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Agrifuels for the cement industry?

As the world's reserves of fossil fuels fall and new concerns about the safety of nuclear power arise, the ability of the world to maintain its 'throw-away society' are called into question. Over the past few years, agrofuels have increasingly been used in the transport sector as an alternative to fossil fuels, hoping that this will help achieve climate protection goals. Should the cement industry take up this lead and if so, how?

Above: A cassuarina agrifuel plantation in Egypt, which partly supplies a local cement plant.

In many industrialised countries and more advanced developing countries, governments have introduced policies to promote agrifuels. In the US, for example, the Renewable Fuel Standard (RFS) is promoted with the aim of 7.5 billion gallons of renewable fuels and within the EU the aim of 10% agrifuels shall be achieved by 2020.

Aims like these, which strengthen the agrifuel industry, are supported by both specialised companies in the genenetically-modified (GM) sector such as Monsanto and those in the conventional fuels industry such as BP, which is planning to invest another US$2bn the renewable energy sector in 2011.

Impact on the cement industry

But what will the impact on the cement industry be? In 2013, the European cement industry will already be suffering from the new CO_2-reduction goals of the European Union (EU) Emissions Trading Scheme (ETS). Currently, only minor quantities of agrifuels are used in the European cement industry as sufficient other, locally-available biomass-derived fuels or refuse-derived fuels with a high biogenic content are available.

It is foreseen that with stricter CO_2 emission reduction goals will come more competition from the power generating industry. Currently, the European energy industry already purchases agrifuels such as crops, rice husks, olive and palm kernel and wheat grain in order to reduce fossil CO_2 emissions in large scale lignite or coal fired power plants.

Meat and bone meal, a 100% biogenic waste material from the rendering industry that is banned from further use as animal food, is one example of the influence of the EU ETS on fuel prices. The European cement industry received gate fees of up to Euro150/t of meat and bone meal for the environmental thermal utilisation as a service offered to the rendering companies just a few years ago. Nowadays, meat and bone meal is mainly used as substitute fuel in coal and lignite fired power plants pay up to Euro50/t for such alternative fuels, considering the 100% CO_2 neutral benefits. Wood chips, originally only used in the cement industry and small-scale power plants are now also used in dedicated power plants or as substitute fuel in coal-fired power plants on a value of up to Euro40/t. This is too high and therefore no longer feasible for the cement industry.

Unintended consequences

Can the use of agrifuels help the achieve lower CO_2 emissions in the cement industry? What is the impact on agrifuels produced under agro-industrial schemes? Questions such as these are increasingly coming to the fore and can be expanded by looking at case studies.

China has recently turned to cassava as an agrifuel after a disastrous experience with corn ethanol in the last decade. The use of corn ethanol triggered a rapid and disastrous inflation of food price and led the country to ban the use of corn for fuel in 2007. Because cassava grows best in tropical soils, Chinese

corporations have been buying up land in Thailand, Cambodia, Laos and several African countries to plant their crops, inflicting what economists call 'externalities' on their neighbours to feed China's growing hunger for cars.

Agrifuels and food markets

Olivier Dubois, a bio-energy expert of the Food and Agriculture Organisation in Rome, says, "It is hard to quantify the extent to which the diversions for biofuels had driven up food prices. The problem is complex, so it is hard to come up with sweeping statements like biofuels are good or bad," he said. "But certainly, biofuels play a role. Is it 20, 30 or 40% That depends on your modelling."

While no one is suggesting that countries abandon biofuels, Dubois and other food experts suggest that they should revise their policies so that rigid fuel mandates can be suspended when food stocks get low or prices become too high.

"The policy really has to be food first," says Hans Timmer, director of the Development Prospects Group of the World Bank. "The problems occur when you set targets for biofuels irrespective of the prices of other commodities." Rosenthal notes that about 40% of the US corn crop is now going to ethanol refineries, helping to spark a 73% increase in corn prices over the second half of 2010. "We have to move away from the thinking that producing an energy crop doesn't compete with food," adds Dubois of the Food and Agriculture Organisation. "It almost inevitably does."

Aside from political decisions, it has been the rise in oil prices that has boosted the demand for alternative fuels from biomass. As a result, the agricultural sector in developing countries increasingly concentrates on fuel production. This results in higher local fuel prices, with many cement plants already using available local biomass-derived fuels purchased from small local enterprises or even directly from small farms. These can build a second income from selling such fuels.

Recent in-depth analyses and studies of the situation have prompted a re-examination of the opportunities and risks presented by agrifuels. The growing demand for agro-energy is in competition with world food security and is resulting in competition over limited natural resources. Developing countries, from which considerable amounts of fuel will need to be sourced if blending targets of 20-40% are to be met, will also face considerable social and ecological risks, for example as a result of local people and smallholders' families being forced from good production locations, poor conditions for workers on plantations and the destruction of the environment and biodiversity.

Locally-developed and sustainable markets for bio or agrifuels (such as rice husk, jatropha and cassia plantations such as in Egypt and other countries, which are sold and to local cement and lime producers) will be destroyed by the politically-driven prices for such fuels in developed economies.

Agrifuels and the third world

Food production could experience serious competition from energy crops. World food reserves are falling while the demand for grains and oilseeds has outstripped supply for the last seven years. Prices have risen sharply. In the case of maize, this is due to increasing amounts of US corn being used for ethanol rather than food.

As ever, it is the poor and marginalised who suffer the worst impacts. The EU and the US are setting targets for agrifuel use in transport, but will not be able to produce the feedstock themselves. Producing soya for animal feed already causes serious problems in Latin America, while oil palm plantations have proved extremely destructive in both Latin America and Asia. Now these countries are gearing up to respond to the demand for agrifuels, further increasing the pressure on food production.

Manufacturers of inputs such as a fertilisers and

Below: There are numerous examples of local agreements between cement plants and agrifuel suppliers. Here rice-husks are being used at a cement plant.

Above: Cassuarina being processed into fuel for cement production.

pesticides expect an increased demand as a result of the attempt to increase yields and small farmers will find it hard to compete with big producers. Some will turn from food to energy crop production and others will leave their land. This will result in a loss of local knowledge and local varieties, which in turn will diminish agricultural biodiversity.

Agrifuels and biodiversity

Because so much remains unknown, a precautionary approach to developing agrifuels is necessary. The Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity, has already discussed this and summarised in Paris on 2-6 July 2007 the effects on using Agrifuels as follows:

"The GM industry, having encountered widespread resistance to GM crops for food, has plans to gain acceptance for them as agrifuel crops. These crops would need to be planted as large-scale monocultures in order to be competitive. Yet, monocultures of GM crops (mainly soya and maize) as animal feed had negative impacts, e.g. in Argentina and Paraguay. Since animal feed and agrifuels can often be produced from the same biomass this could stimulate further expansion of GM crops. In addition, the GM industry looks for ways to engineer crops so they can be made to break down more easily into fuel."

Precious little biodiversity remains in Europe and many species are endangered. Extensive, low input farming is the most favourable system for wildlife. However, agrifuel production increases the pressure to convert such regions into intensive production of agrifuels, with crops such as oilseed rape and beet, which are particularly unfavourable to wildlife. If set-aside land was brought into agrifuel production, the impacts on biodiversity would be severe, as would impacts on water reserves through increased irrigation. In the global south, critical ecosystems are destroyed to plant crops used for agrifuels. Examples include sugarcane and soya in Argentina, Paraguay, Bolivia, and Brazil.

At the same time countries such as Indonesia, Malaysia, Cameroon, Colombia and Ecuador are experiencing accelerating biodiversity loss due to oil palm plantations, often preceded by logging. In India and Africa the planting of jatropha trees for agro diesel will threaten the remaining forests. Promoters of agrifuel expansion claim that yields must be increased by using more fertiliser and irrigation, but irrigation depletes lakes, rivers and aquifers while fertilisers cause an increased burden of nitrates in soil and water. This can cause eutrophication, a major threat to fish stocks. In addition, herbicide-tolerant crops facilitate the use of aerial spraying of herbicides with serious effects for biodiversity and small-scale farming. Indirect impacts of agrifuels are already becoming apparent as US farmers switch from soya cultivation to corn for ethanol. This provides an incentive for extending soya cultivation in Latin America, where the soya boom had been faltering. As with other intensive crops, agrifuel production displaces other activities to new areas, whether small-scale agriculture or large-scale cattle ranching.

Agrifuels and climate change

There is great concern that agrifuels may accelerate climate change rather than combat it. Their production involves a considerable emission of greenhouse gases from soils, carbon sink destruction and fossil fuel inputs and already causes significant deforestation.

The clearance of Indonesia's peat forests to plant oil palm plantations has caused massive outputs of CO_2. Once forest removal reaches a certain 'tipping point', a process of self destruction may begin, particularly in the Amazon. In addition, the greenhouse gas balance of agrifuels varies widely depending on the feedstock used.

Right: Small-scale production of agrifuel in the Philippines.

Agrifuels and jobs

A number of sources are asserting that agrifuels can regenerate rural economies and provide jobs.

However, this depends on who controls development. To benefit local communities, agrifuel production would need to be part of a diverse farming system. But development is focused on large centraliaed monocultures for economies of scale and a consistent product.

The impact of monocultures such as sugar cane in Brazil, is a clear example of the lack of benefit for the poor and marginalised. This is reinforced by experiences from other countries, including Paraguay and Argentina, Ecuador and Indonesia and South Africa, where communities have reacted to government agrifuel strategies. In Europe, the EC has claimed that agrifuels can provide opportunities for farmers as well as creating jobs and rural regeneration. However, EU sources are highly contradictory, especially regarding the number of jobs that will actually be created, not simply replaced or displaced.

Resistance to agrifuels

Resistance to monocultures, including agrifuel production, is spreading. Groups in Africa, Asia and Latin America are mobilising and demanding to be heard. Examples range from land occupations, through court cases, to national and regional campaigns. A number of networks have produced statements of their positions directed at the EU and the UN. They insist that small farmers, local communities, the poor and the marginalised will continue to be the ones to suffer.

There is a tension between the increased demand for agro-energy and efforts to ensure global food security and protect biodiversity, the environment and the climate. Forward-looking policies must be adopted at an early stage in order to resolve this tension as far as possible.

The following actions are to be recommended:

1. Giving priority to food: Non-governmental organisations and experts, including the UN Special Rapporteur on the Right to Food and the German Council of Environmental Advisers, have demanded that when there is competition between the production of food and the production of fuel, priority be given to food. Policymakers should respond constructively to this demand.

Efforts to meet statutory blending quotas in Germany or the EU should not result in pressure on production sites in developing countries. In view of both this and recent findings on the various impacts and precise balance of agrifuels, any further increase in current blending targets should be carefully considered.

German or EU legislation should aim to minimise the risks of agrifuels. Care must be taken in particular to ensure that this legislation incorporates both ecological and social sustainability criteria. This would mean, for example, that biomass is only eligible for inclusion in the blending quota if proof can be provided that its production in the country concerned will not have any of the negative impacts outlined above (particularly the displacement of food production and small farmers or non-observance of ILO core labour standards).

As the German sustainability ordinance is likely to be replaced by EU-wide regulation, consultations on a draft EU directive offer an important opportunity for Germany to ensure that social criteria are reflected. The current revision of the EU Fuels Directive (Directives 98/70/EC and 1999/32/32) also offers a good opportunity for incorporating such criteria. Strategic alliances should be formed with other countries advocating social sustainability criteria such as the Netherlands and the UK.

Another important challenge is to introduce into the international debate new arguments on the WTO compatibility of social standards.

Below: Olive kernal storage facility.

Bottom: Delivery of varied biomass by local farmers.

2. Voluntary commitments and certification systems: Since it has not so far been possible to incorporate binding social standards into existing regulations, the focus for now should be on supporting voluntary sustainability initiatives in the following ways:

a)Testing and development of certification systems and sustainability criteria - A large number of international initiatives have already been launched to develop standards and certification systems. So far, however, no uniform international standards have emerged. The relevant international players should work together more closely on further elaborating these standards and achieving uniformity. The Cramer Commission's assessment framework is one important source that can be drawn on. It defines the following social and ecological criteria:

• Significant reduction in greenhouse gases across the entire chain from production to application with proof that there has been no direct or indirect interference in existing carbon sinks (forests and soils);
• Conservation and, if possible, improvement of natural and agricultural biodiversity with no deterioration of natural reserves;

• Environmental protection to prevent chemicals entering air, water and soil;

• No negative effect on food supply in region concerned as a result of the production of biomass for energy generation, with priority given to the human right to food;

• Growth and prosperity. The production of agrifuels must have a positive impact on the economy, employment and income distribution;

• Proven observation of economic and social rights. This includes ILO standards, land use rights and land title for small farmers.

One particularly important aspect when developing certification systems is that the process be participatory and non-discriminatory and those small farmers are included.

Striving for international agreements

In order to ensure that agro-energy is produced sustainably, agreements should be concluded between producer countries and importing countries. These should reflect their shared responsibility for creating a framework for regulation and monitoring. The countries concerned should also commit to measures to counteract any negative impacts that should emerge.

In particular, the agreements should make reference to the relevant commitments under international law (such as, for example, the duty to observe, safeguard and provide the right to food, which also implies an international responsibility). Should it become necessary to take these corrective steps, consideration should also be given to revising existing blending targets. In this context, WTO rules (Agreement on Technical Barriers to Trade) on standard setting should provide the frame of reference.

Research and development

Developed countries should contribute to research and development into the following topics in particular:

• Appropriate agro-energy sources for rural areas in developing countries, including increased research into the use of biogas;

• Improved land use systems that include energy crops,

• Development of indicators for all relevant sustainability criteria (in particular food situation/right to food, biodiversity, preservation of small farming) as a basis for the application of certification systems, ordinances, etc.

Back to cement...

The cement industry, apparently affected by CO_2-reduction goals and by more competition on renewable biomass derived fuels (especially in developing countries) should also reconsider and strengthen its position in sustainable development.

Local and sustainable biomass produced by small and medium enterprises or entities and used as biomass fuel in the local cement industry will allow the development of new local markets. This has a visible advantage against multinational agro-industries which export such biomass as agrifuels into the developed world. All the above-mentioned negative impacts - environmental, social and others can be avoided if sustainable local structures and networks are built between the cement plants within their regions.

Summary

Giving a chance for sustainable development with fuel crop production for the agro industry as well as for developing countries- if clear standards such for the social, environmental, biodiversity and other impacts will be developed, taking a life cycle approach for climate effects into consideration. The cement industry can take a significant role for sustainable biomass use in many developing countries, which is already done in the Philippines and several African countries.

Below: Woodchips can be as an alternative fuel for cement and lime kilns.