

*What Can You Do:  
- To Save Electricity & Heat  
- To Use Renewable Energy*

# CATALOGUE

Local Solutions To Save Energy  
& To Use Renewable Energy



## PARTNERS OF THE SELNEE PROJECT

**INFORSE-EUROPE**  
International Network for Sustainable Energy



Nordic Folkecenter  
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## ABOUT THIS CATALOGUE

This Catalogue of local solutions on what you can do to save electricity and heat and to use renewable energy is collecting 34 solutions. These solutions include examples of behavioural change and low-cost investments. At each solution it is indicated how much energy you can save, how much it costs, and where can you find more information, mainly in Ukraine and Belarus.

Examples of the behaviour change are:

-  Turning off equipment not in use;
-  Washing dishes in a separate container, not under a running tap;
-  Periodical refrigerator defrosting.

Examples of investment are:

-  Changing light bulbs to LED;
-  Insulating walls;
-  Replacing old inefficient energy consumption equipment (refrigerator, kitchen stove etc).

It is aimed that these solutions inspire people to reduce climate change, to defend environment in general, and to reduce energy poverty. We hope that the catalogue is useful for many. Please let us know if you have some solutions that you propose to add.

See our contact details under contact:

<https://selnee.rea.org.ua/en/contact-us.html>





**Saving Electricity  
Behaviour**



**Saving Electricity  
Investments**



**Saving Heat  
Behaviour**



**Use Renewable  
Energy**



**Saving Heat  
Investments**



## SAVING ELECTRICITY BEHAVIOUR

Saving



Using natural light  
when possible

50 kWh/year



Switch off lights when  
they're not in use

88 kWh/year



Periodical refrigerator  
defrosting

73 kWh/year



Turn off equipment  
not in use

25 kWh/year



Placed refrigerator on  
distance from heat  
equipment and sun light

5.5 kWh/year



Turn off  
the standby

48 kWh/year

## Using natural light when possible



Use light through windows when possible. Every 15 W efficient lamp turned off 9 hour/day in average will save 50 kWh/year.

### INVESTMENT

No investment unless need to change curtains etc.

### SAVING

**50 kWh/year**

## Switch off lights when they're not in use



When many people change their habits they save not only their electricity bill, but also resources used by power plants to produce electricity. For example, when you go to the kitchen for cooking/having dinner for 2 hours and don't forget to switch off the lights in the living room/cabinet/children room, where you have efficient lamps with a total capacity of 135 W, you will save about 99 kWh/year ( $15 \text{ W} * 9 \text{ lamps} * 2 \text{ hours} * 365 \text{ days}$ ).

### INVESTMENT

No investments, just creating an electricity saving habit

### SAVING

**99 kWh/year**

## Periodical refrigerator defrosting



Defrost your freezer (or the freezer compartment of your fridge) regularly as ice builds up. In fact, just 2 mm of ice means the appliance consumes 10% more energy. For example, if your fridge consumes 2kWh/day, monthly defrosting may save you at least 73 kWh/year.

### INVESTMENT

No investments, just creating an electricity saving habit

### SAVING

73 kWh/year

## Turn off equipment not in use



The essence of the measure includes turning off any kind of equipment which currently is not needed for the defined time period. As the rule of a thumb we shall consider that it may be effective if the time in a turned-off mode is at least 4 times more than the time of "switch on" and "switch off".

### INVESTMENT

No investments, just creating saving habit

### SAVING

25 kWh/year



## Place refrigerator at a distance from heat and sun light



Refrigerator is the heat machine which produce cold, and thus the following thermodynamic principle applies "the coolest is the cool source (back of the refrigerator), the better is the performance of heat machine".

### INVESTMENT

No investments, just creating saving habit

### SAVING

5.5 kWh/year

## Turn off appliances in standby mode



Standby electricity consumption usually accounts as 2%-3% of installed capacity of equipment. Considering the installed capacity as 275 W (not all equipment is in standby), and 19 h/day average standby time (24 hours total-5 hours working) the total reduction of consumption will be  $275W \cdot 19h \cdot 0.025 = 130 W$ . The annual saving is 48 kWh for an average typical consumer. This is 4-8% from the total consumption of 1200 kWh..

### INVESTMENT

No investments, just creating saving habit

### SAVING

48 kWh/year



## SAVING ELECTRICITY INVESTMENTS

Investments in purchase of new energy efficient appliances that will make your electricity bills significantly lower.

**1350 kWh/year**

saving for old fridge replacement



### Buy efficient equipment that fits you needs

Depending on the size of your home, number of persons living and your food preferences, your needs in capacity of certain appliances may differ. A double door fridge will consume 30-40% more power than a single door fridge. Also, using a multi-cooker saves electricity, as it heats all around the pot, rather than just under as an electric stovetop does.



Changing light bulbs to LED



Buy efficient equipment that fits you needs



Search for the power leaks/thieves



Replace old energy consumption equipment

## Changing light bulbs to LED



LED lamps are 7 times as efficient as old, incandescent (filament) lamps, 5 times as efficient as halogen lamps and 50% more efficient than fluorescent lamps. If you replace one old 60 W lamp with a 9 W LED you save 51 Watt every hour, if you use the lamp 4 hour/day, you save 74 kWh/year.

INVESTMENT

2€ / LED lamp

SAVING

74 kWh/year

## Buy efficient equipment that fits your needs



Depending on the size of your home, number of persons living and your food preferences, your needs in capacity of certain appliances may differ. A double door fridge will consume 30-40% more power than a single door fridge. The larger the volume of the fridge the more is its power consumption. Also, using a multi-cooker saves electricity, as it heats all around the pot, rather than just under as an electric stovetop does.

Investments will be lower, but you should consider your actual needs

## Search for the power leaks/thieves



If you think that your electricity bill is higher than it should be, you should check your home for power leaks that can be caused by a malfunction in an appliance or power leakage to the ground through a bad connection. In your home, there also can be phantom loads, power usage from electronics, and other devices that continuously draw power even when they appear to be off.

### INVESTMENT

starting from 20\$

## Replace old energy consumption equipment



A 20-year-old refrigerator can use 1700 kWh/year, compared to 350 kWh of a new model. New electrical kitchen stoves can be at least twice more energy efficient compared to the old ones.

### INVESTMENT

Investments in purchase of new energy efficient appliances that will make your electricity bills significantly lower

### SAVING

1350 kWh/year

## To define major leaks use this step-by-step approach

**Step 1.** Turn off the main breaker at your home's service panel (breaker box) and look at the electric meter. If the meter is running, you have discovered the leak. It is somewhere between the power leads and the panel, and you should call an electrician to have it fixed immediately.

**Step 2.** Turn off all the breakers in the panel and turn on the main breaker. Go through the house, turn off all the light switches and unplug everything that's plugged in, including all the major appliances. Some appliances, such as the stove and water heater, may be hardwired, so you can't unplug them. Turn those appliances off or set them to their lowest settings.

**Step 3.** Check the meter again; it should be motionless. Turn on each breaker, one at a time, and check the meter each time you do. If it remains motionless, turn off that breaker and try the next one.

**Step 4.** Double-check the circuit if the meter starts to turn when you turn on a breaker. You should be able to get an idea of which lights, receptacles or devices it controls by looking at the label on the panel door. If you're sure everything is unplugged, and all switches are off, there is an open connection in the circuit, possibly caused by degraded wire insulation. This is a dangerous condition and you should call an electrician.

**Step 5.** Watch the meter when you turn on the breaker controlling a hardwired appliance. If it begins moving, note whether the appliance has cycled on. If it hasn't, it may have an internal fault; for example, an electric water heater may have a corroded heater element. Have that appliance serviced.

**Step 6.** Turn all the breakers back on, leave the lights off and make sure the meter isn't running, then plug in your appliances one by one. All the appliances should be off. Any one of them that causes the meter to start turning needs to be serviced.

**Step 7.** Test each appliance for phantom power loss by using a power monitoring meter. Plug the meter into the receptacle, then plug the appliance into the meter. Leave the appliance off for two or three days, then check the meter. A positive reading indicates power loss.



## SAVING HEAT BEHAVIOUR

**Kipping on inside  
temperature on a minimum  
comfortable level.**

**150-200 kWh/year**

saving



**SAVING**

**8 kWh/year**

Switching off the oven a few minutes before cooking time runs out. The oven temperature will be the same so the food will still cook through to completion without the oven using energy.



**Wash dishes in a  
separate container,  
not under a running tap**



**Switch off the oven a  
few minutes before  
cooking time runs out**



**Keep doors and  
windows closed,  
ventilate well in 10 min**



**Lower indoor  
temperature  
(for very hot flats)**



**Shorter bath**

## Wash dishes in a separate container, not under a running tap



To efficiently wash dishes by hand using less energy and water always scrap off food from the dishes before it. Then fill a separate container/bowl with hot water and dish soap, so that water just covered the dishes. If needed you can leave the dishes to pre-soak, but not too long, so that the water still remained hot/warm. Use this soapy water to clean the dishes. To rinse the dishes use a separate container/bowl filled with clean cool water. This is more efficient than rinse dishes under a running tap.

No investments, just creating heat and water saving habit

## Switch off the oven a few minutes before cooking time runs out



Switching off the oven a few minutes before cooking time runs out will save electricity. The oven temperature will be the same, so the food will still cook through to completion without the oven using energy.

### INVESTMENT

No investments, just creating an electricity saving habit

### SAVING

8 kWh/year

Keep doors and windows closed, ventilate well in 10 min



Open windows for ventilation but keep the time short and close after approximately 10 minutes.

INVESTMENT

SAVING

No investments, just creating saving habit

80-100 kWh/year

Lower indoor temperature (for very hot flats)



Keeping on inside temperature on a minimum comfortable level.

INVESTMENT

SAVING

No investments, just creating saving habit

150-200 kWh/year



## Shorter bath



Shower 5 minutes instead of 10 minutes. The consumption for a normal shower is 10 liters per minute. If you can shower within 5 min., you can save  $5 \times 10$  ltr/min with a normal, not wasteful shower. If you have installed a low-flow shower which consumes only 5 ltr. per minute you can save  $5 \text{ min} \times 5 \text{ ltr/min}$ . If you shower every days, this is equal to 18 m<sup>3</sup>/year and 9 m<sup>3</sup>/year, equal to 950 kWh/year and 475 kWh/year.

### INVESTMENT

No investments, just creating saving habit

### SAVING

500-1000 kWh/year



**Keep blinds and curtains open during the day, closed at night**

Direct sunlight can heat a room 5 degrees or even more. Keep blinds and curtains of windows open during sunny days to let sunlight into your home. This natural heat will allow you to lower your thermostat, reducing heating costs. Don't forget to close curtains at night to help insulate and reduce heat loss.



## USE RENEWABLE ENERGY



Using black water barrels left under the sun for hot water



Solar collectors for water heating



Solar PV for local use, low volt



Solar PV for grid connection



Biomass heating (wood boiler, firewood)



Biomass heating (wood boiler, wood pellets)

## Using black water barrels left under the sun for hot water



To heat water for free, use black barrels. The black absorbs heat and will increase the temperature of the water. Place them where they will receive as much sunshine as possible.

No investments, just creating saving habit

## Solar collectors for water heating



A solar collector is a device that heats water with the help of solar energy. The coolant is heated by the sun and gives energy to water through a heat exchanger located in the tank. Flat collector with an area of 2 sq.m. heats up to 150 liters of water per day to a temperature of 60-80°C.

### INVESTMENT

On average €500 per collector

## Solar PV for local use, low volt



Solar PV panels and batteries can provide off-grid power for many uses. Small systems are inexpensive today and can be used for mobile phones, lamps, laptop computers and others. Small systems are typical 12 Volt and can use car equipment, larger systems often use 24 Volt. The systems can replace grid connections and generators, mainly for spring and summer when the sun is highest. And the output is 40% higher near the Black Sea than in Northern Europe. A system comprises solar PV panels, a regulator, and a battery. For 220 Volt use, a converter to 220 Volt is needed.

### INVESTMENT

A full system with 300-400 Watt solar panel, a regulator, and battery 100 Ah, 12 Volt produces 300-400 kWh/year in Northern Europe.

### INVESTMENT EXPLAINED

Prices vary. A full system with a 300-400 Watt panel, regulator, battery costs 500 -1000 € and will last 20-30 years, except for batteries that often last 5-10 years. A small system with down to 10 Watt PV panel can be some 50€.

Local solar yield, see <https://globalsolaratlas.info/>

## Solar PV for grid connection



Solar panels for grid-connection can supplement power demand in a house or for other use. Usually it is not possible to use all the power in the house, as most electricity comes during summer days. Therefore it is often needed to have an agreement with a power company to sell power. In any case, it is necessary to have a registration or permission with the local power company to connect a PV system to the grid, even in your own house. A system consists of solar panels and an inverter that produces the 230 V or 400 V used in the grid. Some systems also include a battery to store electricity from day to evening, when homes need more electricity.

### INVESTMENT

Each kW of solar PV panel costs in bulk 250 €, single panels around 1000 €, a 1 kW inverter is around 300 €, while a 5 kW is around 500 €.

### INVESTMENT EXPLAINED

Prices vary. A 1 kW system costs around 1300 € for PV panels + inverter while a 5 kW system is about 5000 €, but prices vary a lot, and with bulb purchase, it can be much cheaper, but beware of quality.

Local solar yield, see <https://globalsolaratlas.info/>

## Biomass heating (wood boiler, firewood)



Using biomass for heating and heat water supply is good climate action because biomass is climate neutral fuel. This kind of equipment requires manual upload of fuel and manual regulations.

### INVESTMENT

Purchase of equipment  
and raw materials

## Biomass heating (wood boiler, wood pellets)



Using biomass (firewood or pellets) for heating and heat water supply is good climate action, because biomass is climate neutral fuel. Unlike wood boilers, chip or pellet boilers can be loaded and regulated automatically.

### INVESTMENT

Purchase of equipment  
and raw materials



# SAVING HEAT INVESTMENTS



60 kWh/year

Install radiator reflectors



300 kWh/year

Insulate walls



1.4 kWh/year

Stop the losses in the heating system (pipe insulation etc.)



100 kWh/year

Automatic temperature controllers on radiators (thermostats)



360 kWh/year

Shorter waiting time for hot water



1900 kWh/year

Water saving shower heads (36 m<sup>3</sup> water/yr)



Aerators for water consumption



300 kWh/year

Draught proofing, Search the heat leaks and stop them



400 kWh/year

Insulate ceilings



400 kWh/year

Insulation to the ground/cold basement



1500 kWh/year

Regulate the heat



1200 kWh/year

Air heat recuperation (ventilation with air-air heat exchanger)



200 kWh/year

Change to well-insulating and tight windows, repair, draught-proof and add an extra layer of glass

## Install radiator reflectors



Radiator reflectors work on a very simple principle. Radiators radiate heat both into the room, and into the wall behind it. That heat can simply be lost to the outside, especially if walls are thin. Reflectors are installed behind the radiator and help prevent that heat from being lost by reflecting the heat back into the room.

### INVESTMENT

approximately 2€ per reflector.

### SAVING

60 kWh/year

## Insulate walls



Insulation of the walls by insulating materials reduces heat loss by walls and saves around 15-20% of a home's heat loss and gain.

### INVESTMENT

50€ / sq. m.

### SAVING

300 kWh/year



Stop the losses in the heating system (pipe insulation etc.)



Insulation of the pipeline leads to a reduction in energy losses on heat transport from boiler to consumer.

INVESTMENT

100€ / m

SAVING

1.4 kWh/year

Automatic temperature controllers on radiators (thermostats)



Installation of temperature controllers on radiators is the most efficient and accurate way of controlling the temperature in different rooms.

INVESTMENT

15€

SAVING

100 kWh/year

## Shorter waiting time for hot water



If you can reduce the pipe size or length between hot water tank and shower + hot water taps, maybe you can save quite a bit. If you can save just 30 seconds in waiting time with tap and shower open with 10 ltr water/min and you need hot water 4 times/day, you will save 20 ltr/day of hot water equal to 7 m<sup>3</sup>/year. This will save around 360 kWh/year.

INVESTMENT

40 €

SAVING

360 kWh/year

## Water saving shower heads



Low-flow shower heads use 5/minute instead of 10-20 liters/minute. Savings with a 10 min. shower is around 10min. x 10l = 100 ltr, in a year that is 36m<sup>3</sup>. Each m<sup>3</sup> of hot water, heated at 45 °C, takes 52 kWh to heat, and annual heat saving is 1900 kWh.

INVESTMENT

Cheapest  
10-20 €

SAVING

1900 kWh/year

## Aerators for water consumption



To reduce water consumption, install special faucet aerators, which saturate the water with air. Depending on the type of aerator, you can save up to 80% of water consumption and reduce heating costs accordingly.

INVESTMENT

8-10€

SAVING

up to 80% savings in water consumption and heating energy

## Regulate the heat



Change the regulation of the heat supply to be depending on the weather.

INVESTMENT

400 €

SAVING

1500 kWh/year

## Insulate ceilings



Insulation of the ceiling reduces heat loss by ceilings. It is more critical because air with high temperature moves to the top of the room, and heat loss by a ceiling is more than through a wall with equal square.

INVESTMENT

50€/ sq. m.

SAVING

400 kWh/year

## Insulation to the ground/cold



Insulation of the ground/cold basement reduces heat loss through a floor by around 15-20%.

INVESTMENT

60€ / sq. m.

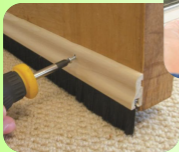
SAVING

400 kWh/year

## Draught proofing. Search the heat leaks and stop them



It is possible to decrease heat losses through a roof without insulating all square meters of the roof. Heat losses often concentrate in some little areas, and insulating only those specific areas can reduce heat losses significantly. Different draught-proofing methods that can be employed within a home are the following: window insulation strips, replacement of an exterior door, door insulation strips, fixing a crack in the wall, filling a hole around pipes.



### INVESTMENT

Costs vary depending  
on the scale

### SAVING

300 kWh/year

## Air heat recuperation (ventilation with air-air heat exchanger)



An air heat recuperator is equipment for using inside air heat for heating ventilation air. With a recuperator, heat consumption for ventilation can be much lower.

### INVESTMENT

500 € equipment  
+ 150€ - installation

### SAVING

1200 kWh/year

Change to well insulating and  
tight windows, repair,  
draught-proof and add extra layer  
of glass



It is possible to decrease heat losses without window replacement but only by repairing the window and minimizing air leaks.

### INVESTMENT

100€

### SAVING

200 kWh/year

## SELNEE PROJECT

This Catalogue of local solutions on what you can do to save electricity and heat and to use renewable energy is made in the framework of the "Civil Society for Sustainable Energy - Local to National in Eastern Europe" in short SELNEE Project in 2020-21. The Project is an NGO Cooperation across the INFORSE-Europe network in Belarus, Ukraine and Denmark.

The objectives of the SELNEE Project is promoting climate action and transition to sustainable energy in Eastern Europe in general and in particular in Ukraine and Belarus. The project shall directly contribute to the following SDGs: Reduce greenhouse gas emissions in sustainable ways (SDG13), Increase renewable energy and energy efficiency as well as providing people that lack it today with affordable energy (SDG7), Increase jobs in green solutions (SDG8), partnership between CSOs, local CBO's, municipalities, and other stakeholders (SDG17). This will in turn contribute to other SDG's such as poverty reduction (SDG1) with more affordable energy and job creation.

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The Project's Partners are Nordic Folkecenter for Renewable Energy, Renewable Energy Agency (Ukraine), Center for Environmental Solutions (Belarus), and INFORSE-Europe Secretariat.