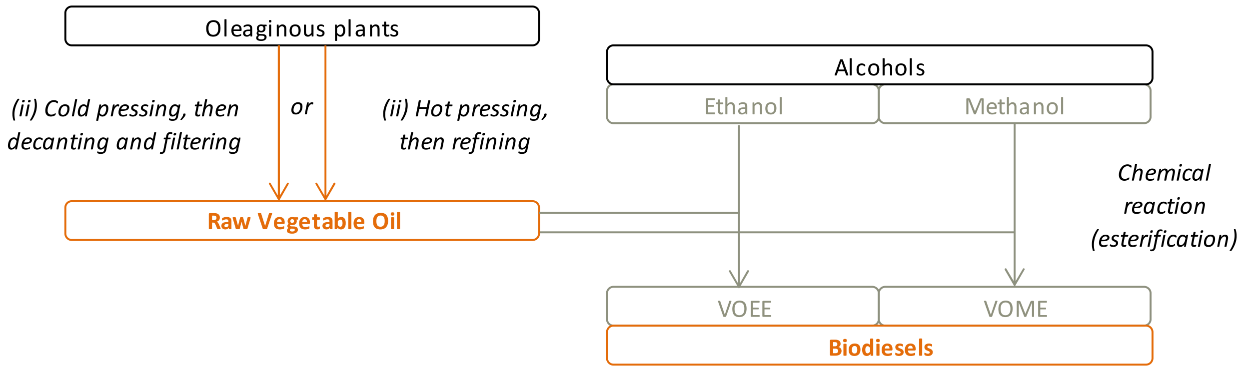
Oil-based biofuel production process



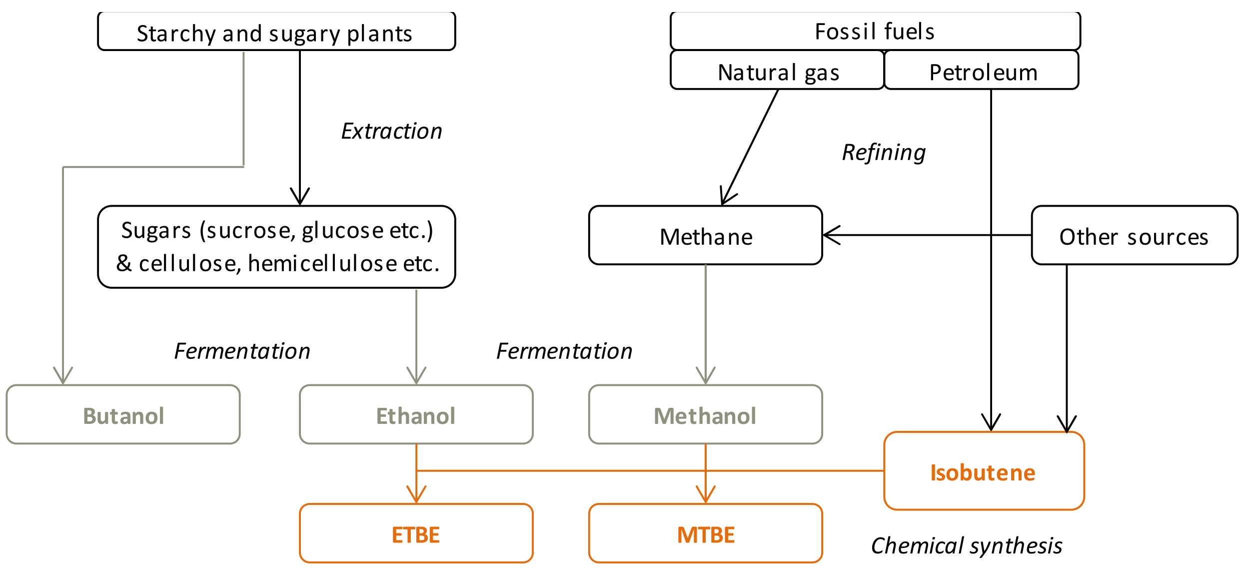
Source: Invest Securities

Alcohol process

The alcohol process involves several products. Bioethanol is the best known and most used biofuel at present. However, biobutanol, methanol and ethyl tert-butyl ether (ETBE) are also produced using this process.

- ✓ **Bioethanol** is considered either as first generation when it results from the fermentation of sugars such as sucrose, glucose or fructose or as second generation when it is produced from lignin, cellulose and hemicellulose (referred to as cellulosic ethanol). Bioethanol is added to gasoline in proportions ranging from 5% to 85%. It should be kept in mind that motors must be modified when this proportion goes over 20%. The term superethanol is used when the mixture contains 85% ethanol.
- ✓ **Biobutanol** is described as an advantageous alternative to bioethanol and above all gasoline. It is meant to be a direct substitute for gasoline as fuel for internal combustion engines.
- ✓ **Methanol** is a methane derivative that can be added to gasoline or diesel fuel. However, this requires modifications in the motor. The major drawback of methanol is its toxicity for humans.
- ✓ **ETBE** is an ethanol derivative added to gasoline in the proportion of 15%. ETBE's drawback is that its production requires isobutene, which is produced from oil for economic reasons.

Alcohol-based biofuel production process



Source: Invest Securities

1 – Focus on Deinol, the 2G ethanol

1.2 The bioethanol market

Bioethanol is produced by the fermentation of sugar …

Technologies used

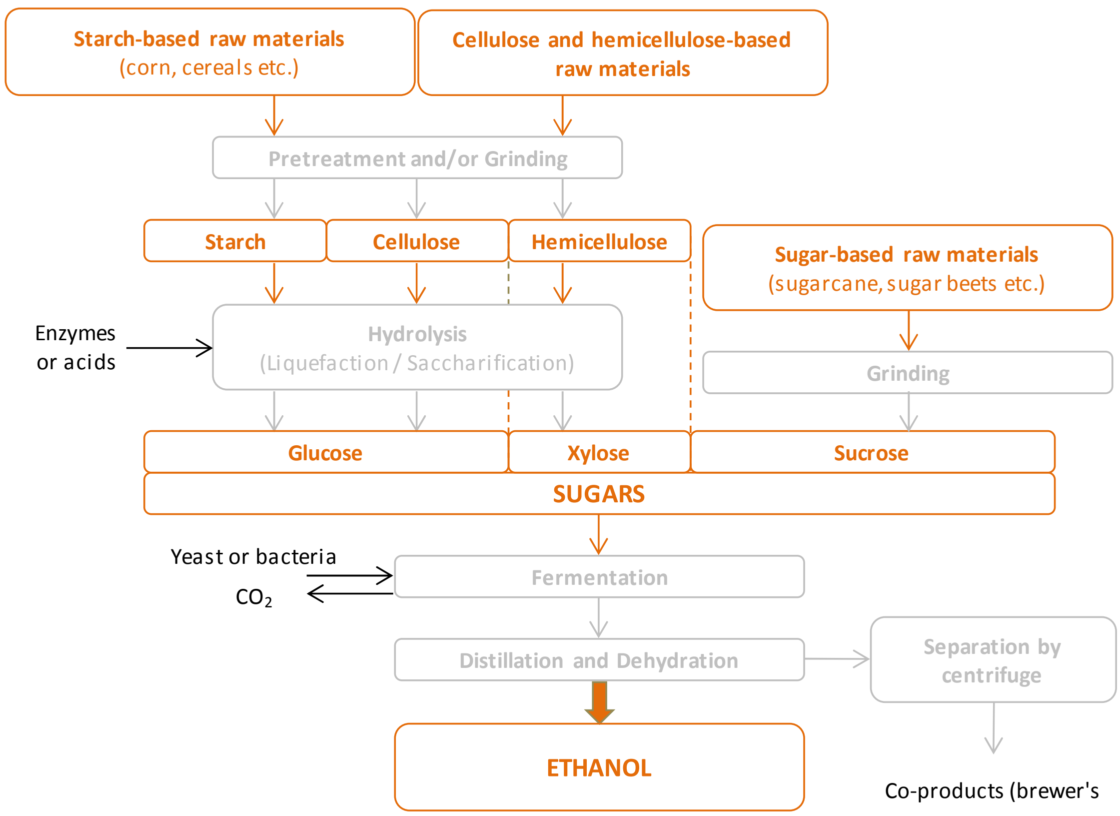
The production of ethanol involves the fermentation of sugars such as glucose or sucrose. These sugars can be extracted directly from sugar-producing plants (sugar cane, sugar beets) or obtained through the hydrolysis of materials such as starch, cellulose or hemicellulose.

Production processes and techniques

There are three ethanol production processes depending on the plant and the part of the plant used as raw material. The choice of the raw material dictates the technology used to produce ethanol.

…through three processes

Bioethanol production steps



Source: Invest Securities

The production of ethanol from starch and cellulose is similar in overall terms. It should nevertheless be noted that (i) cellulose and hemicellulose require greater pre-processing than starch, as sugar chains in cellulose and hemicellulose are more difficult to break than in starch, (ii) sugars produced through the hydrolysis of hemicellulose are more difficult to transform into ethanol and (iii) the level of toxicity is higher given that the lignin frees up toxic compounds during the pre-processing. These three methods produce solid or liquid residues that can be used as animal feed.

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Ethanol: the most widely used substitute for gasoline

Substitution products

At present, ethanol is the most widely used fuel substitute for gasoline. However, it is not necessarily the best alternative. Butanol as well as ETBE are promising solutions that are currently the subject of research:

- ✓ **Butanol** is chemically closer to gasoline than ethanol due to its longer carbon chain and therefore has energy potential closer to that of gasoline. Butanol can therefore be added into gasoline at higher percentages than ethanol without requiring modification of the motor. R&D efforts are being made in improve the profitability of the ABE (Acetone-Butanol-Ethanol) fermentation process that is currently used to produce butanol from starch. Research is also being conducted on new processes using other fermentation methods. Butanol production, which is difficult to evaluate, remains limited at present. It nevertheless represents a market with high development potential. However, there are many risks on the technological, economic and political levels.
- ✓ **ETBE** is produced through chemical synthesis using ethanol and isobutene. For economic reasons, isobutene is currently produced from oil. This is paradoxical for a biofuel. This biofuel can be added to gasoline up to 15%. It possesses chemical qualities that make it a perfect additive for gasoline: (i) it oxygenates gasoline and boosts the octane rating and (ii) its combustion power is higher than that of the ethanol-gasoline blend. The greatest drawback of ETBE is that its solubility in water and low biodegradability make it a potentially dangerous pollutant, notably in terms of groundwater (thereby leading to its being banned in California and number other states in the United States).

Technological choices of the major sector players

Economic and geographical criteria

Companies take the entire ethanol production process into account when they make their technological choices. These choices depend on the raw materials at the companies' disposal in both economic and geographical terms. As such, ethanol production is almost exclusively based on corn in the United States and on sugar cane in Brazil.

Technological criteria

The two phases in which companies make highly distinct technological choices are hydrolysis and fermentation. Deinove is proposing to integrate the hydrolysis and fermentation phases by using a single microorganism, the deinococcus bacteria:

- ✓ There are two categories of hydrolysis techniques: enzymatic hydrolysis and acid hydrolysis. Enzymatic hydrolysis is the most commonly used process. Once the hydrolysis technique is selected, the technical specifications must be decided, with the choice of the enzymes or the acid to be used being particularly important (20-30% of the total production cost).
- ✓ The yield and profitability of the chosen production process largely depend on the alcoholic fermentation phase. The choice of fermentation agents is crucial, as this represents the most important technological factor in this phase. The alcoholic fermentation reaction has a maximum theoretical yield of 0.51 grams of ethanol per 1 gram of sugar. Companies therefore seek to select fermentation agents that bring them as close as possible to this level.

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Another factor to be taken into account at the time of decision is the temperature required by the fermentation agents to produce the alcoholic fermentation. Depending on the organism (the most commonly using being brewer's yeast, Saccharomyces cerevisae), fermentation takes place between 30°C and 35°C. However, this temperature rises during fermentation, which is an exothermic process, As such, the fermentation vats must be cooled to prevent the organisms from dying. A process such as that being developed by Deinove, which allows working at 48°C, makes this cooling unnecessary, thereby leading to substantial energy savings.

The Deinove process makes cooling unnecessary

Principal sector companies

There exist two major categories of companies on the ethanol production market:

- ✓ **Research companies** develop ethanol production technologies. They either offer to build refineries or sell the plans and technology but do not exploit them themselves.
- ✓ **Production companies** focus on the production of ethanol. The technologies needed for the construction and operation of refineries are either developed in-house or purchased from research companies.

The following companies constitute a representative sample of these two types of sector companies. This sample includes several sector leaders as well as companies possessing original production processes.

Abengoa (ABG, listed on the SIBE, market capitalisation: €2.8bn)

Abengoa is a producer of first and second generation ethanol that owns 15 refineries in Europe, the United States and Brazil. Total installed production capacity equals three billion litres per year. The company uses conventional ethanol production technologies: hydrolysis followed by fermentation for starchy plants, simple fermentation for sugary plants. Abengoa is investing in order to improve the yields of its existing process of ethanol production from corn starch. Its stated objective is to reach 95% of the maximum theoretical yield. The company has installed a pilot cellulosic ethanol production unit with a capacity of five million litres per year at one of its refineries in Europe, using straw as raw material.

Archer Daniels Midland (ADM, listed on the NYSE, market capitalisation: $29.3bn)

ADM is an international agri-food company. The company has diversified into first generation biofuels and is targeting the production of second generation ethanol. Bioethanol as such constitutes a new end market for the agricultural products that ADM is accustomed to buying and processing into foodstuffs. The company currently operates seven bioethanol refineries in the United States, using corn as the principal raw material. Installed production capacity equals 6.8 billion litres per year. ADM is also investing in the development of technologies for the production of cellulosic ethanol and has signed several partnership agreements with different companies (Deere & Company, Monsanto and ConocoPhillips) and universities (Purdue University, Indiana).

Ethanol production: a concentrated market

DuPont Industrial Biosciences (unlisted)

This DuPont subsidiary (a former DuPont / Genencor joint venture) has developed a patented technology and a second generation corn-based ethanol production process. The raw materials containing cellulose or hemicellulose undergo enzymatic hydrolysis to extract the sugars (glucose and xylose), which are then fermented using Zymomonas mobilis bacteria. This bacteria has been genetically modified in order to transform both glucose and xylose into ethanol with high yields in an environment containing over 100g/l of ethanol. The construction of its Nevada, Iowa plant, which began in 2012, should be completed in 2015. This project has involved an investment of nearly $225m.

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This plant will ultimately rank among the largest cellulosic ethanol production plants in the world with a total capacity of 113.5 million litres per year. It will use corn residue (leaves, stalks and husks) as raw material and will require an investment exceeding $200m.

POET (unlisted)

Cellulosic ethanol: two plants in operation at present

Poet is a US company that produces first generation biofuels from corn. Its 26 refineries in the United States have installed production capacity of 6.1 billion litres per year. POET has developed an innovative technology involving an enzymatic hydrolysis process that converts starch directly into sugar without going through the highly energy consuming liquefaction phase (a patent application has been filed for this technology, referred to as BPX). Yeasts are then added and the fermentation produces a solution containing 20% alcohol, a higher level than seen in the rest of the industry. Poet has also invested in the development of a cellulosic ethanol production process under the name "Project Liberty" (representing a total investment of $275m) in partnership with DSM. A pilot plant has been operating since January 2009 (production of 75,000 litres per year) and a 2G refinery has been built along an existing ethanol refinery in Iowa to produce cellulosic ethanol. This unit entered into service on 3 September 2014 and has a target capacity of 95 million litres. This plant is the second commercial unit to enter into service following the Beta Renewables plant (80,000 m^3/year) inaugurated in Italy in October 2013.

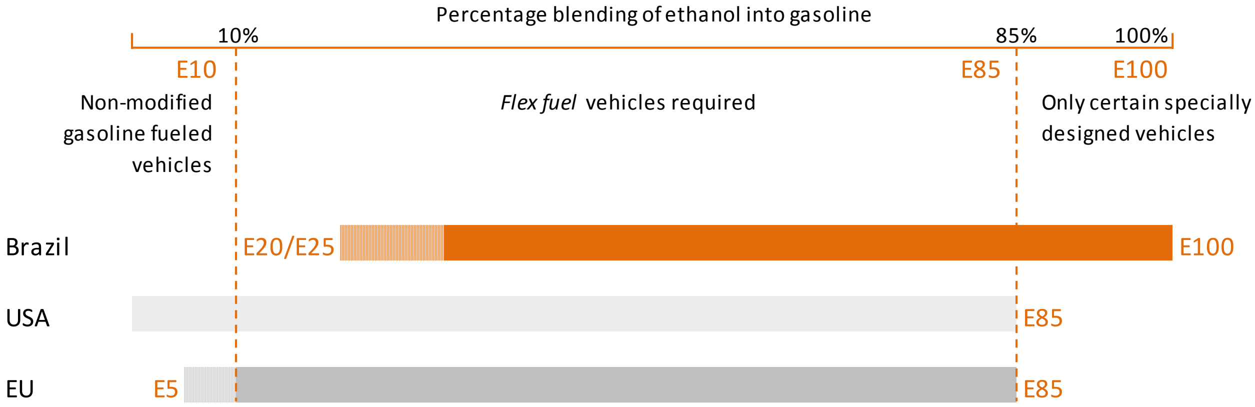
Factors influencing the ethanol market

Government policies concerning biofuels are a key factor defining the market structure. The ethanol market is highly sensitive to the laws, regulations and subsidy policies adopted by the different countries. The nomenclature in terms of the addition of bioethanol is the following: the percentage of additives is preceded by the letter E. For example, E85 indicates that the fuel mixture contains 85% ethanol.

Limits on additions to existing fuels

The majority of vehicles do not require any modifications when the blend rate of ethanol to gasoline is lower than 10%. In contrast, for higher blend rates, vehicle manufacturers have been obliged to adapt motors to enable them to accept fuel containing between 10% and 100% ethanol. These vehicles are referred to as "flex fuel". In Europe and North America, motors are optimised for ethanol percentages of up to 85%. Above this rate, if the fuel includes too much ethanol, it is difficult to start motors when temperatures are too low. There also exist certain vehicles than run exclusively on E100.

Limits on the addition of ethanol to gasoline depending on the type of vehicle and the country



Source : Invest Securities

1 – Focus on Deinol, the 2G ethanol

The percentage of the addition of ethanol to gasoline varies substantially from one region to another, as this percentage is subject to the laws and regulations in each country.

Brazil does not have a problem of low temperatures and therefore authorises the sale of E100 (100% ethanol). Since 1976, the blending of ethanol into gasoline has been made legally mandatory. Since 15 February 2015, the blend rate of ethanol in gasoline has risen from 25% to 27%. The problems with the sugarcane harvest in 2014 in Brazil suggest that the country will have difficulty finding supplies on the domestic market. Brazil may have to turn to imports from the United States.

The **United States** has not imposed a minimum blend rate on the federal level. However, certain states and cities have unilaterally established a blend rate of 10%.

The EU is capping the use of 1G biofuels for transportations purposes at 6%

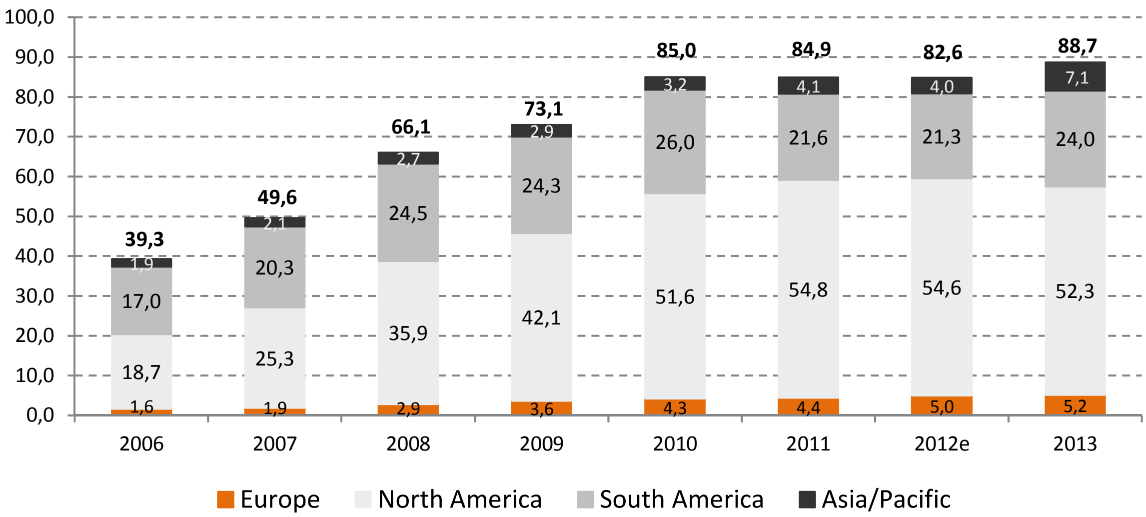
Through directives, the European Union has established objectives for its member states in terms of biofuels. Initially, biofuels were supposed to represent 5.75% of the total quantity of gasoline and diesel fuel sold on their markets for transportation purposes before the end of 2010 (directive 2003/30/EC). This objective was replaced in the directive 2009/28/EC by a 10% objective looking out to 2020. Nevertheless, on 24 February 2015, the ENVI commission of the European parliament approved the proposed law concerning a 6% ceiling on the consumption of first generation biofuels for transportation purposes through 2020. The ENVI commission justified its vote on the basis of arguments involving deforestation and indirect changes in land use, which the bioethanol groups deny and deem to be without any scientific basis. An objective for 2.5% second and third generation biofuels looking out to 2020 should be set. In order to meet the European objectives, France has set an objective for 15% blending of biofuels into gasoline by 2030 with a clear orientation in favour of 2G biofuels. In 2014, France reached an ethanol blend rate of 6%.

Production data

There are several hundred ethanol refineries worldwide at present. The majority of these refineries produce first generation ethanol using well known techniques.

The United States and Brazil represent 84% of worldwide production

World ethanol production
(*billions of litres*)



Source : F.O.-Licht

Worldwide ethanol production reached a record high in 2013 at 88.7 billion litres, up 6.2% compared to 2012.

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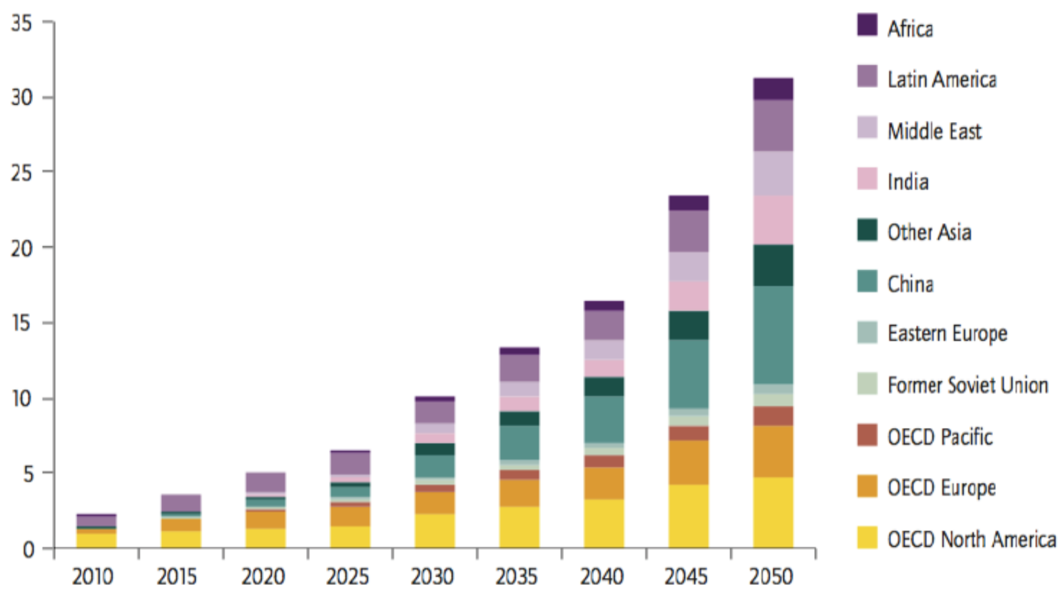
1 – Focus on Deinol, the 2G ethanol

The United States and Brazil are by far the biggest ethanol producers in the world. Together, they represented 84% (74 billion litres) of world production in 2013. The majority of US production comes from corn while production in Brazil is virtually exclusively derived from sugar cane.

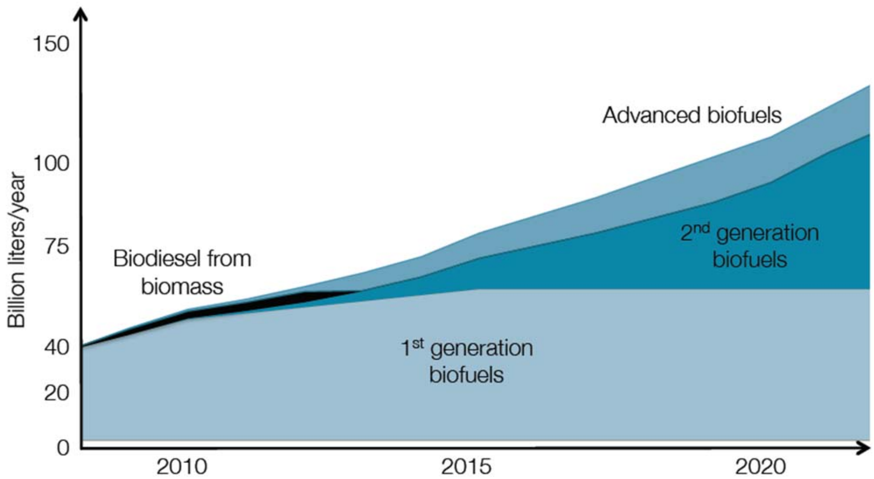
France represents 25% of European production with 1.25 billion litres of bioethanol produced in 2013. The principal producers in France are Cristanol and Tereos, which are above all sugar specialists. These two companies combined represent 55% of the authorisations in the ethanol segment. We can also note Abengoa, Saint-Louis Sucre and Roquette, which together represent 30% of production.

Biofuel demand multiplied by 10x by 2050…



Source: IEA, 2010c

…and a biofuel market turning to the second generation



Source: Massachusetts Institute of Technology (MIT)

1 – Focus on Deinol, the 2G ethanol

1.3 The Deinove approach

Deinove's competitive advantage lies in its break with the paradigm of alcohol production using *Saccharomyces cerevisiae* (brewer's yeast) or other microorganisms such as *Escherichia coli* or the *Clostridia* family through its use of a family of microorganisms that have never been used before and are effective in industrial applications.

Deinococcus, a bacteria with exceptional properties

An innovative process for the production of bioethanol …

Through an exclusive process patented by Deinove involving the selection from natural samples isolated in hostile environments, Deinove has constituted an unmatched library of over 6,000 identified bacterial strains notably belonging to the Deinococcus genus (the "deinococci"), whose multiple applications are being exploited by the company.

The deinococci are bacteria that appeared on Earth several billion years ago. They are very robust and express one of the largest biodiversities in the living world. Over the course of billions of years of evolution in hostile geological and climatic environments, the deinococci have acquired genome fragments and powerful metabolic properties from other organisms (rare bacteria, yeasts, vegetables etc.).

Advantages of deinococci

The natural properties acquired by the deinococci include:

- ✓ **Exceptional robustness** in hostile environments, notably a high degree of resistance to desiccation and extreme temperatures. This is clearly a very valuable advantage in industrial applications. This robustness is due to the unique ability of deinococci to reassemble their genome after it has been fatally shattered by a major stress such as radiation or prolonged desiccation. A deinococcus is literally able to come back to life after having its genome shattered into over 1,000 pieces if placed in normal living conditions.
- ✓ The **ability to assimilate numerous exogenous genetic elements** from other bacteria and even more complex living organisms. Successive assimilations have resulted in a stable genetic mosaic that now gives the deinococci extraordinary genetic and functional diversity. Deinove has proved this concept by sequencing and the computer analysis (using international gene databases) of the genome of many different deinococci strains.

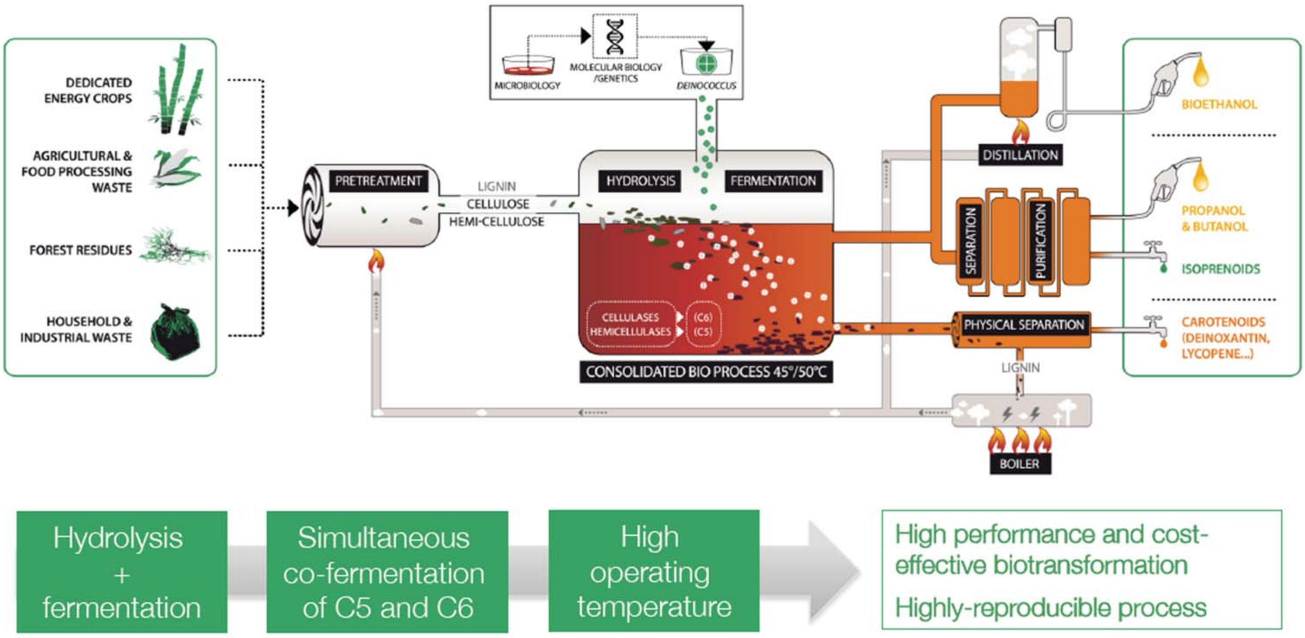
…where yeast is replaced by bacteria

- ✓ Despite this exceptional resistance, **deinococci can be eliminated from any industrial installation through simple procedures** (autoclaving or acid/alkali washing).
- ✓ An **all-in-one process** thanks to the ability of deinococci to break down the highly resistant major components of the biomass and then to ferment the simple sugars issued from this decomposition into ethanol.
- ✓ **No pathogenicity** for animals or humans.

In contrast to conventional biotechnological approaches that seek to introduce new genes into fragile and simple bacteria (like Escherichia coli) through genetic engineering, Deinove can exploit the natural biodiversity created over several billion years that has enabled the deinococci to acquire their robustness, stability and functional abilities. Nevertheless, in order to provide its bacteria with desired properties or to reinforce these properties, the company is developing genetically modified microorganisms (GMM). This is additionally the path being taken by all sector companies.

1 – Focus on Deinol, the 2G ethanol

The Deinove technology at the heart of the industrial process



Source: Deinol

Abengoa and Suez Environnement joined the Deinol project in replacement for Tereos in 2014

The **Deinol project** is being conducted in partnership with Abengoa (which replaced Tereos under the same contract terms in June 2014) and Suez Environnement. This project targets the development of industrial biofuel production processes representing a technological break with existing process through the decomposition of the biomass followed by fermentation by the deinococci.

The Deinol project and the agreement with Abengoa

Under the framework of its Strategic Industrial Innovation programme, Oseo (French innovative companies agency) awarded an €8.9m grant for the realisation of the Deinol project at the end of October 2009, including €6m for Deinove. The pay-outs are being made as project milestones are reached. This grant is the largest ever awarded in France to a small / medium sized company in the biofuel area. Note that the Deinol project will involve a total of €21.4m in investments.

This project, which is being piloted by Deinove, is organised in the form of a consortium involving:

- ✓ Abengoa and Suez Environnement
- ✓ two academic expert partners: the CPBS in Montpellier (CNRS-Université Montpellier 1) and the LISBP in Toulouse (INSA-CNRS-INRA).

The agreement with Suez Environnement

In June 2014, DEINOVE signed a joint industrial R&D contract with Suez Environnement for the conversion of urban waste into ethanol. Running two years, this contract is the first step in a project aiming to explore the potential of an industrial process from the transformation of organic urban waste into ethanol through the action of deinococci bacteria.

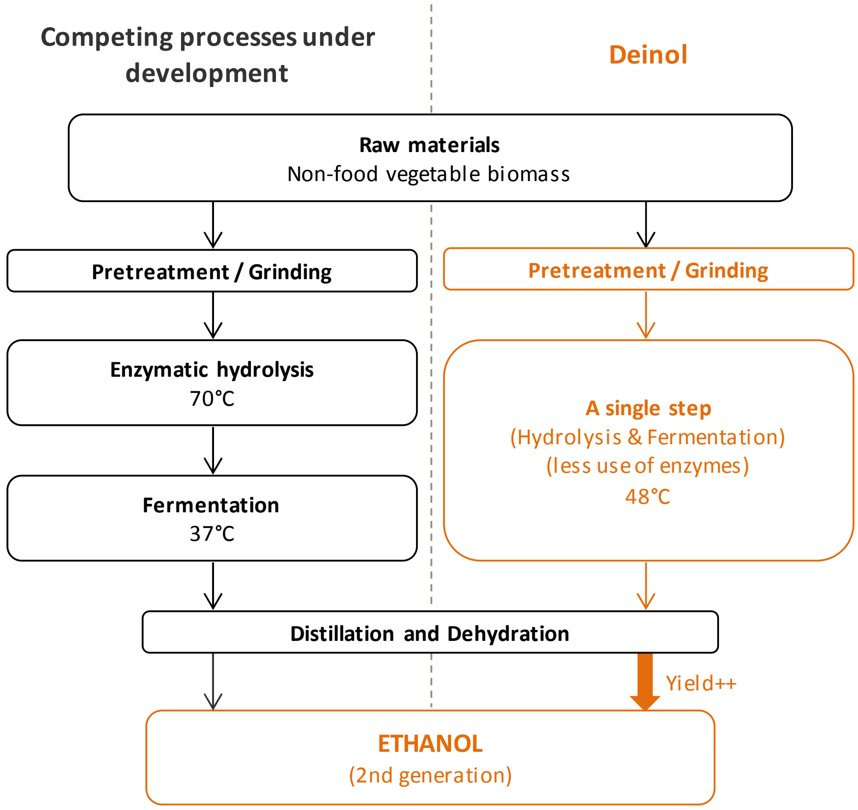
In case of success, the companies anticipate the signing of a licensing contract for the use of the DEINOL process.

1 – Focus on Deinol, the 2G ethanol

Under the framework of the Deinol project, Deinove has entered into a non-exclusive collaboration and licence option agreement with Abengoa for the development of an ethanol production process using deinococcus genus bacteria, with agricultural residues as raw material. This agreement calls for Abengoa to invest in trials of the DEINOL process in a pilot industrial facility and then on the scale of an actual plant. Once the demonstration has been made, Deinove will be able to grant other non-exclusive licences to ethanol producers using wheat, fodder crops or any other lignocellulosic materials as raw materials.

The laboratory results obtained for wheat and other cereals will be transposed to corn and other agricultural waste material such as bagasse and palm residues. Corn is the leading raw material in the production of ethanol in the United States, where the most important players are the cereal producers and biomass processing companies (POET, Archer Daniels Midland, Green Plains Renewables Energy, Valero, Pacific Ethanol, etc.).

Ethanol production technologies - comparisons



Source: Deinove

1 – Focus on Deinol, the 2G ethanol

Development calendar for the deinococcus strain

Four milestones before industrial production

The Deinol project involves four milestones (MS) before the start of production:

1. **MS1, pre-validation of the process:** the company selects candidate "laboratory" strains and then a candidate strain for the first trials of biomass conversion into simple sugars,

This milestone was reached in May 2011.

2. **MS2, proof of concept:** the strain is optimised in order to directly convert this same biomass into bioethanol without additives.

This milestone was validated in 2012.

3. **MS3, laboratory pilot:** start of trials of the candidate strain in order to increase the size of the pilot unit to 300 litres while continue to improve the yield.

The company was slated to reach this milestone in 2013. The project has since been redirected to the 2G.

4. **MS4, industrial pilot:** increase to a 3,000 to 5,000 litres pilot unit in order to validate the technology on an industrial scale.

This milestone had been slated to be reached in 2014. It will be normally reached at the beginning of 2016.

5. **Production**

Once these four milestones have been reached, industrial operations by Abengoa should begin starting in 2017 at the earliest. The first royalties on sales will be received by Deinove in connection with the commercialisation of the bioethanol produced.

Current status of the DEINOL project

Since 2009, DEINOL has successfully reached the first two milestones

In 2011, the selection of the best deinococcus strains enabled the company to select a chassis (field strain destined to be optimised) with the enzymatic and ethanol production capacities comparable to those of benchmark organisms.

In 2012, the chassis bacteria, optimised by DEINOVE, succeeded in transforming wheat residues into ethanol with the help of additives. By reaching the threshold set for this milestone (3% alcohol content), DEINOVE obtained proof of the DEINOL concept.

In 2013, the performances of this chassis bacteria were optimised in order to reach levels of productivity compatible with the requirements of industrial operators. The laboratory results were obtained in fermenters ranging from 1 to 20 litres.

In January 2014, DEINOVE confirmed that its chassis bacteria could produce 9% (v/v) of ethanol from glucose, the equivalent of 7.2% wt/v (weight/volume). This result demonstrated DEINOVE's ability to effectively modify its strains and to exceed the threshold of 5% weight/volume considered by the industry as a prerequisite for the industrialisation of the process. This result was obtained from glucose in a 20L fermenter with excellent yield and productivity conditions, thereby confirming the deinococcus bacteria's high degree of suitability for industrial applications.

Alcoholic content

The alcoholic content measures the percentage of alcohol obtained in the liquid issued from the fermentation process. This is a key indicator for the industrialisation of the process. In 1G bioethanol production units, the alcoholic content averages between 10-12%, obtained exclusively from the alimentary portion (simple sugars). With a level over 5% obtained from complex sugars, the results obtained by DEINOL offer genuine industrial interest.

1 – Focus on Deinol, the 2G ethanol

The project is two years behind schedule

The project is two years behind schedule …

The objective set in connection with the collaborative programme contract for the validation of the third milestone (MS3) is an alcoholic content of 4-6% from complex sugars (vs. 10-12% from simple sugars). This milestone should be reached this year. The company is behind schedule compared to the initial programme calendar, which anticipated that MS3 would be reached in H1 2013. This lag is notably due to the delay seen in connection with the previous milestone (MS2), the final adjustments of the metabolic pathways being used and finally, the calibration of the company's technologies with the second generation substrate.

The current performances are nevertheless sufficient to move on to trials with medium capacity pilot units while still continuing efforts to optimise the strain.

Nest milestone for the DEINOL project: the pre-industrial phase

The progress made in the development of the strains and the engineering platform now allow the company to consider moving into the pre-industrial phase in order to validate the reproducibility of the process in medium capacity fermenters.

…with MS3 expected to be reached in 2015

The validation of this step will then allow the company to pilot trials involving industrial fermenters with capacities of several hundred m3. Beyond 20L, the next results expected in 2015 will involve tests in 300L fermenters, which are closer to real conditions of industrial production. At the same time, the research teams are continuing their efforts to optimise the strains and improve the performances on industrial substrates.

The signing of the partnership agreement with Abengoa as well as the company's other collaborative agreements will nevertheless lead to adjustments in the organisation of the DEINOL programme.

Deinove's teams and partners will work actively on:

- ✓ validating the types of substrates on which the pilot trials will be conducted
- ✓ reworking the chassis strain in order to adapt it to the characteristics of these new substrates
- ✓ selecting the industrial sites where the pilot industrial trials will be conducted
- ✓ preparing the manner in which these pilot trials will be conducted with the production teams

These efforts will require additional time compared to the initial calendar for the DEINOL programme. As such, Deinove currently estimates that DEINOL will begin to generate licence revenues starting in 2016/2017.

Industrial and technology partnerships

- ✓ On 15 October 2014, DEINOVE and the Michigan Biotechnologies Institute (MBI) announced the creation of a technological partnership designed to demonstrate the effectiveness of the DEINOL technology for producing biofuels based on lignocellulosic biomass (2G biofuels). Having demonstrated the value of DEINOL technology on model substrates (glucose/xylose), DEINOVE is now proceeding to test the technology with industrial biomass. An expert in bioprocesses and a pioneer in an innovative pretreatment technique called AFEX, the US biotech hub MBI has assisted a large number of biosourced product companies up to the commercialisation of their technologies. The preliminary results involving second generation substrates show that deinococcus assimilates over 95% of the sugars present in AFEX pretreated biomass and efficiently converts these sugars into ethanol, thereby marking an important step forward on the road to commercial production.

1 – Focus on Deinol, the 2G ethanol

Deinol project highlights since 2013

Review of events since 2013	
01/01/2014	• **DEINOVE announces that it has reached bioethanol alcohol content of 9% (v/v) in 20L fermenters**, the first time ever for a bacteria-based process.
01/06/2014	• **DEINOVE announces the signing of a structuring partnership with the Spanish group ABENGOA, which has replaed TEREOS as the industrial player in the DEINOL programme.** The contract will run for a maximum of three years. DEINOVE will work on the basis of 2nd generation substrates, particularly agricultural waste. Bpifrance, the principal public financer of the DEINOL programme, has committed itself to maintaining its support under equivalent conditions.
01/06/2014	• **Second structuring partnership signed with SUEZ ENVIRONNEMENT targeting the** development of a circular economy. Running two years, this contract is the first step in a project designed to explore the potential for the industrial transformation of organic urban waste into ethanol through the action of deinococci bacteria.
01/07/2014	• Confirmation of the cellulolytic and hemicellulolytic performances of the strains. Major differentiating factor vis-à-vis other microorganisms that are not able to digest the biomass (hydrolysis phase), in contrast to the deinococci.
15/10/2014	• **DEINOVE and the Michigan Biotechnologies Institute (MBI) announce the creation of a technological partnership** designed to demonstrate the effectiveness of the DEINOL technology for producing biofuels based on lignocellulosic biomass (2G biofuels). The preliminary laboratory results involving MBI's second generation substrates show that the deinococci assimilate over 95% of the sugars present in biomass and convert these sugars into ethanol, thereby marking an important step forward on the road to industrialisation.
10/12/2014	• **DEINOVE has been awarded five patents:** These patents protect the technological foundation of the DEINOL process: degradation of the lignocellulosic biomass and production of bioethanol by the deinococci. Award of the company's first patent in China, the PF4 patent "Compositions and methods for degrading lignocellulosic biomass". DEINOVE was awarded four other patents in 2014: the PF2 in Eurasia "Utilisation of bacteria for the production of bioenergy", PF6 in the Ukraine "Recombinant bacteria and their use in the production of ethanol" and the PF8 and PF9 patents in South Africa covering vegetable polymers digestion enzymes. All the patents cover the foundations of the DEINOL process in the production of 2G bioethanol.
25/02/2015	• **1st patent awarded in the United States, a key patent protecting its 2nd generation bioethanol production process**. • **Membership in the US association BIO (Biotechnology Industry Organization)**.

Source: Deinove

2 – Focus on Deinochem, the green chemistry

2 – Focus on Deinochem, the green chemistry

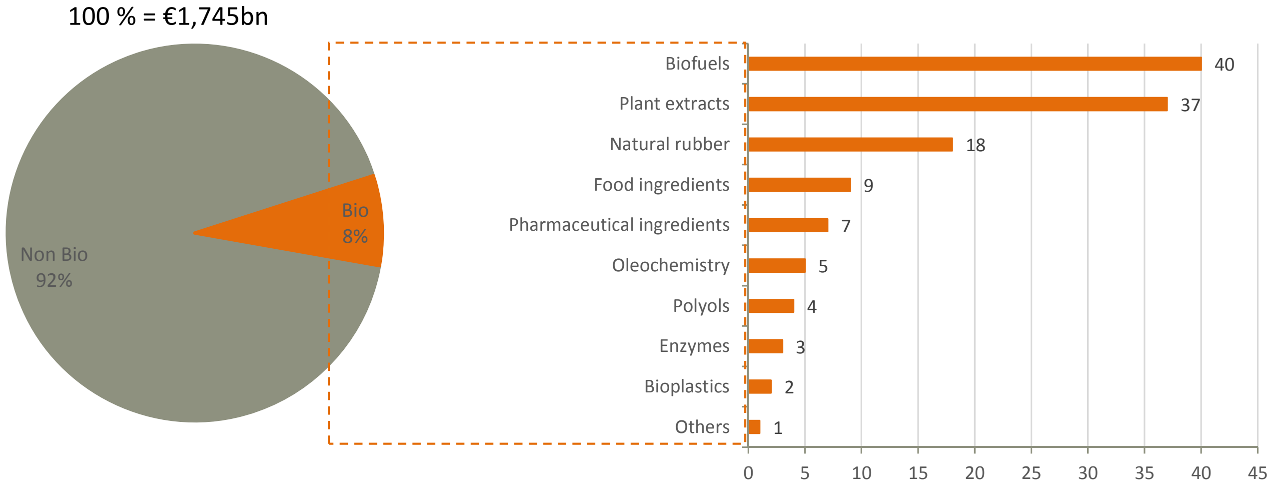
The majority of compounds used in industry today are produced from fossil resources. However, it is possible to obtain chemical compounds of industrial interest from vegetable resources, notably through the use of microorganisms. The use of microorganisms would as such contribute to the transition from processes depending on fossil energies to alternative processes based on renewable vegetable resources. The DEINOCHEM/ADEME strategic programme aims to development new processes for the production of isoprenoid chemical compounds.

2.1 Biosourced chemistry: a €340bn market looking out to 2017

Biosourced chemistry: a new eldorado

In 2008, worldwide sales of compounds issued from biosourced chemistry equalled €48bn, corresponding to 3.5% of the market for traditional chemical products. These sales reached €135bn (7.7% of the total market) in 2012 and according to the OECD should reach around €340bn (15.4%) in 2017. The immense progress in life sciences and technologies over the last 30 years has opened new horizons for biotechnology techniques. Microbiology, genetics, molecular biology, protein engineering and metabolic engineering of microbial processes are revolutionising the range of industrial applications in the pharmaceutical (proteins – drugs), chemical (polymers), feed and every day consumer products (aromas, fragrances, detergents) areas.

Total chemical market in 2012 **Green chemistry market in 2012**



Source: Ademe (McKinsey, SRI, IEA, F.O.Licht)

Isoprenoids: multiple end uses

Isoprenoids: an alternative to petroleum-based compounds

Isoprenoids make up one of the largest families of natural substances in the world, with over 22,000 isoprenoid compounds listed at present.

Isoprenoids feature a very large range of end uses. In order to give the project the greatest chances for success, DEINOVE has decided to concentrate its research programmes on a limited number of compounds that meet two requirements:

- ✓ ability to offer an economically competitive alternative production method (leading to compounds with unit prices under $10 per kilo for this range of products)
- ✓ addressing sufficiently large markets in order to make profitable the heavy investments to be made and to avoid be overly affected by the arrival of a possible new entrant

These criteria have led DEINOVE to work in priority on production processes for derivative compounds such as certain carotenoids.

2 – Focus on Deinochem, the green chemistry

Isoprenoids: five major markets

Isoprenoids open the way to five major markets worth several billion dollars in 2011

Source: Deinove

Pinene and its derivatives: a €500m market

Pinene derivatives target mass markets

The pinenes (α-pinene and β-pinene) are compounds in the isoprenoid family that can be produced from turpentine or petroleum derivatives. A large number of compounds of interest can be synthesised from pinenes, including myrcene, linalool and geraniol.

Depending on the type of target compound, 30% of total production is issued from biomass coming from materials coming from the forest and paper industries. The principal natural source of α-pinene and β-pinene is turpentine, which is 40% produced from pine tree incisions and 60% from the use of waste materials from the paper industry resulting from the kraft process. As such, the price of products derived from pinene is highly correlated to paper market trends.

Myrcene is used directly or as the principal intermediate in the production of terpene derivatives (issued from β-pinene) such as linalool, geraniol, citral and menthol. The principal end markets for these compounds are mass markets: perfumes, hygiene & cosmetics, soaps & detergents, household cleaning products & deodorisers etc.

Linalool and geraniol are principally used in perfumes, but also as intermediates in the synthesis of other chemical fragrances (such as citral and citronellol) and the synthesis of vitamins A and E using citral.

The principal pinene derivatives (linalool, geraniol, α-terpineol, dihydromyrcenol) sold directly on the market without additional transformation represent between 25 and 35 kT per year. However, very substantial additional volumes should be taken into consideration when estimating the potential of a compound. For example, for geraniol or linalool, only 40% of volumes are sold in their pure form, with the balance being transformed into citrol or citronellol or used as an intermediate (for example in the synthesis of vitamin A or E).

2 – Focus on Deinochem, the green chemistry

30-40% of the production of linalool and geraniol is biosourced

The percentage of biosourced production of high volume products such as linalool and geraniol equals 30-40%. At the same time, mass producers such as BASF and DSM use petroleum-sourced production (from isobutene or acetylene).

The price of compounds derived from pinene have trended upward over the last ten years due to two major trends in the paper industry:

- ✓ The overall paper market has stagnated with the reduction in paper consumption.
- ✓ Paper recycling is developing strongly. The kraft pulping of recycled paper does not create sulfate turpentine, which was already extracted the first time.

Linalool market

In 2010, the world linalool market equalled around $183m (all types of applications combined). Europe was the leading geographical zone at $51m. The market is mature in Europe and North America (0.6% and 2.0% growth) but is showing strong growth in Asia and Latin America (9% growth). Looking out to 2020, the market should grow by 66% in value terms to $303m, with Asia becoming the leading market (31% of the total market), followed by Latin America (22%). The principal world linalool producers are BASF, DSM and Renessenz (former Millenium).

Geraniol market

In 2010, the world geraniol market equalled around $111m (all types of applications combined). Europe was the leading geographical zone at $31m. The market is mature in Europe and North America (0.6% and 2.0% growth) but is showing strong growth in Asia and Latin America (9% growth). Looking out to 2020, the market should grow by 66% in value terms to $184m, with Asia becoming the leading market (31% of the total market), followed by Latin America (22%). The principal world geraniol producers are BASF, IFF, Renessenz and DRT.

Myrcene market

In 2010, the world myrcene market equalled around $85m. North America was the leading geographical zone at $34m, following by0 Asia at $17m. The market is mature in North America (0.5% growth) but showing strong growth in Asia (+9% growth). The market is expected to grow by around 45% by 2020, when Asia should become the leading myrcene market and represent around a third of worldwide consumption. Average myrcene prices remained stable between 2000 and 2005 and then doubled between 2005 and 2010, reaching $3/kg.

2 – Focus on Deinochem, the green chemistry

Carotenoids: a market estimated at $1.2bn in 2015

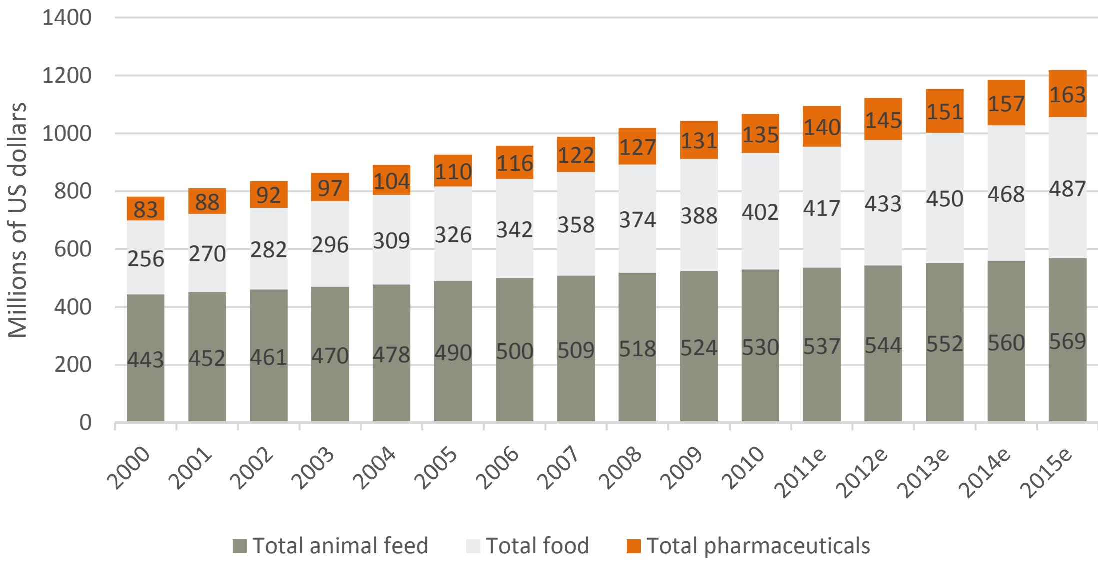
Principal applications: food, pharmaceuticals and cosmetics

The most important markets for carotenoids are found in the food and animal feed segments and in pharmaceutical applications, where they are used either for their antioxidant properties or as dyes. In the animal feed segment, carotenoids are used as feed additives and for the colouring of certain fish such as salmon and trout and as dyes to improve the skin quality of commercial poultry and the colour of egg yolks. The same types of applications are found in the food segment (dyes for certain beverages or food additives). Finally, in pharmaceutical applications, the carotenoids (particularly lutein and zeaxanthin) are used in ophthalmology drugs.

Carotenoids target the food / animal feed and pharmaceutical markets

In 2010, animal feed accounted for half of carotenoid sales, while food and pharmaceutical applications accounted for 37.5% and 12.5% respectively. The strongest growth is being seen in the food segment, where biosourced or petroleum-sourced origins can constitute a significant differentiating factor.

Estimated carotenoid sales by end markets since 2010



Source: GIA 2010

A market dominated by two major players

A market estimated at $1.5bn in 2015

The world carotenoid market totalled over $1bn in 2010 and has shown solid growth of 3.11% per year over the last decade. This market should equal over $1.2bn in value terms in 2015. The market is dominated by two major players, BASF Nutrition and DSM Nutrition, which both use petroleum-based production processes. These two producers by themselves represent over 55% of the world market.

✓ BASF Nutrition is a division of BASF, the world chemical sector giant (109,000 employees and $63bn in revenues). This division covers food and animal feed, pharmaceutical applications and all aroma chemistry applications. This division's products notably include vitamins, carotenoids, enzymes and fatty acids, with sales totalling over €12bn. The carotenoids produced from petroleum include astaxanthin, β-carotene and canthaxanthin.

2 – Focus on Deinochem, the green chemistry

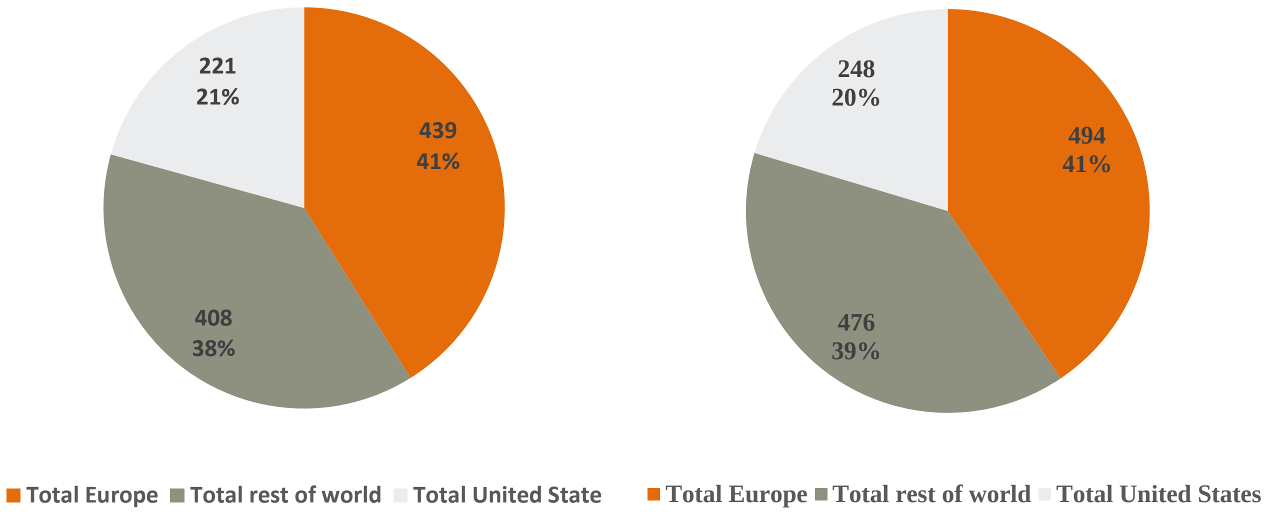
DSM Nutrition is a division of DSM (Dutch chemical and biochemical group with 22,000 employees worldwide and revenues of around €8bn). This division specialises in food and animal feed and personal care applications and had revenues of €2.6bn in 2010, corresponding to over 25% of total group revenues. Its carotenoid products (issued from chemical syntheses) such as β carotene, lutein, lycopene and zeaxanthin are used for both food and animal feed.

Europe is the principal carotenoid market at over 41% of the worldwide total in 2010 with a value of $440m. The United States was the no. 2 market at over 21%, corresponding to $226m in value terms.

Europe is the principal market for carotenoids

World carotenoid market

2010 (Sales in $m & % of total) | **2015** (Sales in $m & % of total)



Source: GIA 2010

2.2 Deinochem: an ambitious project that is beginning to take shape

The DEINOCHEM strategic programme aims to achieve fermentation-based production capable of being industrialised of four compounds from renewable sugars through the metabolism of isoprenoids naturally expressed by the deinococcus bacteria. The targeted compounds are linalool, geraniol and the carotenoids.

Four compounds are naturally produced by deinococci

Four products targeted for a market estimated at €4bn

DEINOCHEM targets markets ranging from so-called mass commodities (whose markets reach several billion euros) to so-called super speciality commodities (such as carotenoids and their market of €1bn at a price above 500€/kg) and including semi-speciality commodites (such as linalool and geraniol, with markets totalling a few hundred millions of euros at prices of around €8/kg). Based on market projections for the targeted products, the DEINOCHEM technologies address a market totalling around €2bn.

2 – Focus on Deinochem, the green chemistry

A business model based on licence sales …

The processes developed will enable the manufacturing of products from low quality, non-food and inexpensive biomass. Additionally, these processes should be economically competitive compared to existing processes in these segments, be they biosourced (as is the case with certain fragrances) or petroleum-sourced.

The DEINOCHEM programmes' business model is based on sales of licences covering the processes and technologies developed by the company. This strategy will able DEINOVE to serve the market with reduced investments (as the company will not build the industrial production facilities) and to valorise its intellectual property more rapidly through earlier revenues (as DEINOVE will not have to wait for product sales before being remunerated).

Valorisation through licence sales …

Once the technologies are developed up to the process book (which will detail the effective application of deinococci bacteria in an industrial process – culture and production conditions) research phase, a partial technology transfer will be made to partners in exchange for an upfront payment. On completion of the demonstration phase conducted by the partners, a second upfront payment will be made, thereby allowing the commercialisation of the processes.

DEINOVE estimates that at the end of four years of exploitation, its technologies should be able to capture a substantial part of the world market with, depending on the case, a single partner (exclusive licence) or non-exclusive licences. This would establish DEINOVE as an emerging leader in green chemistry.

…with targeted partnerships ….

The project will be valorised gradually through the setting up of partnerships with industrials in a position to commercially exploit the developed processes. Each partnership will be specific and could involving particular conditions regarding remuneration and the resulting sharing of intellectual property. These industrial partnerships could be established on two levels:

- ✓ on the upstream level, partnerships could be established with industrials specialising in agricultural vegetable species that are abundant in France and digestible by deinococci bacteria
- ✓ on the downstream level, R&D and licence agreements could be reached with industrial groups that are leaders in the production and commercialisation of the targeted isoprenoids

In order to generate these revenues, DEINOVE has begun commercial prospection efforts targeting different players in the animal feed, fragrance intermediates and cosmetics sector. The partnerships under consideration will begin with a collaborative research phase followed the scaling up of the technology.

…and partnerships to pre-finance R&D costs

The model being privileged by DEINOVE is that of total or partial pre-financing of R&D costs followed by licence contracts (exclusive or non-exclusive) to provide the company with royalties based on sales coming from its processes. Each licence contract should generate fixed fees and royalties based on sales of the chemical products manufactured using the DEINOCHEM technologies.

Given the worldwide chemical players' strong appetite for technologies that would enable them to free themselves from fossil-based raw materials, the project could benefit from the entire range of opportunities, from partnership agreements to joint ventures or licences on the green chemistry market (excluding biofuels), going so far as an acquisition of the company by a major industrial player (European or international).

In order to finance the DEINOCHEM project, DEINOVE obtained a repayable advance from the French Environment and Energy Management Agency ADEME. The ADEME's decision to support the DEINOCHEM programme through this co-financing highlights the pertinence of this project and reinforces its credibility. DEINOVE could also seek financing on the market or from private investors.

2 – Focus on Deinochem, the green chemistry

…with a first agreement already signed

In August 2014, DEINOVE launched the COLOR2B project, a research partnership with Sofiprotéol (which has been since renamed AVRIL). COLOR2B, co-financed by DEINOVE and AVRIL, is a three-year R&D project that should allow the development of a process for the production of natural additives for animal feed. It covers the selection of the best performing bacteria strains from the DEINOVE strain bank, the characterisation testing of the compounds produced and the qualification of their benefits in terms of animal nutrition and health, as well as the development of a pilot-scale production process.

- ✓ DEINOVE's expertise involves the ecological and economical production of additives using its micro cell factories.
- ✓ AVRIL's expertise involves the raw materials used, the evaluation of beneficial effects in animals, its familiarity with the market and regulations and the commercialisation of the technology developed.

The two partners are seeking to ultimately industrialise the bioproduction of these additives and to launch new product lines in the animal feed area. Targeted applications in the human nutrition area will also be studied.

Still limited technological advances …

The different areas of research currently being pursued by DEINOVE feature different timeframes, with outlooks for revenue generation over the more or less long term.

The company estimates that:

- ✓ certain projects involving specific compounds could be introduced on the market within 2-3 years

No revenues before 2-3 years

- ✓ the first projects involving compounds such as geraniol and linalool could be introduced on the market within 3-5 years
- ✓ projects involving certain complex intermediates should not generate significant revenues before 6-7 years

…but substantial profit potential …

Advantages in terms of revolutionising existing production methods

The strategic challenge for DEINOVE involves its ability to gradually generate revenues that will enable it to finance research to support its development over the longer term. Once the production process are developed and validated on the demonstration scale for each family of compounds through collaborative R&D projects, DEINOVE's goal is to see its processes take around 20-30% of the world markets as a result of its two key advantages: an economically competitive production process compared to the best competing processes and a production processes that are not correlated with oil or agricultural food commodities.

2 – Focus on Deinochem, the green chemistry

…and the first phase of the Deinochem / Ademe project has been completed

Project objectives

The DEINOCHEM project targets the validation on the demonstration level of the research into two processes for the conversion of sugar substrates into isoprenoid compounds ((linalool, geraniol etc.) through the use of deinococci bacteria. Several processes will be tested. The two selected will be those present the best technical / economical and environmental performances during the first phases of the project.

DEINOVE's ultimate objective is to use industrial substrates issued from pre-treated agricultural co-products (straw and distillers' grains, dedicated energy crops and industrial organic waste) in order to exploit the deinococci's ability to use oligomers (compounds more complex than simple sugars). The optimisation of the phases of biomass digestion and product extraction and purification as well as the move up to the pre-industrial phase (100 to 300L fermenters) will be the subject of additional efforts following the completion of this project.

The Genoplante technology as support for the project

The Genoplante Valor technology allows an improvement in isoprenoid biosynthesis

In December 2013, Deinove entered into a licence option contract with Genoplante Valor through INRA Transfert (the commercialisation subsidiary of the French national agronomics research institute INRA). This contract involves the patent for the improvement of isoprenoid biosynthetic pathways. DEINOVE is exploiting this technology in connection with the DEINOCHEM project in order to reinforce the abilities of deinococci bacteria to produce chemical compounds from biosourced raw materials. This intellectual property was developed through an ANR (National Research Agency) genomics research programme called "Génoplante". Patent details and conditions of acquisition of exploitation rights remain confidential.

Project structure

The project is divided into two principal phases running from R&D through the construction of a research demonstration unit:

- ✓ **first phase:** identification of productive strains and optimisation of the capacities for expression of the isoprenoid pathway on the level of the targeted products (linalool, geraniol and/or isoprene)
- ✓ **second phase:** optimisation of the fermenting processes for the production of compounds of interest through the level of a 20L fermenter

Deinove has successfully reached the first milestone in its programme

On 21 January 2015, Deinol announced that it had reached the first milestone defined in connection with the Investing of the Future programme established with the Ademe. As a result, Deinove received around €1m in the form of a repayable advance.

The production of strains of industrial interest is gathering pace …

Reaching this milestone has confirmed the progress made in the genetic engineering of bacteria strains. On one hand, the pace of the construction of modified strains has been multiplied by 10x in less than one year, thereby allowing acceleration in the production and testing of strains of interest. On the other hand, the DEINOVE teams have made progress in the identification of limiting enzymes in order to optimise the production of the targeted isoprenoids. The licence acquired from INRA and Genoplante-Valor relating to the key enzyme DXS has contributed to these results. In June 2014, the DEINOVE researchers succeeded in producing in the laboratory three compounds of industrial interest issued from the isoprenoid pathway. These compounds were obtained through the use of a Deinococcus geothermalis strain integrating the DXS key enzyme optimised with the Genoplante-Valor technology, which acted to improve the production of these compounds by the bacteria.

2 – Focus on Deinochem, the green chemistry

Key events in the Deinochem project since 2013

Review of events since 2013	
01/12/2013	• **Technology partnership agreement signed with Genoplante Valor (INRA) to obtain access to a technology for the improvement of isoprenoid biosynthetic pathways**
January-February 2014	• **Three issues of new shares in the framework of the Paceo® equity line (Société Général)**. Net issue proceeds: €3.6m.
01/04/2014	• **1st payout by Ademe** (25% of the total allocated) of subsidies relating to the DEINOCHEM programme for a total of €1.480m, significantly reinforcing the cash position and adding to the equity financing obtained through the Paceo® programme.
01/08/2014	• **Start of the COLOR2B project:** beginning of a research partnership with Sofiprotéol (now AVRIL) for the development of a process for the production of natural additives for animal feed. Co-financed by DEINOVE and AVRIL, COLOR2B is a three-year R&D project that should allow the development of a process for the production of natural additives for animal feed. It covers the selection of the best performing bacteria strains from the DEINOVE strain bank, the characterisation testing of the compounds produced and the qualification of their benefits in terms of animal nutrition and health and the development of pilot-scale production process.
21/01/2015	• **Milestone 1 of the Deinochem programme reached and receipt of €1m from Ademe.**

Source: Deinove

3 – Royalties in 2017 and profitability taking off starting in 2019

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3.1 Review of the targeted markets

Targeted markets totalling several billion euros

A multi-market strategy

DEINOVE R&D programme	Targeted market	Market size	Compounds of interest
DEINOL	Second generation biofuels	€60-110bn* in 2022	Bioethanol
DEINOCHEM	Biochemical compounds of industrial interest	€135bn in 2012 €340bn** en 2017	Carotenoids (anti-oxydants, dyes) Linalool, geraniol, myrcene (aromatic compounds) Other compounds developed based on needs of industrial partners

**Source: McKinsey & Company **Source: Ademe*

3.2 Review of anticipated revenues per project

Deinove has emphasised the Deinol project, its most advanced project, since 2012. The company is continuing to focus its efforts on this project, whose commercialisation phase could begin in 2017.

Our model takes into account two applications for this project, one with the company's new partner Abengoa and the other with another partner involving either wheat or corn.

Note that Deinove's potential revenues will be structured in the following manner:

- ✓ upfront payment on the signing of the non-exclusive licence contract
- ✓ possible milestone payments
- ✓ royalties received from industrial partners based on the commercialisation of the products covered by the partnership

The greater the maturity of the R&D effort, the more likely that the technology will be applied directly. As such, as the company approaches commercialisation, new contracts should involve less upfronts and milestone payments. Our forecast horizon runs through 2025, thereby allowing us to model a period running ten years.

Revenues issued from the Deinol project

The Deinol project is linked to the contract with Abengoa and Suez Environnement, While not revenue producing for the moment, this contract is important in terms of signing other contracts in the same area of application (wheat) or in other areas (corn) where transposition is technically possible.

- ✓ **Abengoa** (ABG, listed on the SIBE, market capitalisation: €2.8bn). Abengoa is a producer of first and second generation ethanol that owns 15 refineries in Europe, the United States and Brazil. Total installed production capacity equals three billion litres per year. The company uses conventional ethanol production technologies: hydrolysis followed by fermentation for starchy plants, simple fermentation for sugary plants. Abengoa will in principle adapt its refineries to used the deinococci process, starting with an initial refinery with a capacity of 60,000 m^3 per year. Assuming a sale price for ethanol of €550/m^3 (€0.55/litre), Abengoa's revenues would reach €33m at peak sales, with 6% going to Deinove according to our estimates. Production should begin in 2017, with the production coming up to speed over several months (we are assuming six full months of production in 2017). The objective is to reach ten refineries in 2024. To be cautious, we do not assume price inflation.

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Deinol project revenues with Abengoa

m€	12/16e	12/17e	12/18e	12/19e	12/20e	12/21e	12/22e	12/23e	12/24e	12/25e
CA **Deinol**	0,5	1,5	2,0	4,0	7,9	11,9	15,8	19,8	19,8	19,8
Upfronts	0,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Royalties pour Deinove (6%)	0,0	1,5	2,0	4,0	7,9	11,9	15,8	19,8	19,8	19,8
Capacité de production en m3		45 000	60 000	120 000	240 000	360 000	480 000	600 000	600 000	600 000
Prix en €/m3	550,0	550,0	550,0	550,0	550,0	550,0	550,0	550,0	550,0	550,0
Ventes partenaires (m€)	0	25	33	66	132	198	264	330	330	330

Source: Invest Securities estimates

- ✓ ***Contract 2:*** Deinove is seeking to enter into other agreements, for example with an industry leader such as POET, which has 26 refineries. In our model, we assume a contract for the integration of the Deinol process in five US refineries with an average capacity of 50,000 m^3. We use a fixed ethanol price of €550/m^3 (€0.55/litre) over the period. We anticipate an upfront of €2m for this contract, paid in 2017 and 2018. Royalties would equal 5%, with commercialisation starting at one refinery in 2018. To be cautious, we do not assume price inflation.

Revenues from Deinol contract 2

m€	12/16e	12/17e	12/18e	12/19e	12/20e	12/21e	12/22e	12/23e	12/24e	12/25e
CA **Deinol** - Contrat 2	0,0	1,0	1,3	1,4	2,8	4,1	5,5	6,9	6,9	6,9
Upfronts	0,0	1,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Royalties pour Deinove (5%)		0,0	0,3	1,4	2,8	4,1	5,5	6,9	6,9	6,9
Capacité de production en m3			12 500	50 000	100 000	150 000	200 000	250 000	250 000	250 000
Prix en €/m3			550,0	550,0	550,0	550,0	550,0	550,0	550,0	550,0
Ventes partenaires (m€)			7	28	55	83	110	138	138	138

Source: Invest Securities estimates

Revenues issued from the Deinochem project

Green chemistry could become an interesting application for Deinove given the number of compounds of interest that it represents and the number of potentially addressable markets, as we have seen previously. The rapid development of these projects should allow the signing of partnership agreements over the relatively near future (we anticipate an upfront of €1m in 2017 and the start of commercialisation in connection with two contracts in 2018).

- ✓ ***Two green chemistry contracts:*** We assume the signing of two contracts in one of the different areas (isoprene, pinene and carotenoids) discussed previously. Each contract would have the following terms: upfront of €1m, 8% royalties and average sales for the partnership of €50m.

Revenues from Deinochem contracts

m€	12/16e	12/17e	12/18e	12/19e	12/20e	12/21e	12/22e	12/23e	12/24e	12/25e
CA **Deinochem** - Contrat 1&2	0,0	2,0	4,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0
Upfronts	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Royalties pour Deinove (6%)	0,0	0,0	4,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0
Ventes partenaire (m€)			50	100	100	100	100	100	100	100

Source: Invest Securities estimates

Deinobiotics

We do not take into account the potential revenues from the Deinobiotics project (a long-term pharmaceutical project), as its horizon is still too distant to allow its modelling.

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3 – Royalties in 2017 and profitability taking off starting in 2019

3.3 Review of project progress

Overview of DEINOVE's R&D programmes

Programmes	Product category	Products	Raw materials**	Applications	Type	Progress	1st revs	Partners	Financing	Competitors
DEINOL	Ethanol	Ethanol	Non-food biomass	Biofuels (substitute for gasoline)	Commodity	20 to 300 L	2017	Abengoa, Suez Environnement	Bpifrance for part (€5-6m)	Leaf Technologies, Terranol Novozymes, Dupont, DSM, Lallemand, Masconna
	Isoprenoids	Linalool, Geraniol, Limonene etc.	Non-food biomass or simple sugars	Fragrance intermediates (perfumes, detergents	Intermediates	R&D	2019	Prospecting phase	Ademe (€6m)	Amyris and Allylix
DEINOCHEM		Carotenoids	Non-food biomass or simple sugars	Food and animal feed, cosmetics	Specialities	R&D	2018	AVRIL		Fragmented market (DSM, BASF, DuPont etc.)
	Other compounds	Natural products (pigments, EPS etc.)	Non-food biomass or simple sugars	Cosmetics	Specialities	R&D	2018	Prospecting phase	-	Fragmented market
		To be defined with clients	Non-food biomass	Chemical intermediates / solvents	Commodity	R&D	-	Prospecting phase	-	-
DEINOBIOTICS	Drugs	Antibiotics, antifungals	(not relevant)	Human health	Specialities	Selection of compound(s)	-	Prospecting phase	Bpifrance / L-R Region / Feder (€700k)	Pharmaceutical groups present in these therapeutic indications

Not included in our estimates | Included in our estimates

Source : Deinove

* Projects initiated with clients rather than in a proactive manner

** Deinococci can use lignocellulosic biomass, indispensable for commodities but not mandatory for specialities.

3 – Royalties in 2017 and profitability taking off starting in 2019

3.4 Revenues beginning in 2017 and breakeven in 2018

2017 horizon for the first royalties…

2015 and 2016 should be the last two years before the entry into the industrialisation phase, at least in terms of the Deinol project. This nevertheless assumes the validation of milestones 3 (300L pilot unit, alcohol volume of 4-6%) and 4 (3000-5000L industrial pilot unit) over these two years.

€m	12/16e	12/17e	12/18e	12/19e	12/20e	12/21e	12/22e	12/23e	12/24e	12/25e
Sales	**0,5**	**4,5**	**7,3**	**13,3**	**18,7**	**24,0**	**29,3**	**34,7**	**34,7**	**34,7**
Sales Dinol -1	0,5	1,5	2,0	4,0	7,9	11,9	15,8	19,8	19,8	19,8
Sales Deinol -2	0,0	1,0	1,3	1,4	2,8	4,1	5,5	6,9	6,9	6,9
Sales Deinochem 1&	0,0	2,0	4,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0

Source: Invest Securities estimates

These two years will therefore not see significant years and further reported losses. 2017 should be the first year with significant revenues, i.e. royalties.

…2018 - breakeven reached

€m	12/16e	12/17e	12/18e	12/19e	12/20e	12/21e	12/22e	12/23e	12/24e	12/25e
Sales	**0,5**	**4,5**	**7,3**	**13,3**	**18,7**	**24,0**	**29,3**	**34,7**	**34,7**	**34,7**
Cost of sales	-0,1	-0,1	-0,1	-0,3	-0,4	-0,5	-0,6	-0,7	-0,7	-0,7
Gross margin	**0,4**	**4,4**	**7,2**	**13,1**	**18,3**	**23,5**	**28,8**	**34,0**	**34,0**	**34,0**
Other external charg	-4,0	-4,0	-4,0	-4,0	-4,0	-4,0	-4,0	-4,0	-4,0	-4,0
Value Added	**-3,6**	**0,4**	**3,2**	**9,1**	**14,3**	**19,5**	**24,8**	**30,0**	**30,0**	**30,0**
Salaries & charges	-3,6	-4,0	-4,2	-4,4	-4,6	-4,8	-5,0	-5,3	-5,6	-5,8
Operating subsidies	0,2	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Taxes	-0,1	-0,1	-0,1	-0,1	-0,1	-0,1	-0,1	-0,2	-0,2	-0,2
EBITDA	**-7,1**	**-3,4**	**-1,1**	**4,6**	**9,6**	**14,6**	**19,6**	**24,5**	**24,2**	**23,9**
Net DAP	-0,7	-0,6	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5
EBITA	**-7,8**	**-4,0**	**-1,6**	**4,1**	**9,1**	**14,1**	**19,1**	**24,0**	**23,7**	**23,4**
Excep. Result	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
EBIT	**-7,8**	**-4,0**	**-1,6**	**4,1**	**9,1**	**14,1**	**19,1**	**24,0**	**23,7**	**23,4**
Financial result	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Pretax profit	**-7,8**	**-4,0**	**-1,6**	**4,1**	**9,1**	**14,1**	**19,1**	**24,0**	**23,7**	**23,4**
Tax (incl. CIR)	1,6	2,3	1,9	1,1	0,4	(0,3)	(1,0)	(1,7)	(1,6)	(1,5)
Net income	**(6,2)**	**(1,8)**	**0,4**	**5,2**	**9,5**	**13,8**	**18,1**	**22,4**	**22,2**	**22,0**
Minority interests	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Net income - group	**(6,2)**	**(1,8)**	**0,4**	**5,2**	**9,5**	**13,8**	**18,1**	**22,4**	**22,2**	**22,0**

Source: Invest Securities estimates

The company should reach breakeven in 2018 thanks to the receipt of research tax credits, even if operating profitability should only be reached in 2019. Profitability should then grow very rapidly as a result of the business model based on licence sales.

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3 – Royalties in 2017 and profitability taking off starting in 2019

3.5 A managed cash position

€11.5m in guaranteed equity financing …

The company set up a guaranteed equity financing line at the beginning of December 2014 divided into four tranches over three years and with a maximum amount of €15m. The first tranche totalling €3.5m was drawn down on the signing of the contract and secured the company's financing for seven months.

Each of the four tranches provides DEINOVE with an amount of funding that can be drawn down over a predefined period. The issue price of shares depends on the stock market price, reduced by a maximum discount of 7.5%. This type of equity line should enable the company to assure its funding through Q3 2016 and consequently represents an "insurance policy" in case in does not raise funds on the market.

…that should be sufficient to fund operations

Cash Flow Statement (EURm)	12/14	12/15e	12/16e	12/17e	12/18e	12/19e	12/20e
Net earnings	(6,5)	(4,9)	(6,2)	(1,8)	0,4	5,2	9,5
Depr. & Prov.		(0,6)	(0,7)	(0,6)	(0,5)	(0,5)	(0,5)
Declared Cash Flow	**(5,9)**	**(4,3)**	**(5,5)**	**(1,2)**	**0,9**	**5,7**	**10,0**
Change in WCR	0,8	1,8	(0,6)	(0,8)	(0,2)	(0,5)	(0,4)
Operating Free Cash Flow	**(5,1)**	**(2,5)**	**(6,0)**	**(2,0)**	**0,6**	**5,2**	**9,6**
Capital Expenditure	(1,3)	(1,5)	(1,5)	(0,5)	(0,5)	(0,5)	(0,5)
Free Cash Flow	**(6,4)**	**(4,0)**	**(7,5)**	**(2,5)**	**0,1**	**4,7**	**9,1**
Financial Investments	(1,2)	0,0	0,0	0,0	0,0	0,0	0,0
Rights' issue	4,1	7,1	6,5	0,0	0,0	0,0	0,0
Mov. in net cash before debt	**(1,1)**	**3,1**	**(1,0)**	**(2,5)**	**0,1**	**4,7**	**9,1**
New debt	1,5	0,0	0,0	0,0	0,0	0,0	0,0
Reimbursement	(0,1)	(0,1)	(0,1)	(0,8)	(0,8)	(0,8)	(0,8)
Mov. in net cash	**0,3**	**3,0**	**(1,1)**	**(3,2)**	**(0,6)**	**4,0**	**8,3**
Cash	**2,2**	**5,2**	**4,1**	**0,8**	**0,2**	**4,2**	**12,6**

Source : Invest Securities estimates

Based on our assumptions, the drawing down of the equity line in 2015 and 2016 should allow the financing of operations through 2018, the year in which FCF from operations should turn positive.

4 – A valuation based exclusively on Deinol and Deinochem

4 – A valuation based exclusively on Deinol and Deinochem

4.1 Discounted Cash Flow method

Principal assumptions

We have based our valuation on our forecasts for the period running from 2015 to 2025, with a normative cash flow starting in 2026. We then calculated the cash flows using the following assumptions :

- ✓ a conservative perpetual growth rate of 0.5%
- ✓ an operating margin that should reach 60% starting in 2022.

Hypothesis	
Perpetual growth rate	0,5%
Normative margin	60,0%

Investments and depreciation / amortisation are assumed to be moderate for the group, which expenses the majority of its R&D charges. The changes in working capital are essentially linked to changes in revenues (assumption of one month of revenues for client receivables).

Net profit from industrial property rights (i.e. royalties) is taxable at a rate of 15%. We calculate the research tax credit by taking 70% of the external charges and salary costs (representing the eligible portion) at the rate of 30%.

WACC calculation

In order to calculate the cost of equity, we have assumed a risk-free rate of 0.36% (3-month average for the 10-yr OAT rate as of 20 April 2015) and a market risk premium of 5.9% as calculated by Factset (3-month average compared to the CAC 40 as of 20 April 2015).

We do not apply a beta in our calculation of the cost of capital, as the share's liquidity is too low for this figure to be significant. Instead, we apply a specific risk premium that we assume to be equal to that of the market.

We then calculated a WACC per year as a function of the capitalisation / net debt ratio. The discount rate as such is based almost exclusively on the cost of capital and we arrive at a rate close to 12.2% each year.

Calcul du WACC	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	Norm.
Market capitalization	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1	49,1
Net debt	2,3	0,3	2,8	2,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Risk-free rate	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%
Market premium	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%
Specific premium	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%	5,9%
Cost of capital	**12,1%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**
Cost of debt	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%	6,0%
Tax rate	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Net cost fo debt	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**	**5,1%**
Net debt	4,5%	0,5%	5,3%	5,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Equity funding	95,5%	99,5%	94,7%	94,9%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
Discount rate	**11,8%**	**12,1%**	**11,8%**	**11,8%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**	**12,2%**

Source: Invest Securities estimates

4 – A valuation based exclusively on Deinol and Deinochem

Cash flow and valuation table

€m	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	Norm.
Sales	**0,2**	**0,2**	**0,5**	**4,5**	**7,3**	**13,3**	**18,7**	**24,0**	**29,3**	**34,7**	**34,7**	**34,7**	**34,8**
Operating Income	**-7,1**	**-6,9**	**-7,8**	**-4,0**	**-1,6**	**4,1**	**9,1**	**14,1**	**19,1**	**24,0**	**23,7**	**23,4**	**20,9**
Operating margin	*n.s.*	*n.s.*	*n.s.*	*n.s.*	*n.s.*	*30,8%*	*48,7%*	*58,7%*	*65,0%*	*65,0%*	*65,0%*	*65,0%*	*60,0%*
Depreciation & Amortization	-0,6	-0,7	-0,6	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5
Gross Cash Flow	**-6,5**	**-6,3**	**-7,1**	**-3,4**	**-1,1**	**4,6**	**9,6**	**14,6**	**19,6**	**24,5**	**24,2**	**23,9**	**21,4**
Tax rate	21,0%	32,0%	22,5%	66,1%	181,6%	-24,8%	-4,5%	1,8%	4,9%	6,7%	6,4%	6,1%	15,0%
Theoretical tax	1,4	2,0	1,6	2,3	1,9	1,1	0,4	-0,3	-1,0	-1,7	-1,6	-1,5	-3,1
Operating Cash Flow	**-5,2**	**-4,3**	**-5,5**	**-1,2**	**0,9**	**5,7**	**10,0**	**14,3**	**18,6**	**22,9**	**22,7**	**22,5**	**18,3**
Change in WCR	0,8	1,8	-0,6	-0,8	-0,2	-0,5	-0,4	-0,6	-0,7	-0,8	-0,8	-0,8	0,0
Capital Expenditure	-1,3	-1,5	-1,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5	-0,5
Operating Free Cash Flow	**-5,7**	**-3,9**	**-7,5**	**-2,5**	**0,1**	**4,7**	**9,1**	**13,3**	**17,4**	**21,6**	**21,4**	**21,2**	**17,8**
coefficient		0,7	1,7	2,7	3,7	4,7	5,7	6,7	7,7	8,7	9,7	10,7	11,7
Discounted Free Cash Flow		-3,7	-6,3	-1,9	0,1	2,8	4,8	6,2	7,2	8,0	7,1	6,2	

Source: Invest Securities estimates

Our DCF valuation equals €74.3m, corresponding to €9.1/share on a fully diluted basis (warrants, stock options and equity line)

Valuation	€m	€
Sum of discounted cash flows	30,6	0,0
Discounted terminal value	40,1	0,0
Adjusted net debt	2,3	0,0
Minority interests	0,0	0,0
Financial long term assets	0,8	0,0
Valuation before t.c.v.	**69,1**	**8,5**
Discountes taxe credit value	5,5	0,7
Valuation	**74,5**	**9,1**

Dilution		
Nb of existing shares	5 460 000	
Dilution from options	1 321 350	24,2%
Nb of potential shares	**6 781 350**	
Dilution from equity line	1 385 500	25,4%
Nb of total potential shares	**8 166 850**	

The number of fully diluted shares includes the remaining tranches of the equity line (€11.5m) based on a share price of €9 and a discount of 7.5%.

Our table indicates that the valuation is highly sensitive to the cost of capital and, to a lesser extent, the perpetual growth rate.

Sensitivity table (in €/share): cost of capital and perpetual growth rate

	0,1%	0,20%	0,3%	0,4%	**0,5%**	1,0%	1,5%	2,0%	2,5%	3,0%
8,9%	9,1	9,1	9,1	9,1	**9,1**	9,1	9,1	9,1	9,1	9,1
9,9%	9,1	9,1	9,1	9,1	**9,1**	9,1	9,1	9,1	9,1	9,1
10,9%	9,1	9,1	9,1	9,1	**9,1**	9,1	9,1	9,1	9,1	9,1
11,9%	**9,1**	**9,1**	**9,1**	**9,1**	**9,1**	9,1	9,1	9,1	9,1	9,1
12,9%	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1
13,9%	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1
14,9%	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1	9,1

Source: Invest Securities estimates

4 – A valuation based exclusively on Deinol and Deinochem

4.2 Listed peers

There are no companies that are strictly comparable to Deinove and consensus estimates for somewhat similar companies are relatively scarce. We have listed in the following table the principal listed companies (European but above all American) after having excluded those with market capitalisations that are either too large (> €1bn) or too small (<€20m). These companies operate in one of the following business areas

- ✓ manufacturers/operators of ethanol refineries
- ✓ technology suppliers such as BDI BioEnergy International AG.

The closest companies to Deinove are Metabolic Explorer, Global Bioenergies and Metabolix, whose valuations are essentially based on their technological potentials.

It is not possible to derive a valuation for Deinove from the following table, However, we can see that the majority of these shares feature very strong revenue growth forecasts. These figures lend support to our approach.

Peer group	Ticker	Country	Cap.	Sales 14	Sales 15	Sales 16	Sales 17
Aemetis, Inc.	AMTX-US	UNITED STATES	81	172			
Amyris, Inc.	AMRS-US	UNITED STATES	193	36	91	166	303
BDI - BioEnergy International AG	D7I-DE	AUSTRIA	39	16	37	41	45
BioAmber, Inc.	BIOA-US	UNITED STATES	213	1	11	52	106
Green Brick Partners, Inc.	GRBK-US	UNITED STATES	259				
Clean Diesel Technologies, Inc.	CDTI-US	UNITED STATES	25	34	40	45	
Deinove SA	ALDEI-FR	FRANCE	48	0	0	0	
EcoGreen International Group Limite	EGFCF-US	UNITED STATES	147	189			
Global Bioenergies SA	ALGBE-FR	FRANCE	96	3	7	12	10
GreenHunter Resources, Inc.	GRH-US	UNITED STATES	38	22	36		
METabolic EXplorer SA	METEX-FR	FRANCE	109	4	4	5	6
Metabolix, Inc.	MBLX-US	UNITED STATES	101	2	2		
Synthesis Energy Systems, Inc.	SYMX-US	UNITED STATES	91				
Average			**96**	**44**	**25**	**46**	**94**
Median			**91**	**16**	**11**	**41**	**45**

Source : consensus Factset au Minibase en EUR au 22/04/15

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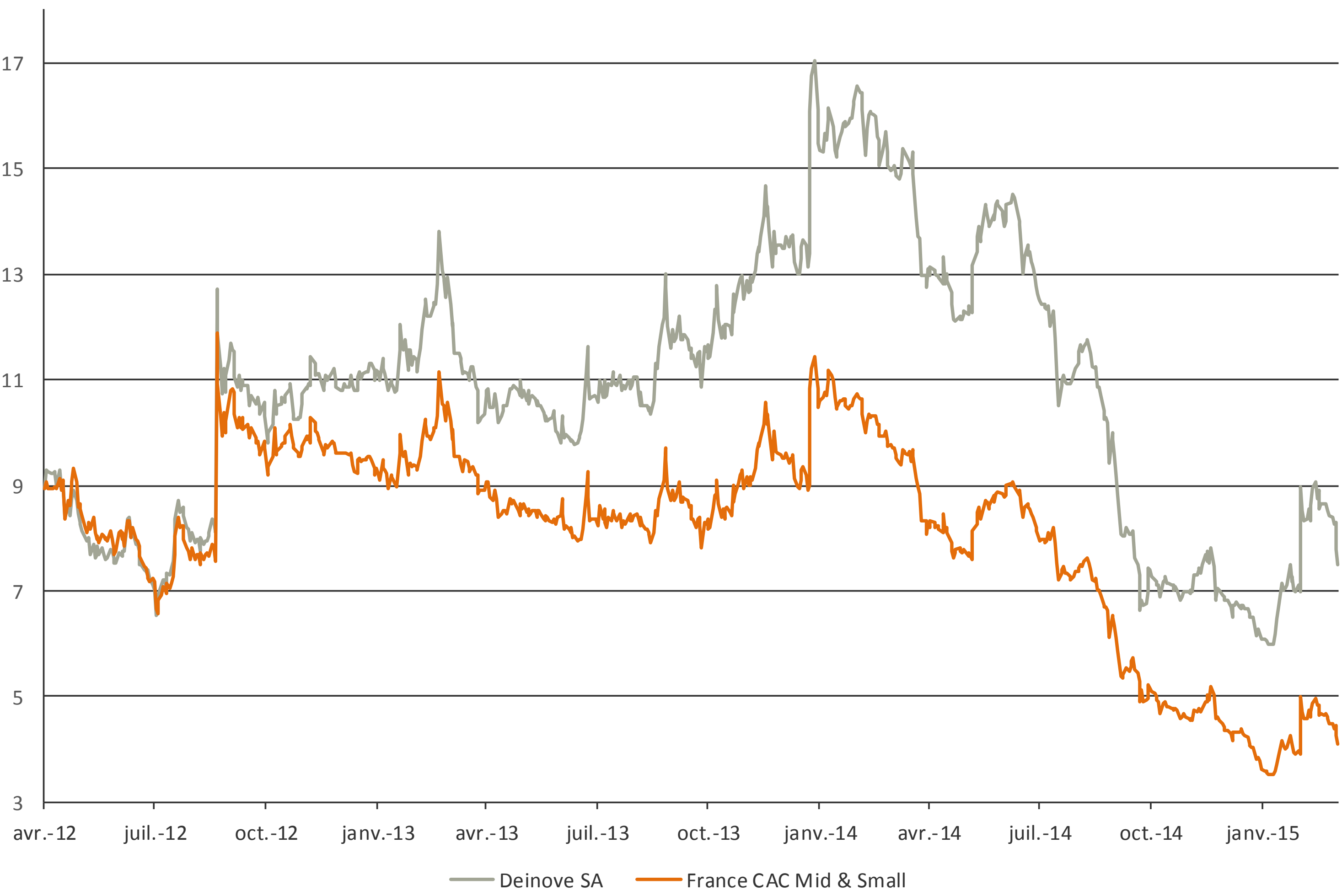
Relative and absolute change price



CONFLICT SCREEN

	Corporate Finance	Treasury stocks holding	Prior communication	Analyst's personnal interest	Liquidity contract	Listing Sponsor	Research contract
Deinove SA	no	no	yes	no	no	no	yes

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