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РАЗУМНОЕ ЭНЕРГОСБЕРЕЖЕНИЕ – НОВЫЙ «ИСТОЧНИК» ЭНЕРГИИ

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Автором рассмотрены актуальные вопросы возможности разумного энергосбережения в быту. Показано, что энергосберегающие мероприятия позволяют существенно сэкономить энергетические ресурсы и являются ключом к повышению уровня жизни, а также сохранению окружающей среды. Энергосбережение рассматривается как новый «источник» энергии.

Ключевые слова: энергия, энергосбережение, экономия, ресурсы.

REASONABLE ENERGY CONSERVATION IS A NEW «SOURCE» OF ENERGY

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Some topical issues concerning the possibility of a reasonable energy conservation in everyday life were considered by the author of this article. It is shown that energy saving measures allow to save energy resources; they are the key to improving the quality of life and preserving the environment. Energy conservation is a new «source» of energy!

Keywords: energy, energy conservation, economy, resources.

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The main drawbacks of non-renewable energy resources such as coal, oil and natural gas are an irreversible reduction in the amount of energy stored in them and environmental pollution. An insignificant amount of solar energy each year is converted into the non-renewable energy sources; millions of years are needed for them to turn into large deposits of coal, oil, gas or uranium. That is why nowadays it is extremely important to develop resource-saving technologies and technologies using renewable energy sources – so-called alternative energetics: hydrogen energetics, nuclear energetics, solar energetics, wind energetics, tidal energetics, geothermal energetics, explosive energetics, biomass's energetics, energy energetics, etc. Progress in these areas, new projects, researches of well-known Russian and foreign scientists are widely represented in different sources of information. But let's think about how each of us can take part in these global processes? Saving energy in everyday life gives us this opportunity. In addition to the resource conservation, it can significantly save your own money. Not only does energy conservation include cost savings but it is also connected with saving natural resources. This principle of taking care about nature and future generations influences our habits and our attitude to energy conservation.

Energy is one of the most fundamental parts of our universe. Almost everything around us consumes a certain amount of energy. For instance, energy is needed for manufacturing industry, agriculture, transport, scientific work and our daily household use. In fact, most of energy consumption accounts for its use at home. Every day from an early morning until the late night, we count on various sources of energy to help us cook our meals, heat and cool our apartments, light our way and keep us informed and entertained. Certainly, it takes an enormous amount of energy to provide us with all of the mentioned things. So, the main question is what can we personally do to have all we need and save energy at the same time?

In general, saving energy means decreasing the amount of energy used while achieving a similar outcome of end use. Taking steps to be more energy efficient is about using less energy to do the things we need. Therefore, the benefits of energy efficiency are numerous. Some of them are lowering household energy bills, reducing local air pollutants, improving the quality of life, etc. Sounds impressive, right? All of this is achievable. Don't know where to start? Here is the list of simple advice you should follow to become energy efficient.

Heating & Cooling

As it is shown in the diagram from the website http://energy.gov/ (Fig. 1), space heating and cooling is the largest energy expense in your home. No matter what kind of heating and cooling system you have in your house, according to the Fig. 2, they all have the same components and therefore, you can save money and increase your comfort by properly maintaining and upgrading your equipment. To begin with, set your programmable thermostat as low as it is comfortable in the winter and as high as it is comfortable in the summer [1]. Moreover, it is important to be aware of the condition of your heating and cooling systems. In order to maintain them in the proper condition, clean or replace filters on furnaces and air conditioners once a month.

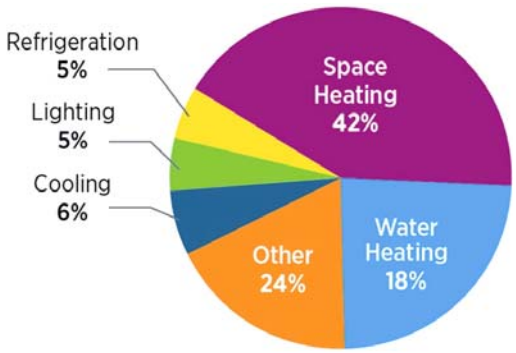
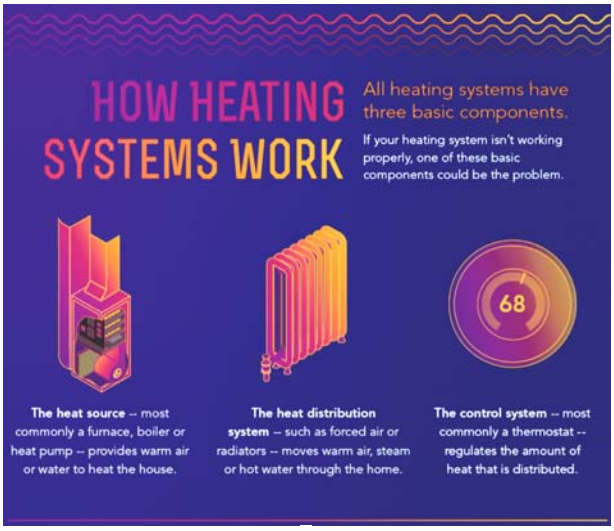
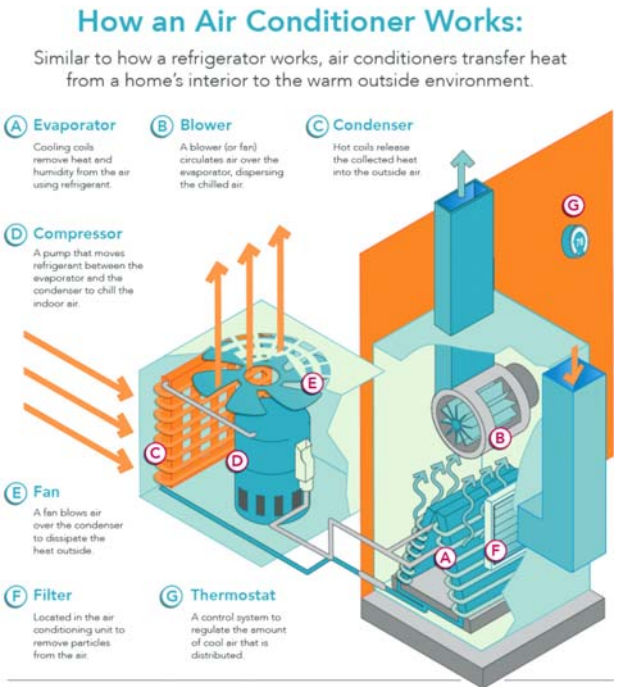


Рис. 1. Использование энергии в бытовых условиях
Fig. 1. Home's Energy Use



a



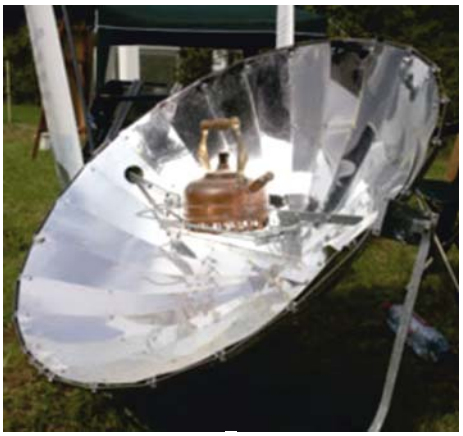
b

Рис. 2. Основные компоненты:
a – обогревательных систем; *b* – охладительных систем
Fig. 2. Basic components:
a – heating systems; *b* – cooling systems

The next step is controlling direct sun through windows depending on the season and local climate. Keep the curtains on your windows open during the day to allow the sunlight to enter your room and closed at night to reduce the chill you may feel from cold windows [2]. Be sure if you be following these easy rules you will see the first results very soon [1].

What is more, another option for saving energy is using solar power instead of electricity. The Earth receives an incredible supply of solar energy. The energy provided in one minute is actually enough to supply the world's energy needs for one year. Therefore, concerning saving energy it is quite clever to use solar power for water and space heating. There are many types of solar water heating panels made of glass (Fig. 3, *a*) and solar mirrored furnaces (Fig. 3, *b*) [3].

a



b

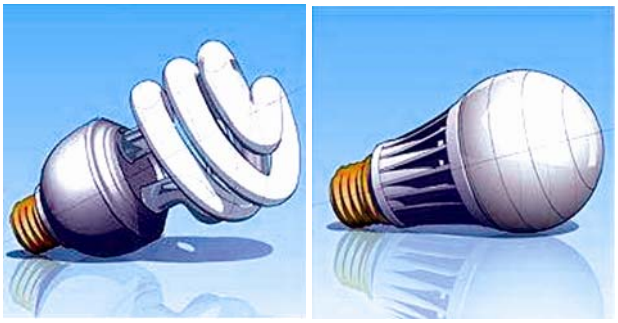
Рис. 3. Приборы, работающие от солнечной энергии:
a – система нагрева воды за счет солнечной энергии;
b – солнечные батареи
Fig. 3. Appliances working on solar energy:
a – solar water heating panel; *b* – solar furnaces

Electricity

The next expenditure item in our budget is the lighting in our apartments. It is well known that lightning is directly connected with electricity. Every day we rely on electricity to power our lights, appliances and electronics. Many of us also use electricity to provide our homes with hot water, heat and air conditioning. As we use more electricity, electric bills rise. Efficient products and energy-saving strategies can help you save money and energy at home. The first electricity saving tip is very simple – turn off the lights and other equipment when they are not in use. High utility costs often include paying for energy that is completely wasted.

Also, as it is advised in the website http://energy.gov/ – replace the regular lightbulbs with energy saving ones – CFL and LED (Fig. 4). CFLs use about 75% less energy and last up to 10 times longer than traditional incandescent bulbs. A typical CFL can pay for itself in energy savings in less than 9 months and continue to save you money each month. LED bulbs offer similar light quality to traditional incandescents, last 25 times as long, and use even less energy than CFLs. LEDs use only about 20-25% of the energy [1]. To learn more about the features of the energy saving lightbulbs look at the Fig. 5 [4].

Moreover, you can find some useful information about the efficiency of energy conversion into light for different lighting systems in the Table.



a *b*

Рис. 4. Энергосберегающая лампа:
a – люминесцентная лампа; *b* – светодиодная лампа
Fig. 4. Energy saving lightbulbs:
a – CFL – compact fluorescent light;
b – LED – light-emitting diode

Characteristic	Incandescent	Halogen	Compact Fluorescent	LED	Smart LED
Energy Savings	25%	25%	75%	85%	94%
Lifespan (in hours)	1,000	2,000 - 3,000	8,000 - 10,000	30,000 - 50,000	30,000 - 50,000
Instant On	Yes	Yes	Warm up time required	Yes	Yes
Dimmable	Yes	Yes	Only select models; can be difficult to dim	Yes	Daylight can be dimmed; LEDs cannot
Color	"Warm" yellow to white	"Warm" yellow to white	Yellow to white; some dislike bluish color quality	Multiple color options (white, yellow, blue, red, etc.)	"Warm" yellow
Contains Toxic Materials	No	No	Yes	No	No

Рис. 5. Сравнительная характеристика различных видов ламп
Fig. 5. The comparison between the different types of lightbulbs

Эффективность преобразования энергии в свет для различных систем освещения
The efficiency of energy conversion into light for different lighting systems

Sources of lighting systems	Light efficiency, Lm/W
Incandescent of general purpose	18–22
Linear 2-socle halogen incandescent lamp (150; 250; 300; 500; 1000; 1500 W)	18–22
Mirrored halogen incandescent lamp voltage 12 V (20; 35; 50 W)	25–30
High pressure mercury lamp with a phosphor (DRL type) (50; 80; 125; 250; 400; 700 W)	45–55
Compact fluorescent lamps (5; 7; 9; 11; 15; 20; 23 W)	50–60
Linear fluorescent lamps (18; 36; 58 W)	60–80
Metal halide lamps (35; 70; 150; 250; 400 W)	70–100
High pressure sodium lamps (70; 100; 150; 250; 400 W)	90–130
LEDs	Up to 170

Furthermore, adjust lighting to your actual needs. Use daylight during the day. To prevent eyestrain and headaches, do not over-light the room because too much light can be as bad for visual quality as too little and it costs a lot more. Do not forget that even our small attempts to save electricity will be helpful.

Water

It is equally important to expend water correctly and not to overpay for it. Water is the most precious gift of nature. It is the source of all life on Earth. Thus, we need to do our best to save water to ensure adequate supply of water for our future generation. Firstly, the "United States Environmental Protection Agency" advice you to stop the misuse of water and manage the usage of water properly (Fig. 6). So, fix the leaks. Small leaks add up to many gallons of water and money wasted every month.

Рис. 6. Использование воды в бытовых условиях
Fig. 6. Home's water use

Water usage for different activity @Home					
Activity	**Water usage by tap with standard Aerator (12-15 LPM)**	**Water usage by tap with Eco365days Aerator (3 LPM)**	**Water Saved in Litres**	**Water saved %**	**Water Saved Annually by family of 4**
Washing of Hand	**9 litres**	**2.25 Litres**	**6.75 Litres**	**75%**	39420
Run Time: 45 Sec					(365 days x 4 times x 6.75L x 4 members)
Brushing of Teeth	**12 litres**	**3 Litres**	**9 Litres**	**75%**	13140
Run Time: 1 mins					(365 days x 1 times x 9L x 4 members)
Washing Utensils	**120 litres**	**30 Litres**	**90 Litres**	**75%**	32850
Run Time: 10 mins					(365 days x 90 Litres)
LPM- Litres Per minute, Runtime & Times of usage could vary case to case basis. Consider +_10%			**Total Water Saved Annually (In Litres)**		**85410**

Рис. 7. Использование воды для различных видов деятельности
Fig. 7. Water usage for different activities

Secondly, use water-saving taps and faucets. According to the Fig. 7, they will save you about 85 410 gallons every year [5]. To be sure about this decision, check out the researches made by the "United States Environmental Protection Agency" about the water loss (Fig. 8) [6, 7].

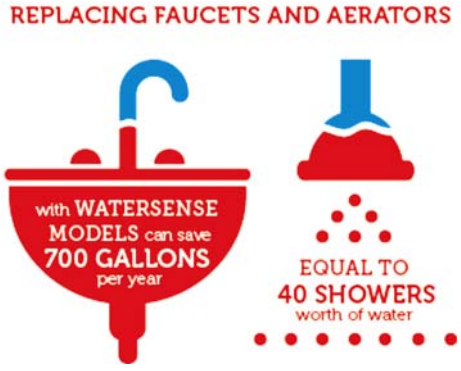


Рис. 8. Преимущества замены старой сантехники
Fig. 8. Benefits of replacing the old sanitary engineering

What is more, set water temperature only as hot as needed to prevent scalds and excessive spending. Usually water conservation really saves energy and money.

In addition, if you are aware of modern technologies, you have probably heard about "The Smart Houses". It is an exclusive system designed by the "Luxury Systems" company. The main idea is to create a complex system, which will allow automating all the regular operations. "The Smart House" was designed to make human life more comfortable and safer. Automated functions of "The Smart House" include:

– Lighting control;
– Climate control and Control of ventilation system;
–Monitoring and control of electrical drives;
– Video surveillance;
– Full automation of the engineering system via sensors and touch panels, etc.

All the other functions listed in the Fig. 9.

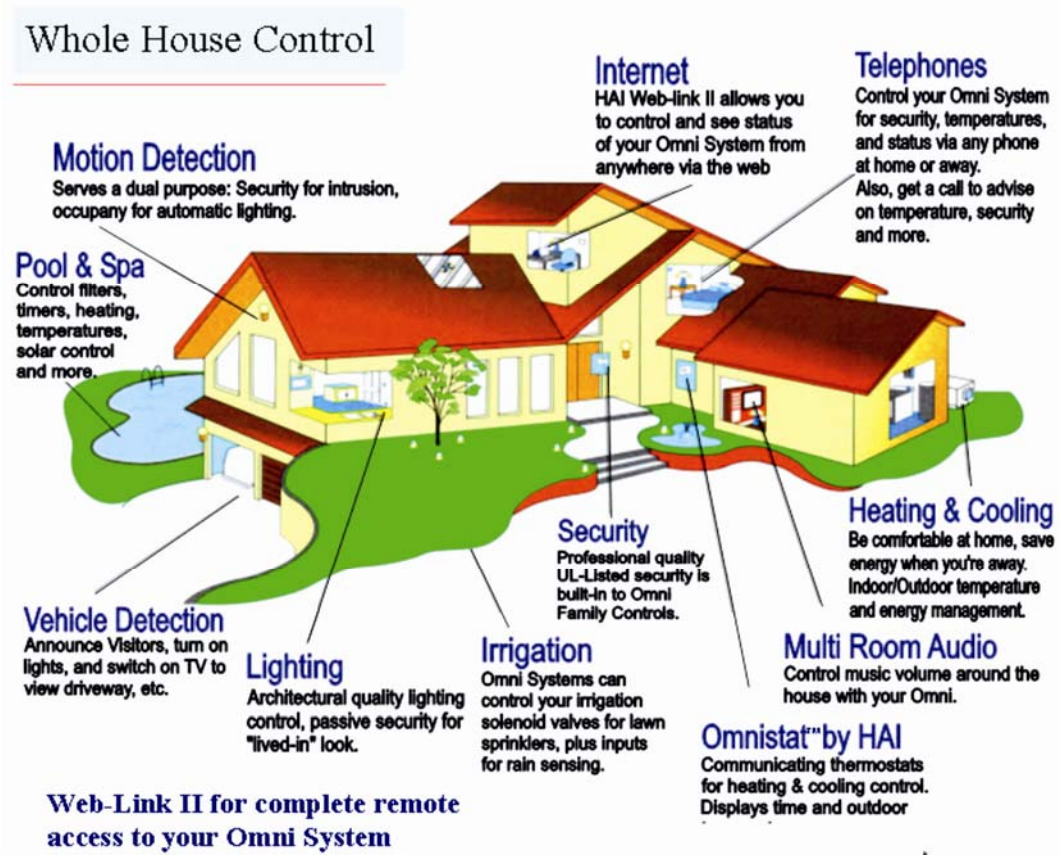


Рис. 9. Автоматизированные функции «Умного Дома»
Fig. 9. Automated functions of "The Smart House"

To my mind, one of the most useful functions of "The Smart House" is the climate control. Firstly, the system automatically maintains the set temperature regardless of the season. It determines the temperature in the room and controls all the appliances (air conditioners, radiators, underfloor heating and ventilation system). Secondly, the climate control saves energy resources during its work. Energy savings provided by the climate control system often exceed by 50%. Moreover, it takes care of our health by adjusting the temperatures and controlling the settings.

Another great option offered by the "Luxury Systems" company is Smart Energy Saving System, which allows the owner to set his personal save mode to prevent high electricity costs. For example, you do not have to turn off the lights and all the electronic devices when you leave a room, this system will do it for you. You can also push the "I'm leaving home" button and the appropriate mode will be activated. Thereby, all the appliances will be switched off automatically and the security control system will be switched on.

Also, the remote control is included, so you can keep all of the system's actions under control.

The possibility of saving energy is in every family. Energy-saving measures actually saves energy, energy resources. Energy resources are the key to improving the quality of life and the preservation of the environment. These measures don't require high costs and they depends on the people's personal awareness about energy conservation and people's interest in it. Energy conservation can be definitely considered as the new "source" of energy.

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