

## Global climate change: Little steps towards a new energy policy?

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It is almost impossible to find any issue today – political, economic or social – where climate change does not play a part. We hear about it on a daily basis, mostly in a negative context. However, we hear less about the origins of this phenomenon, and about the consequences, which will affect every inhabitant of the Earth. Because the change is slow and gradual, we tend not to sense the obvious signs. However, our Earth is already sending distress signals.

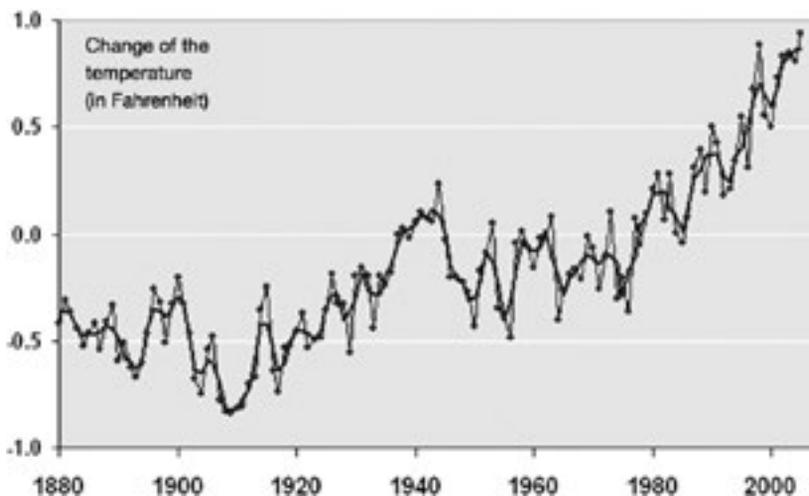
In the first part of this study, climate change and its potential effects are presented. Then the international efforts are discussed. In my opinion, the different international and global agreements are not able to stop the negative consequences of climate change. The only way to reverse the expected outcomes is to cut down on greenhouse-gas emissions, and to start a new energy policy, where renewables have a determinative role. In the second part of the study Hungary is in focus. It can be established that there are positive changes, “little steps” in the direction of using alternative energy sources. But these examples are rather isolated and individual initiatives. The study determines the push and pull factors of this issue, namely the success factors and the obstacles regarding the use of renewable energy in Hungary.

### 1. A FEW WORDS ABOUT CLIMATE CHANGE

‘Climate change’ and ‘global warming’ are often used as synonyms. In the past the phrase ‘global warming’ phrase was used for the rising of the surface temperature, but this expression does not cover all the common effects. But ‘climate change’ includes beyond the rising of the temperature; it also covers changes in the quantity and distribution of rain, in the height of the sea level, and in the meteoric current. Hence experts nowadays prefer the expression ‘climate change’, because this term describes not just the warming but also all of its consequences.<sup>[2]</sup>

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[2] Európai Bizottság: *Climate Action, Mi az az éghajlatváltozás?* Elérhető: <http://ec.europa.eu/clima>.

Figure 1: **Change of the global temperature, 1880-2005**Source: NOAA<sup>[3]</sup>

It is undisputedly proven that the average temperature of the Earth has been rising since the Industrial Revolution. But what generates this? There are two accepted answers. According to one of these, our Earth is always in a cycle regarding the temperature: sometimes in a falling and sometimes in a rising period; and presently we are going through a warming period. The other answers claims that we have undergone a lot of changes since 1880 – for example, the population has increased from 1 billion to 7 billion – which influence the climate of the planet<sup>[4]</sup>, and the phenomenon is basically a consequence of the human activity.

The different effects of the warming which concern both human and natural systems are already noticeable today. If the present tendency of the greenhouse-gas emission remained unchangeable, the temperature of the Earth could rise by 4-6 Celsius degrees by the end of this century. Even if this rise were half this projected number, that would also cause huge damage and a potential disaster. The fourth report of the IPCC<sup>[5]</sup> calculates with several dangers and disadvantages in the future, which are more serious than earlier expected.

Weather extremities and the changed water supply will manifest the most important impact. A larger extent of ultraviolet radiation and longer periods of drought are also likely to happen. Climate change can have an effect on the geographical location of different species. Intruder animals can appear and

[3] *National Oceanic and Atmospheric Administration*. Elérhető online: <http://zfacts.com/node/280>.

[4] Láng István (2006): *Klímapolitikára van szükség*. Európai Tükör. XI. évf. 3. sz. 2006. március. Elérhető: [http://www.euvonal.hu/kulogy/upload/M\\_29/rek5/427.pdf](http://www.euvonal.hu/kulogy/upload/M_29/rek5/427.pdf). Letöltés ideje: 2009.02.15.

[5] Intergovernmental Panel on Climate Change – IPCC: international body of scientists, whose aim is to give impartial and unbiased informations about the climate change, in the forms of reports. The latest report was the fifth, which came out in September 2013.

overwhelm the native wildlife, and we have to calculate with the definite disappearance of many species. The higher temperature can cause serious physiological disorders, or it can even cost human lives, especially amongst the elder generation.<sup>[6]</sup>

The above-mentioned effects of climate change can originate from two phenomena: the immense growth in the population and the cumulative hunger for energy. The Population Division of the United Nations prognosticates that the population of the world will exceed 9 billion by 2050.<sup>[7]</sup> But the problem is that the surface of the Earth cannot be increased. Demand for food, consumer and luxury goods is creating a major pressure. People always desire a higher standard of living and this has a direct effect on the careless usage of the environment.

## 2. HUNGER FOR ENERGY

The different natural resources and other goods are not equally available for the population. A reasonably small proportion leads a wasteful lifestyle, while the bigger proportion has to deal with poverty. This so called welfare gap results in growing tension, which leads to riots and emigration in many countries. The consequences are also harmful for nature. The destruction of the environment is not only specific for the developed societies. People who live in necessity and poverty also damage the nature, as they must utilize everything useable, unfortunately without any regard to its consequences. The result is often ruthless exploitation, burned forests and extinct animals and plants. Growing welfare and consumer needs and an increasing population are all leading to the exploitation of the non-renewable raw material sources, which is irresponsible from the next generation's point of view, as the utilized resources, as well as extinct animals and plants are cannot be brought back.<sup>[8]</sup>

Due to climate change a new group of emigrants can appear: the environmental migrants. Current international legal regulations do not cover the status and definition of these people. Their number is predicted to reach 150 million by 2050, which would mean 1.5% of the population. Regarding migration, host countries already have visible social tensions and racist manifestations are becoming more frequent. The above-mentioned emigration would definitely intensify this already volatile situation.<sup>[9]</sup>

[6] W. L. Hare (2009): Az éghajlat biztonságba jutásáért. In: *A világ helyzete 2009. - Úton egy felmelegedő világ felé*. Worldwatch Institute, Föld Napja Alapítvány, Budapest.

[7] United Nations (2008): *Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2008 Revision*. Elérhető: <http://esa.un.org/unpp>. Letöltés ideje: 2009.02.25.

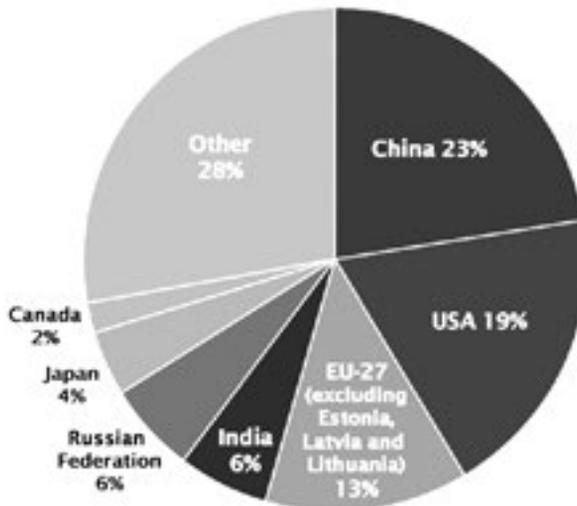
[8] Sojka, Nikolaus (1997): *Környezetvédelem és környezeti jog*. Jatepress, Szeged.

[9] Dr. Kondorosi Ferenc (2010): *Rend és szabadság: esély Európában*. Magyar Közlöny Lap- és Könyvkiadó.

An increase in the world population has already attracted the attention of science and scientists. An explosive rise in figures would already create confusion by itself, among others in the food supply, the drinking-water resources, or the growing rate of the poverty, even if it didn't go hand in hand with the damage of the environment. Changing this process would demand a very long-time commitment; in addition it also creates a great deal of moral questions regarding, for example, the rights of the women. So, restriction or limitation of the population cannot give an appropriate answer to climate change and the damage of the environment.

A growing hunger for energy can be much more an impressionable factor and it does not induce any ethical questions. Decision-makers of the world should concentrate on this issue because cutting down on the use of fossil fuels, and an increase in the application of the alternatives could give a solution only in the short run. Technologies are given in many places; however the application is still below the realizable rate.

Figure 2: **Global CO<sub>2</sub> emissions from fossil fuel combustion, 2008**  
(Million metric tons of CO<sub>2</sub>)



Source: EPA<sup>[10]</sup>

The majority of the world still uses pollutant fossil fuels with huge carbon intensity, in spite of the growing expenses and medical, environmental and even national security risk. In Figure 2 the biggest carbon dioxide emitters can be

[10] *US Environmental Protection Agency*. Elérhető: <http://www.epa.gov/climatechange/ghgemissions/global.html>. Letöltés ideje: 2009.04.10.

seen, with China in the first place and the United States in the second. Until now fossil fuels were cheap and abundant, and as a consequence their application was wasteful. But the easy available, convenient sources are becoming depleted; explorations cannot keep up with demand. The competition for non-renewable energy sources already deepens the international tensions, and this trend will probably intensify in the future.

### 3. EFFORTS ON AN INTERNATIONAL LEVEL

The global community recognized the urgent demand of cutting down carbon-dioxide emissions a long time ago, in order to avoid a disastrous scenario. Climate summits in Stockholm, Rio, Johannesburg, Kyoto or Copenhagen are all demonstrate this effort. Yet the climate change conferences up to the present have proved to be unsuccessful because they do not contain any legal sanctions. The main reason for this is the lack of political will. Out of the numerous documents, agreements and accords from 1972 regarding the slowing of climate change, only the Kyoto Protocol disposes of obligations and not just recommendations. However, even in this case, the enforcement mechanism is missing.

The environmental law has many antecedents: for example the boundary waters treaties from the second half of the 19<sup>th</sup> century, or the first protection agreements of different species.<sup>[11]</sup> After the Stockholm Conference, the international law constitutions on the environment have become very intense. Hundreds of multilateral and bilateral environmental agreements are in force nowadays. Besides this, many decisions, recommendations, guidelines, directives and action programs have been made. The environmental agreements have undergone not only quantitative but also qualitative changes. From the regional and sub-regional agreements we arrived at the global handling of the problem; to the necessity for joint collaboration. The common issue for mankind has appeared.

Still, it is to be established that the content-related conversion did not go hand in hand with the improvement of the legal quality, namely the establishment of stricter international obligations. The grand multilateral treaties are rather frameworks and for further development additional complementary protocols would be needed, in order to determine legal commitments. In many cases, relevant nation states are staying away from the agreements, which can also cause problems.<sup>[12][13]</sup>

[11] Bruhács János (1999): *Nemzetközi jog II. – Különös rész.* Dialóg Campus Kiadó, Budapest.

[12] A very good example for this is the Kyoto Protocol. In one hand, positive effect, that it determines obligations. On the other hand, it can be observed, that a relevant state, namely the United States is staying away.

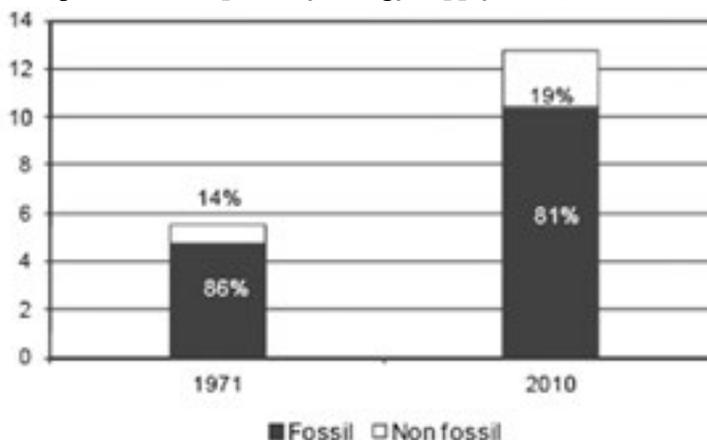
[13] Bruhács János (1999): i. m.

The creation of a global climate agreement is going to be a difficult task for the nation states, particularly if the aim is the constitution of a legal obligation. The process is moving slowly, because every country keeps its own interest in mind, while sitting at the conference table. Saving the Earth's climate and protecting the ecological systems should become the national issue of about 200 independent nation states. The creation of a successful agreement would be a diplomatic action with no historical precedent, considering the fact that the solution for the climate problem will probably require some real sacrifices. The sources, the technology and the people's ability to change are already given. The only missing element of the formula is the political will - but this is a renewable source.

#### 4. DOES THE “ENERGY-REVOLUTION” EXIST?

It is a fact that the present energy-scenario is unsustainable. The world needs more and more energy: growth in the global energy demands pro year is expected to reach 1.5% by 2030, according to the International Energy Agency. It can be seen from the following figure, that although the share of non-fossil sources in the total energy consumption rose (from 14% to 19%), this result was achieved beside the growth of the total energy consumption. As a consequence, the utilized absolute amount of fossil energy sources also grew.

Figure 3: **World primary energy supply (Gtoe), 1971-2010**



Source: IEA<sup>[14]</sup>

[14] International Energy Agency (2012): *CO2 emissions from fuel combustion - Highlights, 2012*. Edition. Elérhető: <http://www.iea.org/co2highlights/co2highlights.pdf>. Letöltés ideje: 2013.10.22.

During the past decades, the volatile changing in prices of fossil energy sources has ruined a lot of economies. The need for change in energy-production is becoming more urgent.<sup>[15]</sup> Ultimately, the population may have to reduce the emission of greenhouse gases to zero. As the biosphere is only able to absorb a limited amount of these gases, in order to avoid a man-made climate change, the world will have to cut back emissions to a negligible level. Most people find the concept of a zero-emission society impossible, but this would be essential to maintain our civilization.<sup>[16]</sup>

Positive changes can be found regarding renewable energy sources. A series of renewable technologies are being used nowadays for the production of electricity, and to satisfy cooling or heating demands. The bigger proportion of the current capacity can be found today in the developed world, although 40% of the renewable energy capacity would be available in developing countries.<sup>[17]</sup> According to a United Nations' study, the incentive factors of using alternative energy sources are not the same everywhere. Europe, Japan and the United States are turning in the direction of non-fossil fuels because of climate change, environmental issues and the energy-security, while for the developing countries the satisfaction of consumer demand and economic development are motivating factors. Rising responsibility also emerges as influential.

Figure 4: Key drivers for renewable energy

	Factors Affecting Demand for Renewable Energy					
	Climate Change <sup>1</sup>	Environmental Issues	Energy Security	Consumer Demand	Increased Reliability	Local Economic Development
Europe	●	●	●	⊖	○	⊖
Japan	⊖	●	●	⊖	○	○
United States	⊖	⊖	●	⊖	⊖ <sup>2</sup>	⊖
Developing Countries	○	○	⊖	●	⊖	●

1 Government vs. individuals  
2 Region specific

● High ⊖ Medium ○ Low

Source: UN<sup>[18]</sup>

[15] Sawin, Janet L. - Moomaw, William R. (2009): A fenntartható energiaellátás jövője. In: *A világ helyzete 2009. - Úton egy felmelegedő világ felé.* Worldwatch Institute, Föld Napja Alapítvány, Budapest.

[16] Engelman, Robert: Álljon az alku az éghajlat megmentésére. In: *A világ helyzete 2009. - Úton egy felmelegedő világ felé.* Worldwatch Institute, Föld Napja Alapítvány, Budapest.

[17] Sawin, Janet L. - Moomaw, William R. (2009): i. m.

[18] United Nations (2005): *Department of Economic and Social Affairs, Background Report, Increasing Global Renewable Energy Market Share.* Elérhető: [http://www.un.org/esa/sustdev/sdissues/energy/op/beijing\\_re\\_egm/beijing\\_re\\_report.pdf](http://www.un.org/esa/sustdev/sdissues/energy/op/beijing_re_egm/beijing_re_report.pdf). Letöltés ideje: 2009.03.17.

Opinions are often heard that the switch to renewable energy sources is costly and very expensive compared to fossil fuels. This is because there are many ways to calculate and express different energy-expenses. The question arises: may the world have a price, where climate change, pollution, and all the problems arising from these issues – starvation, lack of drinking water, natural disasters, extinction of animals, and the growing welfare gap – are vastly smaller. If we also consider these expenses, is fossil fuel still cheaper?

## 5. HUNGARY: LITTLE STEPS TOWARDS SUSTAINABLE ENERGY-PRODUCTION

Environmental investment and the growing significance of renewable energy sources are not a novelty today in Hungary. The population have become environmentally aware and the new ways of energy-production gaining more recognition and acceptance. In Hungary, a determinant proportion of the renewable energy can be produced in rural areas.<sup>[19]</sup> This is why alternative energy sources should play an important role in rural development issues and in economic innovations. The main question is, if the renewable energy sources would be able to cause economic innovation in a rural settlement, and if so, what are the push and pull factors.

To understand the need of the examination<sup>[20]</sup> better, it is important to mention a few facts about the current renewable energy situation in Hungary. The country is in a similar situation regarding energy import dependency than the European Union average; however the Hungarian rate is a little bit higher: 58% in 2010.<sup>[21]</sup> This means that it is crucial in Hungary – similarly to the Union – to increase supply-security and to diversify the energy sources.

In accordance to the European Union directive (2009/28/EC), Hungary has to increase the rate of renewable energy sources to 13% of its whole energy-consumption. The country has raised this number to 14.65% in its own national action plan. In Hungary, the rate of the produced primer energy from renewable sources was 7.4% in 2010. This number is twice as much as 10 years ago; however it is still only half of the 2020 target. It is also a fact that the most significant factor is biomass, making up almost 80% of the produced renewable energy. The use of other alternative sources is increasing slightly, but their adaptation is still slow.<sup>[22]</sup>

[19] Hungarian Central Statistical Office (2012): *A fenntartható fejlődés indikátorai Magyarországon*. (Statistical database.) Elérhető: <http://www.ksh.hu/docs/hun/xftp/idoszaki/fenntartfejl/fenntartfejl12.pdf>. Letöltés ideje: 2013.06.12.

[20] This study was issued in the frame of the Hungarian Rural Research 2012-2013, carried out by the Hungarian Academy of Sciences, Centre for Economic and Regional Studies.

[21] Hungarian Central Statistical Office (2012): *A fenntartható fejlődés indikátorai Magyarországon*. i. m.

[22] U.o.

During the study, three good domestic examples<sup>[23]</sup> were chosen, to analyse the use of renewable energy (or other forms of environmental investments) in rural areas. The main qualitative method was personal interviews with mayors of these rural settlements. The aspect of choosing the settlements was the use of environmental investments and renewable energy sources. After analysing the domestic models, one Austrian model<sup>[24]</sup> was also chosen for comparison and both the European and the Hungarian current situation regarding the use of renewable energy was analysed.

More consequences and experiences can be drawn. It can be established that the use of renewable energy sources is able to create economic innovation and prosperity in rural areas. (For example by creating workplaces, using local sources, decreasing the council's expenses, etc.) However, there are also differences between the Hungarian and the Austrian examples. In order for renewable energy to play a bigger role in the future, both the success-factors and the obstacles need to be mentioned and considered.

It is clear from all of the case studies that the innovation regarding the use of renewable energy could not be realized without an innovator, more specifically without a local innovator. In all of the examples, the mayor was the main player, who started the developments at the given settlement. It is essential for a mayor to have a conception, a theory and willingness. All of the innovators in the case studies see the environmental investments as a way out of economic stagnation.

It is also a fact that the mayor was not responsible for the expertise and the know-how. It should be emphasized that in the case of renewable energy sources, a respective knowledge base is essential with the aim of realizing the idea. This knowledge base can be another innovator-player, an organization or another good example. In one of the domestic case studies, there was no knowledge base and no helping hand behind the mayor, although the willingness was there. This was the main reason why the investments failed to take off in this settlement.

Creating an appropriate recipient space is also important for the success of the innovation. Although alternative energies have an awareness-raising effect of their own, it is essential to inform and prepare the local population about the innovation. In other words, a social innovation has to be achieved before the realization of the economic innovation. In the case of the Austrian model, a lot of attention was paid to this factor.<sup>[25]</sup> Changing the mentality of the population is a longer process, and a great deal of energy needs to be invested. It turned out from the Hungarian case studies that the mayors acting as innovators do not have enough time and capacity for this. Public information has to be continuous and systematic, but there is no opportunity to this without an office organization.

[23] Répceszemere, Sopronhorpács and Bakonyszombathely.

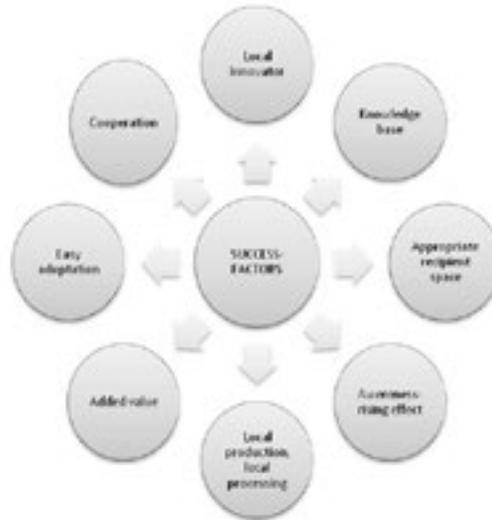
[24] Güssing (southern Burgenland).

[25] Krantz, Timothy (2010): *Güssing's quiet revolution*. Engineering & Technology. Vol. 5. Issue 12. 22-25. ISSN: 1750-9637

However, good examples were also seen in the domestic case studies. In one of the settlements the mayor installed the first solar panels in the primary school. Even if there is not always capacity to inform the whole local population, in the case of younger people it is even more crucial. This primary school won the eco-school prize in 2008, so the settlement is already over target: educating an environment- and energy friendly new generation.

One of the important factors of rural innovation is to focus on local production and local processing. Renewable energy sources can be used most effectively on a local scale. Besides this, they also mean a significant added value. A positive quality of alternative energy is that it can be easily adopted. There is no need for original innovation ideas. In all of the Hungarian case studies, the pro-venance of the innovation was mentioned. However, cooperation is also an important factor. In the case of the Austrian model, not only the settlement, but also the whole region altogether recognises the significance of the use of renewable energy sources. This is an essential edification for the Hungarian rural areas, because it is easier to adopt an innovation through cooperation.

Figure 5: **The success-factors of using renewable energy sources**



Source: author's editing

By analysing the case studies, besides the success-factors, more differences were also observed. The Austrian model settlement started from a bad economic position, but today it is a well-known innovation centre and a renewable energy

knowledge base across Europe<sup>[26]</sup>. Yet this is not the case regarding the Hungarian examined settlements, which has several reasons.

Figure 6: **Obstacle-factors for using renewable energy sources**



Source: author's editing

First of all, the know-how is missing from the rural areas. The expertise is given, but the network is not well evolved, so the knowledge does not find the needs. The only opportunity for advancement is to use the domestic or the European subvention system. But these tenders do not always consider the local facilities, for example the most effectively useable renewable energy source in the given area.

Rural settlements are not able to implement different investments without external help. There is no opportunity for a settlement to make its own decision about the use of the financial sources. Most of the tenders are created according to the European Union's development policies, and these are often different from the Hungarian rural development needs.

It is important to mention that the basis for the Austrian model settlement was given by bottom-up initiatives with the involvement of local innovators. This opposes the practise that the domestic rural areas have to adjust their own, local needs to the top-down initiatives. Even though a tender can be successful, and numerical measurable, it will be purposeless if the created develop-

[26] This settlement is the seat of the European Centre for Renewable Energy (Europäische Zentrum für erneuerbare Energie).

ment trend does not match the local demands and facilities. The fact that the tender application systems are complicated creates problems regarding the use of financial sources. Skilled application-writers have to be employed, and during the execution process a lot of administrative obligations have to be fulfilled. Subsequent financing is also not favourable.

It should be stressed that local councils and communities need to focus more on cooperation, in order to avoid parallel investments and developments. Regarding environmental innovations and especially in case of renewable energy sources, collaboration is particularly important, because joint investments can be more effective.

Last, but not least, more attention is also needed from the national authorities. The Hungarian energy production is based on the nuclear power plant in Paks, while the highest proportion of energy-import is made up of natural gas and fossil fuels.<sup>[27]</sup> Hungary has a long-term National Energy Strategy until 2030. This document notes the increase of renewable energy sources in the total energy-consumption, but it does not want to change the present trend: it is based mainly on nuclear energy and on coal. However, a clear renewable energy strategy would be needed, where different support systems and utilization plans are formulated.<sup>[28]</sup>

To summarize the case studies, it can be seen, that in order to adopt an environmental innovation, many factors have to be taken into consideration. Success-factors are able to help the realization, by determining those factors, which are easier to change and to focus on (like the election of a committed mayor, or the systematic information of the local population). On the other hand, they also indicate the positive qualities of using renewable energy (like the easy adaptation, or the local production). Changing the obstacles can only be a result of a longer process (like the national strategy or the subvention system). It needs to be stressed that both the success-factors and the obstacles need to be considered. However, further research and analysis is needed in order to widen the determining factors.

## 6. CONCLUSIONS

On the whole it can be established that one of the most effective strategies to reduce the impact of climate change would be provided by the growing use of the renewable energy sources. But there are no simple solutions to this issue. Alternative energy can have a determinative role in the task, but it will not be

[27] Hungarian Central Statistical Office (2012): Hungary, 2011. (Statistical database)

Elérhető: <http://www.ksh.hu/docs/hun/xftp/idoszaki/mo/mo2011.pdf>. Letöltés ideje: 2013.05.16.

[28] The question also arises as to how the investment in Paks 2 will influence the potential national strategies regarding the renewables.

enough itself. More emphasis should also be placed on the present on-going international climate summits, because a consensus has to be achieved in order to collectively overcome the huge challenge faced by the global population. The global community is forced to make a choice between cheap, harmful fossil fuels and the higher cost clean energy, which could be readily available; only the infrastructure needs to be established.

If we switch to a carbon-free system, we will be able to help prolong life on Earth for another few million years. How we act depends on us. We can continue our „free lunch” from fossil fuels until they run out. Or, we can start the change-over now.

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## HUNGARIAN SUMMARY

A globális klímaváltozás kétségkívül mai világunk egyik kiemelkedő jelentőséggel bíró problémája. Jelen tanulmány első részében a klímaváltozás jelensége és a várható hatások kerülnek bemutatásra. Bár a globális közösség felismerte, hogy a változások elkerülése vagy azok csökkentése érdekében erőfeszítésekre van szükség, véleményem szerint a különféle nemzetközi egyezmények nem alkalmasak a klímaváltozás negatív hatásainak megállítására, főként azért nem, mert a szankció hiánya jellemzi azokat. Lehetőséget az jelenthet, ha a politikai döntéshozók az üvegházhatású gázok kibocsátásának csökkentésére koncentrálnak, és új energia-politikát kezdenek, ahol a megújuló energiaforrások meghatározó szerephez jutnak.

A tanulmány második felében Magyarország kerül a középpontba. Különböző magyarországi és egy európai gyakorlat kerül összehasonlításra annak érdekében, hogy a megújuló energiák alkalmazását érintő lehetőségeket és nehézségeket, akadályokat megismerjük. Megállapítható, hogy vannak pozitív változások, „kis lépések” az alternatív energiaforrások irányába. Ugyanakkor ezek a példák inkább elszigetelt és egyéni kezdeményezések. Holott a megújuló energiák alkalmasak arra, hogy egy adott településen gazdasági innovációt gerjesszenek. Ráadásul ez a típusú energia legnagyobb részben a vidéki térségekben állítható elő. Ezért is lenne fontos, hogy a jövőben a vidékfejlesztési politikában is nagyobb hangsúlyt kapjon a kérdés.



*Virgin Mary in the centre of Széchenyi square*