



*Economic and policy analysis for
the agri-food and biofuels sectors*

**EU BIOFUELS INVESTMENT
DEVELOPMENT: IMPACT OF AN
UNCERTAIN POLICY
ENVIRONMENT**

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Special Study
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Executive Summary

This *Special Study* shows that meaningful investments in biofuels in the EU ceased well prior to 2012. The data thus show that the Renewable Energy Directive itself was empirically not a stimulus for biofuels investments, which is how it is nearly universally described, but rather it caused or simply coincided with a near total abandonment by investors in EU biofuels. Thus, EU policymakers need to be aware that efforts to channel Renewable Energy Directive inspired investments from first generation biofuels to second generation biofuels may be an exercise in semantics only.

There is an old adage of a doctor emerging from the operating theatre with a smile exclaiming “*The operation was a success! Yet, disappointingly the patient died.*” The same appears to be happening with biofuels in that the policies being debated so earnestly by EU institutions at present all lack the stability or certainty to attract long-term investors. While the EU has the most ambitious biofuels policy in the world, outside of European Commission-funded projects and grants, biofuels investment in the EU has died.

I. Introduction

Although there has been quite considerable development of renewable energies (including biofuels) over the past decades, they are generally not yet competitive with conventional energy; biofuels is no exception, lacking competitiveness with conventional transportation fuels. It is therefore commonly acknowledged that sufficient policy support is required to help commercialise effective lower-carbon options and technologies to meet the challenges of energy security and climate change in the future.

Although in 2009 the Renewable Energy Directive set *mandatory* targets for all Member States to achieve a minimum 10% share of renewable energy in transport fuel by 2020, in September 2012 the European Commission proposed to amend these, proposing to cap at 5% the contribution of first generation biofuels (based on sugar, cereals and vegetable oils). Since then there has been extensive discussion within the European institutions about the future direction this policy framework should take. The discussion within both the European Council and within the European Parliament has been highly polarised and hitherto inconclusive. Much of the emphasis of the discussion has been focused on the understandable concern relating to the potentially adverse impacts of feedstock production for biofuels on both the environment and food security. This has led to a preoccupation with issues related to indirect land use change (ILUC) and more generally on the proposals to cut back on what are generally termed first generation or conventional biofuels using readily available agricultural feedstocks.

While these issues clearly merit attention, little discussion has focused on the question of the investment needed to supply 5% of EU transport sector energy from renewable sources other than conventional biofuels or indeed what the drivers for such investment are. This is in part based on the assumption that the investment will follow from whatever policy targets are set and indeed by the belief that the supposed current biofuels investments boom needs to be altered to funnel money towards advanced biofuels. It is against this background that this *Special Study* contributes to the on-going debate on the future of biofuels support policy and whether we can expect any significant investment in the sector in the medium term without agreement on the future direction of EU biofuels policy.

2. Biofuels policy and the dynamics of biofuels investment

2.1. Policy background

At the EU level there have been policies in place since 2003 to encourage biofuels production and use, although some Member States have had biofuels policies in place for more than a decade. The first EU level biofuels policy was known as the Biofuels Directive (Council Directive 2003/30/EC). This Directive established *voluntary* national targets for the proportion of biofuels blended in all gasoline and diesel fuels sold in the EU market. Specifically, this Directive required all EU Member States to set indicative national targets for the share of biofuels used in transport fuel, proposing a reference target of a 2% minimum share by 2005 and a 5.75% share by 2010.

Biofuels policy remained largely unchanged until 2009 when, in order to further encourage the development of biofuels production, the Renewable Energy Directive (Council Directive 2009/28/EC) was introduced. This Directive set *mandatory* targets for all Member States to achieve a minimum 10% share of renewable energy in transport fuel by 2020, with the ultimate of essentially to:

“provide certainty for investors and to encourage continuous development of technologies which generate energy from all types of renewable sources”.

Furthermore, it established that all biofuels sold on the internal EU market were required to be certified and authorised in order to meet defined sustainability requirements. Each EU Member State was required to set out its own national legislation to implement the Directive and to report to the European Commission on the measures taken to promote the use of biofuels or other renewable fuels and on progress towards achieving the mandatory target.

In September 2012, in a major U-turn, the European Commission proposed to move the goalposts by altering the nature of the *mandated* targets and by proposing to cap at 5% the contribution of first generation biofuels (based on sugar, cereals and vegetable oils) to the EU’s 10% target for renewable energy used in transport fuel by 2020. This proposed change to the Renewable Energy Directive’s *mandatory* targets for all Member States has been the subject of extensive debate within the EU Council of Ministers and the European Parliament.

2.2. Dynamics of biofuels investment

A key driver for investment in renewables including biofuels is a stable policy environment and ideally a stable price for the energy being generated. This has manifestly not been provided in the EU as many investments in the sector have not prospered as expected and have either had to operate intermittently or have effectively had to write off the initial investment made. Apart from the frequent changes and uncertainty regarding policy highlighted above, this is in part due to the fact that in contrast to the use of renewables for electricity generation for biofuels in Europe there is no equivalent of the feed-in tariff as the main legislative provision supporting production is simply the

Renewable Energy Directive mandate, requiring that a fixed proportion of transport fuel used by 2020 be addressed by biofuels.

As discussed in Section 2.1, the legislative provisions governing this mandate are currently the subject of extensive debate. Therefore, there is at present no certainty what the outcome of this debate will be and the outlook for policy beyond 2020 is even more unclear as the European Commission has not yet announced what its plans are to 2030 or even whether these will include targets for transport fuels¹. This creates an adverse investment climate for the sector as a whole. This is exacerbated by the fact that as well as facing higher and increasingly volatile feedstock costs over the last five years, investors in the sector are operating in a market which has relatively weak protection from imports. Thus, they are faced with the risk that their output prices are undercut by cheaper biofuels from third countries. More importantly, this risk is further aggravated by the fact that for both ethanol and biodiesel, exporters to the EU have been able to undermine the EU market by exploiting loopholes in the EU customs protection system or indeed by having their exports subsidised.

For **biodiesel**, trade policy tends to encourage the import of feedstocks rather than biodiesel itself. This is because biodiesel imports into the EU are subject to an ad-valorem duty of 6.5%. In contrast, import tariffs on vegetable oils tend to be either nil or very low. That said, a loophole in US legislation led to the so-called 'splash and dash' trade from 2007 onwards. This enabled both US domestic and imported (and then also re-exported) supplies of biodiesel to attract a subsidy (the blender's tax credit of approximately US\$1 per gallon) which was effectively intended to encourage use on the US domestic market. In the period 2007 to 2009 this subsidy enabled exports from the US to substantially undercut EU domestic supplies of biodiesel. The volumes were thought to amount to some 100,000 tonnes of B99 in 2007 (i.e. 10% of US exports), rising to some 1.5 million tonnes in 2008. Following a complaint from the European Biodiesel Board representing the industry the European Commission initially imposed a provisional countervailing duty on imports of biodiesel originating from the United States² and then finally a definitive countervailing duty ranging from EUR 211.2 to EUR 237 per tonne on imports of biodiesel³. Despite this, while direct imports from the US fell, imports of subsidised US biodiesel continued to enter the market via third countries (Canada) and in the form of B20 blends. Following an investigation, the European Commission finally blocked imports in these forms and imposed anti-dumping duties *via* two further Regulations adopted in 2011⁴.

For **bioethanol**, similar problems have similarly significantly affected the market as in the past few years significant quantities of ethanol have been able to enter the EU market in blends which attract a significantly lower duty than conventional ethanol imports thus undercutting the market. .

¹ The Commission is expected to produce a paper on Energy Policy to 2030 in early 2014.

² Regulation EC/194/2009,

³ Regulation EC/598/2009

⁴ Regulation EC/443/2011 and Regulation EC/444/2011

Thus, both biodiesel and fuel ethanol producers have been confronted with imports which have disrupted the market and damaged profitability. At the same time they continue to be faced with a policy environment which is addressing both a time horizon which is too short and provides no clear framework going forward. These factors have therefore created uncertainty and thus reduced the attractiveness for investment in the sector.

3. Review of biofuels investment in the EU

3.1. Investment in biofuels production capacity

Investment in biofuels (biodiesel and fuel ethanol) production capacity across the EU has been politically driven. Prior to 2003 biofuels production capacity was relatively small, but following the implementation of the Biofuels Directive⁵ and Taxation of Energy Products Directive⁶ in 2003 investment in production capacity of biofuels began to boom.

Between 2003 and 2013, this policy induced investment in biofuels production capacity soared by 1,041% from 2.5 million m³ in 2004 to 26.5 million m³ in 2013 (Figure 3.1). Approximately two-thirds of biofuels capacity in the EU is for the production of (first generation) biodiesel (17.4 million m³ in 2013), with approximately a third being for the production of (first generation) fuel ethanol (9.0 million m³ in 2013). Investment in advanced (second generation) biofuels (mainly cellulosic ethanol) capacity remains more limited, currently totalling 75,000 m³.

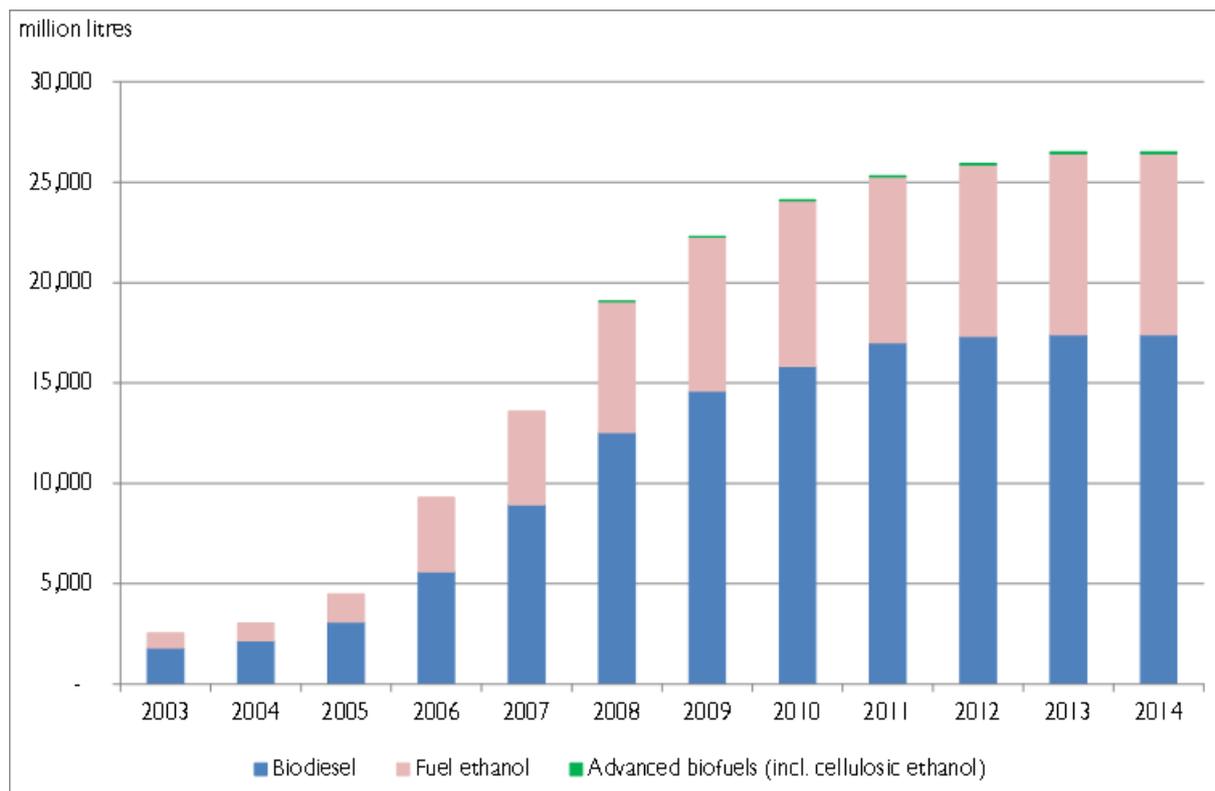


Figure 3.1: EU biofuels capacity development (million litres), 2003-2014

Source: Agra CEAS calculations based on F.O. Licht data

⁵ Council Directive 2003/30/EC

⁶ Council Directive 2003/96/EC

It should be noted that Figure 3.1 shows the evolution of investment in biofuels capacity as it has come on stream and not the level of annual operating capacity. Over the period, significant volumes of capacity have been (temporarily) taken out of production at various stages, and hence the actual level of operating capacity in a given year may be less than that reported in Figure 3.1. For example, the 2013 fuel ethanol capacity total includes the capacity of some plants that have recently ceased production (e.g. the 190,000 m³ ESP Chemie plant in Germany, the 100,000 PLP m³ PLP plant in the Czech Republic and the 32,000 m³ Komers International plant in Poland) as well as those that were temporarily non-operational (e.g. the 400,000 m³ Ensus (Crop Energies) plant in the UK and the 480,000 m³ Abengoa plant in the Netherlands). Thus, ironically, the level of operating capacity in 2013 (and that expected to be operational in 2014) is actually much less than in 2011 and 2012.

3.2. Biofuels investment phases

Since 2003, and the implementation of the EU's first Directives to encourage the use of biofuels, it is possible to discern three distinct biofuels capacity development phases for biodiesel (Figure 3.2) and fuel ethanol (Figure 3.3): an initial pre-boom growth in first generation capacity; a policy-induced boom in first generation capacity; and, a slow-down in first generation capacity development (with a very slight growth in second generation capacity).

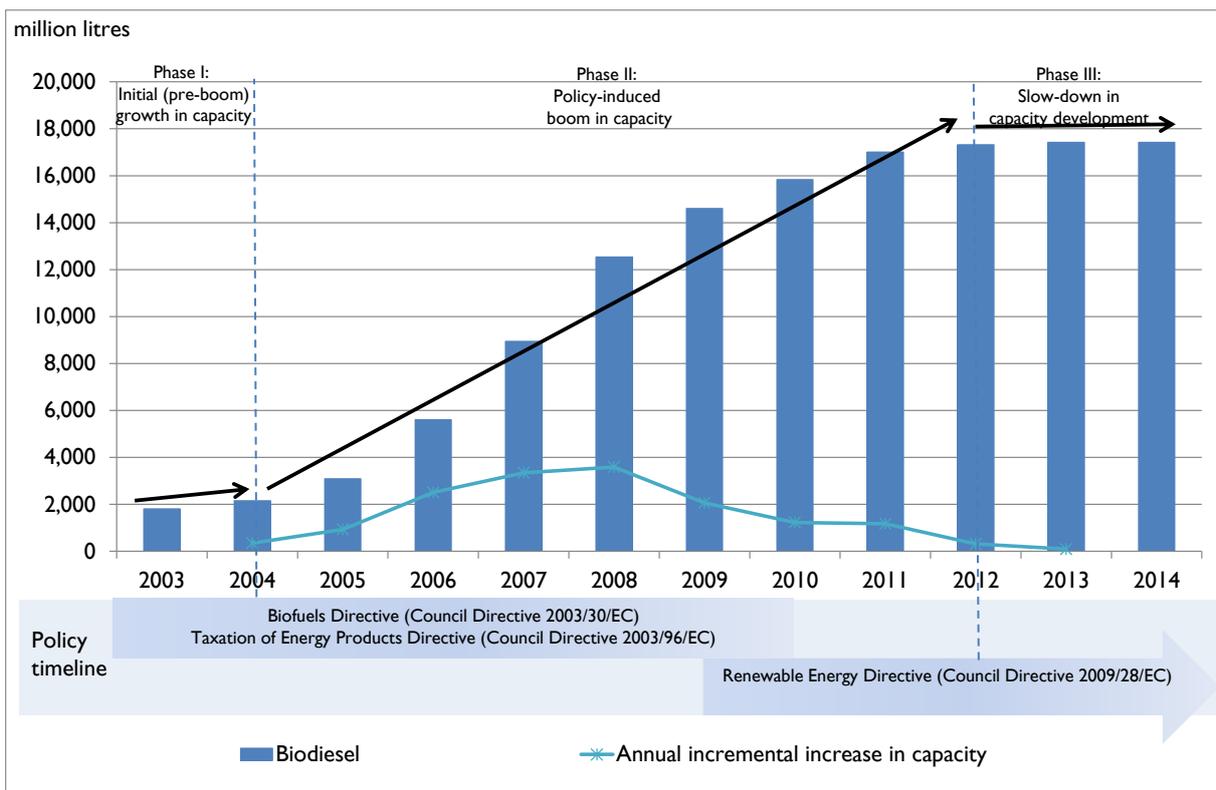


Figure 3.2: EU biodiesel capacity development phases with policy timeline, 2003-2014

Source: Agra CEAS calculations and analysis based on F.O. Licht data

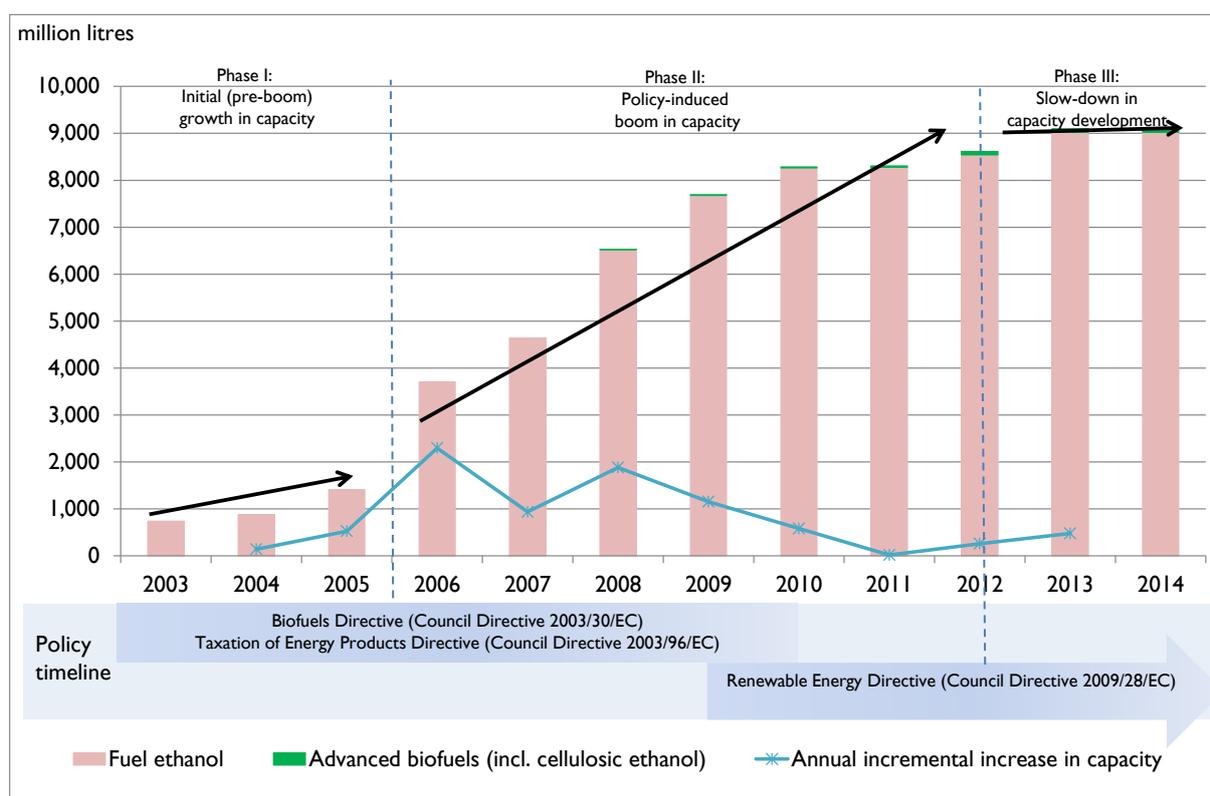


Figure 3.3: EU fuel ethanol capacity development phases with policy timeline, 2003-2014

Source: Agra CEAS calculations and analysis based on F.O. Licht data

- Phase I: Initial pre-boom growth in first generation capacity.** Despite the introduction in 2003 of Council Directive 2003/30/EC, which set indicative targets for the use of biofuels in transport fuel by 2005 and 2010, and Council Directive 2003/96/EC, which introduced tax incentives to encourage the production and use of biofuels, there was some 18 months delay in the case of biodiesel capacity investment and 36 months delay in terms of fuel ethanol capacity investment until the boom in biofuels production capacity really took off. Between 2003 and 2005 in the case of biodiesel and 2003 and 2006 in the case of fuel ethanol, capacity increases were relatively conservative in comparison due to the investment lead time required to obtain the necessary permits, undertake project development, raise the required finance and build the plant capacity itself; i.e. there is a 1.5 year time lag in the case of biodiesel and a 3 year time lag in the case of fuel ethanol from the introduction of Council Directive 2003/30/EC and Council Directive 2003/96/EC and the boom in capacity development due to this investment lead time.

Analysis of the lead time of a sample of the larger EU biodiesel and fuel ethanol plants generally supports this finding; as shown in Figure 3.4 the average lead time (from 'formal' project announcement, through plant construction to the commencement of biofuel production) for the sample of biodiesel plants analysed averaged 2.6 years and for the sample of fuel ethanol plants analysed averaged 3.2 years. However, it should be noted that the average actual lead time is

likely to be greater as in reality these projects will have been developed from an earlier date than the 'formal' date on which the projects were 'officially' announced to the industry.

In addition, it should be noted that there is significant variability in the lead time between biofuels plants, with larger capacity biofuels plants typically incurring longer construction phases than plants with smaller capacities, and fuel ethanol plants generally taking longer to construct than biodiesel plants. For example, in the case of the larger fuel ethanol plants that are currently operational in the EU, this lead time generally exceeds 5 years.

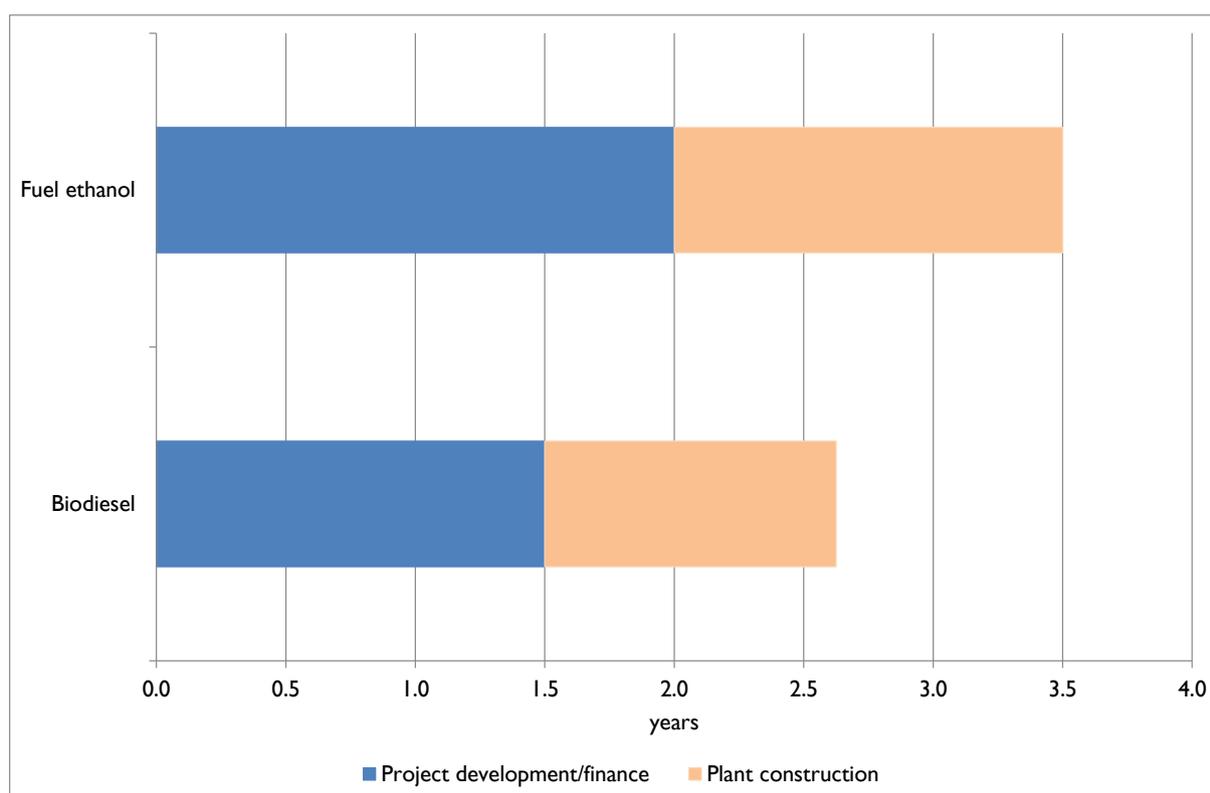


Figure 3.4: Average lead time (years) for EU first generation biofuels capacity development

Source: Agra CEAS analysis based on F.O. Licht data

- Phase II: Policy-induced boom in first generation capacity. From 2005 to 2011 in the case of biodiesel and 2006 to 2012 in the case of fuel ethanol, the full effect of the incentives provided under Council Directive 2003/30/EC and Council Directive 2003/96/EC combined with a favourable investment climate resulted in a boom in capacity development. Annual expansion in all biofuels capacity over this period averaged 4.5 million m³, compared to 1.5 million m³ in 2005.
- Phase III: Slow-down in first generation capacity development (with a very slight growth in second generation capacity). From 2012 onwards both biodiesel and fuel ethanol capacity development within the EU biofuels sector has slowed down considerably. Annual expansion in

biofuels capacity since 2010 has fallen year-on-year, averaging just 1.1 million m³. This reduction in capacity development has occurred despite the introduction of the Renewable Energy Directive (Council Directive 2009/28/EC), which set compulsory targets for the use of biofuels in transport fuel by 2020. The reason for the slowdown in capacity development during this time was not the implementation of the Renewable Energy Directive itself, but a combination of various factors including the prevailing global economic climate for investment at that time.

This lack of attractiveness to invest in biofuels capacity over this period can be seen in the slowdown in the number of new (first generation) biofuel projects being announced by the industry. According to F.O. Licht data (Table 3.1), there are currently just 13 first generation biodiesel projects and 22 first generation fuel ethanol projects in varying stages of development. Of these new first generation biofuels projects there are, however, none currently reported to be under construction. This compares with some 239 first generation biodiesel projects (of which 38 were under construction) and 104 first generation fuel ethanol projects (of which 17 were under construction) that were in varying stages of development in 2008 (i.e. during the policy induced boom in capacity phase, and hence prior to the slowdown in biofuels capacity development). Accordingly, history has shown that the vast majority of the biodiesel and fuel ethanol projects under development in 2008 never progressed to the construction phase due to a combination of, *inter alia*, the changing cost economics of biofuel production and the gaps in tariff protection, and the increasing difficulty of raising finance following the start of the financial crisis in 2008. With these factors now compounded by an increasingly uncertain biofuels policy environment going forward, it is likely that few, if any, of these announced projects will move to the construction phase.

Table 3.1: Comparison of new biofuel projects in development in 2008 and 2013

	Biodiesel projects		Fuel ethanol projects		Total biofuels projects	
	2008	2013	2008	2013	2008	2013
Project development/financing	201	13	87	22	288	35
Under-construction	38	0	17	0	55	0
Total	239	13	104	22	343	35

Source: Agra CEAS calculations based on F.O. Licht data

Significantly, although investment in advanced biofuels capacity is still in its infancy (given that second generation technology is still very much in the development phase and current cost economics are generally not competitive with first generation capacity), there has been some growth in investment in (small-scale) capacity in the EU since the introduction of Council Directive 2009/28/EC (Figure 3.5). This is in contrast to the annual growth of first generation biofuel capacity that has been reducing over the period.

The largest capacity development in cellulosic ethanol capacity came on stream in 2012, three years after the introduction of Council Directive 2009/28/EC, with the addition of 50,000 m³ of

capacity in Italy⁷ (accounting for two thirds of total current cellulosic ethanol capacity). The lead time from ‘formal’ project announcement, through plant construction to the commencement of advanced biofuel production for this plant was almost five years. Compared to first generation biofuels plants, the average lead time (from ‘formal’ project announcement, through plant construction to the commencement of biofuel production) for the sample of cellulosic ethanol plants analysed averaged slightly longer at 3.6 years, despite a shorter plant construction phase (given that second generation plants are of generally smaller scale).

This overall longer lead time was due to a longer project development and finance phase, most likely due to the difficulty of raising finance given the current uncertain biofuels policy environment (Figure 3.6). Similarly, given the smaller scale nature of such new capacity developments in advanced biofuels capacity, the plant construction phase is relatively short. However, once again it should be noted that the average actual lead time is likely to be greater as in reality these projects will have been developed from an earlier date than the ‘formal’ date on which the projects were ‘officially’ announced to the industry.

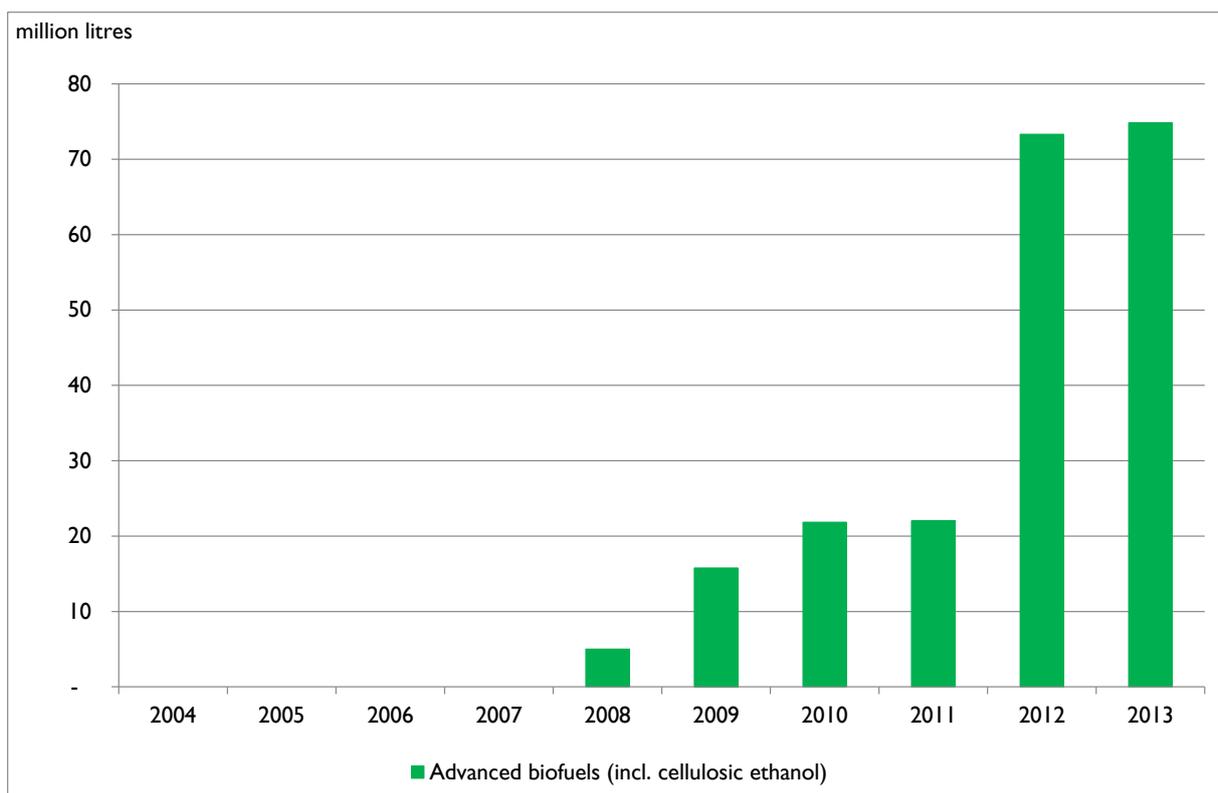


Figure 3.5: EU advanced biofuels capacity development (million litres), 2004-2013

Source: Agra CEAS calculations based on F.O. Licht data

⁷ Beta Renewables’ cellulosic ethanol plant in Crescentino, Piedmont which uses wheat and corn stover, and wood as feedstocks.

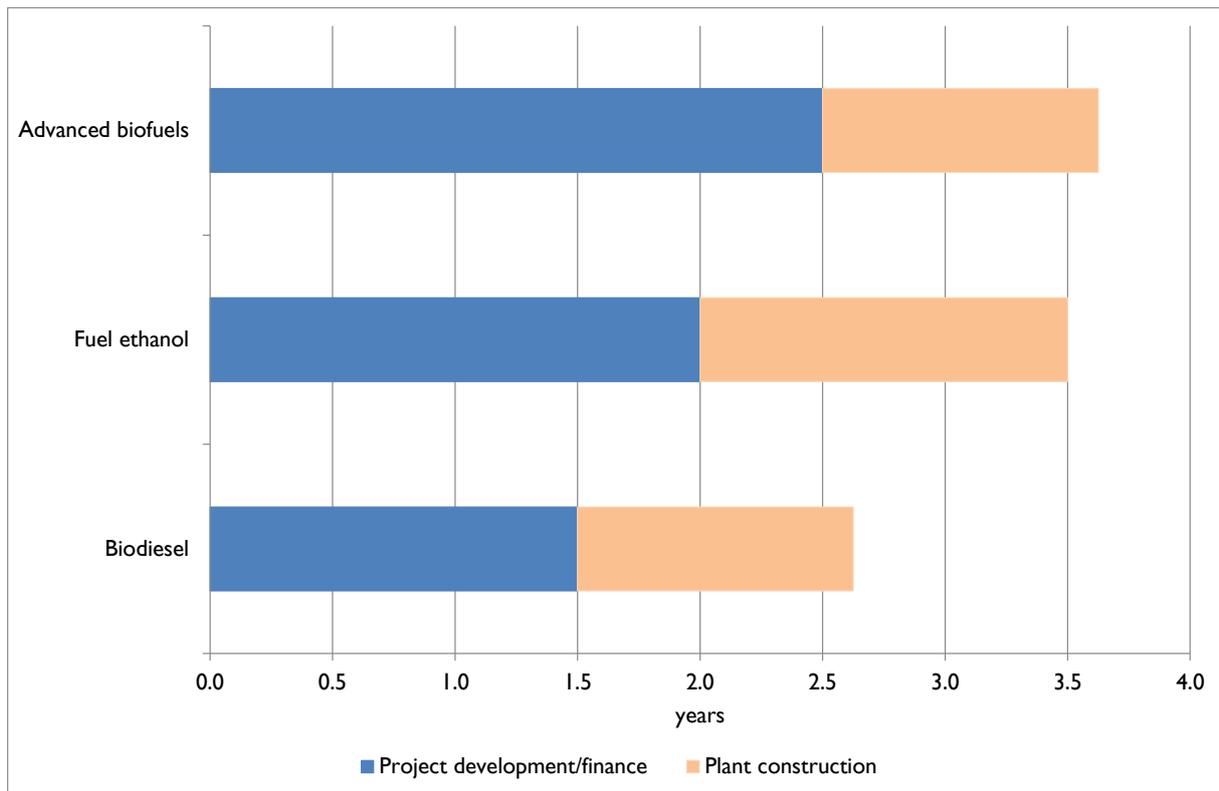


Figure 3.6: Average lead time (years) for EU first and second generation biofuels capacity development

Source: Agra CEAS analysis based on F.O. Licht data

4. Potential contribution of current biofuel proposals

As demonstrated in the analysis presented in Section 3, there has been a dramatic slowdown in the rate of investment in traditional (first generation) biofuels and the investment in advanced (second generation) biofuels do not appear to be compensating for this decline. According to F.O. Licht data, there are currently 25 relatively small-scale advanced (second generation) biofuel projects in varying stages of development, with only one (biodiesel) plant (of just 120 million litres) currently under construction. Given the current investment climate, and as history has shown, it is highly unlikely that these could all be expected to come on stream by 2020. Moreover, even if they were all to come on stream within the timeframe, these new projects are in the main relatively small-scale advanced biofuels plants which would thus add little additional capacity to that required to meet the mandated levels shown in Figure 4.2; it should be noted that these mandated levels are based on relatively conservative 2020 diesel and petrol consumption assumptions. In addition, the calculation made for Figure 4.1 assumes that 100% of EU capacity would be fully utilised. This is unrealistic in practice and therefore significantly understates the true additional investment in capacity development which would be required to achieve the mandates.

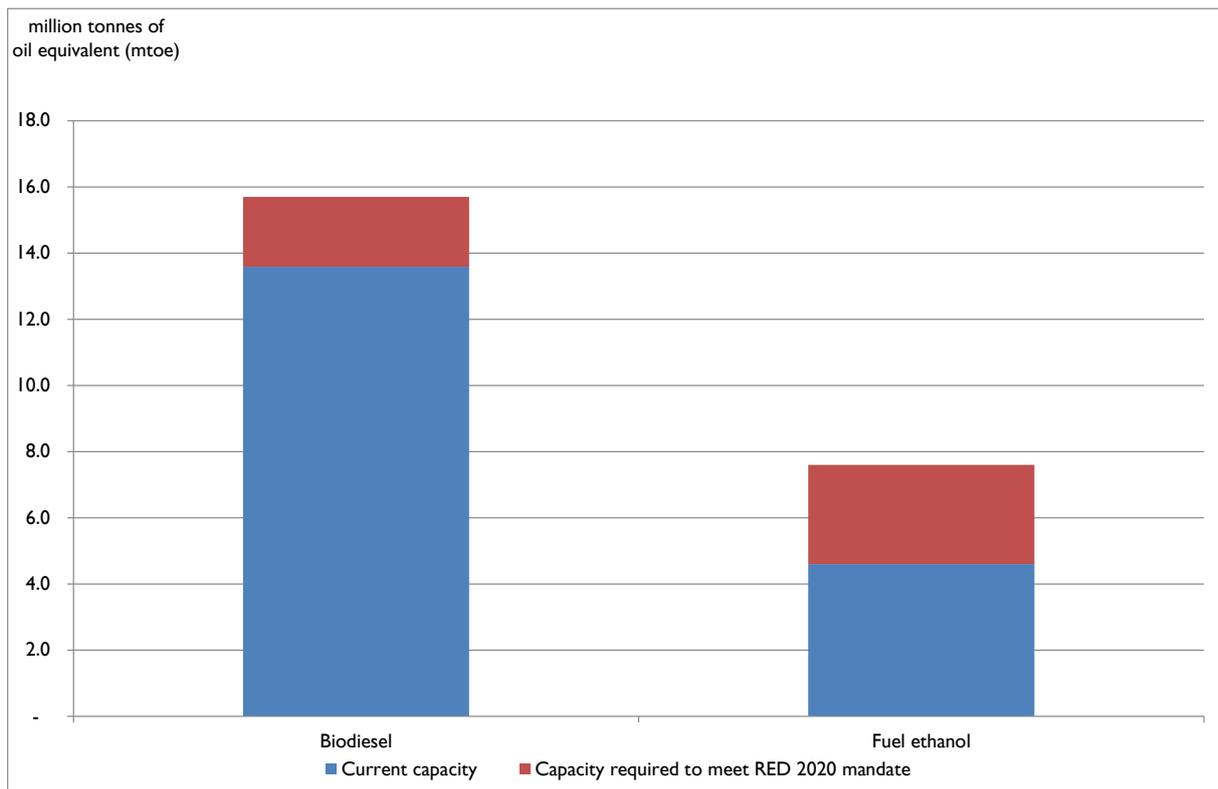


Figure 4.2: EU 2020 mandated biofuels demand and current capacity

Source: Agra CEAS analysis based on F.O. Licht and European Commission data

The reason that biofuels capacity is no longer being built in line with projected 2020 mandated demand is primarily linked to the continued investment uncertainty within the sector resulting from

regular changes in policy direction and a lack of clarity as to what policies are going to be in place going forward. Discussions with the sector have revealed a consensus that investment cannot proceed without a clear policy framework going forward. While one of the objectives of the Renewable Energy Directive and the setting of the *mandatory* targets to 2020 was to:

“provide certainty for investors and to encourage continuous development of technologies which generate energy from all types of renewable sources”

...clearly the proposed revisions of this Directive announced in 2012 and the continued indecision within the European institutions on how to conclude this debate means that the uncertainty and potential risks of further future policy reversals are too great to encourage investment to take place. This uncertainty and risk is further exacerbated by both the weaknesses of the EU's system of tariff protection, as exposed in the case of both biodiesel and fuel ethanol in recent years, but perhaps even more significantly by the fact that the time horizon being addressed by the Renewable Energy Directive only runs to 2020. Given the inherent risks to margins which arise from operating in a market characterised by increasing, and likely continuing, volatility in feedstock costs investors need a longer secure planning horizon of at least 10 years to ensure adequate returns. There is an urgent need for the biofuels policy framework to be set up to take this into account.

Currently, although the European Commission has indicated that it is due to present its thinking on energy policy generally to 2030 early in 2014, there is no suggestion that the framework for biofuels will be addressed by this and legislation would in any case take considerably longer to be put in place. Given the timescales for investment evaluated in Section 3 and the continued uncertainty, this suggests it would seem highly unlikely that even modified EU targets for biofuels use are likely to be met unless a longer and more secure planning horizon based on technologies and feedstocks which can be accepted is adopted.



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