

Andrzej MATCZYŃSKI
Gdańsk University of Technology, Poland

INTRODUCTION OF THE BIO-FUEL ACT FROM THE POINT OF VIEW OF SUSTAINABILITY

Agriculture plays a major role in the Polish economy. Its state has become worse in recent years. Lots of land remains unused, individual farmers have problems selling crops. Now, a huge concern of the government is how to improve this situation. But there is an idea to fight this problem, to create a new market for crops, to start cultivating less fertile soil. This solution is the bio-fuel industry. What will happen if we introduce the government's program, in the way it has been proposed? There is no correct answer, but I will try to take a closer look at the possible opportunities of and threats from the "Bio-fuel Act" from the point of view of sustainability.

The term sustainability in general represents a way of running and developing your own type of enterprise, taking into consideration other areas that it might affect. Reducing the negative impacts and stimulating positive effects of your action on other fields is a good example of sustainability. In the case of Polish agriculture, there is a clear development plan with good perspectives for industrial farms. However, there are surrounding fields that are directly or indirectly related to bio-fuels and influenced by the act. These areas are society, the economy, automotive industry, petrol industry and environment.

First of all, bio-fuels are additives of plant origin produced during chemical reactions and added to liquid fuel. Bio-fuels can be divided into two groups: bio-diesel (methyl esters or ethers of fatty acids) for diesel engines, and bio-ethanol (dehydrated ethanol) for petrol engines. Diesel additives may be created from the reaction of rapeseed or sunflower oil with methanol in the presence of a catalyst. This creates production waste that is good material for other industries or farming purposes.

These uses include mainly chemicals (glycerine) used in the chemical, cosmetic and pharmaceutical industries, and rapeseed products used as fodder for cattle and poultry. Ethanol is produced by distillation (96%). Afterwards, it must be additionally treated to remove water. The last process is rather expensive compared to primary distillation. When the additives are ready, they are mixed together to reach the desired concentration. According to the Polish act, petrol should contain at least 4.5% of ethanol from July 2003, and petrol and oil should contain 5% of bio-additives from 2006. This is a high level compared to other EU countries. Up to now, our refineries have produced gasoline containing from 1.5 to 2.5% of ethanol (this aids smooth running). In comparison, the minimum limits in other European countries do not exceed 2% (D 1.3%; F 0.8%; I 0.9%). We have to keep in mind that there have been no official tests in Poland on the use of bio-fuels. The results of such experiments and possible effects on the environment that have been published seem to be contradictory. Therefore, I would not take them into consideration until there is one official research project carried out by a reliable institute and its report is published by independent media.

The authors of the act promote it by claiming large economical benefits. According to the act, it is estimated that around 70,000 or more people will be employed in the production of bio-fuels. New employment will be created in agriculture, distilleries and oil extraction factories. Unemployed people hired there will no longer receive unemployment benefit. This will reduce budget expenses. Taxes from their income will stimulate the economy. Production of bio-fuels will also influence our international relations as Polish refineries will decrease the amount of gasoline they import. It is estimated that 150mln USD will be saved. Also, the problem of large unused state farms could be solved. At least 0.5 mln ha of fallow land will be cultivated again.

On the other hand, there are a couple of uncertain points. For example, the monitoring and control of standards may pose a problem. The act says that ethanol should constitute at least 4.5% of the total mass, so theoretically in one tank there may be 9% and in another no bio-additives. Constant variation in fuel components may lead to the reduced durability of motors. Since there are high fines for those who do not fulfil the required percentage, suppliers may add more bio-additives than they should. This may exceed the preferred limits of car manufacturers.

My biggest concern is the honesty of gas station owners. It is known that water dissolves more easily in alcohol than in petrol. To get more revenue they may dilute gasoline with water and therefore sell more "petrol". Of course, this leads to deterioration in the quality of gasoline and possible engine damage.

Another social aspect is who will produce, how much will be produced and at what price. The control of this will be carried out by giving licences and permits to producers. They are supposed to be given by the government, which may lead to bribery. Only a small group of manufacturers and suppliers will benefit from such a planned economy. Small family businesses will not stand the competition of industrial farming. Costs of investments in the bio-fuel industry are rather high, so in such competition only companies with large capital have any chance of entering the market.

Another social aspect is the price of pure uncontaminated ethanol. It will be around 0.5 USD per litre. This is 2.5 litres of 40% alcohol, which in a store would cost nearly 15 USD. This will create a black market. The availability of cheaper alcohol will increase the problem of pathologies in society.

Another aspect is freedom of choice. According to the new act, all fuel must contain the desired concentration of bio-additives. So there will be no gasoline or diesel for owners of older cars. 40% of cars in Poland are more than 10 years old and it is expected that these vehicles will not tolerate bio-fuel. So, in general, the act does not take into account consumer preferences and leaves no choice for the customer. It does not follow the rules of the free market.

Another question is whether Polish farms will supply such an amount of potatoes, rapeseed or wheat at such short notice. The deadline for the implementation of the act is short and we do not know if the amount of crops from local fields will be enough to satisfy the both the food and petrol industry. Another step in production is chemical processing. Distilleries and extraction factories are not yet ready to produce enough bio-additives. Obtaining bank credit to finance and reactivate closed factories is required. The quantity of fuel consumed in Poland is so large, that there will not be enough bio-additives to fulfil the requirements of the act. This will result either in fines or fuel shortages. The petrol industry will not be able to provide enough bio-additives. Petrol companies will have to import these ingredients from other countries. Imported crops and additives may be cheaper than Polish products and pose a great threat to Polish farmers and the bio-fuel industry. To prevent this, the use of only Polish products has been proposed. This, however is not in accordance with European Union directives. Also, the exemption of Polish producers from duty violates the law of free flow of goods in the EU.

Finally, there is a huge threat to our economy. Introduction of the act will result in increased fuel prices. To reduce them the duty on fuel must be decreased. This will reduce budget income and the resulting shortage

of budget income needs to be replaced with a new tax. If fuel prices rise, then the whole transport sector will suffer. In such a case, prices of food and other goods will also increase. Once again, society will suffer from the disadvantages of the hasty introduction of the bio-fuel act.

It is also worth mentioning the cost to refineries importing fuel and to suppliers in adapting to new production methods.

The impact on cars, and thus on car owners, is not known yet. Vehicle manufacturers have not run enough tests to decide whether it is safe to use bio-fuel with such a high ethanol content. Some experts predict possible malfunctions of motors. Manufacturers such as Ford, Opel, Fiat, warn that some bio-fuels may not fulfil warranty requirements and refuse liability for engine damage when car owners use these fuels. Different companies warn about the following possible side effects in the engine and exhaust duct.

- Corrosion of seals and rubber pipes in diesel engines (Bosch, Opel),
- Sediments on injector elements, blockage of injection pumps (CLN, Opel),
- Corrosion of alloyed elements (Delphi, Bosch),
- Reduced durability and service life (CLN).

Apart from component failure, problems related to the running of a motor are important. Above all, starting a cold engine may be a problem. At higher temperatures combustion is less harmful to the environment. Dissolving water in ethanol may lead to a separation of phases.

This may also contribute to problems in the functioning of the motor. Also, major concern for car owners is increased fuel consumption (10% according to Opel). This also increases expenditure on car maintenance. Reduction of engine power is a secondary concern. Engine tuning must be carried out to combat loss of horsepower. This is, of course, connected with monetary investment.

According to Renault, exhaust gases do not fulfil the Euro2 emission norm. Also, Opel warns about some toxic substances that might be present in combustion gases. It is hard to estimate the impact on the environment, since companies that are in favour of the act (extraction equipment suppliers, distilleries, farmers, NGOs) present statistics showing the positive aspects and those who may lose from the implementation of the act (refineries, car manufacturers, car owners) present negative results. It is hard to determine which point of view is closer to the truth, since no one has provided sufficient data for independent analysis. As an example, those who are against bio-fuels say that rape fields are monocultures and thus bad for other species and soil. The opposition says that it is necessary to fight the wheat monocultures (70% of crops). I also found two articles on cultivating rape. According to one, it requires

excellent soil. According to the other, you can grow it on poor quality ground. This leaves the question of under what conditions rape is cultivated, which is seldom mentioned.

In conclusion, the use of bio-fuels seems to be a good solution for Polish agriculture. Its introduction is also a solution to the depletion of fossil fuel resources. However, industry and society must be ready for such a huge leap involved in the introduction of bio-fuels. Oil refineries and gas stations must introduce new technology required for the mixing and storage of new fuels. Car engines and many fuel-powered machines must be tested and retuned to the use of bio-fuels. Step-by-step implementation of bio-additives would probably provide enough time to adjust to the new fuels. Also, there should be traditional fuel available at gas stations for those not convinced about using bio-components. Research and distribution of results is an important point of promoting this technology. A good example is given by a bus company in Kielce, which got a 400,000 PLN grant for testing bio-fuels on 10 buses. As long as we do not know all the environmental aspects of the use of bio-components, we should not dive into deep water. We should not set the Polish lower limit for the content of additives at the EU's upper limit. We should not force the use of such fuel at all costs. Only large companies and large land owners will benefit from the act in its present form.

Literature

paliwa.pl/onas/opinie5_1.html
www.biodiesel.pl/en/mainindex.html?porownanie.html
www.biooleje.com.pl
www.ekoenergia.pl/praca/marzec/biopaliwa.htm
www.gazeta.pl
www.journeytoforever.org/biofuel_library/ethanol_motherearth/me2.html#table
www.minrol.gov.pl/bprasowe/kom281102pal.htm
www.pawcar.pl/ustawa.html
www.polityka.pl
www.wprost.pl

Other sources

Auto Świat, 51/52, 2002.
Gazeta Wyborcza, 5 December 2002.
Gazeta Wyborcza, 14–15 December 2002.
Gazeta Wyborcza, 3 January 2003.
Gazeta Wyborcza, 4–5 January 2003.
Gazeta Wyborcza, 14 January 2003.
Gazeta Wyborcza, 17 January 2003.
Polityka, 25 January 2003.
Wprost, 19 January 2003.