

SocialMedia support for Renewable Energy Sources:

Turn the washing machine on at the right moment, that is, how you can support the development of renewable energy sources and reduce the carbon consumption of traditional power plants. Proposal for a social project: www.oze-razem.pl

Windy and sunny weather in June brought new records in the production of electricity by wind and solar farms. According to WysokieNapiecie.pl, only on Sunday, June 19 this year, about a thousand coal wagons were saved and an adequate amount of dust and CO₂ emissions were stopped from getting into the atmosphere thanks to that weather. At that time, renewable energy covered over 60% of the national power demand. Although it was Sunday and the consumption was lower, because computers and air-conditioning in offices were not working, this share of renewable energy in the production of national power is impressive - even 20 years ago it was about one percent.

On the same website, you will find an interesting description of how the power regulator in the national grid, i.e. Polskie Sieci Elektroenergetyczne, deals with balancing the demand and supply for electricity by juggling every day, hour after hour, the production or consumption of pumped storage power plants, selling or buying power to the grids of other countries, as a last resort, asking operators of larger wind farms to turn off some of the windmills when there is too much energy. The latter actions result from the fact that the production from windmills can be reduced "on the spot", on-demand, in just a few minutes, by changing the angles of attack of the propellers and slowing their revolutions down.

However, it is impossible to effectively eliminate fluctuations in the production of electricity from renewable energy sources by controlling coal-fired power plants. Starting a coal-fired steam turbine is a process that takes hours and must be planned. The irregularity of power transferred to the national grid by RES has always been a barrier to their development. Hence the modern popularity and the need to invest in all forms of energy buffering (energy banks, pumped storage power plants) or hydrogen production technologies.

It is a pity that while balancing the power in the network, we have to "turn down" the windmills and lose energy from the wind, while the power plant chimneys continue to smoke. Especially in the evening, when the wind and sun often weaken and the demand from households usually increases. The question is, how else can you react to irregularity in RES?

In Poland, back in the People's Republic of Poland, there always was a night electricity tariff and two-tariff electricity meters, which allowed starting electric heating at night (storage stoves, boilers), because at night there was always excess electricity from coal-fired power plants and that electricity was cheap. For the same reasons, freight trains often traveled at night as well (and still do).

At the same time, the Solina hydroelectric power plant was put into operation every day around 5:00 p.m., only for an hour or two, to meet the electricity demand during the "TeleExpress" broadcast at 5:15 pm. It could not be turned on for longer, because the water supply from the Bieszczady region was too small to operate continuously.

These observations lead to the conclusion that the area worth paying attention to is not only the method of generating electricity but also the time of its consumption. Since the popularity of Teleexpress, combined with the power-hungry cathode ray tube TVs in the People's Republic of Poland, forced the power plant in Solina to be turned on, nowadays it probably matters when we turn on washing machines, dishwashers, irons, boilers and air conditioning in millions of homes, or when we charge our bikes or electric cars from the socket. You can make some simple calculations on this subject that lead to interesting conclusions. The purpose of the calculations was to estimate the daily consumption in households and the total power household items may require if we turn them on at the same time and aggregate their work to several hours. We took into account only those devices whose start-up time can be regulated without disturbing the functioning of our home and family. In total, various variants of these calculations led us to around 10 GWh of consumption per day.

If all this consumption was concentrated over a few hours, it would mean a change in consumed power at the level of a few GW (i.e. about 10% of the power with which the entire country usually operates). This means that by regulating the times of use of some household receivers, you can reduce the evening electricity consumption in homes by switching them to times when the wind blows or it is sunny. This is enough to collect the energy surplus from wind farms. The results of these estimates are quite promising. The power consumed by domestic receivers is large enough to be important for stabilizing the national power production from renewable sources.

How to do it in practice? If the "Internet of things" technology was widespread, we could have our washing machine or dishwasher do its job not necessarily "now", but for example, within the next 6 hours, or "until tomorrow morning", with an additional condition, to do it when

electricity is the cheapest or the central regulator sends the information: "I have excess power, turn on the laundry". The implementation of such solutions would allow the operator to constantly signal directly to millions of electricity receivers what the current level of supply is - whether we have a surplus or a shortage.

A significant part of devices in households could automatically adjust the time of their operation to the level of power available in the national grid - not to overload it when there are shortages and use the excess when there is strong sun or wind. Of course, in an ideal world, all this should be regulated by the price of electricity, which could change even every hour, within a safe time and price range, so that laundry started at a low electricity price does not end up at a much higher price. The situation can be dynamic - an avalanche of switching on devices with excess power and low electricity prices could turn the excess power into a shortage - so the system should update its recommendations, perhaps even every minute. It can all be summarized in fair market algorithms.

However, before washing machines, dishwashers, and electric boilers are equipped with computers connected to the network that follow recommendations on the status of the national network or the price of electricity, we will probably wait another decade. You also need electricity meters that will take into account the time of its use and frequently changing prices. There is also no certainty that such a solution will be adopted because it increases the costs of home appliances that would be incurred by users. Perhaps the energy sector will be so saturated with energy banks before that time that the surplus produced by RES will be easy to store for the duration of shortages. After all, the possibility of free buffering of electricity produced by windmills and the sun is a basic condition for replacing coal-based energy with renewable energy.

The question is, what can be done now to adapt to the irregularities of the wind and the variable availability of the sun? Well, online social technologies and a positive attitude, especially of younger generations, to various types of ecological actions coordinated via the Internet, can come to the rescue. So, imagine a web portal with a suitable phone application that works with the central regulator and all major wind and solar farms. The portal collects data from them on an ongoing basis about the current volume of electricity production as well as plans and forecasts for each farm for the next 24 hours, taking into account the location of the farm and the energy district to which it is assigned because electricity should be consumed as close to the place of its generation as possible. Using the geolocation of the mobile application user (with his consent), knowledge about the current production from nearby renewable energy sources, and the current power balance in the nationwide network, it is possible to recommend

to residents of various regions the time to turn on household appliances, boilers or air conditioning.

The application would also allow for interaction - the user would inform about his actions, marking the time at which he would turn on one or another device, which would generate feedback on the time and power consumption plans. With an appropriate scale, already with the first million households using the system, its operation could be significant for the national network. A million washing machines, air conditioning, or dishwashers are even a few GW of power. This is more than the surplus that windmills generate today.

The user's benefit from participating in such a game would be completely non-financial and limited to the satisfaction of supporting the development of ecological energy - the feeling of living in harmony with nature. Poles like to be socially and ecologically involved. Charity dumps break records. Two decades ago, I had the opportunity to research the Polish society's willingness to pay higher electricity prices, provided that it would come entirely, literally 100%, from ecological sources (windmills). The research was part of the MA thesis at the Faculty of Economic Sciences, University of Warsaw, with prof. T. Żylicz. The results of this experimental ecological economy were then very promising - 2/3 of the Polish society was ready to incur higher costs for the sole satisfaction of supporting the development of ecology. The research was part of the proprietary project "Voluntary Clean Energy Certificates", the general concept of which is still valid and worth implementing, even for the promotion of renewable energy sources. The whole idea was to sell to thousands of cafes or other businesses (and owners of private houses and flats) the right to "green" electricity, bought in the normal way from a local distributor. Such a service can be organized "outside the system" bypassing the market and energy exchanges, allowing all B2C companies to promote their premises with a slogan that reads like this: "In our hotel, we only use ecological electricity from a windmill - a power plant located here and here". The "windmill" and solar industries would certainly also benefit from this image.

The survey carried out in cooperation with OBOP showed that 2/3 of the Polish society, almost regardless of the level of income or education, were willing to pay higher prices for electricity in their private homes, apartments, or businesses, if it only came from wind farms (then solar energy practically did not exist on the market yet).

Such research would of course have to be repeated. With the involvement of even 10% of the society, we achieve the possibility of shifting even 1.0 GWh from the evening maximum consumption in households to the time of the appearance of surpluses from RES. This makes

the whole project meaningful and our individual decisions about when to turn on the dishwasher can make a difference.

The Foundation is preparing for a pilot launch of this system. We are currently looking for support from strategic partners in the renewable energy industry. And because the project is social, as an internet habit, we also invite everyone to "choo in" to "get it started":

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