

## Communications & Opinions



### Dancing with agro-fuels: common sense or march of folly?\*

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I am a strong advocate of public support for renewable energies in general. But, I question the rationale of subsidizing biofuels from crops, or “agro-fuels”,<sup>1</sup> whose development should in my view be left to the market. Agro-fuels only are the subject of my presentation today. I will briefly recall the world multifaceted and interdependent context in which we have to act, list and assess supporting and critical arguments, as well as the motivations of promoting or promoting agro-fuel production, and draw tentative conclusions.

#### The Context: Looming Scarcities

Population explosion, urbanization, economic development and changes in consumption patterns are progressively causing food, feed, and energy shortages. They are the main long-term causes of skyrocketing commodity and raw material prices. Paul Ehrlich’s *Population Bomb* has been activated. Monday’s Financial Times titled a series on the need to feed “The end of abundance”. Food shortage is of particular importance because food is the foremost Basic Human Need. Food markets are inelastic. As food demand exceeds supply, even by relatively small amounts, it can therefore provoke alarming increases in food bills (+71% in the last two years) with dire consequences for poorer people and countries.

Four decades ago, the Green Revolution saved humanity. Trying to replicate it, notably in Africa, forty years later at comparable resource costs (water irrigation and fertilizers) would be in contradiction with today’s realities. Prospects for productivity increases suffer from underinvestment in agricultural research, infrastructure and production, crop land limitations, as well as rising input costs and greenhouse gas emissions. Rising temperatures will expose billions of people to the risk of water shortages and food production losses. Food security, together with energy security and environmental security have become major policy challenges for our planet and its people. They are interrelated. They call for action. Can agro-fuels policy be part of the solution? So it seemed. There were and still are fashionable with governments and environmentalists alike, but the tide has been turning against it. Just read this Tuesday’s Financial Times leader “(FAO) Summit heads for biofuel clash”, with the US and Brazil on a collision course with others.

#### Agro-fuels: Emancipators or Pretenders?

Agro-fuels are being promoted as the philosopher’s stone for cutting emissions and energy independence. But their development is not properly thought through, feeding an increasingly heated debate.

Although agro-fuel production is currently uneconomic (except bioethanol from Brazilian sugar cane), it has escalated thanks to generous agro-fuel subsidies and protection, causing a major structural shift in commodity markets. Currently some 6% of cereal production and 8% of vegetable oil production are

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<sup>1</sup> *Agro fuels* is a more appropriate term for fuels from crops than *biofuels* (some include even oil among the biofuels). Transport fuels can be made from plant and animal matter. This is an old idea, which was not implemented because oil was so, excessively cheap. Bio-diesel is generally derived from soyabeans, colza, palm oil and canola oil. Bio-ethanol is derived from a number of crops including maize/corn, wheat and molasses. Any reference in the text or footnotes to biofuels refers to the wider renewable energy context or regards citations.

devoted to agro-fuel feeding 954 biofuel plants world wide (2007). Acreage under oilseeds (soya and colza) declined to make place for corn; soybean-and-colza-based oil supplies contracted and their prices shot up, pulling palm oil prices along to the point that palm oil itself became less interesting for bio-diesel production. Mounting competition between food for people and fuel for cars has had serious implications for food prices, world hunger, and environmental degradation (mainly in non-European countries).

Agro-fuels are under attack, despite a strong defense from their greatest beneficiaries: large farmers and refiners. It is therefore worth discussing the pros and cons of agro-fuels, in relation to the world's three main challenges: food security, energy security and environmental security.

**Advocates** of agro-fuels are not short of arguments. They notably trust that:

- much of domestic energy needs can be produced at home with agro-fuels reducing energy dependence;
- farmers' incomes benefit from diversification into agro-fuels;
- food price increases depend mostly on factors other than agro-fuel production;
- cars would produce only carbon already absorbed by plants from the atmosphere;
- there would be fewer oil spills from tankers, less opportunities for blackmail from OPEC countries, and less oil-generated power politics in the Middle East;
- oil prices will stay high and technology will eventually allow production of agro-fuels without subsidies at prices competitive with fossil fuels even if oil prices go down somewhat;
- new technologies will permit production of agro-fuels profitably from more than just the current leading sources (maize, palm oil, rapeseed and sugarcane). Experiences with plants such as *miscanthus*, *jatropha*, *pongamia* (Indian beech tree), are encouraging. All of them can be grown with relatively little water and fertilizer on fallow land, without therefore displacing food production. New sources could be obtained from by-products of food production, for instance wheat stalks, as well as from food refuse, grass and even trees (cellulosic ethanol), or genetically modified agro-fuel crops;
- there is substantial used and unused good-quality agricultural land available for agro-fuel production, particularly in Africa, Latin America and Russia, large enough to cap the price of oil at the marginal cost of bio-energy: oil price hikes would only crowd in more agro-fuels;
- agricultural land, food and feed price increases, thanks also to agro-fuel production crowding out other crops, will allow to do away with agricultural subsidies and protection;
- this will pave the way for fully liberalized and presumably fair agricultural trade;<sup>2</sup>
- demand creates its own supply, and technology will eventually help solve all remaining problems.

**Critics** have advanced counterarguments undermining the agro-fuel economy such as:

- "The bewildering array of incentives that have been created for agro-fuels in response to multiple (and sometimes contradictory) policy objectives bear all the hallmarks of a popular bandwagon aided and abetted by vested interests."<sup>3</sup>

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<sup>2</sup> See: "Biofuels can match oil production" by Ricardo Hausmann, Director of Harvard University's Center for International Development, Financial Times, 7 November 2007

<sup>3</sup> "Biofuels – At What Cost?", Global Subsidies Initiative, Institute for Sustainable Development (2007).

- Agro-fuel subsidies and import protection are “irrational” (OECD); first-generation agro-fuels cannot compete on the market (except Brazilian ethanol) without fiscal incentives and/or subsidies and tax credits, and/or border protection. Public support is wasted unless a country is competitive (Brazil), or has the potential to become a competitive producer of the necessary feedstock (such as Malaysia), and to achieve the technological capacity and economies of scale required to produce agro-fuels efficiently.
- Agro-fuels require a lot of water, and mostly good, irrigated agricultural land, both of which are finite. They reduce food and feed supplies and increase prices, worsening the food balance. Grain price changes have knock-on effects on livestock, poultry and pork prices because maize/corn, wheat and soybeans (soy meal) are used also as animal feed.
- Agro-fuel targets have also knock-on effects on deforestation and destruction of natural habitats. Greenpeace has called palm oil (the most energy efficient crop so far) a “climate bomb” in Indonesia. Agro-fuels penalize the poor, who spend most of their income on food, with the seventy odd net-food-importing developing countries having to pay the bill increasing their indebtedness; income differentials will grow, and additional food costs will nullify budget restoration and development assistance efforts;
- Agro-fuels are of little help in reducing prices of heating oil and petrol at the pump. Unlike energy savings, their availability tends to increase overall energy demand, leaving oil demand unchanged. By privileging the energy use of grains, they shift the risk of foodstuff demand and supply fluctuations to food alone.
- Current agro-fuels have an unsubstantial and shaky record in reducing greenhouse gas emissions as compared to conventional diesel or petrol, except perhaps for sugarcane (with a near total emission reduction) and wheat (with half as much). Carbon certification and sustainability criteria and supervision are currently too weak to allow to decide which plants and production methods provide an acceptable net contribution to greenhouse gas reduction to deserve to count towards target implementation;
- Biofuel targets and subsidies tend to divert policy focus away from fuel/energy saving measures, necessary changes in consumption patterns (notably regarding meat) and life-styles, carbon pricing and trading arrangements, trade liberalization, and catering for the special needs of the poorer countries and people, who cannot join the main stream of the global economy without domestic electricity and connectivity.

On balance, first-generation agro-fuels have fewer advantages than draw-backs.

## **The Next Generation**

Agro-fuel advocates respond to criticism by underlining that first-generation agro-fuels represent but a necessary phase towards the development of second-generation technology such as bioethanol from lingo-cellulose, which is said to be just around the corner without involving loss of food production.<sup>4</sup>

They point to the marvels of science and technology that have saved humanity during the previous food crises in the early seventies. Technology is indeed a key factor, and research with it. Scientists are actually working to improve the efficiency of photosynthesis, carbon capture, nitrogen fixation and many other cellular processes that boost biomass yields. There are good prospects with genetically modified algae yielding much more per hectare than any other plant, and minimizing ecological damage (if grown in closed tanks), as well as with genetically modified sugar (which might double production per ha), rape seed (+60%), and sweet sorghum. Enzymes can allow production of cellulosic ethanol from the inedible parts of crops such as straw stalks (or from wood or food waste). Bio-mass-eating bacteria can break down cellulose quickly. It may become possible to plant crops in soils lost to salinisation, and to genetically produce plants that can grow in marginal or otherwise unusable farmland. Several potential crops for agro-fuels have the advantage not to be grown on farmland, or deforested land, or to preserve the food component of plants.

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<sup>4</sup> There are other more interesting second-generation biofuels such as synthetic diesel produced from biomass inputs including wood pulp and waste (SunDiesel), biomass-to liquid (BTL) plants, biodiesel from biogas, and biofuels derived directly from the photosynthesis of green micro algae. As these are basically no typical agro-fuels, they are not dealt with here.

Agro-fuel critics admit that second-generation technology may help reduce the negative impact of agro-fuels on food prices. If agro-fuels become just a by-product of crop residues, the crop can provide food as well. However, most agricultural waste is organic material useful to maintain the soil structure, nutrients and its store of carbon function. According to a letter sent to Science Magazine, removing 75% of crop residues to transport them (at a CO<sub>2</sub> cost) to the biofuel refinery could increase the rate of soil erosion hundredfold. Our addiction to cars would then lead to “peak soil as well as peak oil” (Monbiot). In order to compensate for the nutrient loss, more fertilizer would have to be used, causing additional CO<sub>2</sub> emissions. It is therefore unlikely that second-generation agro-fuels could get clear of most of the pitfalls of the first generation. Moreover, it remains to be proven whether large-scale cultivation of miscanthus, jatropha or pongamia are commercially feasible, and whether the benefits will trickle down to the small farmers instead of concentrating on big farmers and large corporations.

There are increasing warnings from scientists, academics and institutions such as EEA, EFSA, FAO, IFAD, OECD, JRC and the BRS<sup>5</sup>, as well as (initially favourable) NGOs, that beyond limited production there are serious flaws with subsidizing agro-fuels; they notably reduce food production and increase food prices (according to FAO, by 30% in 2007), whereas their net emission effect is between negligible and substantially negative.

I very much hope that the next generation of agro-fuels will be better than expected, without negative impact on food production. Because, new technologies capable of raising land productivity are shrinking and will be of diminishing help as yields of wheat, rice, and maize/corn press against the ceiling ultimately imposed by the limits of photosynthetic efficiency. Prospects of a boost in African agriculture, which missed the “green revolution”, may take a long time due to infrastructural, institutional, and organizational weaknesses. Unlike Asia, Africa has wide varieties of soil, climate and crops such as cassava, sorghum, millet and maize. New seeds need to be developed. Foreign farm aid, which is down to 3% of total aid (17% in 1985), would need a boost. There are also limits in diversifying renewable energy supplies. Uncultivated good agricultural land resources exist also elsewhere, notably in Eastern Europe and Russia, but are limited in practice.

According to the IEA “The world faces a fossil energy future to 2030”, and General Electric CEO does “see a disruptive new technology that changes the game in the next 20-30 years. It is not the nature of this industry. Everything that has been developed so far – wind, solar and so on – has taken decades to come to fruition. My expectation is that it will remain that way.”

A Financial Times editorial reaches the gloomy conclusion that, although significant steps can be taken to push for renewable energy sources and establish stricter standards to increase energy efficiency, there is at the moment insufficient political leadership to obtain the necessary public support.<sup>6</sup>

## **Conclusion and Policy Suggestions**

Current agro-fuel policy in Europe (and even more so in the US) is an illustration of “The March of Folly” described by the late American historian Barbara Tuchman, of pursuing government policies contrary to their own interests.<sup>7</sup> The European Commission has been acting like a boat (occupied by EU member

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<sup>5</sup> European Energy Agency, European Food Safety Authority, Food and Agricultural Organization, Organization of Economic Development, EU Joint Research Center, International Fund for Agricultural Development, UK Royal Society, and World Food Program

<sup>6</sup> See : Ed Crooks, « Twin threats and lack of leadership », Energy Special Report, November 9, 2007

<sup>7</sup> “The March of Folly: from Troy to Vietnam” (Abacus, 1984) includes two other case studies of self-defeating policies in history: how the renaissance Popes provoked the protestant secession, and how the British lost America. Tuchman explained that “Wooden-headedness, the source of self-deception, is a factor that plays a remarkably large role in government. It consists in assessing a situation in terms of preconceived fixed notions while ignoring or rejecting any contrary signs. It is acting according to wish while not allowing oneself to be deflected by the facts.” Tuchman explained that such kind of policies represent a fourth kind of misgovernment, together with tyranny/oppression, excessive ambition, and incompetence. “To qualify as folly the policy must meet three criteria: it must be perceived as counterproductive in its own time, ... a feasible alternative course of action must have been

governments): once it got going for understandable reasons, it proved difficult to stop when countervailing facts took center stage.

Agro-fuel subsidies, together with tax-rebates and import protection, impact on all three major world scarcities: food, energy and the environment. On all three there has been market failure. Current agro-fuel policies do not help correct such failures, they aggravate them. They actually ignore fundamental political realities, economic and social aspects, power and income differentials among and within countries, let alone human rights. They are an ethical failure, and should be discussed by ethics committees.

EU leaders called for the 10% biofuel target in petrol last year. Several Commissioners expressed doubts about the best biofuel strategy. The European Commission was between a rock and a hard place as it unveiled its new climate change strategy on 23 January, 2008 in a context that had meanwhile changed.

The time has come for the Commission to go back to the agro-fuel drawing board. The first step is to consider whether subsidizing agro-fuel production helps or hinders efforts to balance food demand and supply, save energy and water, and preserve the environment, all at the same time, or at least whether the net effect of agro-fuel production is positive compared to other options.

The second step regards sustainability. The Commission has been bravely defending its approach to biofuels highlighting the sustainability requirement of the biofuel target. This excludes counting towards the target all biofuel crops on virgin forest or unused land, or involving ecosystem loss, deforestation, population displacement, food price increases or higher CO<sub>2</sub> output, and providing less than 35% overall greenhouse gas (GHG) savings. This is not quite enough. A coalition of development and environment NGOs has asked biofuel targets to be scrapped unless sustainability criteria are toughened. I suspect this is wishful thinking. Even if these criteria are made tougher, how are they going to be implemented? I am not aware of any agreed calculation method for sustainability criteria and emission saving targets regarding agro-fuels. Who would check the calculations? Is any currently produced agro-fuel (apart from Brazilian ethanol) capable of meeting the 35% emission saving criterion taking into account all direct as well as indirect CO<sub>2</sub> input and output data and knock-on effects? Besides, I hope it has become clear by now that, while it is right to impose sustainability requirements for biofuel target calculations as a matter of principle, socio-economic, political and ethical concerns raised by agro-fuel subsidies should have been factored in instead of being ignored.

In the light of the most recent estimates regarding the net emission foot-print of agro-fuels, and positions taken since then science, academia, and virtually all relevant organizations, I hope that the Commission will, not only be prepared to update its biofuel strategy with particular regard to agro-fuels on the basis of science, but also to further “consider ethical and political issues related to bio-fuel subsidies such as food security, food-fuel competition, and the geopolitical consequences such as potential adverse impacts on the developing world”.<sup>8</sup> If the Commission does not do it, the European Parliament must.

Unless government support for agro-fuels is abolished soon, tax payers and public opinion will turn against them, agro-fuel refineries will risk further expanding capacity beyond demand, and other emission saving alternatives may suffer neglect as vested interests combat any threat of substitute biofuel products in order to protect their profits (or limit losses).

This brings me to provide my answer to the title of this work-shop “The opportunity cost(s) of biofuels”. Governments incur a high opportunity cost when they shift their policy focus from energy conservation to subsidizing agro-fuels, foregoing production of a basic human need such as food with only limited, and possibly no impact on reduced oil imports. Agro-fuel subsidies are a waste of tax-payers’ money. Investors in agro-fuel production will make substantial amounts of money at taxpayers’ expense as long as government support is significant. If and when such support is withdrawn, they will realize the opportunity

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available, ...the policy in question should be that of a group, not an individual ruler and should persist beyond any one political time.”

<sup>8</sup> Quoting a letter to the Financial Times “Europe should not leap too hastily into biofuels” by E. Iozia and D. Osborn, Members of the European Social and Economic Committee, 17/01/08.

cost they have incurred by not making alternative investments with better market prospects. Domestic politics will therefore determine whether they were right to bet on agro-fuels or not.

If a growing opinion perceives agro-fuel subsidies as inappropriate and counterproductive, this raises the question as to whether alternative courses of action are feasible in order to reduce energy consumption and hence dependence on foreign oil. Let me suggest just a few.

Firstly, abolish the 10% Biofuel target. Despite its close link with agriculture, the Commission inexplicably failed to mention such link, ignoring the indirect effect it could have on land use change, and the displacement effect on food production. It has been estimated that meeting the 10% target may require devoting 10m hectares to agro-fuel production.<sup>9</sup> Instead of mandatory biofuel targets, the Commission should put much more emphasis than it did on reducing emissions. This could notably be promoted through moderate temperature targets in public buildings, both in summer and winter, and recommended targets in private homes.

Secondly, abolish all biofuel subsidies as they dampen food production. By contrast, investment levels in agricultural research and production should be raised back to what they were in the 1980s in both developed and developing countries and traditional (decoupled) farm subsidies should be continued everywhere to the extent that farm production needs to meet demand at reasonable prices.

Thirdly, use the fiscal instrument to limit emissions. “Eliminate the payroll tax and replace it with carbon dioxide tax” (Al Gore). I recall that over twenty years ago the Jacques Delors’ Commission had proposed to reduce taxes on labour compensating the fiscal shortfall via a CO2 tax (rejected by the UK on grounds of principle). Moreover, one should establish punitive fees for private and company energy consumption exceeding strict levels. In addition, one should impose a large surtax on gas-guzzling road transport vehicles, steeply increase motorway fees, particularly on lorries, using the proceeds to subsidize rail and combined transport, making (privatized) train prices for piggy-backing motor-vehicles so cheap as to become irresistible.

Fourthly, offer full investment tax credits for renewable energies like solar energy (whose prices are plummeting), wind energy (above all off-shore), other bio-energies in the form of landfill and sewage treatment gas, biogas from organic wastes, sewage sludge and demolition food, renewable-energy-based hydrogen fuel cells, low carbon technologies such as batteries, carbon capture and storage, and upgrade electricity distribution systems to a “smart grid”, or *electranet*, that would allow people to generate their own electricity from renewable sources and sell it back to the power grid.<sup>10</sup>

Fifthly, after recent major market failures, distrust both the *miracle of the market* tenet that supply will always meet demand (ignoring price effects), and the *miracle of science* tenet that holds that we can have it all: food, energy and fuel without negatives regarding water, clean air, sustainability, biodiversity or what have you. Instead, put political leadership back into the saddle for a convincing energy policy.

None of these suggestions is easy to implement. As long as government support for agro-fuel subsidies and strategies helps politicians (with the best intentions) to acquire green credentials, and provides them with the illusion of an easy technological fix, it will divert their attention from getting on with more important, less popular measures for saving the planet, such as those I just described, starting with energy conservation.

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<sup>9</sup> Meeting the more ambitious US bioethanol target may require shifting 40m hectares of land to biofuels.

These remarks are taken from Bos Eickhout’s presentation at an EPC seminar early this May

<sup>10</sup> From « International star (Al Gore) plays coy on domestic plans », Financial Times, 13 November 2007.

Al Gore was reported joining Silicon Valley in setting up the fund management company Generation Investment Management in order to tap the public markets, where “more money is allocated in an hour than by all governments in the world in that space, and promote clean technologies”.