

The basis for the transformation to a sustainable society when using renewable energy resources with least possible investments is primarily a transformation of the whole society to a new value system. One of the most outstanding specialists of the The Centre for Research on Economics of Renewable Energy Sources and Distribution Systems (Centrum pre výskum ekonomiky obnoviteľných zdrojov energie a distribučných sústav) is its founding member Dušan LUKÁŠIK who was interviewed by an editor of Parlamentný kuriér, Anna Komová.

Determining factor is new value system



In 2008 you founded the Centre for Research on Economics of Renewable Energy Sources and Distribution Systems together with TU (Technical University) Košice, STU (Slovak Technical University) Bratislava and EU (Economic University) Bratislava. What is the subject of your research?

We focus mainly on the practical application of cutting-edge technologies intended for energy market and buildings that adopted the term of near zero energy building. The team consists of prominent experts from the energy sector industry such as Ing. Ľudovít Tkáčik and Ing. Ján Ferenci together with the researchers from the academic environment Ing. František Vranay PhD and Ing. Marek Kušnir PhD. We collectively form the core of the research team designated to the acquisition of knowledge enabling the proposition of an economically effective solution for the transformation of the energy market. We use the experiments with an office building with the area of 4,300 m² which is gradually being transformed into a near zero energy building, while still being used as offices, as a practical model for our research. It enables us to set the actual parameters for the model of the energy market transformation.

The energy market is again getting into the attention of the professional and general public and eventually also politicians, too. Why is the energy market so important for the society?

The development of a modern society is from approximately the beginning of the 19th century largely

based on the energy. There are always several core technologies that are able to realize the energy conversion and create the prerequisites for such goods and services that have a forming impact on the society forming an above standard economic added value. For example the second half of the 19th century and the beginning of the 20th century were characterized by coal, steam and iron and it was the coal supplies that boosted the economics of Great Britain and ensured its dominance in the world. Great Britain gradually lost its dominance. The discovery of crude oil supplies in the North Sea in 1980's not only covered Britain's consumption but it also brought income from the export. That led to a new economic development and Great Britain returned to the countries with the highest standard of living. Energy dominates in economics as the basis of goods and services. Together with the foods they represent the biggest item within the family spending. Thereby they directly influence the standard of living and they remain interesting for the general public. It is a huge market because of its capacity and therefore it is interesting for the business sector both for an energy supplier or a consumer. If the price of energy is too low such situation creates conditions for social waste and development deceleration. However, high priced energy causes the effect known as the energy poverty and eventually the reduction of the demand on the internal market and restriction of investment activity. For that reason the energy security and balanced management of energy sources is one of the main economic policies of a state and it is the center of interest for politicians. The infrastructure of energy supplies forms the basis for the necessary infrastructure of a modern society.

The reduction of economic activity related to the crisis caused the reduction of energy consumption in the European Union and therefore the reduction of prices, too. Is it really necessary to invest on expensive new technologies of renewable energy sources?

The energy crisis in 1970's set an enigma for economists. New energy suppliers were supposed to enter the market in accordance with the standard economic models of a competitive market and they should have squeezed the price of energy in the market. However, it did not happen. Many reputable economists have identified this fact as an anomaly and left it without an explanation as an exception to the rule. It was Schumacher who pointed to the fact that natural resources do not figure in the models of human economic activity. He showed that the crisis is nothing else than an imbalance provided by the nature between available resources and a decline in economic activity that is

perceived as a crisis. This means the striking of new balance between the available natural sources and human economic activity. Globally, the natural resources form 60 to 75% of the values of the goods and services, specifically energy and only the rest of it is supplied by human economic activity. The crisis of the

1970's was not solved by the expansion of the energy supply to the market but by the development of information technologies that were able to reduce the energy and natural resources consumption on average to the half of a GDP unit. It took 15 years until the information technologies were sufficiently developed and implemented on the market in order to ensure the prosperity of the society approximately until the turn of the millennium. However, around the year 1995, even the information technologies started to lose their ability to form the above standard economic added value. Nano technologies, biotechnologies and especially renewable energy sources can play a very similar role that the information technologies played within the solution of the energy crisis in 1970's. The society needs approximately 10 years to master the technologies related to renewable energy sources and their effective implementation on the market. Our analysis verified by the experiments show that renewable energy sources will form an above standard economic added value and fill in the expected decline of supply by fossil fuels as well as the demands for new volumes. Moreover, the decisive part of renewable energy sources is not related to the production of CO₂ emissions, which also solves this social issue. Renewable energy sources have a strategic position within the economy of a country. Therefore it is not surprising that the European Union set out an ambitious plan 20-20-20. For Slovakia there are 14% of renewable energy sources set as target in an energy mix in 2020.

The National Council adopted the Act on Energy Efficiency of Buildings in 2012. The Act no 309 on the support of renewable energy sources was criticized during the discussion of the amendments in the National Council of the Slovak Republic at the end of 2012 and in the beginning of present year. The Prime Minister, Robert Fico has already announced its further change.

You are right. The present Minister of Economy, Tomáš Malatinský expressed the strongest comments in the National Council, what is not a typical thing, when he said in a debate on 29th January 2013: „The fact that we lack the energy concept is true. However it is always like that. The present conception has been valid since 2008 and I am working on it, so that we may accept a new one in 2013". It is perhaps a tragedy of Slovakia that all

crucial laws are prepared in a hurry and even though their negative impacts are known, they are promoted first in the government, then in the National Council. Think about the Act on the Second Pension Pillar that has a similar economic importance in the society. It has been subsequently revised 20 times and another revision is going to happen again. A similar faith awaits for the Act no 309/2009 Col. We can take an example from the Czech Republic. There was the seminar in Lysá Pořana in 2011, during the discussion I asked the representative of the Ministry of Economy and Industry of the Czech Republic, Mr. Pokorný, whether he does not consider the realization of energy sources according to the Act 180/2005 Col as an economic sabotage. The change of practically all energy supply from the photovoltaic cells during the summer means that though it would be technically manageable at the level of energy network, the price of electricity would increase three or four times and the economy of Czech Republic would count the weeks till the date of collapse. It is known that the Act 180/2005 Col. ceased to apply on 1st January 2013. The problems of similar type with the high price of energy are in Bulgaria and also in Romania.

What is the problem if on one side we need the renewable energy sources and you claim that they will play a strategic role and on the other side they create economically unsolvable situations?

The development of the society is based on several economic principles. These are the relative prices that ensure the effectiveness of allocations of investments; it is the tax and levy systems that ensure equitable distribution of values in the society and their reproduction and the third principle shows the setting of limits for available resources, whether they are natural, human, financial or other. Nowadays, there is also the corruption phenomenon that joins them. If you have a look at the wording of the Act 309/2009 the violation of the first principle is represented by the increased additional payments together with preferential market access that deform the prices. The fact that the additional payment is not realized by the state at the level of taxes, but by the increased obligatory fees in the distribution part of the price for energy represents by its character the excise tax. While the excise tax on alcohol and cigarettes has its aim in limiting the negative health impact on citizens, this type of excise tax in the form of distribution fees represents direct taxation of a citizen and it affects their standard of living. By doing so it violates the second principle - the distribution of values. They are the strategic materials regarding the energy concept or

strategy of the development of energy sector, where the social needs for energy are set with the view to 2030, where the relative structure of energy sources the need for recovery and economic context should be determined with relative accuracy. In other words, these materials should provide the third part of power system control in the form of determination of required capacities. The market is not able to set them; they must be set by an expertise of available resources, whether they are natural, human or financial in relation to the needs of the society. The situation where the law and lower legal standards did not solve these links caused the useless investments and creation of capacities that either do not have enough primary energy sources or they are actually unnecessary. This violates the third principle of economy management.

What should be done in order to come up with a change which brings a real impact?

In the first place it is necessary to set a future position of a particular technology in the society. Our analysis of the financial crisis from 2008 lead to the conclusion that the financial crisis is only the top of the irreversible transformational process which is always related to the change of the value system. We identified two problems. The crisis known under the term of climate change connected the disability of ecosystems to assimilate the CO₂ emissions and future crisis in supplying the energy market with fossil fuels approximately 15 years after the global transition by Hubbert peak. Security analysts found out that the crisis is not in the fact that there will be the lack of energy itself. Rather in the fact that if the technologies are not developed and implemented on the market that would ensure the renewable energy sources for common market prices quickly enough, there is a possibility, of the failure to supply the local market. This can cause chaos that will not be able to be controlled. Therefore the development of renewable energy sources represents the preventive safety precaution and determines strategic position of technologies of renewable energy sources in the society. The ideal solution is having the economy based on the renewable energy sources. However our everyday decisions are based on the compromise between what is realistically possible and what we consider as an ideal. We must accept the actual reality and design transformation processes that lead to reaching of a desired ideal state. If we do not do it and the realism prevails over the ideal, the society will start to stagnate. On the contrary, the thoughtless deflection to idealism causes a quick exhaustion of resources and the collapse of the solution. The deflection to the ideal and the subsequent collapse has already happened in the Czech Republic. The options of the Act 309/2009 in Slovakia are practically also exhausted. We have one of the highest

distribution fees for the electricity within the EU states and we have high prices of energies in relation to the incomes of inhabitants. The result is that a significant proportion of the population is in real energy poverty which is one of the important agents that causes the inability of internal market recovery. Big investors like Slovalco or US Steel have also spoken up and they are searching for a solution that would not reduce their competitiveness on the market. The depreciation of the investment climate is finally mirrored in the unemployment growth. There is a need to have a different view of the problem.

Can the results of your research bring a really qualitatively different view of the problem?

The current wording of the Act provides various supports for various technologies. However, the consumers do not purchase the technologies or their proportions on the energy market but the energy itself no matter what technology was used. Energy represents the basic utility value. After exceeding the capacity of ecosystems of the Earth related to the ability to assimilate CO₂ emissions, the ability to supply the market by the energy without the accompanying production of CO₂ emissions became the second utility value. It is the second utility value. So far, there is no other. Then the correct question is: How many additional costs must a company invest into the energy supply without producing 1 ton of CO₂ emissions? A known Stern Review set the social value of CO₂ emission to \$85/t, that is about 65€/t to 70€/t according to the conversion rate. In other words, it is the amount of money that a company must invest in the damage recovery connected to the release of 1 ton of CO₂ into the atmosphere. The logic of this solution is that it pays to use energy when the additional payment to the energy price on the market does not exceed this value. Otherwise it is more convenient to release the emissions into the atmosphere. It is no problem and possible to calculate the fees for individual technologies published by a regulator for 2011 and 2012 for a parameter determining the amount of costs paid by a consumer in order to avoid 1 ton of emissions getting into the atmosphere. We can see that a consumer paid additionally from 5€/t for the wind energy up to an astronomical 346€/t for the solar energy to generate one permit. Our calculation shows that a consumer paid in 2011 on average 93.84€/t in order to produce energy without 1 ton of CO₂ emissions and 97.9€/t in 2012. An increase of more than 4% means a negatively stimulated market. Every negatively stimulated market signalsizes the beginning of a crisis. But the

costs higher than 50% than the ceiling of social costs related to damage recovery after the released emissions into the atmosphere tells us that the serious economic mistakes occurred within the solution of the system of the market transformation. Recommended values of Stern Review set the range of 20 to 30 €/t, also indicated by the development of the emissions trade. In relation to this it is worth mentioning that on the basis of a government and parliament decision it is illogically a consumer and not a tax payer that has to put together nearly 100€ in order to generate one emission permit which will be sold by the state for 5€/t. In addition to violation of the above mentioned three decisive economic indicators there is also the fourth important indicator. It is a high rate of corruption that in this case exceeds all known economically quantifiable unit indicators and reaches up to 90% of the value. The principle of the rise of distribution fees together with the method of CO₂ emissions disposal cause economic redistributions among the energy sources through energy markets. The proportion of the investors is harmed by the others, further impacted by a chosen form of regulation. This creates economic barriers and distorts the competition of the energy market. The result is clear - the restriction of the competition ensured the increase in costs and hence energy consumer prices.

Which findings from your researches are applicable in practice?

Even politicians found out that the actual crisis does not have the character of a cyclical crisis and we cannot treat it as a flu by lying in a bed and doing nothing. It is about the transformation in the horizon of 10 to 15 years providing effective measures are taken. In my opinion, we need the change of the value system and in the case of the energy market it has been shown that it is the social value of CO₂ emissions that can play an important role within the transformation of the energy market. It fulfills all requirements in order to measure the transformational costs of energy sector precisely by this parameter, because not only we are able to measure them but we are also able to attribute them the values, thus the economic values, too. We can make a knowledge curve from the calculated unit costs based on the energy supply to the market, separately for each technology and based on the fact that within them we do not produce 1 ton of CO₂ emissions. We can determine what technologies are already suitable for the market. It is possible to use the

development trends of relative technologies to determine which of them have a down trend and roughly identify the period when it will be possible to implement them in an economically effective way on the market.

However, technologies that showed the rise in costs should be analyzed in detail to identify the cause. An example is the biomass where the price of investments funds has doubled during the past 8 years. The price of the biomass has risen in a similar way. However, the inflation during this period reaches circa 25 %. It is a principle of obligatory redemption price and setting the amount of additional fee to the price. This created the negatively stimulated market in favor of an investor and at the expense of a consumer. The result of our calculation is that already in 2012 there were so many energy sources that market lacked approximately half a million tons of biomass. And others have been launched since then. The lack of biomass was partially compensated by burning the higher quality wood because the redemption price of electricity enabled it. However, the wood-working industry pointed out the fact that there is not enough wood on the market and it will lay people off. Here you can see immediately an impact on the employment. However, if we understand that natural gas represents a strategic commodity that will be on the market for 60 more years, a practical measure is the transition to the natural gas in the places where there is no biomass within 30km. The level of the redemption price set by a regulator enables to transport the biomass from the distance of 80 km. There is actually the transport from Hungary to Prešov. The customer pays for all of these unreasonable expenses. If that was not enough, the legislature used weighting factor and changed the physical parameter of CO₂ emission factor for the biomass that is higher than for the black coal into almost an insignificant value.

What do you mean by the weighting factor?

Nearly in every system described by technical parameters for which it is necessary to elaborate economic model suitable for legislation and expressible within legally binding standards, some parameters must be transformed into an economic model through weighting factors to promote the socially desirable aims and to suppress unwanted ones in adopted laws. The already mentioned factor of CO₂ emissions does not represent a direct physical parameter related to the energy at a consumer but represents the amount of CO₂ emissions produced by a specific energy source burning a specific fuel and measured in a chimney. And yet the

factor of emissions is linked to the energy consumed by a consumer, e.g. buildings. Then in the energy mix the average value of the factor of emissions stated is based on the proportion of energy produced per unit of time from individual energy sources. This is the calculated value of CO₂ emissions used in energy certification of buildings that burdens the environment. After some time the public views them as technical parameters, even though they assume a more model character of weighting parameter. The determination of a near zero factor of emissions for the biomass means that such an energy source does not pay for released CO₂ emissions in the atmosphere, even though we measure them or can even see them with our naked eye. The result is that with our naked eye it is possible to see a huge areas of naked forest land in High and Low Tatras, Slovak Paradise and

Malá and Veľká Fatra. The small water cycle is interrupted by the excessive deforestation. The water cannot be held in leaves and pine needles, the flood risk is increased and there is less of underground water. The lack of water will influence drying of landscape and will cause the rise of food prices. Only because we burn the wood in order to produce the electricity that we actually do not need. That is why the political decisions of this type should be thought out, well tested and outreach studies should be elaborated before being transferred into legislative form.

One of the initiatives of the European Union is also the emphasis on the energy efficiency. It is represented by the buildings with near zero energy need. Isn't it an utopia?

It is a really controversial term chosen in Brussels probably because of political marketing and many technically oriented experts have problems with it. This model is relatively highly abstract, but it is fully consistent. However, its understanding is easier if shown on a specific example. The principle of the idea is that local energy sources that are the part of the object which they supply the energy into are not included in the energy balance of a building consumption. If a building consumes the energy supplied from the distribution networks and vice versa, from the surplus of local renewable energy source back into the distribution network, it is possible to calculate the balance between the local energy source and the distribution network in the clearing interface point of building and distribution network. If the energy balance reaches zero in a clearing point, we can talk about a building with zero balance of energies with the distribution network. A

system interface of a building and distribution networks then have minimally three levels of balance, namely the balance of individual energy carriers, the balance of primary energy sources and the balance of CO₂ emissions. Professor Milan Bielek introduced the concept of a building with zero energy balance for such a type of building that is closer to technical expression and reality as the concept that is linguistically managed within the possibilities of Slovak language but controversial, too. Many operators of centralised heat supply companies got scared of this issue, as they were afraid of losing their jobs.

And are they? Is it not about the closure of centralised heat supply companies?

I think it is quite the opposite. On the one side the consumption of heat really goes down because of the energy efficiency. For example, we have saved 73% of heat consumption in our building by the implementation of progressive measures since 1996. However, the heat balance had to be constantly supplied from a local renewable source. We expanded the range of provided services by modern technologies for cooling and therefore we increased the energy supply by one third using the same local energy source. However, we saved up to 87% of primary energy sources and 96% of CO₂ emission in comparison with 1996. The heating and the cooling in the office building of the area of 4,300 m² is ensured exclusively by renewable energy sources. In our case it is the energy water source where the processes of natural ecosystems provide necessary energy output for our economic activity in real time of our economic process of heating or cooling without the necessity to invest in a human effort. This is a difference in comparison to biomass or bio-gas. That is the reason why the operational costs reduce significantly after paying these investments creating an above standard economic added value. This situation cannot be expected within forced energy sources like biomass, biogas or landfill gas. The trends in technologies of solar energy show the fact that in the year 2018 to 2020 we can expect the technological progress which provides realistic return on investments and moreover with the panels efficiency two times higher than at present. The area of roofs on buildings is small and it gains the value with the possibility of installation of solar power stations. The area enables us to install a solar power station with the annual production of 200 MWh of electricity by 2020. It enables not only to cover the need

of a building but also to supply the distribution heating network with 350 MWh energy per year. The building becomes a clean energy supplier within the energy balance. In this situation it is necessary for heating companies to understand that it is in their interest to change a business model and start to build local energy sources and connect them into their systems. Through 309/2009 legislation they got high funding for the prices of electricity and while their money cumulated, they have them ready for investments. However, the transformation of centralised heat supply companies is economically and technically demanding and it is necessary to distribute it within 15 to 20 years. Regulating function of a contradiction compels us to appreciate even the reverse of the original ideal of centralised heat supply system. Everything what a man created is relative and lies in the internal antimony. It is not about the closure of centralised supply systems but about their transformation whilst preserving current values and the recognition of the contradiction in the form of the number of dispersed energy sources localized directly in the place of consumption.

What is necessary for the transformation of centralised heat supply systems?

First of all, it should be realised that the buildings represent a consumer for energy sector. The aim is to minimize proportion of the energy consumption of buildings from actual 40% to significantly lower proportion within the total energy consumption of society. For new buildings it means that an investor can build only such a big building that can be supplied by the energy from the local energy sources. The relation in which a human makes a decision and nature supplies the energy, changes into the relation where the nature restricts the possibilities of a human. This is a practical example of a value system change. Moreover, it is pleasing to know that the research sets up to 18 parameters in architecture and building construction. If they are optimized by a designer according to the principles of sustainable architecture, he reduces the energy consumption necessary for the operation of building by half in comparison to the situation without optimization. This twice the size within the same performance of energy sources. These are the possibilities of a new building. We realized the transformation of a building constructed in 1980 during the full operating mode. We did it without any subsidy, even though we have been doing the applied research. Practical experience enables us to assess what technologies and their combinations are really suitable for a specific building. The solution is given by the building itself, its

construction and architecture and energy output of local renewable sources. They are the technical solutions. As I have already shown, the buildings become real energy suppliers of the distribution networks. Our analysis has shown that the solution must also include the transformation of the energy market based on the competitive principle for the organization of the market with cooperative-competitive principle. The transformation costs can be measured by CO₂ emissions and we can allocate them the motivation role in the form of green bonus and create the economic resources for the transformation of market by the method of excise tax on energy from the fossil fuels. The level of social value of emissions is determined by the possibilities and needs of economics and functions in a selective way choosing the cheapest technologies. At the same time the profit potential causes the pressure on the costs and the prices. Energy sources in the proposed solution cooperate at preservation of distribution energy networks and compete within the energy supplies to the customer. Thus a customer gets socially reasonable price created by the market and regulated by the volume and price of CO₂ emissions. Those who want to stay in the market, must be active and innovate, reduce the costs and expand the services. This is the meaning of the whole transformation.

The crisis has been recurring continuously, but changes its form. Once it is the crisis of mortgages, then the crisis on the financial markets followed by the crisis of the public sector. Will we find a way out?

I have already stated that together with the cyclical crisis there is also an irreversible transformation process connected to the change of value system. The society has got two possibilities exactly as the yachtsman when the wind turns in the opposite direction. Either he will fight against the wind or he will turn the sail so that the opposing wind will get him to the destination point. He will wisely use the natural powers or he will stubbornly fight a losing battle. Financial markets are the image of the economy that can be temporarily deformed. The solution is not the economy of the deformed picture but creation of a massive base of new technologies of renewable energy sources, nano technologies and biotechnologies. Similar to previous big economic cycles known by scientific literature under the concept of Kondratieff Waves, it will be these eco technologies which will influence in a forming way a man and society and ensure the above standard formation of economic added value. The period of interface of two cycles is the period

of a crisis, but at the same time it brings many stimuli and original solutions. It is a time designated for the formation of new value systems. To the contrary to Kondratieff who understood the social movement only in technologies, the modern researches in many disciplines clearly show that it is necessary to move to a higher organization of cooperative-competitive market that will enable better and more effective allocation of resources and expand the range of services. The same way as the customers in the information technologies and other services are drawn into processes that wipe out the differences between the provider of services and their consumer, it also happens in the energy market. The buildings which are now a passive energy consumer become active energy market participants and wipe out the difference between a provider of energy and a consumer. Only a close cooperation between them helps to increase the energy effectiveness and thus the energy safety and to create the conditions in energy market for the future development of the society. To this end the whole number of laws must be changed and set the stable investment environment for relatively long-term transformation of the energy market and of buildings as energy consumers. It is the task for 10 to 15 years, but exactly like in the case of information technologies it will lead to important social effect and they will form the society for a long period in line with a new values system. Such transformation of the energy market and buildings creates a huge number of job opportunities and preconditions for future growth of the standard of living measured not only by GDP growth but also by the quality of life. Because the economic added value can be achieved also by the reduction of the energy consumption and natural resources whilst at the same time increasing the quality of internal condition of buildings. This is precisely what helps to correctly select technologies and implement them in the right time. In the following ten years it is possible to expect the explosion of technologies designated for the electricity supply from the Sun and technologies enabling the storage of electricity. All that at the prices with return on investment. The dynamics of the entries of new technologies will verify mainly the quality of the system analysis and the decisions and determine how cost-effective they are within the long-term investment cycle of the energy sector. Here is hidden a substantial portion of society's prosperity in the future. The Act 309/2009 violated all three basic national economic principles of economic governance, which, topped up by the corruption have a devastating effect on

the development of society. The withdrawal of circa 400 million € per year from the consumers can cause not only the decrease of the placement of this money on the internal market but it has a psychological effect that due to the concern about future growth of energy prices a citizen will rather save the money that spend it on the consumer market. This is visible in the growth in the savings in banks and the decrease of the consumer market. What is needed is increase in National economic turnover and a fundamental change. Just what the Minister of Economy, Tomáš Malatinský said in the National Council.