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UNBRIDGEABLE GAP BETWEEN TRANSPORT POLICY AND PRACTICE IN HUNGARY

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Abstract. Due to the increasing energy demand and mobility of the human population and in order to pursue sustainable development and decrease fossil fuel dependency there is a major need to use alternative energy sources. Nowadays the 20-20-20 policy is under revision. It has become clear that the transport sector on the EU level will not be able to meet the goal of 20% usage of renewable energy sources by 2020. Our paper investigates the possibilities of Hungary for reaching 10% of renewable energy sources in transport sector. Our research indicates that blending bioethanol and biodiesel with conventional fuels is not sufficient not provide an effective and alternative way to fulfill 10% part of transport-related energy demand. Further efforts are needed that can only be done by deep analysis of the current situation and active participation in policymaking as an additional tool of reaching the target: changing our social behaviour. Furthermore, our investigation shows that this general problem can occur not only in Hungary but in those European countries that targeted the 10% renewable energy share in their transport sector.

Keywords: fuels, energy policy, energy demand, carbon dioxide, environmental regulation.

1. Introduction

In the last few thousand years, our natural environment has provided a stable base of living and seemingly infinite supply of biosphere resources to mankind. In the early ages, humanity made changes to the environment with limited technology, but the rate was infinitesimal compared to the size of the natural environment, global changes were not detected. In the last two or three hundred years, there has been an explosion in the development of industrial and technical sector that supplied people with a multiplied set of tools to encroach nature. Motorization has been developed so dynamically that air, soil, and water pollution is now a direct threat to natural ecosystems and biodiversity. (Al-Mofleh *et al.* 2010; Baltrėnas *et al.* 2010; Chernyak *et al.* 2010; Jović, Đorić 2010; Kovács, Török 2010; Labeckas, Slavinskas 2010; Lebedevas *et al.* 2010; Török, Stubán 2010; Burinskienė 2009; Jovanović *et al.* 2009; Juostas, Janulevičius 2009; Kuprys *et al.* 2009; Mačiulis *et al.* 2009; Török 2009; Bazaras *et al.* 2008; Boychenko *et al.* 2008; Kinderytė-Poškienė, Sokolovskij 2008; Lingaitis, Pukalskas 2008a, 2008b; Szwaja, 2009, Tánczos, Mészáros 2008; Kugelevičius *et al.* 2007; Lashkova *et al.* 2007; Mockus *et al.* 2006). Sustainable development means "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Our common future 1987) Transportation cannot be replaced entirely because it is a part of the production chain. Societies are horizontally and vertically differential. The manpower, stock and semi finished and finished products must be transported. It has also become clear that since technological solutions have proven insufficient to handle the negative impacts of transportation (this includes external effects, such as pollution or congestion), demand management is also one of the cornerstones of reviewing transport policy measures in Hungary and the EU. These measures also include the development of public transport that is affordable, sustainable and meets the needs of the local population in order to be competitive with individual (passenger car) transport.

2. Necessity of a new transport policy

Nowadays climate change is subject to scientific debate and the magnitude of the human factor is not yet completely understood (e.g. air transport). To investigate the necessity of new transport policy, a model has been developed based on game theory and analysed by employing the tools of mathematical statistics. The model applied for this research and the statistical tests revealed a new way of thinking about the relationships between transport (as a productive and yet environmentally harmful activity of mankind) and climate change. The authors have designed a model with two different and independent players – humanity and nature. The first and basic task was to assign costs to climate effects to have the basic cost matrix of the game between nature and humanity (Stern 2006). The research investigated the key impacts of climate change, the two players being Nature and Humanity, their history driving the relationship. A model of the two players with two strategies and four outcomes have been elaborated.

Impacts on climate:

1. Humanity inflicts negative impacts on climate
2. Humanity does not inflict negative impacts on climate

Sensitivity:

1. Climate is sensitive to human impacts
2. Climate is not sensitive to human impacts

The outcomes have been investigated by the players' possible reactions, like moderate or serious disasters, possible energy saving or costs of the greening. With tools of mathematical statistics numeric answers have been made: four different game theory criterions namely *Laplace, Wald, Savage, Bayes* (due to the lack of space authors would not describe these well-known statistical tools) have been investigated: **No matter whether there is climate change or not humanity needs to change its behaviour and way of thinking to avoid greater losses.**

Major changes have taken place in the transport and energy sector in the last years. There is a mathematical connection between transport performance as an output and energy consumption and consumption-related environmental emissions. Transport emissions can be seen as the product of three broad components: transport activity levels, energy intensity of transport and carbon intensity of the energy used (1):

$$E_{CO_2} = Output + \frac{Energy}{Output} \cdot \frac{Emission}{Energy}, \qquad (1)$$

where

E_{CO_2} : Sectoral CO_2 emissions of transport [kt]

Output: Performance indicator of transport [passengerkm], [tkm]

Energy: Energy consumption of the transport sector [ktoe]

Emission: Emissions of transport sector [kt]

From (1) Output describe the level of activity that can be influenced by the tools of

- Demand Management.
- Accessibility.
- Land Use Planning.

Energy and output ratio (1) describes the energy intensity that can be increased by

- Utilizing the advantages of each transport mode.
- Network optimization.
- Efficient vehicles.

Emission and energy ratio (1) shows the Green House Gas intensity, which can be influenced by the shift to cleaner fuels (*Markovits-Somogyi, Bokor 2011*). In the last couple of decades efficiency has increased, but so has demand and therefore pollution resulting from ever-increasing traffic flows.

Oil prices have increased dramatically; the age of cheap energy is a thing of the past. These factors necessitate a new transport policy, not only to meet the 10% goal for renewable energy shares in transport by 2020, but also to provide a solid basis for long-term transport planning and demand management. While it is certain that a lot of fundamental changes will take place in the next programming period (2014-2020), there are a few factors that will likely remain unchanged:

1. Oil prices will continue to increase
2. Risks associated with oil production and use will stagnate or escalate
3. Transport demand will increase
4. Environmental regulations will become more stringent
5. Hungary will have to develop and implement its transport policy together with the rest of the EU

Therefore, the new policy will have to be quick to adapt to changing conditions, but also take constant factors, like those above, as well as national preferences into account, be flexible, and have a European perspective.

The strategic aim of the new transport policy is to optimize supply security, economic efficiency, competitiveness, environmental protection and social responsibility. To achieve these goals, the following tools should be used:

1. Increasing energy efficiency, thereby slowing the rise of energy needs in transport
2. Implementing an appropriate energy source structure, diversification, with special attention to the share of renewable energy sources
3. Increase supply security
4. Manage increasing demand
5. Improve modal split

Increasing the share of renewable fuels in transport is a priority that affects all the other factors. Changing driver behaviour is another broad-spectrum measure that covers most of the points above. As a result, congestion charging is becoming increasingly common in Europe and worldwide as a tool in the service of sustainable transport (Richardson, Bae 2008).

In this article, the authors will first review the available tools of transport policy (financial incentives and tools of environmental economics) in order to analyse the influence of these tools on environmental quality, and will then investigate possible scenarios for reaching the 10% goal in Hungary.

3. The role and significance of environmental regulation

The main goal of environmental regulations is to enhance environmental quality on a long-term basis, and to comply with different related norms, measures etc. Environmental policy producing environmental quality with the lowest costs is the most effective way to decrease the negative environmental effects, externalities related to different activities just as transport.

The basic concept of environmental regulations should take at least three different aspects into account. Firstly, there is an urgent need to keep the use of natural capital in balance according to the principles of sustainable development. Secondly, environmental regulation emphasises the significance of cost effective methods, policy tools, measures etc. The transport strategy of any given country should be based upon a sound cost-benefit analysis that includes transport and environmental considerations (World Bank 1996). Thirdly, only those environmental regulation measures or policy tools are preferred which can consider both of the above-mentioned criteria and can respect the views of socio-economic ethics.

A complex requirement system was developed related to environmental regulation. No perfect solution can be found in practice. The recent environmental regulation mechanism can meet the requirements only partially. There are diverse policy tool portfolios working simultaneously in different countries and it is similar in the case of transport systems all over the world.

In the frame of this complex environmental regulation requirement system it is important to make efforts towards improving the current level of environmental quality or at least maintain the current state. To achieve this aim, there is a need to define the permissible level of environmental pollution (norm). Sanctions are necessary in case the norms are not observed. Thus sanctions need to be developed but preferably in the way they can also foster the innovation of economic actors. The ambition level of environmental quality has to be achieved with the lowest social costs. The environmental regulation should also take into account the other economic regulation systems and mechanisms. These regulations, both in case of norms and sanctions, have to be acceptable to decision makers as well. Flexibility is another requirement, which is important for the system just to be able to answer global, regional and local challenges. The transparency of environmental regulations can help the effectiveness of practical implementation. An optimal environmental regulation should focus on the financial allocation methods as well on developing a financial background for diverse environmental tasks and to direct the economic actors.

Resources or processes or stocks and flows also can be in the focus of an environmental regulation policy system. The main aims of environmental regulation can foster the improvement of emission or immission measures.

According to the above mentioned complex requirement system it is worth mentioning that there are three main types of environmental regulations, which can complement and support each other e.g. generating positive externalities or synergic effects (Table 1).

Table 1. Strategies of environmental regulation

Main strategies in environmental regulation		
Based on direct intervention	Based on incentives	Based on supplying information
– Trade restrictions – Environmental quality norms – Permits – Prohibition	– Demand-side management – Responsibility reforms – Cutting subventions – Tradable permits	– Awards, grants, prizes – Raising awareness, environmental education – Life Cycle Assessment – Environmental Report – Environmental auditing, Environmental Management Systems – Labeling – Voluntary agreements

(*Source: own compilation based on Kerekes, 2007*)

Firstly, the group of direct tools, norms etc., secondly, the indirect tools e.g. incentives, supports etc. and the third group is related to information supply e.g. audit schemes, labelling, LCA etc. Furthermore, it is worth considering that traffic control elements may have an influence on the environment through the reduction of emissions and noise (Kinderyte-Poskiene, Sokolovskij 2008).

In case of adaptation the different measure portfolios related to the Hungarian transport system this article is taking into account the relevant and complex requirements of environmental regulation systems.

4. Possible fiscal measures to promote alternative fuels and propulsion systems in Hungary

By 2020, the number of vehicles on Hungarian roads is expected to increase to 3.6 million. At the same time, our estimations show that alternative fuels and propulsion systems will become more widespread:

- European and Japanese car manufacturers (Saab, Volvo, Ford, Renault, PSA, Toyota) have started the mass production of their flexi-fuel models in the 2005-2007 period. Considering purchasing power, these models will be affordable to a wider audience after 2015 (Zöldy *et al.* 2009)
- CNG and LNG and biogas vehicle models will also be more widely available. The lack of infrastructure will be a considerable inhibiting factor, however. The Hungarian laws pertaining to natural gas should be reconsidered, redefining the real (economically producible) amount of natural gas, also considering combined heat and power production.
- Forecasts made for the European Commission suggest that electric and hybrid vehicles will only represent a small segment of the market in the next decade in Hungary. This is a result of the high average age (11.6 years) of the vehicle fleet (which makes changes less effective in the short term), although this is likely to improve drastically with time. Battery electric vehicles will cover 1–2% of the market by 2020, improving to as much as 11–30% by 2030 (Zöldy *et al.* 2009). Hybrids will reach 2% by 2020 and 5–20% by 2030 according to estimations.

The appearance of vehicles powered by bio- and natural gas can also be expected to a smaller extent. At present (2010), there are 400 flexi-fuel vehicles on the roads in Hungary with prices ranging from €20 000 to €30 000 based on the model, performance and extras.

4.1. Vehicle taxes

The vehicle registration tax is levied upon purchasing a new or imported vehicle. Its differentiation has contributed to the increased popularity of vehicles with smaller engine displacement. It is to be mentioned that evasion techniques also plague this fiscal measure, as the number of cars with foreign license plates on Hungarian roads (Slovakia is especially popular) has increased considerably. As an incentive measure, it is quite common in Western Europe to reduce the vehicle registration tax for E85 vehicles to 50–75%, a practice that could also be effectively used in Hungary.

Therefore it is proposed to decrease the vehicle registration tax by 50% in the 2011-2015 period for E85 vehicles. This measure should be reviewed according to market conditions for the 2016-2020 period decreasing the tax cut to 25% if necessary.

Based on the calculations of the authors, the 50% cut would decrease the state budget by 1.9 billion HUF (€6.8 million) per year between 2011–2015, and by 7.6 billion HUF (€27 million) per year between 2016–2020, totaling 35.7 billion HUF (€127.1 million) for the whole period (see Fig. 1). With this incentive approximately 2,9 PJ and 56 000 000 m^3 CO_2/year can be saved.

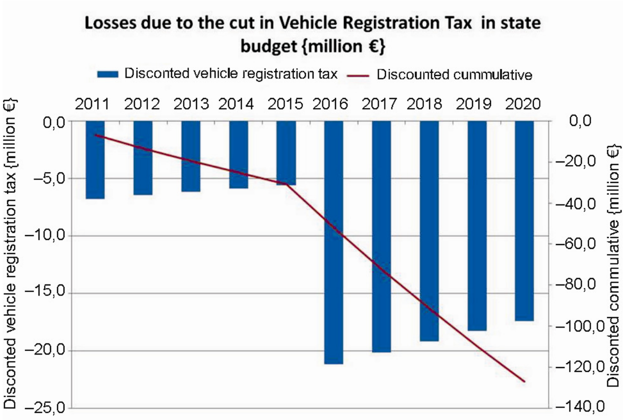

Fig. 1. Losses in state budget in Hungary due to cuts in vehicle registration tax {million €} (*source: own calculation*)

Calculation was based on the dataset of National Tax and Customs Administration (NAV) of Hungary and the forecast of market penetration of new vehicles done by Zoldy (Zoldy *et al.* 2009). The cumulative losses had been discounted to 2011.

4.2. Annual vehicle tax

The economic incentive of cutting the vehicle registration tax can be further reinforced by cutting the annual vehicle tax by 50%. Company car tax may also be reduced, but it is less reasonable and therefore should only be intended as a temporary measure. It is to be noted that tax cuts are only really effective if there is a credible, long-term program pertaining to the extent of the cuts for vehicle operators, while cutting the vehicle registration tax can be realized instantly.

The absolute value of the tax cuts for all three tax types (vehicle registration tax, annual vehicle tax, company car tax) is to be maximized so as to avoid subsidizing and providing incentives for the procurement of vehicles with large engine displacement. The annual vehicle tax for buses and trucks, as well as the vehicle registration tax is currently equipped with a system of tax cuts based on environmental class (local pollution). This method, however, is no incentive to use alternative fuels and propulsion systems. Therefore, a differentiation of taxes in this respect would be necessary. The changes proposed for the annual vehicle tax result in much smaller losses than in the case of the vehicle registration tax, but they affect municipalities that are worse off: a 50% annual vehicle tax cut for E85 vehicles would cost 0.13 billion HUF (€460 000) each year between 2011-2015, and 0.8 billion HUF (€2.8 million) between 2016-2020, totalling 3.4 billion HUF (€12.1 million). With this incentive approximately 0.2 PJ and 5 000 000 m^3 CO_2/year can be saved (Fig. 2).

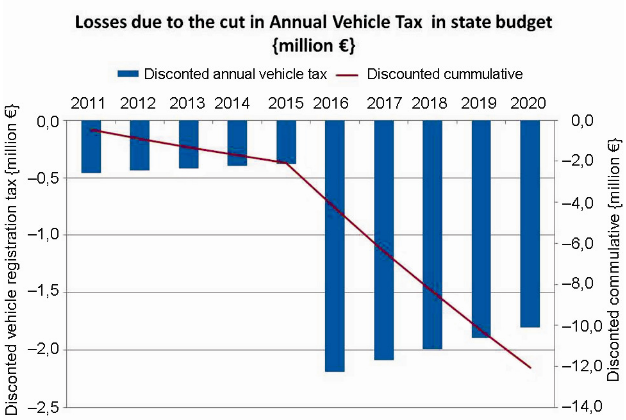

Fig. 2. Losses in state budget in Hungary due to cuts in annual vehicle tax {million €}(*source: own calculation*)

The above calculation was based on the dataset of National Tax and Customs Administration (NAV) of Hungary and the forecast of market penetration of new vehicles done by Zoldy (Zoldy *et al.* 2009). The cumulative losses had been discounted to 2011.

As a result of these tax cuts, an additional 190 000 flexible fuel vehicles would be in operation, substituting as much as 3.26 PJ worth of fossil fuels with renewable energy by 2020, making for considerable benefits in emissions as of 62 000 000 m^3 CO_2/year. From these three taxes, cutting the vehicle registration tax is the most efficient incentive towards the procurement of flexible fuel vehicles. The other two tax cuts are necessary if and as long as they contribute to reaching the goal (190 000 flexible fuel vehicles) and provide sufficient incentive. The body responsible for these measures is the Ministry to which transport governance issues are allocated. These calculations on the negative impacts concerning the state budget are estimations of the authors. The main benefit of the measures described above would be reaching the 10% goal in the Hungarian transport sector as it was declared on the EU level.

5. Conclusions

To investigate the necessity of a new transport policy in Hungary, a model has been developed based on game theory and was analysed by the tools of mathematical statistics. The created model which was applied for this research and the statistical tests revealed the necessity of new transport policy, not only to meet the 10% goal for renewable energy shares in transport by 2020 on the EU level, but also to provide a solid basis for long-term transport planning and demand management. The key issue is that blending 10 v/v% (volumetric) renewable liquids (bioethanol and biodiesel) to gasoline or diesel oil will not reach the 10% (energetic) renewable energy share. There is a gap of 3.2%, which needs to be addressed. By the current forecasts, the share of renewable energy should be 25.8 PJ (616 ktoe) in the Hungarian transport sector by 2020. Assuming that E10 and B10 fuels will be commonly available by then, there will be 8.3 PJ (197 ktoe) gap that needs to be addressed in different ways (Zöldy *et al.* 2009). In this article the authors have investigated the possibility "soft" measures and their effects to solve the problem. Later, however, it is important to study renewable fuels for the actual amount of replaced fossil fuels (Venturi 2005; Bereczky 2007).

Based on our findings, the necessary tools and steps toward a more sustainable Hungarian transport policy system and compliance with European goals can be summarized as follows:

1. Reviewing environmental regulations and tools so that they harmonize with the goals of a sustainable transport policy
2. Increasing energy efficiency, thereby slowing the rise of energy needs in transport
3. Implementing an appropriate energy source structure, diversification, with special attention to the share of renewable energy sources
4. Increasing supply security, managing increasing demand, improving modal split
5. Reviewing vehicle taxes and financial incentives in general to foster renewable technologies
6. Environmentally sound and responsible (political) decision making
7. Continued efforts towards the internalization of externalities related to transport in general

These steps will contribute to achieving a more sustainable and environmentally sound transport (policy) system, thereby addressing one of the major challenges we have to face in the 21st century.

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References

Al-Mofleh, A.; Taib, S.; Salah, W. A. 2010. Malaysian energy demand and emissions from the transportation sector, *Transport* 25(4): 448–453. http://dx.doi.org/10.3846/transport.2010.55

Baltrėnas, P.; Vaitiekūnas, P.; Vasarevičius, S.; Jordaneh, S. 2008. Modelling of motor transport exhaust gas influence on the *atmosphere, Journal of Environmental Engineering and Landscape Management* 16(2): 5–75. http://dx.doi.org/10.3846/1648-6897.2008.16.65-75

Bazaras, J.; Jablonskytė, J.; Jotautienė, E. 2008. Interdependence of noise and traffic flow, *Transport* 23(1): 67–72. http://dx.doi.org/10.3846/1648-4142.2008.23.67-72

Bereczky, Á. 2007. Utilisation of biofuels in internal combustion engines, in *8th International Conference on Heat Engines and Environmental Protection*. Budapest, 43–47.

Boychenko, S.; Shkilnuk, I.; Turchak V. 2008. The problems of biopollution with jet fuels and the way of achieving solution, *Transport* 23(3): 253–257. http://dx.doi.org/10.3846/1648-4142.2008.23.253-257

Brundtland Committee 1987. Our Common Future, Oxford: Oxford University Press.

Burinskienė, M. 2009. New methodology for sustainable development towards sustainable transportation system, *Technological and Economic Development of Economy* 15(1): 5–9. http://dx.doi.org/10.3846/1392-8619.2009.15.5-9

Chernyak, L.; Boychenko, S.; Fedorovich, L.; Novikova, V.; Prentkovskienė, R.; Pukalskas S. 2010. Dependence of evaporation losses on petrol quality, *Transport* 25(4): 442–447. http://dx.doi.org/10.3846/transport.2010.54

Jovanović, V. D.; Tica, S.; Milovanović, B.; Živanović, P. 2009. Researching and analyzing the features of oil and demand for transporting oil derivates in the area of Belgrade, *Transport* 24(3): 249–256. http://dx.doi.org/10.3846/1648-4142.2009.24.249-256

Jović, J.; Đorić ,V. 2010. Traffic and environmental street network modelling: Belgrade case study, *Transport* 25(2): 155–162. http://dx.doi.org/10.3846/transport.2010.19

Juostas, A.; Janulevičius, A. 2009. Evaluating working quality of tractors by their harmful impact on the environment, *Journal of Environmental Engineering and Landscape Management* 17(2): 106–113. http://dx.doi.org/10.3846/1648-6897.2009.17.106-113

Katalin, T. ; Ferenc, M. 2008. Impacts of Road Transport Pricing Reform on Supply Chains, *Acta Technica Jaurinensis* 1:(2): 223–228.

Kinderytė-Poškienė, J. Sokolovskij, E. 2008 Traffic control elements influence on accidents, mobility and the environment, *Transport* 23(1): 55–58. http://dx.doi.org/10.3846/1648-4142.2008.23.55-58

Kovács, V. B.; Török, Á. 2010. Investigation on transport related biogas utilization, *Transport* 25(1): 77–80. http://dx.doi.org/10.3846/transport.2010.10

Kugelevičius, J. A.; Kuprys, A.; Kugelevičius, J. 2007. Forecasts of petroleum demand, *Transport* 22(1): 9–13.

Kuprys, A.; Kugelevičius, J. 2009. Possibilities of using liquefied oil gas in transport, *Transport* 24(1): 48–53. http://dx.doi.org/10.3846/1648-4142.2009.24.48-53

Labeckas, G.; Slavinskas, S. 2010. The effect of ethanol, petrol and rapeseed oil blends on direct injection diesel engine performance and exhaust emissions, *Transport* 25(2): 116–128. http://dx.doi.org/10.3846/transport.2010.15

Lashkova, T.; Zabukas, V.; Baltrėnas, P.; Vaitiekūnas, P. 2007. Air pollution near a port oil terminal, *Chemical and Petroleum Engineering* 43(5–6): 358–361. http://dx.doi.org/10.1007/s10556-007-0064-2

Lebedevas, S.; Lebedeva, G.; Makarevičienė, V.; Kazanceva, I.; Kazancev, K. 2010. Analysis of the ecological parameters of the diesel engine powered with biodiesel fuel containing methyl esters from Camelina sativa oil, *Transport* 25(1): 22–28. http://dx.doi.org/10.3846/transport.2010.04

Lingaitis, L. P.; Pukalskas, S. 2008a. Ecological aspects of using biological diesel oil in railway transport, *Transport* 23(2): 138–143. http://dx.doi.org/10.3846/1648-4142.2008.23.138-143

Lingaitis, L. P.; Pukalskas, S. 2008b. The economic effect of using biological diesel oil on railway transport, *Transport* 23(4): 287–290. http://dx.doi.org/10.3846/1648-4142.2008.23.287-290

Mačiulis, A.; Vasilis Vasiliauskas, A.; Jakubauskas, G. 2009. The impact of transport on the competitiveness of national economy, *Transport* 24(2): 93–99. http://dx.doi.org/10.3846/1648-4142.2009.24.93-99

Markovits-Somogyi, R.; Bokor, Z. 2011. Efficiency in Transport Logistics, in *Logistics Yearbook*, 19–27. ISSN 1218 3849

Mockus, S.; Sapragonas, J.; Stonys, A.; Pukalskas, S. 2006. Analysis of exhaust gas composition of internal combustion engines using liquefied petroleum gas, *Journal of Environmental Engineering and Landscape Management* 14(1): 16–22.

Richardson, H. W.; Bae, Ch.-H. Ch. 2008. *Road Congestion Pricing in Europe*. Edward Elgar Publishing Limited, Cheltenham, UK.

Sándor, K. 2007. *A környezetgazdaságtan alapjai* (The basics of environmental economics – in Hungarian). Aula Kiadó, Budapest.

Stern, N. 2006. *Stern Review on The Economics of Climate Change*. Executive Summary. London: HM Treasury.

Szwaja, S. 2009. Hydrogen rich gases combustion in the IC engine, *Journal of Kones – Powertrain and Transport* 16(4): 447–455.

Török, Á. 2009. Theoretical estimation of the environmental impact of biofuel mixtures, *Transport* 24(1): 26–29. http://dx.doi.org/10.3846/1648-4142.2009.24.26-29

Török, Á.; Stubán, N. 2010. Theoretical investigation into exhaust gas energetic utilisation, *Transport* 25(4): 357–360. http://dx.doi.org/10.3846/transport.2010.44

World Bank 1996. Sustainable Transport: Priorities for Policy Reform. The World Bank, Washington, D. C.

Zöldy, M.; Török, Á.; Mészáros, F.; Imre, Z.; Miklós, S. 2009. *A hazai közúti közlekedés várható jövője* (Possible future of road transport sector in Hungary – in Hungarian). ERTRAC-Hungary Environemtal and Energy workgroup, research report, 1–34.

VENGRIJOS TRANSPORTO POLITIKOS IR PRAKTIKOS ATOTRŪKIS

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Dėl vis kylančio energijos poreikio ir gyventojų mobilumo bei siekiant įgyvendinti tvariosios plėtros principus, sumažinti priklausomybę nuo iškastinio kuro, didėja būtinumas naudoti alternatyviuosius energijos išteklius. Svarbu konkrečiau apibrėžti projekto „20–20–20“ tikslus. Akivaizdu, Europos Sąjungos lygiu transporto sektoriui nepavyks įgyvendinti, kad iki 2020 m. atsinaujinantys šaltiniai būtų naudojami 20 proc. Nagrinėjamos Vengrijos transporto sektoriaus galimybės alternatyviuosius energijos šaltinius naudoti 10 proc. Atlikus tyrimus nustatyta, kad maišyti bioetanolį ir biodyzeliną su įprastiniu kuru nėra pakankama priemonė, kad taptų efektyvia alternatyva ir transportui būtinos energijos poreikį patenkintų 10 proc. Būtinos tolesnės pastangos, dalyvaujant suinteresuotosioms šalims, išsamiai analizuoti esamą situaciją ir keisti socialinę elgseną, kad tai taptų papildoma priemone siekiant tikslo. Nustatyta, kad ši bendrojo pobūdžio problema gali kilti ne tik Vengrijoje, bet ir tose Europos šalyse, kuriose užsibrėžta atsinaujinančius šaltinius transporto srityje naudoti 10 proc.

Reikšminiai žodžiai: kuro rūšys, energetikos politika, energijos poreikis, anglies dioksidas, aplinkosauginis reguliavimas.

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