HUNGARIAN JOURNAL
OF INDUSTRIAL CHEMISTRY
VESZPRÉM
Vol. 39(2) pp. 177-181 (2011)

THE ATTENDANCE OF RATIONAL ENERGY UTILIZATION AND OF THE GREEN ENERGY

A. FARKAS✉, P. FARAGÓ

Szent István University, The Management and Business Administration PhD School
Páter Károly utca 1., Gödöllő, HUNGARY
✉E-mail: fegnisz@gmail.com

In the XXI century the most important global problem is the energy crisis. First of all the problems in Hungary based on the import dependence. Against the effect of the crises the main solution process could be the rationalization of the energy utilization and the increase of the alternative energy types.

The crisis managements arrangements are analyzed from different aspects. Most of the publications deal with the economic importance of the renewable energy. At the focus of this subject stands the demand of the green energies subvention and also the announced energy types income and their effect on the markets but these publication are dealing with the legal- and political background as well. From technological aspect they show the functioning of the indispensable equipments. From environmental aspect they tone the connection between the environmental protection and the propagation of the green energies. The previously mentioned analyzing aspects are indispensable although beside these sights we should take care of the social system and opinions as well. Most of the studies mention the importances change of approach, but they do not review the future tendencies.

In our study we demonstrate the connection between the appropriate lifestyle, the spread of the biomass and the auspicious Hungarian energy balance. We make a sketch of one of the reasons about our countries over-consumption, we delineate the appearance forms of the biomass and also we measure the Hungarian producer potential.

Keywords: energy balance, energy consumption, time balance-examination, renewable energy, biomass

Introduction

At the beginning of the XXI century the reserves of the World are running out, thus now days our biggest challenge is the solution of the energy crisis. The new energetic conception could be examined from different aspects. Several studies inform the readers about the new energetic trends.

On the field of the crisis solutions possibility the thrift analysis is momentous, which is mostly examining the financial side of the alternative solutions; from the resource to the market effect. After the financial aspect it is important to mention the technological publications, which handle with the development of the modern equipments. On the other hand there are also several studies in the subject of the environment, these disquisitions are dealing with connection between the energy consumption and the protection of the environment.

The analysis's biggest failures are the social studies. Most of the publications only concentrate on the goal and the access path is forgotten. There is no hope on the solution of the energy crisis without the social cooperation. According to several studies, the increase of the alternative energy resources should be combined with the approach change, but there is no opinion in these studies about what sort of instruments are crucial to this change. How is the approach look like now days? What could have been the ideal attitude? How is it possible to reach this ideal state?

The aim of this study is to complement the failures and to handle with the social, sociological psychological aspects during the crisis management. Through the publication we demonstrate two improvable possibilities of the country energy balance. First of all on the field of the social analysis we measure the energy consumption, then we delineate the current changes during the usage of a few alternative energy resources.

Energy balance of Hungary

Our country – after the temporary decrease in 2010 – uses more and more energy again. In 2011 the energy consumption is going to develop according to the Central Statistical Office, the rate of this increase depends on the weather. [1] The energy balance shows the stock conformation of Hungary in a specific year.

According to the dates of the energy balance in 2009 it is possible to announce that almost 70% of the Hungarian energy consumption comes from the import. The previously mentioned measurement exfoliated even worse in the pass few years before the fiscal year.

Summa summarum it can be diagnose that Hungary mainly needs to fetch in energy. [2]

Table 1: Energy balance of Hungary (2009)

Announce	Volume (PJ)
Production	458.5
Import	733.1
Total resources	*1191.6*
Used energy	1055.8
Export	106.3
Stock changes	29.5
Total stock decrease	*1191.6*

Research methodology

In our opinion in the field of the energetics there are loads of reasons for the existence of the social research. In the case of several publications, it is announced that one of the most important benefit of the biomass is the population – observer ability, therefore it should be the migration the main topic. Beside the former research it is also significant the "action theory of Weber", the "Bourdieu – capital" decision from the sight of the individuals and also the time balance examining.

Within the confines of a questionnaire research we estimated what kind of attitude could be discovered in one group of the Hungarian population, precisely the students of the Corvinus University. During the research we even made a time balance monitoring. The questionnaire was filled by 296 people. The research is representative, namely it suits the educational institutions generic- and qualification rates. We achieved the research at the university with printed questionnaire sheets (PAPI). The students filled the sheets alone, therefore we did not use interrogator. The enquiry started in the second half of December in 2010 and it finished at the end of the year.

The results of the research

During the research we were interested that how many hours the asked students spend with their own physiological needs. In average the youth sleep 7 hours/day, which means that they sleep through one third of their university year. Most of the questioned ones sleep 6–9 hours a day. There is only just a few repliers, who relax extremely lot or less.

The one of the most important questions at the time balance researches case is that how the population is spending their free time. In our case free time is defined as follows: when the responder is not in the university on a lesson. Besides of sleeping, the nourishment and the bathing count as physiological needs. The students do not spend a lot of time on these needs. They spend only half an hour on the previously mentioned basic needs, but the main weight belongs to the bathing. The women spend more hours with the bathing, which causes the higher energy usage.

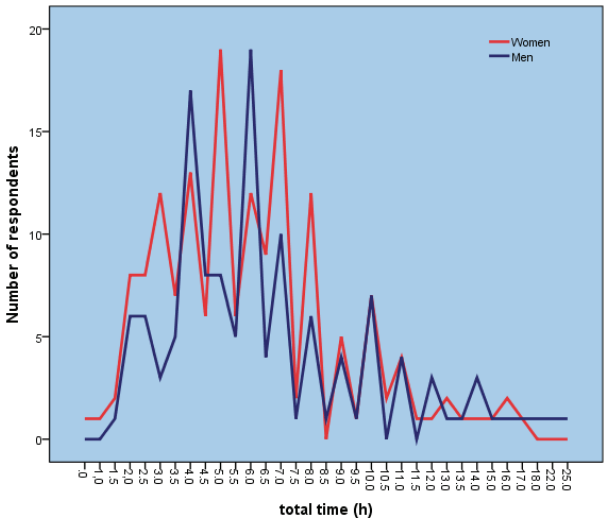

Figure 1: Aggregated time of the following activities: watching television, usage computer and music listening

Table 2: Descriptive statistics of watching television, usage computer and music listening

Indicator	***Men***	***Women***	***Together***
Median	6.00	5.50	6.00
Mode	6.00	5.00	6.00
Mean	6.74	6.09	6.37
Minimum	1.50	0.00	0.00
Maximum	25.00	17.00	25.00
First quartile	4.00	4.00	4.00
Third quartile	8.00	7.75	8.00

Above the physiological needs the youths choose such free time activities which use a lot of energies. In average the Hungarian population spends extremely lot of time in front of the television. This statement is true to the students as well, although the computer usage belongs to their every day habits much more. The average youth spend more than 3 hours in front of the screen a day. Besides they listen to the music almost 2 hours and they watch the TV a little bit more than for one hour. The mentioned three activities mean around six hours a day (though likely they are each others background activities as well, so the amount of the hours could decline), this means that during the day they use six hours of high volume electricity.

The women spend 1.5 times more time on the housework than the men. None of these kind of work approached the women dates in the case of the men. The most important difference could be recognized in the case of the washing, when the men spend almost as much time with this activity as the girls. On the whole the youth spends around one hour every day with housework, as washing, cocking or cleaning etc.

During the time balance-research we examined also that how many hours the responders spend with studying. We only count those hours of studying when they are not on university lessons, so when they are studying home or anywhere else if they are concerned with the university knowledge. The result showed us that the responders spend almost an hour every day independently from their gender.

For the students the travelling is an everyday activity. In the mentioned research we also asked about their travelling attitudes. Most of the responders use public transport, considering with the fact that an average student out of its 13 hours of travelling 8 hours includes the use of public transport. In the view of the energy usage the most friendly transport type are the wayfaring and the cycling, which take just out three hours in the case of the responders. We found differences between the two genders in the choice of car or public transport. The men use the public transport far more often than car.

In the studied free time activities the sport activities are also mentionable. The repliers practice sports in average three hours a day even so we can separate them in to two categories. Many of them do remarkable sport activities (one hour a day), the others hardly even train for an hour a week. Very few of the repliers do the average sport rate, the three hours a week. In the two genders case we came to the result that the men do sport 1.5 times more than the women.

The conclusions of the research

The questionnaire measuring showed us, that the students' lifestyle in the view of the energy is quite wasteful. The luxury services (listening to music, watching the television) make most of their energy usage instead of the basic needs, as cooking or showering. It is also interesting that the active relaxing types as for example sports are not common in the case of the repliers, which could be seen at the chosen travelling types, because most of them do not walk or cycle. This attitude increase their energy needs.

The occurrent effect of the optimistic time balance on Hungary

In the case of the populations time balance advance, Hungary's energy usage would decline with 10% according to our measures. If we take away this 100 PJ energy-saving from the utilization and from the import, the import-usage rate would be 2/3 of itself. It could be also appreciate, that the now days 6–7% of renewing energies utilization would increase it share to 8%.

Alternative energy resources

In the alternative energy resource the natural energy (solar, water, geothermic energy and wind power) resources have a significant importance. The energy plants and the biomass are also appropriate instead of the traditional, fossil energy sources.

Natural energy sources

One of the most important possibilities is in the utilization of the solar energy. The sun is available almost without restraint, though we can just use a small amount of it's capitalize. The importance of the solar energy is improved by the fact that the energy of the sun can assure the Worlds energy needs. Hungary is in a favorable situation because the sunny hours are between 1500–2000 hour a year. [3]

The water energies most significant signature is that it is in a service seasonally. Although the wind cannot be mentioned as a premier energy source according to the 2009 dates, though the water energies emission is less than the others. [4] The emission and Hungary's favorable water map give us a significant opportunity on the field of the water energy utilization. With the maximal calculation we could have win more than 20 times as much energy (1 GW) out of it utilization. [4]

The wind power in Hungary is developing dynamically, which made this energy resource the market leader out of the natural resources. [5] The wind power after the water energy is the second less pollutant energy resource. Although the utilization of it has a serious disadvantage, that in our country the average wind strength is quite low (2–3 m/s). [3]

In Hungary the most popular natural energy is the geothermic one. [6] For our country the heat of the earth could be a springboard, because the lands energy stock is commanding. The exhibit of this statement is our thermal water stock.

Energy plants

There are two big groups of the energy plants, the ligneous and herbaceous plants. The ligneous plants advantage is that their income is quite big (~10MJ/kg) and also during their burn the pollutant materials volume is irrelevant. In Hungary the wattle and the sallow are use in energetic purpose. The most important disadvantage of the tree utilization is the high innovation costs. [7]

From the herbaceous energy plants many type of them are known in Hungary. In our country first of all they are dealing with grape, hemp (annuals), energy reed and grass on the fields. In the comparison with the ligneous plants they own that feature, that they are harvested in every year. Though their disadvantage is that these plants own a low level of energy density. [8]

Biomass

Biomass means the living and in the short past died organism in the land or in water. [9] The biomass gives the biggest opportunity for the exchange of the fossil energy sources. The proof of this statement is the fact that the green energies share is over 90% out of the renewing energies according to the 2008 dates. [6] Hungary's all green energy stock is 1200 PJ, which

means by Table 1 that is the exactly amount of the yearly energy usage. [10] This means that if most of Hungary change to biomass energy than the whole import and an important amount of Hungarian fossil energy would have been replaced. In a financial sight the change is also favorable, because the biomasses price is 100–2800 HUF/GJ and the price of the heavy oil is 7500 HUF/GJ. [11]

According to the formation we separate premier, secondary and third biomasses. In the view of the aggregate we can define consistent, liquid and gas aggregates.

Consistent aggregated biomass

In practice the most important consistent biomasses are the cornstalk, the grape and grain straw, the sunflower stalk, the hay, the fruit tree loppings, the grapevine and the various types of wood. In our country out of these resources the grapevine and the tree loppings are common. The vine is from the big grape fields, after the yearly cut. While the treeloppings are the new part of the plants after the cut in fruit or private gardens. According to this study it is useful to utilize these two resources in an energetic sector, because they do have a value on market until they do not become fuel. The capacity of the grapevine and the treeloppings is around 5 PJ/year. [12]

Liquid aggregated biomass

In the category of the liquid biomass we separate the bioetanol and the biodiesel. The bioetanol is such an alcohol, which is the result of the vegetal material fermentation. Against this the biodiesel is made out of the oil included vegetal parts it is similar to the heavy oil. [13] The importance of the bioetanol is not arguable, but it is ambiguous, how big could the product potential be. The doubt caused by the change in the case of the E85 fuel, which only stays tax free until the end of 2012, possibly its price will increase from next year. Now the E85 fuel is cheaper with 80–100 HUF than the traditional types. According to this study the importance of the bioetanol based on the assumption that the use of this biomass would decrease Hungary's import dependence and also new jobs would appear. [14]

In our country they use grape and sunflower for the biodiesel production. These two plants have a high oil level and it is possible to utilize it. [15] A study had compared the grape with other plants, which could use to the biodiesels production. The result of the research revealed that the highest income belongs to the sugar beet (120–140 GJ/hectare). Out of the analyzed plants the wheat and the corn have also high purchase. The maximum energy from the grape is 50 GJ/ ha. [16]

The government does not support the biodiesel as much as the ethanol, because the biodiesels selling is encumbering with 25% of VAT. The government is not planning to change this situation because they would fall from a big amount of revenue tariff. [14]

The gas biomass

Now days for the biogas production first of all they use waste (in 50–60%). To the produce the compounds fell apart to carbon dioxide, methane, hydrogen, nitrogen and to sulphur. A study was dealing with the countries maximal biogas capacity. It announced that Hungary's theoretical emission potential combined with efficiency is between 74.7–233 PJ. Beside the lowest technology level (biogas production where is possible) it could have been possible to generate 74.7 PJ biogas instead of the same amount of fossil energy. [17]

Conclusion

In the study it gets proved, that Hungary's energy balance was unfavorable in the past few years. Beside the previously mentioned conclusion our study showed us that the society research could have an important roll in the energetic researches. The proof of this statement is the result of the questioner researches result. The conclusion is that the young people live a wasteful life. The daily average 6 hours of listening to music, using the computer or the television watching in our opinion is mostly part of the fancy category and not the basic needs. According to our measurement we think that the lifestyle advance would cause the energy utilization decrease. The non-rational energy utilization could be recognized in the consumption of the country which includes just 6–7% of renewing energy resources. In the study we introduced many type of alternative possibilities. The utilization of these alternatives would decline the fossil energy resources use. Our countries favorable geological position gives us the possibility of the successful use of the geothermic and solar energy. Beside the natural resources we introduced also the biomasses different types- In the case of the consistent biomass, the biodiesel, the bioethanol and of the biogas we still have unused capacity, which could advance our energy balance.

Through the increase of importance the green energy and other alternative resources and with the rational energy utilization, we could decline the countries energy dependence.

REFERENCES

1. Központi Statisztikai Hivatal: A gazdaság összes energiafelhasználása (2011), http://portal.ksh.hu/pls/ksh/docs/hun/xstadat/xstadat_evkozi/e_qe001.html
2. Központi Statisztikai Hivatal: Energiamérleg (1990-) (2010), http://portal.ksh.hu/pls/ksh/docs/hun/xstadat/xstadat_eves/i_qe001.html
3. K. NAGY: Az alternatív energiaforrások magyarországi lehetőségei, különös tekintettel a biomassza potenciálra (2010), Budapesti Corvinus Egyetem, Mikroökonómia tanszék, szakdolgozat
4. Z. HÁGEN, T. MARSELEK: Vízenergia potenciál Magyarországon (2010), V. Csépe, L. Dinya, R. Solymos: Szociális zöldenergia program, 110–115
5. ZS. DUPCSÁK, Z. KEREK, T. MARSELEK: Zöldenergia stratégia Magyarországon (2010), V. Csépe, L. Dinya, R. Solymos: Szociális zöldenergia program, 77–80
6. J. RONCZ, T. SZÉP: Adottságok és lehetőségek a megújuló energia felhasználására (2010), V. Csépe, L. Dinya, R. Solymos: Szociális zöldenergia program, 125–129.
7. CS. GYURICZA: Fás szárú energianövények, Magyar mezőgazdaság 63(37), (2008), 16-18
8. S. MAGDA, S. GERGELY: Energiastratégia – lehetőségek, Magyar mezőgazdaság 61(36), (2006), 12–13
9. S. LUKÁCS GERGELY: Zöldenergia és vidékfejlesztés (2008), Szaktudás Kiadó Ház, Jászberény
10. R. MAGDA: Megújuló és fosszilis energiahordozók Magyarországon, Gazdálkodás 55(2), (2011), 153–166
11. G. BÜKI: Biomassza-hasznosítás az épületek energiaellátásában, Energiagazdálkodás 51(1), (2010), 5–9
12. G. PINTÉR, K. NÉMETH, T. KIS-SIMON: A szőlővenyige és a fanyesedék biomassza-erőművi beszállításának elemzése, Gazdálkodás 53(4), (2009), 358–363
13. K. KŐVÁGÓ: A hazai bioetanol piac a gazdaságosság és versenyképesség tükrében – nemzetközi kitekintéssel – (2010), Budapesti Corvinus Egyetem, Mikroökonómia tanszék, szakdolgozat
14. Z. PÁLYI: A bioüzemanyagok adózása Magyarországon, Gazdálkodás 55(2), (2011), 194–198
15. L. KOMAREK: Az agrárgazdaság és a megújuló bioenergia kapcsolata, Comitatus: önkormányzati szemle 18(11-12), (2008), 122–129
16. L. TÓTHNÉ HEIM, Z. PETERDI, SZ. ZVEKÁN: Biomasszából előállított folyékony üzemanyagok hazai termőföldigénye és gazdaságossága, Gazdálkodás 51(5), (2007), 54–59
17. I. SZUNYOG: Elméleti biogáz potenciál – Egy európai uniós kutatási projekt részeredménye (2008), http://zoldtech.hu/cikkek/20080314-elmeleti-biogaz-potencial