



# POWERPOOR

Empowering Energy Poor Citizens through Energy Cooperative Initiatives

**MODULE 2 - Working on the ground with energy-poor households and policymakers on lowering energy poverty levels**

**DOOR, INZEB, NTUA**





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# Module 2 – Structure and content

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## Module 2 – Goals

-  To identify the types of energy poverty alleviation policies and measures adopted by different stakeholders, with emphasis on their results and benefits for citizens facing energy poverty episodes
-  To provide trainers, supporters and mentors information, tips and tools to improve Household Energy Performance

## PART I: European energy poverty alleviation policies

1. Types and categories of energy poverty alleviation policies

2. Key energy poverty alleviation policies at the EU level

3. Summary of all national policies + case studies/actions/best practices from partners

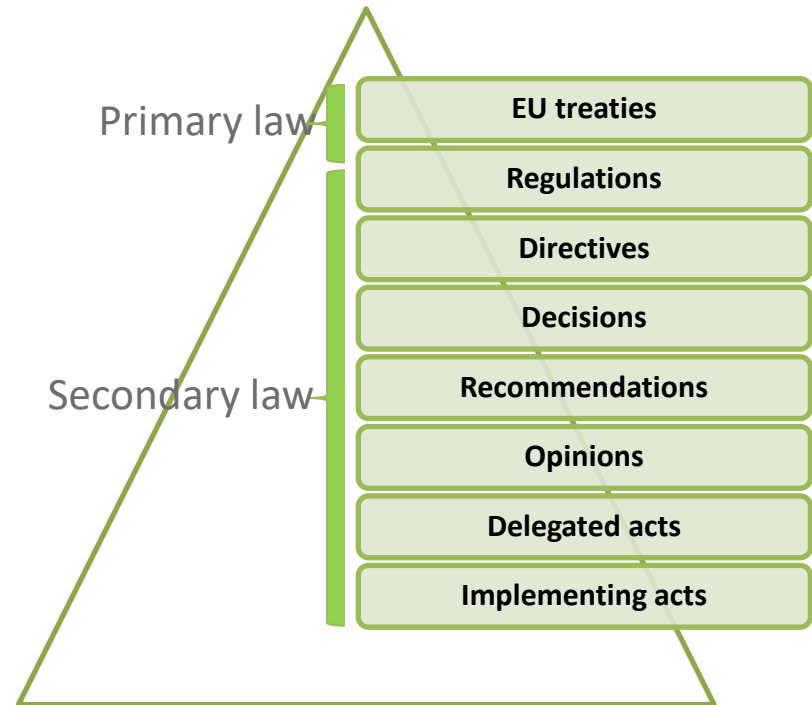
## PART I: EU energy poverty alleviation policies

### 1. Types and categories of energy poverty alleviation policies

The rule of law is one of the fundamental values of the European Union. This means that every action taken by the EU is based on treaties that have been democratically approved by its members.

EU laws help the Union achieve objectives established in EU treaties and put EU policies into practice. There are two main types of EU laws:

- ✓ **Primary and secondary laws**
- ✓ **Legislative and non-legislative acts**

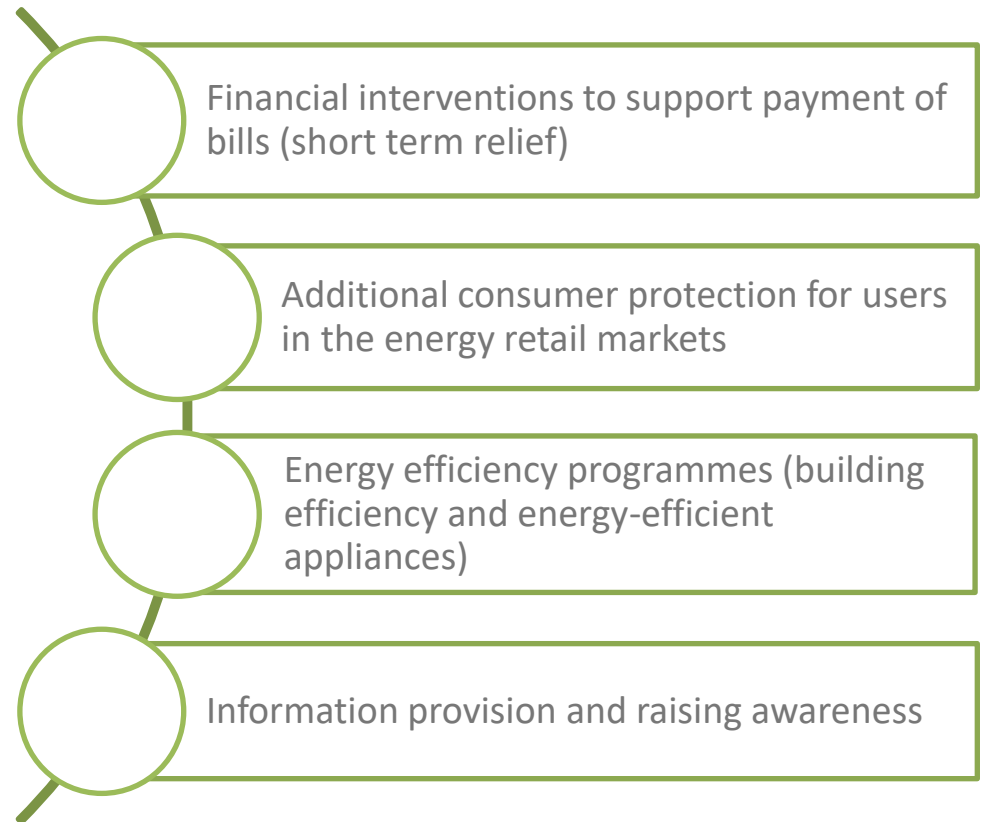


## PART I: EU energy poverty alleviation policies

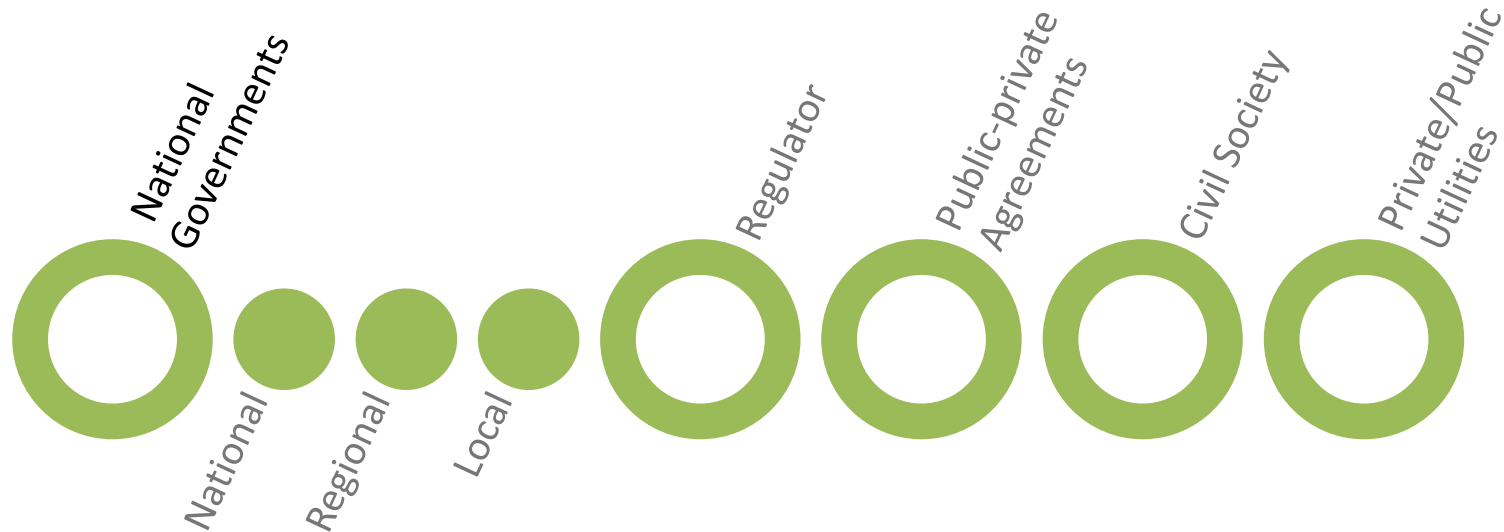
### 1. Types and categories of energy poverty alleviation policies

#### Energy Poverty Handbook (2016)

**POLICIES** are reflected in  
different types of measures



## PART I: EU energy poverty alleviation policies



*Key stakeholders implementing policy measures on a national level in alignment with national and EU policy frameworks*

Source: <http://bpie.eu/wp-content/uploads/2016/11/energypovertyhandbook-online.pdf>

## PART I: EU energy poverty alleviation policies

### 2. List of energy poverty alleviation policies at the EU level

#### Directive (EU) 2019/692 Internal Market for Natural Gas Directive

States that “**energy poverty** is a problem and Member States should take action”

#### Directive (EU) 2018/2002 on energy efficiency

“When designing the measures to fulfil energy saving objectives, Member States should take into account the need to **alleviate energy poverty** in accordance with criteria established by them, and they shall include information about the outcome of measures to alleviate energy poverty”

#### Directive (EU) 2018/844 on energy performance of buildings

“Member States must outline relevant national measures to help **alleviate energy poverty**, as part of their long-term renovation strategies to support the renovation of the national stock of residential and non-residential buildings”

#### Regulation (EU) 2018/1999. Governance of the Energy Union and Climate Action

“MS must include an objective of energy poverty alleviation in their National Energy and Climate Action Plans (NECPs)”

Source: <https://eur-lex.europa.eu/homepage.html>





## PART I: EU energy poverty alleviation policies

### 2. List of energy poverty alleviation policies at the EU level

#### Directive (EU) 2019/944 Internal market for electricity

Policy plans and measures to **alleviate energy poverty** and ensure that vulnerable consumers have access to energy in critical periods

#### Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources

Empowering jointly acting renewables self-consumers also provides opportunities for renewable energy communities to advance energy efficiency at household level and helps fight energy poverty through reduced consumption and lower supply tariffs. Member States should take appropriate advantage of that opportunity by, inter alia, assessing the possibility to enable participation by households that might otherwise not be able to participate, including vulnerable consumers and tenants.

#### Renovation Wave (Area of intervention 6)

“Using renovation as a lever to address **energy poverty** and access to healthy housing for all households (...). The Commission will launch an Affordable Housing Initiative for 100 lighthouse project and will examine whether and how the EU budget resources alongside EU Emissions Trading System (EU ETS) revenues could be used to fund national energy efficiency and savings schemes.”

Source: <https://eur-lex.europa.eu/homepage.html>



## PART II: Energy poverty alleviation actions

### 1. Croatia - Policies

Key national policies	Name of policy affecting energy poverty	Coordinating authority	Short description	Category
Energy Act (Official Gazette, No. 120/12, 14/14, 102/15, 68/18)	Regulation on the monthly allowances for vulnerable energy customers, the manner of participation in reimbursement of the energy costs of the beneficiary and the actions of the competent social welfare centres (Official Gazette, number: 102/2015)	Minister of Labor, Pension System, Family and Social Policy	<ul style="list-style-type: none"> <li>Co-financing of electricity costs to a maximum of 200 HRK per month (26,39 euro per month)</li> <li>solidarity fee paid by electricity customers from the household category in the amount of 0.03 HRK for each kWh of electricity consumed</li> </ul>	<p>Additional consumer protection</p> <p>Financial interventions</p>
Energy Act (Official Gazette, No. 120/12, 14/14, 102/15, 68/18)	Regulation on the criteria for acquiring the status of vulnerable energy customers from networked systems (Official Gazette, number: 120/12, 14/14, 95/15, 102/15, 68/18)	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>Definition of the status of “vulnerable customer”</li> </ul>	Additional consumer protection
Energy Act (Official Gazette, No. 120/12, 14/14, 102/15, 68/18)	Regulation on the criteria for acquiring the status of a protected customer in conditions of crisis in gas supply (Official Gazette, number: 65/2015)	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>Definition of “protected customer”</li> <li>Regulation to protect certain categories of end users of gas in crisis in gas supply → required quantities of gas for all protected customers and allocates them to suppliers</li> </ul>	Additional consumer protection

Source: <https://www.zakon.hr/>



## PART II: Energy poverty alleviation actions

### 1. Croatia - Policies

Key national policies	Name of policy affecting energy poverty	Coordinating authority	Short description	Category
Energy Act (Official Gazette, No. 120/12, 14/14, 102/15, 68/18)	2015 Agreement of Cooperation in Combating Energy Poverty Measures	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>The agreement on cooperation in measures to combat energy poverty by which HEP took over the costs of solidarity compensation, was established by agreement between the Government of the Republic of Croatia and suppliers and may expire at any time</li> </ul>	Additional consumer protection
Electricity Market Act (Official Gazette, Nos. 22/13, 102/15, 68/18, 52/19)	Decision on the amount of the fee for the use of space used by production plants for the production of electricity (Official Gazette, No. 84/2013, 101/2013, 72/2015)	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>Owners of production plants for electricity production are obliged to pay compensation to the premises where power plants are built to local self-government units →municipalities and cities, which should be used for social welfare programs</li> </ul>	Financial interventions
Energy Efficiency Act (Official Gazette, No. 127/14, 116/18, 25/20)	Regulation on the obligation system of energy efficiency (Official Gazette, No. 41/2019)	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>The fee for vulnerable energy customers (in accordance with the regulation on social welfare) is increased by 20% for an energy-saving customer or 10% for residential energy-saving customer</li> </ul>	Financial interventions



## PART II: Energy poverty alleviation actions

### 1. Croatia - policies

Key national policies	Name of policy affecting energy poverty	Coordinating authority	Short description	Category
Social Welfare Act care (OG 157/13, 152/14, 99/15, 52/16, 16/17, 130/17, 98/19)	The Guaranteed Minimal Support programme (Social Welfare Act (Official Gazette, number: 157/13, 152/14, 99/15, 52/16, 16/17, 130/17, 98/19, 64/20, 138/20)	Minister of Labour, Pension System, Family and Social Policy	<ul style="list-style-type: none"> <li>The right to financial assistance for a single person or a household to meet their basic living needs</li> </ul>	Additional consumer protection Financial interventions
Social Welfare Act care (OG 157/13, 152/14, 99/15, 52/16, 16/17, 130/17, 98/19)	Decision on the basis for calculating the amount of the minimum fee (Official Gazette, No. 157/2013)	Minister of Labor, Pension System, Family and Social Policy	<ul style="list-style-type: none"> <li>guaranteed minimum financial assistance → 800.00 HRK (107 EUR)</li> <li>single parent → 100% (800.00 HRK) for an adult member of the household → 60% (480.00 HRK = 64 EUR) for a child → 40% (320.00 HRK = 43 EUR) and for a child of a single parent → 55% (440.00 HRK = 59 EUR)</li> <li>single person or household - using wood for heating (3 m<sup>3</sup> of wood or approved monetary amount to cover that cost)</li> </ul>	Additional consumer protection Financial interventions
Act on Write-Off of Debts to Natural Persons (Official Gazette, No. 62/2018)	/	Croatian Electricity Company (HEP)	<ul style="list-style-type: none"> <li>writes off debts to persons up to the maximum amount of debt of HRK 5,000</li> </ul>	Additional consumer protection Financial interventions

Source: <https://www.zakon.hr/>



## PART II: Energy poverty alleviation actions

### 1. Croatia - policies

Key national policies – future strategy and actions plans	Name of policy affecting energy poverty	Coordinating authority	Short description	Category
Long-term strategy for the renovation of the national building stock until 2050	Programme of energy renovation of family houses 2014 – 2020 - programme is planned to continue according to the Energy Renovation Programme for Single-family Houses 2021-2027	Environmental Protection and Energy Efficiency Fund	<ul style="list-style-type: none"> <li>Public Call in 2020: Public call for citizens at risk of energy poverty</li> <li>there will be a new Program for the energy renovation of family houses from vulnerable groups of citizens from 2021-2027</li> </ul>	Energy efficiency programmes
Long-term strategy for the renovation of the national building stock until 2050	Programme of energy renovation of multi-apartment buildings for the period 2014 – 2020 – programme is planned to continue according to the Energy renovation programme for multi-apartment buildings 2021-2027	Environmental Protection and Energy Efficiency Fund	<ul style="list-style-type: none"> <li>the Program lacks concrete measures to meet the needs of energy-poor citizens in the energy renovation of apartment buildings</li> </ul>	Energy efficiency programmes
Climate Change and Ozone Protection Act (Official Gazette, No. 127/19)	Act establishes a <u>new plan</u> for the use of funds obtained from the sale of emission allowances.	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>measures to combat energy poverty will be co-financed with funds obtained from the sale of emission allowances through auctions</li> </ul>	Ministry of Economy and Sustainable Development

Source: <https://www.zakon.hr/>



## PART II Energy poverty alleviation actions

### 1. Croatia - policies

Key national policies – future strategy and actions plans	Name of policy affecting energy poverty	Coordinating authority	Short description	Category
Energy development strategy of the Republic of Croatia until 2030 with a view to 2050 (Official Gazette, No. 25/2020)	Energy Poverty Reduction Program until 2026	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>no active policy</li> <li>it is planned to implement energy efficiency measures in 50,000 households</li> </ul>	Financial interventions Energy efficiency programmes
Integrated National Energy and Climate Plan for the Republic of Croatia for the period from 2021 to 2030 (NECP)	Program to combat energy poverty, which includes the use of renewable energy sources in residential buildings in assisted areas and areas of special state concern for the period 2019-2021	Ministry of Economy and Sustainable Development	<ul style="list-style-type: none"> <li>currently there is no public information available on the stage of development of this Program</li> </ul>	Financial interventions Energy efficiency programmes



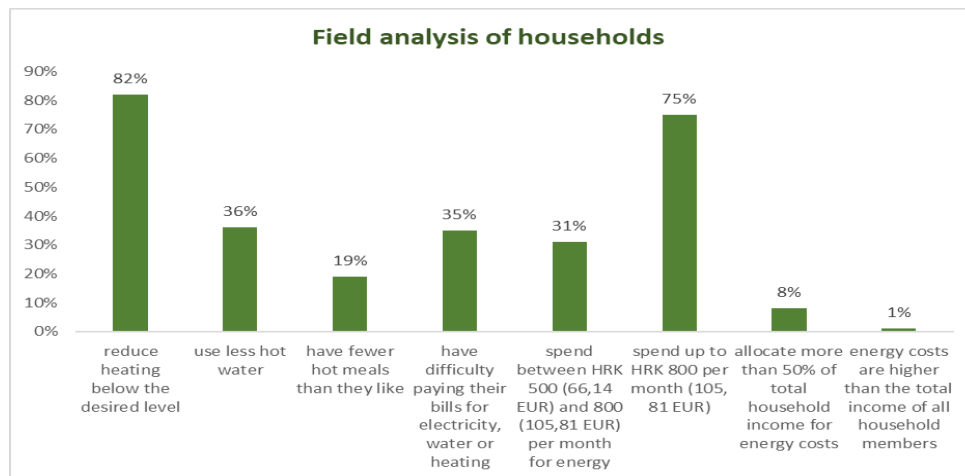
## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/ actions/best practices

CASE STUDY	ENERGY POVERTY ACTION FER (Fair Solutions for Better Community)	LOCATION
		Zagreb, Croatia
DESCRIPTION	<ul style="list-style-type: none"> <li>Project implementation period: 03/2018.-03/2020</li> <li>Budget: - 1.167.759,73 HRK (154.090,43 EUR)</li> <li>Partners: DOOR, Faculty of Electrical Engineering and Computing, University of Zagreb and City of Zagreb</li> <li>Stakeholders: students, professors, NGOs, energy poor citizens</li> <li>Source of funding: European Social Fund (ESF) and State Budget (UZUVRH)</li> <li>Description: investigating energy consumption habits in energy-poor households, implementing energy efficiency measures, educating energy advisors</li> </ul>	
SOLUTION	<ul style="list-style-type: none"> <li>A methodology has been developed for the systematic engagement of associations as a subject in college</li> <li>A policy proposal has been made for the City of Zagreb to combat energy poverty</li> <li>Developed a model for calculating energy consumption</li> </ul>	
IMPACT	<ul style="list-style-type: none"> <li>Students performed energy audits of 102 energy-poor households in the City of Zagreb and installed energy-saving equipment</li> <li>identification of a vulnerable customers</li> </ul>	



Source: <https://door.hr/portfolio/fer-rjesenja-za-bolju-zajednicu/>



## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION Na sunčanoj strani - “On the sunny side”	LOCATION Croatia
DESCRIPTION	<ul style="list-style-type: none"> <li>• Consumer cooperative organized by the Green Energy Cooperative (ZEZ)</li> <li>• Local equipment manufacturers, suppliers, and installers</li> <li>• Small solar power plant that will suit citizens’ needs and capabilities.</li> <li>• Solar energy used primarily to supply household electricity needs (net metering)</li> <li>• Improving the status of renewables in Croatia</li> </ul>	
SOLUTION	<ul style="list-style-type: none"> <li>• 1000 solar power plants installed onto roofs by the beginning of 2022</li> <li>• Average power of 3-6 kW</li> <li>• Average price of 1330 EUR/kW (design, equipment, transport, instalment)</li> <li>• Lower price and less complicated procedure due to „One-stop shop” solution</li> </ul>	
IMPACT	<ul style="list-style-type: none"> <li>• Reduced energy consumption</li> <li>• Lower household electricity costs</li> <li>• CO2 emissions reduction from energy savings</li> </ul>	



Source: <https://www.nasuncanojstrani.hr/>



## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION REACH - Reduce Energy use And Change Habits	LOCATION Bulgaria, Croatia, North Macedonia, Slovenia
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• Contributing to energy poverty abatement at practical and structural levels</li> <li>• Empowering energy-poor households to take actions to save energy and change their habits,</li> <li>• Establishing energy poverty as an issue that demands structural solutions at local, national and EU levels</li> <li>• Implementing project activities at national level (investigating energy consumption habits in energy-poor households, implementing energy efficiency measures, educating energy advisors)</li> <li>• Participating in EU-level activities (international conferences, public policy advocacy)</li> </ul>	
<b>SOLUTION</b>	<ul style="list-style-type: none"> <li>• Established overview of fuel poverty for 4 countries</li> <li>• Local workshops for local actors, trainings for teachers and trainings for energy advisors</li> <li>• Implemented 1600 visits of households with tailor-made advice, package of energy saving devices, guidebook and post-visit support</li> </ul>	
<b>IMPACT</b>	<ul style="list-style-type: none"> <li>• 20 local actors engaged in local actions, 20 trained teachers and 250 trained energy advisors</li> <li>• 3200 hours of energy audits, 3200 hours of energy advising, 4800 installed EE devices,</li> <li>• Savings of 1280 t CO<sub>2</sub>,</li> <li>• 768 toe of energy and 512.000 EUR</li> <li>• Recommendations reach out to at least 160 decision makers and about 400.000 people, engaging the decision-makers in triggering policies and measures for fuel poverty</li> </ul>	

Source: REACH – Reduce Energy use And Change Habits (door.hr)

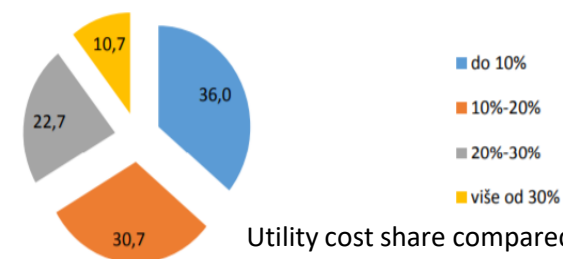


## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION Znanjem do toplog doma „Through knowledge to warm home”	LOCATION Sisačko-Moslavačka County, Croatia
DESCRIPTION	<ul style="list-style-type: none"> <li>• Goal: to initiate an innovative social service - energy consultancy for poor households - and enable energy-poor households to save energy and change their habits.</li> <li>• Project implementation period: 02/2012-04/2016</li> <li>• Budget: ~102.572 EUR</li> <li>• Partners: DOOR (project coordinator), City of Petrinja, Youth society „Novi Svijet” (Luščani)</li> <li>• Source of funding: European Social Fund, Croatian national budget</li> </ul>	
SOLUTION	<ul style="list-style-type: none"> <li>• The implementation of the described activities aimed to focus on energy poverty as a problem that requires tailor-made policies and measures at local, national and EU levels due to the high prevalence of energy-poor households in Sisak-Moslavina County</li> </ul>	
IMPACT	<ul style="list-style-type: none"> <li>• Educational activities conducted on energy poverty and energy efficiency</li> <li>• Report on energy poverty in Sisačko Moslavačka County, public policy analysis</li> <li>• Organized meetings between local government and local NGOs focused on energy poverty</li> <li>• Simple energy audits conducted in 80 households, data collection</li> <li>• Recommendations issued to consider energy poverty in local energy and social policies</li> <li>• Public discussion and round table conducted</li> </ul>	

Source:  
<https://door.hr/portfolio/znanjem-do-toplog-doma/>



Utility cost share compared to household income



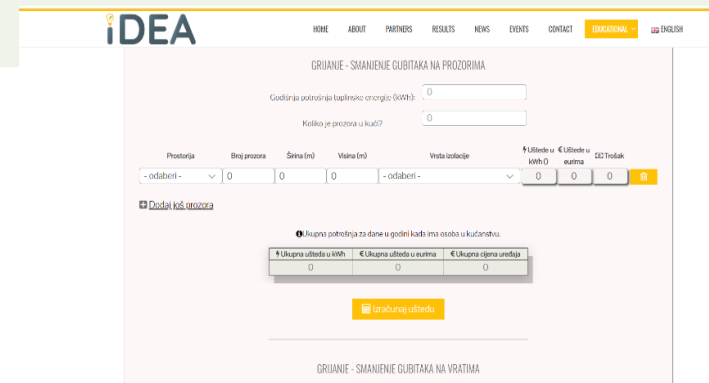
## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION IDEA - Innovative Direction in Energy Advising	LOCATION
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• Project implementation period: 11/2017-11/2019</li> <li>• Budget: 134.598 EUR</li> <li>• Stakeholders: NGOs and energy poor citizens</li> <li>• Source of funding: Erasmus+</li> <li>• Description: IDEA was a project that aimed to decrease energy poverty by implementing an educational platform for energy awareness.</li> </ul>	Slovenia, Bulgaria, Croatia, Cyprus
<b>SOLUTION</b>	<ul style="list-style-type: none"> <li>• educational programme with a curriculum for adult education about energy poverty</li> <li>• a set of innovative educational materials (tools, methods, practices, initiatives,...) defined in the curriculum</li> <li>• a guide to accompany the curriculum and to help interested stakeholders to implement it - complemented by video tutorials for each tool and an overview webinar in each country</li> <li>• a website (<a href="http://www.project-idea.eu/">http://www.project-idea.eu/</a>) to allow access</li> <li>• to all the educational materials and guidance</li> </ul>	
<b>IMPACT</b>	<ul style="list-style-type: none"> <li>• a tool for future simple energy audits</li> </ul>	



Source: <http://www.project-idea.eu/>

**IDEA** HOME ABOUT PARTNERS RESULTS NEWS EVENTS CONTACT **SRK/ITALIA** ENGLISH

GRUJANJE - SMANJENJE GUBITAKA NA PROZORIMA

Godišnja potrošnja toplinske energije (GWh):

Koliko je prozora u kući?

Prostorja	Broj prozora	Širina (m)	Visina (m)	Vrsta izolacije	Uštede u kWh	Uštede u eurima	CO2 trošak
- odaberi -	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	- odaberi -	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Dodaj još prozora

Kupna potrebnja za dane u godini kada ima osoba u kućanstvu.

Ukupna ušteda u kWh	Ukupna ušteda u eurima	Ukupna štednja uređaja
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GRUJANJE - SMANJENJE GUBITAKA NA VRATIMA



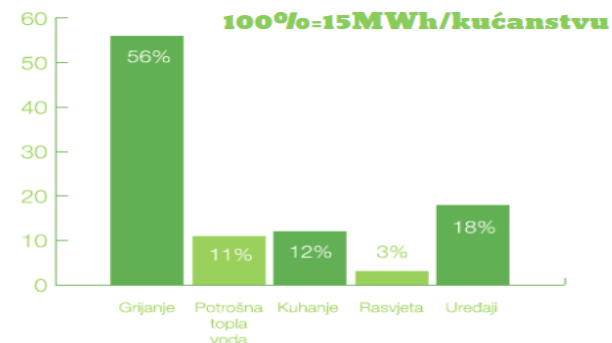
## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION Together to more comfortable housing 1-4	LOCATION Zagreb, Croatia
DESCRIPTION	<ul style="list-style-type: none"> <li>Project implementation period: 2016-2020</li> <li>Budget: 11.200 EUR (over 4 years)</li> <li>Partners: Local NGOs working with vulnerable citizens</li> <li>Source of funding: City of Zagreb, Social protection and disability fund</li> <li>Description: Project is focused on visits to energy poor households in city of Zagreb. Project has been renewed for 4 consecutive years, with specific vulnerable groups addressed every year. For example, women-only households or homes from disabled people.</li> </ul>	
SOLUTION	<ul style="list-style-type: none"> <li>Household visits consist of acquiring data, giving advice on energy efficiency and giving out small energy efficiency aid packs (LED bulbs, sealants for windows...).</li> </ul>	
IMPACT	<ul style="list-style-type: none"> <li>~10 households visited each year</li> <li>Reduced energy consumption (not quantified)</li> <li>Increased quality of life (not quantified)</li> <li>Policy recommendations to the city administration to address energy poverty affecting vulnerable citizens</li> </ul>	



Energy efficiency aid packs



Slika 1. Prikaz potrošnje energije u tipičnom kućanstvu<sup>2</sup>

## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION ENPOR – Action to Mitigate Energy Poverty in the Private Rented Sector poverty	LOCATION Velika Gorica, Croatia
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• Project implementation period: 09/2020-09/2023</li> <li>• Budget: 1.999.966,25 EUR</li> <li>• Source of funding: HORIZON 2020</li> <li>• Partners: Netherlands, Germany, Belgium, United Kingdom, Greece, Croatia, Italy, Estonia and Austria</li> <li>• Description: The general objective of the ENPOR project is to draw attention to energy poverty in the private rental sector (PRS), taking into account the needs of landlords and tenants and to include them in the wider political context</li> </ul>	
<b>SOLUTION</b>	<ul style="list-style-type: none"> <li>• an assessment of the extent of the energy poverty problem in the PRS at the EU level</li> <li>• supporting the development of policies tailored to the specific needs of households in the PRS</li> <li>• Pilot city Velika Gorica → Target so-called free – based tenancy, which always includes two separate families/households in the same dwelling. This subgroup has not been targeted yet and rented apartments were mainly out of policy focus due to lack of information.</li> </ul>	
<b>IMPACT (expected)</b>	<ul style="list-style-type: none"> <li>• highlighted innovative and "win-win" ways to increase energy efficiency for vulnerable households in the PRS with special emphasis on creating synergies between landlords and tenants and sustainable solutions</li> <li>• establishment of a REACT group to enable the exchange of local and national knowledge on energy poverty in the PRS at EU level</li> </ul>	

## PART II: Energy poverty alleviation actions

### 3. Croatia - active energy poverty projects

CASE STUDY	ENERGY POVERTY ACTION EmpowerMed– Empowering women to take action against energy poverty	LOCATION Zadar, Croatia
DESCRIPTION	<ul style="list-style-type: none"> <li>• Project implementation period: 09/2019-09/2023</li> <li>• Budget: 1.982.150 EUR</li> <li>• Source of funding: HORIZON 2020</li> <li>• Partners: Slovenia, Croatia, Italy, Spain; France, Germany, Albania</li> <li>• Description: The main objective of the project is to contribute to energy poverty abatement in the Mediterranean</li> </ul>	
SOLUTION	<ul style="list-style-type: none"> <li>• implementing a set of practical energy efficiency and RES measures, tailored to empower households in energy poverty and specifically focused on women and health</li> <li>• assessing their efficiency and impacts to formulate policy recommendations</li> <li>• promoting policy solutions among key actors for stimulating action against energy poverty at local and EU level.</li> </ul>	
IMPACT (expected)	<ul style="list-style-type: none"> <li>• 10,200 participants empowered to fight energy poverty in 6 pilot areas</li> <li>• Primary energy savings - 6.5 GWh/yr, CO2 emission reduction 1.600 tCO2/yr</li> <li>• 160.000 € investment in sustainable energy, 780.000 € wider economic savings</li> <li>• 50 women and men freed of debt or disconnection from power grid</li> <li>• At least 60% women participating in project activities</li> <li>• Public policy and best practices advocacy to fight energy poverty</li> </ul>	



Source: [www.empowermed.eu/](http://www.empowermed.eu/)  
[www.powerpoor.eu](http://www.powerpoor.eu)



## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION SocialWatt	LOCATION Croatia
<b>DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• Project implementation period: 09/2019-09/2022</li> <li>• Budget: 1.998.297,50 EUR</li> <li>• Partners: EU (Greece, Netherlands, Belgium, Austria, Romania, France, Spain, Ireland, Latvia, Croatia, Italy)</li> <li>• Source of funding: HORIZON 2020</li> <li>• Description: SocialWatt will develop and provide utilities and energy suppliers with appropriate tools for effectively engaging with their customers and working together towards alleviating energy poverty</li> </ul>	
<b>SOLUTION</b>	<ul style="list-style-type: none"> <li>• SocialWatt will also enable obligated parties under Article 7 of the Energy Efficiency Directive across Europe to develop, adopt, test and spread innovative energy poverty schemes</li> </ul>	
<b>IMPACT (expected)</b>	<ul style="list-style-type: none"> <li>• Identify energy poor households</li> <li>• Develop innovative schemes to alleviate energy poverty</li> <li>• Build the capacity of utilities, energy suppliers and social services</li> <li>• Implement the schemes to alleviate energy poverty</li> <li>• Replicate the project's outcomes and provide policy recommendations</li> </ul>	

#### SocialWatt Tools



#### Energy poverty in the SocialWatt targeted countries



## PART II: Energy poverty alleviation actions

### 2. Croatia - case studies/actions/best practices

CASE STUDY	ENERGY POVERTY ACTION ENGAGER - European Energy Poverty: Agenda Co-Creation and Knowledge Innovation	LOCATION
DESCRIPTION	<ul style="list-style-type: none"> <li>• Project implementation period: 2017-2021</li> <li>• Source of funding: The COST Association</li> <li>• Research network funded via the European <u>Co-operation in Science and Technology (COST)</u> scheme</li> </ul>	Croatia
SOLUTION	<ul style="list-style-type: none"> <li>• It is aimed at developing and strengthening an international community of researchers and practitioners focused on combating energy poverty</li> </ul>	
IMPACT (expected)	<ul style="list-style-type: none"> <li>• Involves currently more than 200 members from over 40 countries</li> </ul>	



Source: <http://www.engager-energy.net/>





## PART III: Household energy performance

1. Introduction: household energy consumption, terminology

2. Simple energy audit

3. Simple energy efficiency measures and practical tips

4. Understanding energy and electricity utility bills and costs

## PART III: Household energy performance

### 1. Introduction: household energy consumption, terminology

#### BASIC TERMS

Energy (kWh) = Power (kW) x time (h)

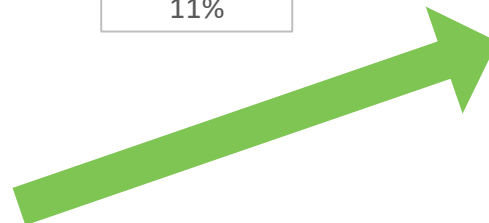
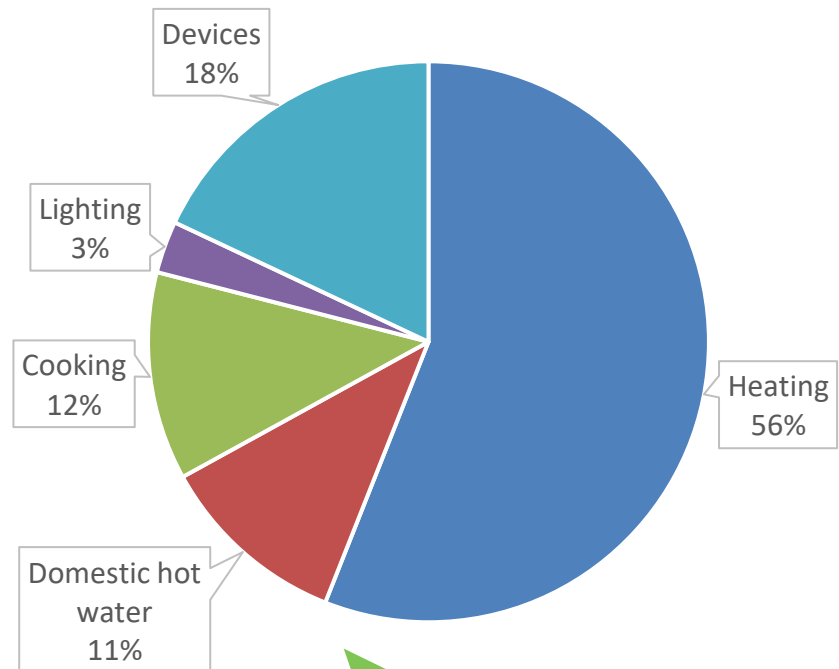
1kWh:

- 10W LED bulb x 100h (~4 days)
- 2kW electric water heater x 0.5h
  - Energy to heat 21l of water from 10C to 50C
- 2kW electric convection heater x 0.5h

The typical non-energy efficient home in Croatia consumes  
~250kWh/m<sup>2</sup>

**Why is it important to focus on heating when talking about energy efficiency?**

*Average household energy consumption in Croatia*



## PART III: Household energy performance

### 1. Introduction: household energy consumption, terminology

Most common heating sources of energy:

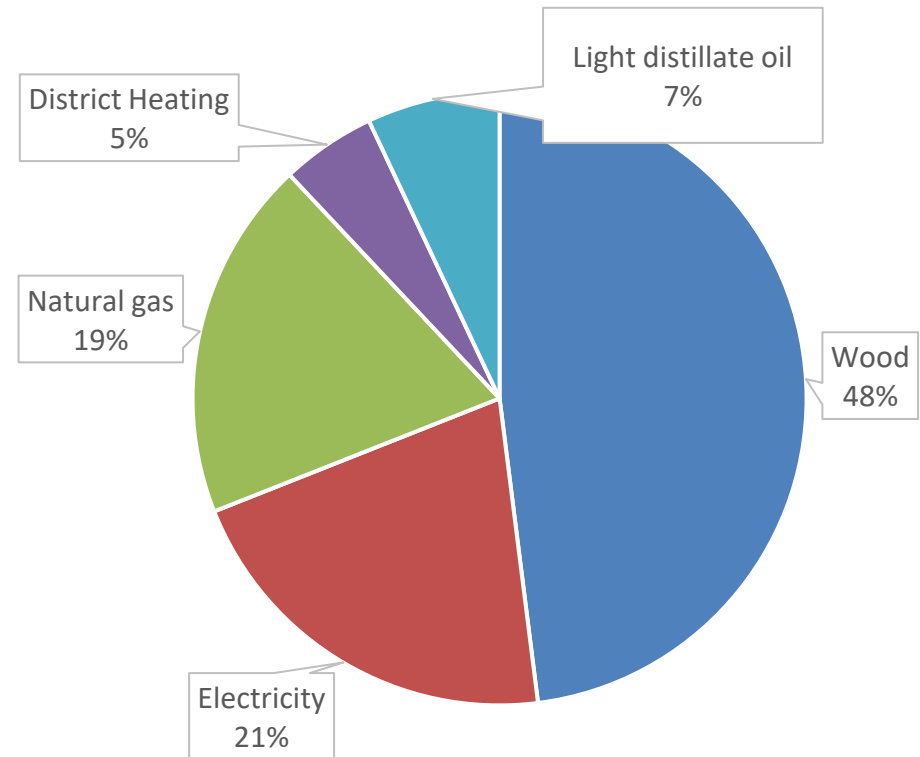
#### Wood

- Direct heating (stove, fireplace)
- Furnace connected to hot water tank + radiators

#### Electric

- Electric resistive heating
  - Convection heaters
  - Radiating heaters
  - Thermal storage heaters
- Air to air heat pumps – air conditioning devices

Heating distribution in Croatia (1)



(1) Program for using potential for efficiency in heating and cooling for 2016-2030

[https://ec.europa.eu/energy/sites/ener/files/documents/croatia\\_report\\_eed\\_art\\_141update\\_hr.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/croatia_report_eed_art_141update_hr.pdf)



## PART III: Household energy performance

### 1. Introduction: household energy consumption, terminology

Most common heating sources of energy:

#### Natural gas

- Typically furnace connected to hot water tank + radiators

#### District heating

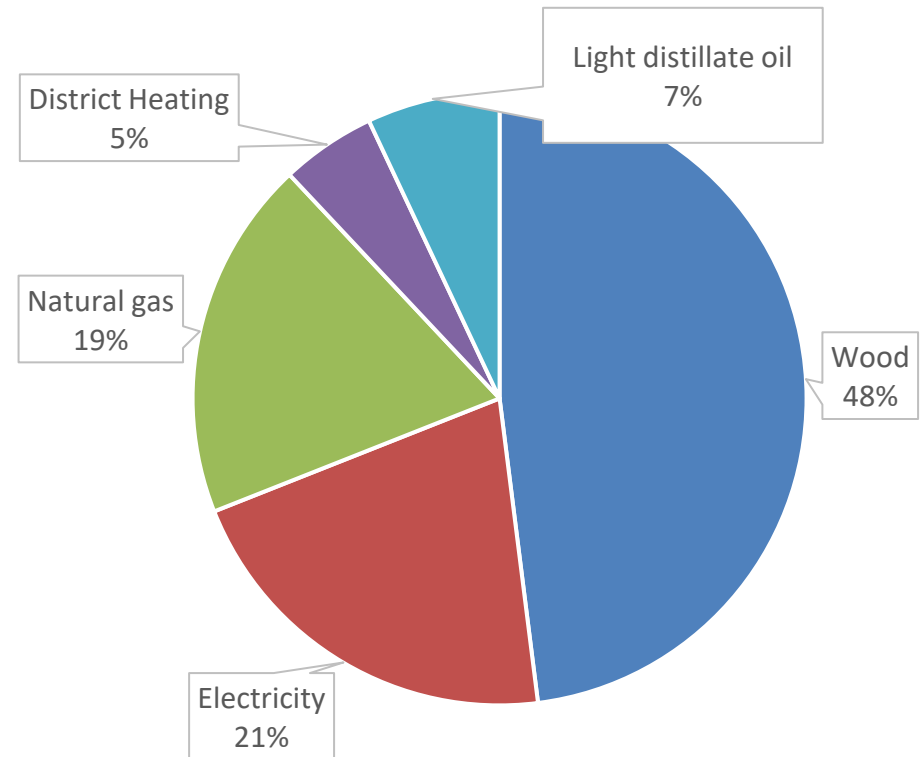
- Urban areas, apartment buildings
- Fuel source is typically fossil fuel

#### Light distillate oil &

#### Liquid Petroleum Gas (LPG)

- Typically furnace connected to hot water tank + radiators

Heating distribution in Croatia (1)



(1) Program for using potential for efficiency in heating and cooling for 2016-2030

[https://ec.europa.eu/energy/sites/ener/files/documents/croatia\\_report\\_eed\\_art\\_141update\\_hr.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/croatia_report_eed_art_141update_hr.pdf)



## PART III: Household energy performance

### 1. Introduction: Heating technology overview

	UNIT	COST	FEATURES	SAFETY
<b>Wood</b>	m3 for raw wood  Kg/ton for pellets	~0.03EUR/kWh  *important to use properly dried wood	<ul style="list-style-type: none"> <li>• Direct heating (stove in living space) or</li> <li>• Central heating (furnace + water distribution to radiators)</li> <li>• 1 „spatial meter of wood” =1575 kWh</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon monoxide (CO) suffocation risk if chimney is not regularly maintained</li> <li>• Fire hazard if stove is faulty</li> </ul>
<b>Electric – resistive</b>	kWh	Day: ~0.15EUR/kWh Night: ~0.8EUR/kWh	<ul style="list-style-type: none"> <li>• Simple to use</li> <li>• Thermal electric storage heaters taking advantage of lower tariff</li> </ul>	<ul style="list-style-type: none"> <li>• Fire hazard if devices are faulty or if heaters are covered</li> </ul>
<b>Electric – heat pump (Air-Air)</b>	kWh	Day: ~0.13EUR/kWh Night: ~0.7EUR/kWh	<ul style="list-style-type: none"> <li>• Coefficient of Performance 2.5-4: for 1kWh electricity, 2.5-4kWh thermal energy is pumped into indoor space.</li> <li>• Lower efficiency at lower outdoor temperatures</li> </ul>	<ul style="list-style-type: none"> <li>• Some devices cannot operate at low outdoor temperatures (-5C or lower)</li> </ul>

\* Reference values only, actual prices vary due to multiple factors



## PART III: Household energy performance

### 1. Introduction: Heating technology overview

	Unit	Cost	OTHER	SAFETY
<b>Natural gas</b>	m <sup>3</sup> /kWh	~0.04EUR/kWh	<ul style="list-style-type: none"> <li>Regulations allow only condensation boilers to be sold, which have higher requirements for chimneys. Customers often need chimney reconstruction and delay replacing old boilers</li> <li>1 m<sup>3</sup> = 9,4 kWh</li> </ul>	<ul style="list-style-type: none"> <li>Some gas boilers need minimal water pressure to operate properly, water reactors can cause issues</li> <li>Carbon monoxide (CO) suffocation risk if chimney is not regularly maintained</li> </ul>
<b>District heating</b>	kWh, kW, m <sup>2</sup>	~0.025EUR/kWh	<ul style="list-style-type: none"> <li>Confusing billing methods reduced customer trust in district heating schemes</li> </ul>	
<b>Heating oil &amp; LPG</b>	Liters, kg	~0.07EUR/kWh	<ul style="list-style-type: none"> <li>Local storage tank required</li> <li>1 L heating oil = 11,86 kWh</li> <li>1 kg LPG= 13,73 kWh</li> </ul>	<ul style="list-style-type: none"> <li>Fire hazard due to storage of flammable fuel</li> </ul>

\* Reference values only, actual prices vary due to multiple factors



## PART III: Household energy performance

### H1. Introduction: Building thermal envelope

#### Thermal insulation

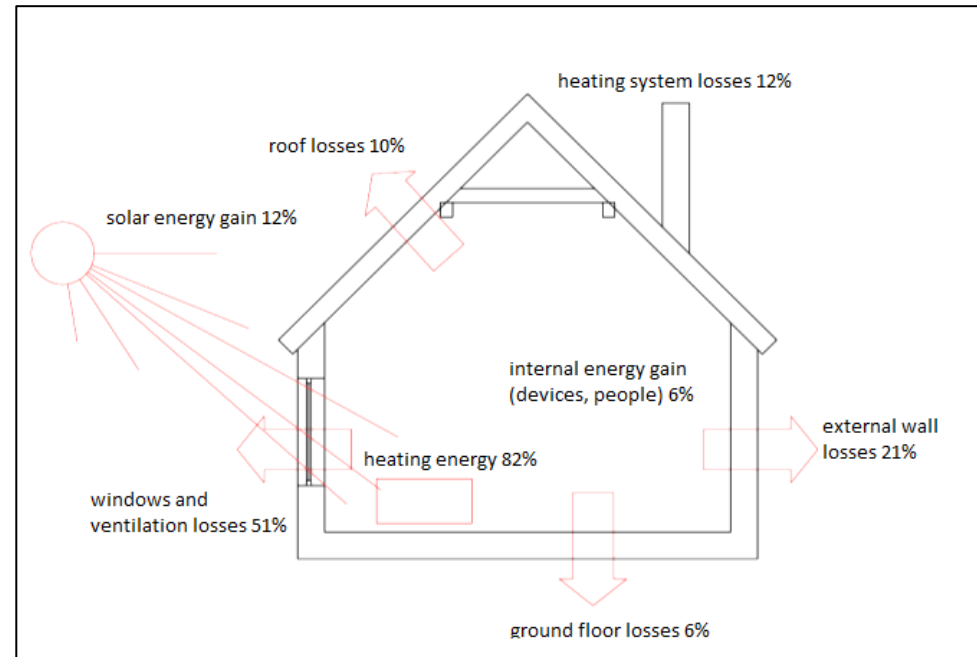
- Walls, roofs, windows, floors
- Important to avoid thermal bridges

#### Thermal mass

- More thermal mass indoors increases thermal inertia and makes the space more thermally passive
- E. g. solar thermal energy can be stored by the floor below the window

#### Heating system efficiency

- Regular maintenance is important for efficient heating system operation
- Correct temperature setpoint regulation can reduce energy consumption
- Is the heat distributed in equally or concentrated in one spot?



Reference values for thermal energy gains and losses / Source: REACH

#### Air-tightness

- Gaps on windows & doors cause drafts & thermal energy leaks
- Bathroom and kitchen extraction fans need non-return flaps to reduce draft

## PART III: Household energy performance

### 1. Introduction: Building thermal envelope

#### Geographic orientation

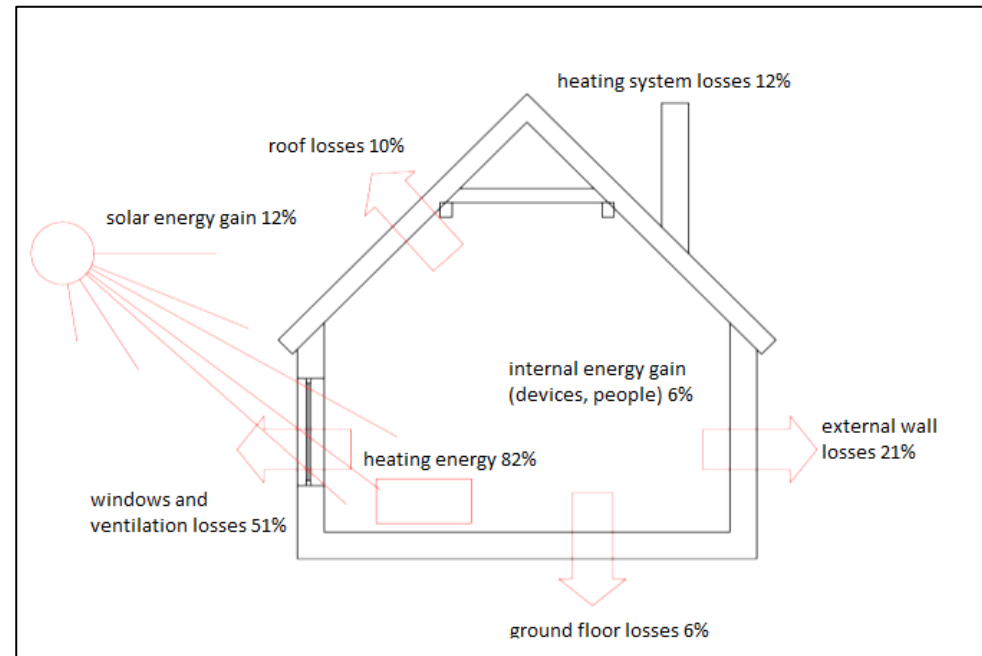
- Orientation towards south results in more solar energy gain
- Eaves above windows allow low angle winter sun to enter the windows, while keeping out high-angle summer sun

#### Shape / form factor

- Compact space distribution with minimal surfaces exposed to outside conditions result in less energy losses

#### Neighboring dwellings

- Walls shared with heated areas lose less energy



Reference values for thermal energy gains and losses / Source: REACH



## PART III: Household energy performance

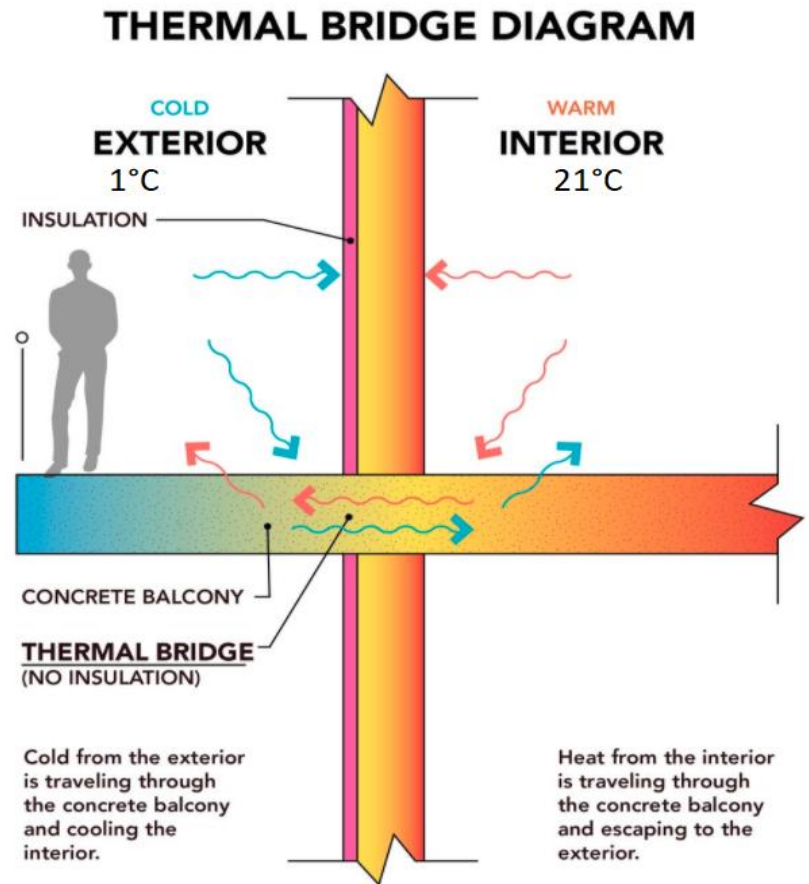
### 1. Introduction: Building thermal envelope

#### Thermal bridge

- Thermal conductive connection between interior and exterior of the building
- Non-insulated walls, concrete balconies

#### Water vapour, air tightness & mold

- 1 person can generate ~1.5kg water vapour per day
- Cooking, showering, drying clothes, dishwashing also generate water vapour
- If living space is air-tight and not ventilated, water remains trapped inside
- Mold often occurs on cold spots where water vapour condensates (thermal bridges)



<https://civilengineering4u.wordpress.com/2017/05/29/thermal-bridging/>

<https://www.isse.org.uk/articles/dampness>



## PART III: Household energy performance

### 2. Simple energy audit

Goal of the simple energy audit is to gather key information **to determine the existing energy situation** in the household.

After the audit, energy supporters should be able **to propose measures to reduce energy costs and increase quality of life.**

#### Checklist

Heating/cooling  
system

Energy  
performance  
of the building

Energy  
appliances

Energy  
behaviour

Safety  
considerations

Energy bill  
analysis

## PART III: 2. Simple energy audit

### Key steps

#### DATA COLLECTION

Find:

**Energy consumption** for heating, electricity, water (kWh, l.)

**Energy use:** heating types (gas, wood!, district heating, oil, electricity), electric devices (how many, stand-by consumption...)

**Energy performance of the building envelope:** insulation, outer walls, roof, chimney, thermal bridges.



#### ENERGY ANALYSIS

Define:

**Consumption patterns** (e.g. season, daily, monthly)

**Significant energy use** (will lead to best EE measure pay-off)

**Benchmarks** (using the latest energy performance indicators kWh/m<sup>2</sup>)



#### PRESENTATION OF RESULTS

Report to beneficiary

**Certification**



## PART III: Household energy performance

### 2. Simple energy audit

#### POINTS TO KEEP IN MIND

##### HEATING

- Heating type – gas/district heating/electricity/wood/pellets
- Positioning of heat emission devices in the living/working space – are heating devices close to cold walls that act as heat sinks? What is the heat distribution in the room?
- Heating system service periods

##### BUILDING ENERGY PERFORMANCE

- Wall composition from inside to outside with focus on thermal insulation and thermal mass properties; detection of potential thermal bridges
- Windows and doors – air tightness inspection, glass type (single/double/triple)
- Ventilation openings – air flow inspection in the kitchen and bathroom extraction fan openings



## PART III: Household energy performance

### 2. Simple energy audit

#### POINTS TO KEEP IN MIND

##### ENERGY BEHAVIOR

- What are the biggest “energy pain points”?
- Parts of the house/flat that feel cold
- Any activities that are avoided because of cold – e.g. sitting at the table for too long
- Body parts that feel cold – feet, hands, back
- Determine if there are any applicable government energy poverty alleviation schemes
- How long will the tenants live in the property?
- Any renovation needed/planned soon?

##### SAFETY

- State of the chimney - Carbon monoxide hazard
- Old electric heaters, obstructing airflow around heaters
- Electric installation (e.g. if high-power electric heaters are used)



## PART III: Household energy performance

### 2. Simple energy audit

#### USEFUL TOOLS



- Distance meter
- kWh meter
- Photo camera
- Infrared thermometer



## **PART III: Household energy performance**

### 2. Simple energy audit

#### **COMMUNICATION TIPS when performing household visits**

##### **BENEFICIARIES COULD BE:**

- Elderly people,
- People with various health problems (physical and mental): hearing or visually impaired, anxious, depressive.

##### **DO's and DONT's of household visit**

- First contact is important: smile, introduce yourself, make eye contact, shake hands (but be aware of COVID-19 measures!)
- Explain the purpose of the visit and what will happen during the visit.
- DO NOT enter the house prior to invitation!
- DO NOT enter the rooms without the presence of the beneficiary!
- Repeat that the energy visit is FREE of CHARGE, you are not selling anything!
- Up to 2 persons are optimal for the visit
- Adapt the communication based on beneficiary health status (hearing, vision, invalid person...)
- Leave contact details and inform them about the next steps
- Respect the dignity of the beneficiary, their home, privacy, values.
- DO NOT share private data with third persons (GDPR).
- Listen to the beneficiary patiently, but allow yourself to leave (if you have enough data, or if it is not comfortable for you).
- Inform mentor if any problem occurs.



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### How to save energy?

**REDUCE TOTAL ENERGY CONSUMPTION**  
but do not reduce comfort (improve it)

#### FIND SIGNIFICANT ENERGY USERS

- **Replace with EE**  
New A rating (2020) consumes up to 100 kWh less per year  
or
- **Reduce their operation time**  
Using timer for electric water heater

**FIND THERMAL BRIDGES or HOLES** like windows, entrance door, outer walls, ceiling toward non-heated attic

- **“Patch” them**  
Insulation strips, reflexive foils, thermal insulation

**USE NATURAL LIGHTING AND SUN RADIATION OPTIMALY** by adjusting room orientation

**PROTECT HOUSE FROM OVERHEATING IN SUMMER** by using blinds, eaves, trees on south side of the house

**Simple measures** will show quick results with small investment, but low impact.

**Optimal measure** is one with quick results, lower investment and higher impact

= **SHORT PAYBACK PERIOD**

ENERGY RENOVATION as a long-term approach





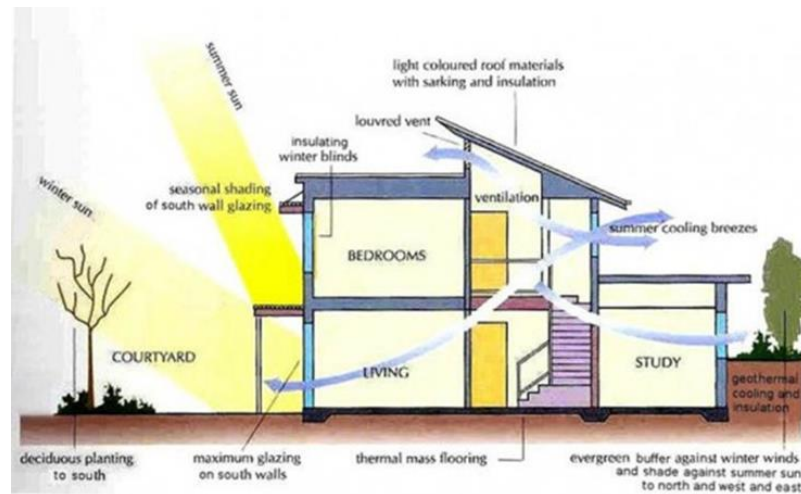
## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

EXAMPLE: Passive solar retrofit 250 kWh/m<sup>2</sup> to 15 kWh/m<sup>2</sup> annually

#### MAXIMIZE

- solar gain in heating season
- thermal insulation (cost effective!)
- use of wasted heat (heat exchangers)
- use of renewable sources



#### OPTIMIZE

- thermal mass (slows down temperature change!)

#### MINIMIZE

- solar gain in cooling season (no need for air conditions)
- air leaks (but allow fresh air to come in!)
- thermal bridges

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house  
250 kWh to 90 kWh per m<sup>2</sup>

LARGE investments

1. **THERMAL INSULATION** of outer envelope
2. EE windows and doors
3. **HEATING SYSTEM** renewed
4. **SOLAR THERMAL** system

SMALL and MEDIUM investments:

EE lighting, EE appliances, draft proofing, water saving devices

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### Outer envelope THERMAL INSULATION

MEASURE	INVESTMENT	PAYBACK PERIOD (YEARS)	EXPECTED LIFETIME (YEARS)
10 cm mineral wool on outer wall	30 Eur/m <sup>2</sup>	10-15 (depends on energy used)	50
20 cm mineral wool in roof	10 Eur/m <sup>2</sup>	3-5 (depends on energy used)	50

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### Outer envelope THERMAL INSULATION

- MOISTURE problems if material with **low vapour diffusion factor** is used
- **Good ventilation** is crucial
- THERMAL BRIDGES - High quality installation reduces risk of TB on windows, doors, roofs



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### Outer envelope THERMAL INSULATION



**Natural materials** increase sustainability by reducing embedded energy (recycled cellulose, sheep wool, straw bale)

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

ENERGY EFFICIENT windows and doors

U value – heat transfer coefficient: lower U – better insulation - higher price

MEASURE	INVESTMENT	PAYBACK PERIOD (YEARS)	EXPECTED LIFETIME (YEARS)
ENERGY EFFICIENT windows • PVC, alu, wood • U value less than 1,2 W/m <sup>2</sup> K)	200 - 300 EUR/m <sup>2</sup>	15-20 (depends on type installed and energy used)	50



## PART III: Household energy performance

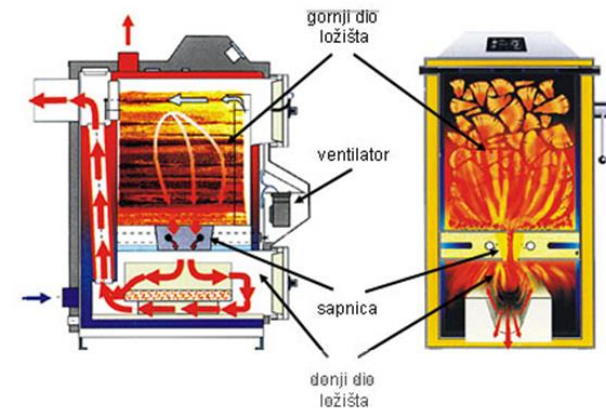
### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

HEATING SYSTEM – change of energy source from heating oil to biomass

MEASURE	INVESTMENT	ANNUAL ENERGY SAVINGS	PAYBACK PERIOD (YEARS)	EXPECTED LIFETIME (YEARS)
BIOMASS pirolitic instead of heating oil boiler	5800 EUR	2600 L oil	3-4	15
BIOMASS pelet instead of heating oil boiler	3000 EUR	2100 L	2-3	15

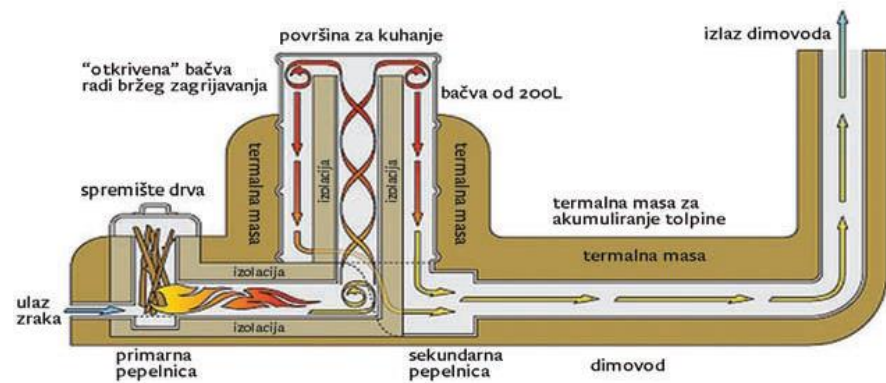
Sources: DOOR, <https://door.hr/>  
<https://www.centrometal.hr/>



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### HEATING SYSTEM – standard wood burning furnace vs. high efficient „Rocket stove”



Sources: DOOR, <https://door.hr/>  
<https://www.zmaq.hr/>



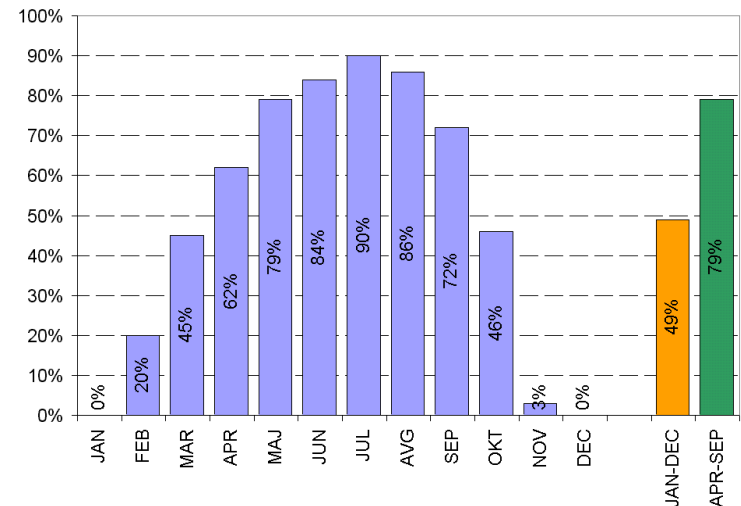
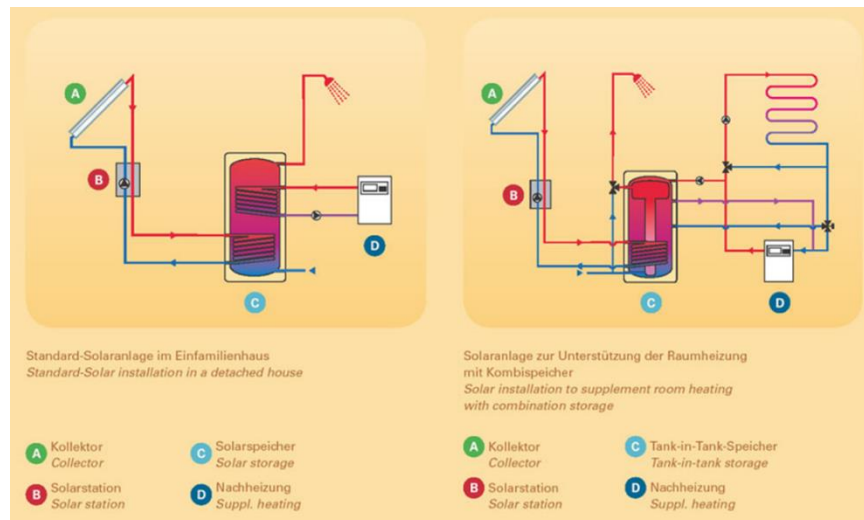
## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

MEASURE	INVESTMENT	ANNUAL ENERGY SAVINGS	PAYBACK PERIOD (YEARS)	EXPECTED LIFETIME (YEARS)
SOLAR THERMAL SYSTEM instead of ELECTRIC BOILER for sanitary water and/or heating backup	3000 EUR	2000 kWh	10 (no incentives or change in electricity price)	25

Source: DOOR, <https://door.hr/>



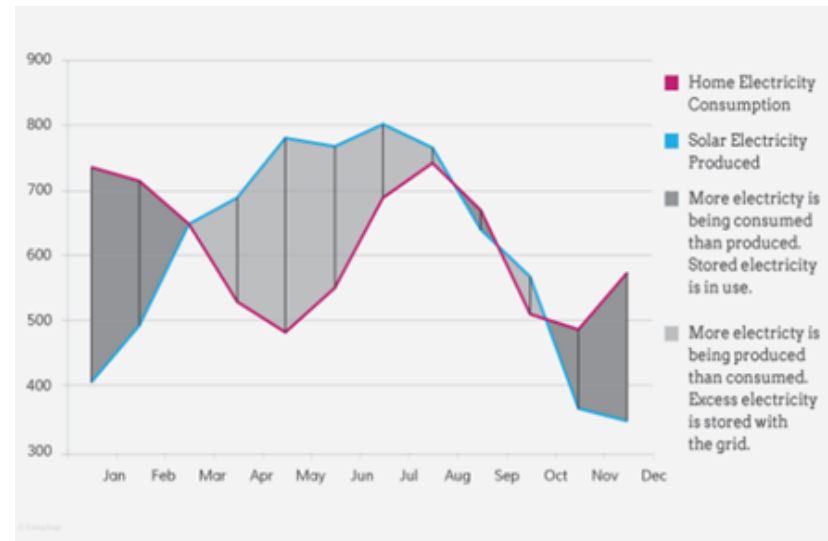
## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

MEASURE	INVESTMENT (design, equipment, transport, installation, insurance)	ANNUAL FINANCIAL SAVINGS	SIMPLE PAYBACK PERIOD (YEARS)	EXPECTED LIFETIME (YEARS)
Photovoltaic power plant for own supply (4 kW)	~ 3500 EUR	385 EUR	9 years	25

Source: DOOR, <https://door.hr/>



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### SMALL and MEDIUM investment :

- **Standby appliances**
- Draftproofing, reflective foils
- EE lighting
- EE appliances
- Water-saving devices

Typical stand-by consumption	
TV	6-7 W
DVD	5 W
Alarm clock	1 - 3 W
Microwave oven	2 - 6 W
Battery charger	2 - 4 W
Phone station	2 - 4 W
Laptop (sleep)	3-11 W
Router	8 W
TOTAL	~39 W x 24 h = 936Wh

1kWh per day, 48 EUR per year

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### SMALL and MEDIUM investments:

- Standby appliances
- **Draftproofing, reflective foils**
- EE lighting
- EE appliances
- Water saving devices

3-4 windows,  
20 EUR investment,  
Payback period of 1 year



3 radiators  
20 Eur investment,  
Payback period of 1  
year

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### SMALL and MEDIUM investments:

- Standby appliances
- Draftproofing, reflective foils
- **EE lighting**
- EE appliances
- Water saving devices



2 LED bulbs,  
14 EUR investment,  
Payback period of 1 year

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

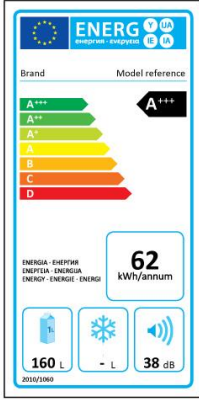
Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### SMALL and MEDIUM investment:

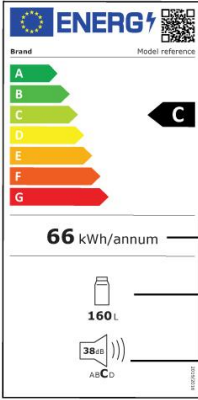
- Standby appliances
- Draftproofing, reflective foils
- EE lighting
- **EE appliances**
- Water saving devices

#### How to recognise a rescaled product ?

**Current energy label**



**New energy label**



The energy labels for a fridge without freezer

- The **QR code** gives access to more information on the model
- The **rescaled energy efficiency class** for this fridge, an A+++ in the previous label
- The **annual energy consumption** of this fridge is calculated with refined methods
- The **volume** of the fridge expressed in liters (L)
- The **noise level** measured in decibels (dB) and using a four classes scale

#### New 2021 energy labels

Source: [https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/product-database/qr-code-new-energy-label\\_en](https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/product-database/qr-code-new-energy-label_en)



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

Example: ENERGY RENOVATION of a family house with 100 m<sup>2</sup>

#### SMALL and MEDIUM investments:

- Standby appliances
- Draftproofing, reflective foils
- EE lighting
- EE appliances
- **Water saving devices**



10 m<sup>3</sup> potential savings compared to normal tap

## **PART III: Household energy performance**

### 3. Energy efficiency measures and practical tips

#### **HEATING – practical tips**

##### **WOOD HEATING**

- When buying a furnace, select one that fits the size of the room.
- Close air intake whenever the furnace is not in use to avoid heat loss through the chimney
- Make sure that there is no exhaust gas leakage into the living space (!)
- Make sure that the wood is dry enough to be used as fuel
- Regularly inspect and clean the chimney
- Don't overfill the furnace with wood
- Consider stovepipe heat reclaim radiators to increase heat transfer to the room

##### **GAS/ CENTRAL HEATING**

- Reduce thermostat set points for unused rooms
- Insulate hot water piping, especially if passing through “cold” areas
- Service the system regularly



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### ELECTRICITY – practical tips

- Use night/“cheap” electricity tariff for heating – especially for electric thermal storage heaters and electric water heaters
- Use socket timers to heat only rooms that are in use at certain part of the day
- Keep heating elements clean and free of airflow obstruction
- Use insulation + reflective pads between heating element and the wall

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### SANITARY HOT WATER – practical tips

- Use night/“cheap” electricity for water heaters
- Limit water heater temperature – around 60C is enough for most household needs
- Avoid excessively low water heater temperatures to prevent the growth of Legionella bacteria
- If the existing water heater is poorly insulated, consider additional insulation
- The size of the water heater should match the needs of the household – water heaters larger than necessary are less efficient
- Take a shower instead of a bath
- Remove lime scale (especially in case of hard water) from electric heating elements to increase efficiency
- Check pipe fittings – faulty water mixers and shower heads cause hot water leakages

## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### INSULATION and BUILDING ENVELOPE – practical tips

- Use insulation + reflective pads between heating elements and the wall
- Use rubber seals on doors/windows to eliminate unwanted airflow
- Utilize window blinds for passive energy efficiency
- Close blinds during the night to reduce heat loss through the windows
- Open blinds to allow the sun to warm up the rooms
- Look for mold and damp walls to determine cold spots on the walls – consider additional insulation around these spots
- Thick carpets can reduce heat loss through the floors



## PART III: Household energy performance

### 3. Energy efficiency measures and practical tips

#### HOME APPLIANCES – practical tips

- When buying a new appliance, pay attention to the appliance energy class
- Defrost refrigerators regularly
- Keep refrigerators away from heat sources and leave enough empty space behind them to allow efficient heat rejection
- Check if the refrigerator doors are airtight
- Don't set refrigerator setpoint too low – suggested values are 4C for refrigerators and -18C for freezers
- Use laundry washing machines and dryers during low electricity tariff periods
- Consider using lower water temperature while doing laundry
- Consider natural drying instead of electric dryer
- Induction stoves are more efficient than electric resistance ones
- Keep pot lids on when cooking to reduce required energy
- Shut down electronic devices when not in use; avoid leaving them on or in standby mode



## **PART III: Household energy performance**

### 3. Energy efficiency measures and practical tips

#### **LIGHTING – practical tips**

- Turn off the lights in unoccupied rooms
- Use natural lighting when possible
- Correct light fixture can reduce power required for lighting a room

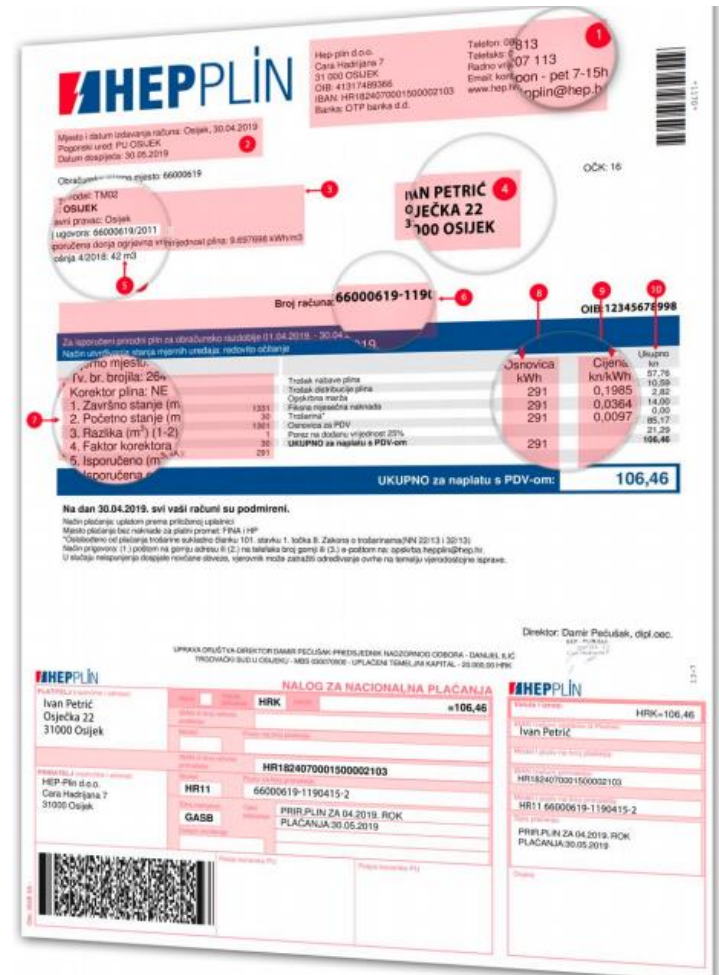
## PART III: Household energy performance

### 4. Understanding energy and electricity utility bills - Gas

1. **Informacije o izdavatelju:** podaci o izdavatelju računa
2. **Informacije o računu:** podaci o mjestu i datumu izdavanja računa, pripadnosti organizacijskoj jedinici unutar HEP-Plin-a d.o.o., datumu dostupijeća
3. **Tehnički podaci:** podaci o Tarifnom modelu, MRS-i , obračunskom mjernom mjestu, dobavnom pravcu i isporučenoj donjoj ogrijevnoj vrijednosti sukladno Mrežnim pravilima plinskog distribucijskog sustava (NN [50/18](#))
4. **Podaci o kupcu:** naziv i adresa navedena za dostavu računa
5. **Potrošnja:** podaci o prošlogodišnjoj potrošnji u istom obračunskom razdoblju u m<sup>3</sup>
6. **Broj računa:** obračunsko mjerno mjesto, podaci o pozivu na broj, obračunsko razdoblje na koje se odnosi
7. **Podaci o potrošnji:** podaci o tvorničkom broju plinomjera, podaci o postojanju korektora plina (DA/NE), razlika početnog i završnog stanja, pretvorba u kWh (umnožak potrošene količine plina (m<sup>3</sup>) i donje ogrijevne vrijednosti).
8. **Osnovica kWh:** osnovna jedinica mjere obračunskih elemenata. Od 1. siječnja 2012. godine na tržištu prirodnog plina RH primjenjuje se mjerna jedinica kWh (kWh/h).
9. **Cijena kn/kWh:** sukladno Odluci o iznosu tarifnih stavki za javnu uslugu opskrbe plinom za razdoblje od 1. travnja do 31. prosinca 2019. za energetski subjekt HEP-Plin d.o.o. (NN [15/19](#))
10. **Ukupno kn:** umnožak osnovice (kWh) i cijene (kn/kWh), svedeno na dvije decimalne jedinice

- 1 m<sup>3</sup> of natural gas: ~9.4kWh
- 1kWh of natural gas: ~0.04EUR/kWh

- Natural gas is measured in cubic meters (m<sup>3</sup>)
- However, natural gas can have different energy densities in different locations
- Gas volume is multiplied with lower heating value of gas, specific for diferent distribution areas
- Resulting energy in kWh is billed according to price per kWh

**HEP-PLIN** HEP-Plin d.o.o. Casa Hadrijana 7 31 000 OSIJEK OIB: 41317469366 IBAN: HR1824070001500002103 Banka: OTP banka d.d.

Tel: 098 113 07 113 Email: korisnik@hep.hr

Mjesto i datum izdavanja računa: Osijek, 30.04.2019. Pogodni usodi PU OSIJEK Datum dostupijeća: 30.05.2019.

Obračunsko mjerno mjesto: 66000619

Podaci o kupcu: Ivan PETRIĆ OSJEČKA 22 31000 OSIJEK

Broj računa: 66000619-1191 OIB: 12345678998

Opis	Osnovica kWh	Cijena kn/kWh	Ukupno kn
Trošak nativnog plina	291	0.1905	55.78
Trošak distribucije plina	291	0.0384	11.26
Opisnina mreža	291	0.0097	2.82
Fiksna mjesečna naknada	291		14.00
Trošak	291		85.17
Opisnina za PDV			21.29
PDV na ukupnu vrijednost 23%			19.66
<b>UKUPNO za naplatu s PDV-om</b>			<b>106.46</b>

Na dan 30.04.2019. svi vaši računi su podmireni.

Nalog za nacionalna plaćanja: HRK=106.46

**HEP-PLIN** HRK=106.46

HR1824070001500002103

HR11 6600619-1190415-2

PRIR.PLIN ZA 04.2019. ROK PLACANJA 30.05.2019.

Source:  
[https://www.hep.hr/elektra/UserDocsImages/dokumenti/ce-sta-pitanja/Pojasnjenje\\_racuna\\_2\\_2018.pdf](https://www.hep.hr/elektra/UserDocsImages/dokumenti/ce-sta-pitanja/Pojasnjenje_racuna_2_2018.pdf)



## PART III: Household energy performance

### 4. Understanding energy and electricity utility bills - Electrical

- Electricity price in Croatia:
  - Day: ~0.15EUR/kWh
  - Night: ~0.8EUR/kWh

- Actual electricity readings are taken several times per year, while bills are issued monthly based on assumptions. Consumers are often confused by the balancing accounting.
- Items explained in the bill:

1: customer information

2: billing period

3: measurement units

4: energy consumed, high/low tariff

5: unit prices (energy, grid usage, renewables surcharge, "solidarity surcharge")

6: subtotals per each item

7: total for energy

8: total for renewables surcharge

8a: total for "solidarity surcharge"

9, 10: Value Added Tax (VAT)

11: total bill for the billing period

12: issued bills for the period based on estimates – obsolete for new meters

13: difference between estimated and real energy consumption

14: balance – can be positive or negative, depending on how much is owed or overpaid

15: total due payment

**1**

**HEP ELEKTRA d.o.o.**

Matični broj: 04622430  
OIB: 43965974818

ZAGREB, Ulica grada Vukovara 37  
TEL.: bespl. potroš. tel.: 0600 300 303  
FAX: 00385 (0)1 460 00385 (0)1 460 1  
RAČUN: HR9223400091510077598

Datum računa: 31.12.2017  
Mjesto izdavanja: ZAGREB  
Datum dospijanja: 30.01.2018  
Broj dokumenta: 12400002206  
**R-1**

**JOSIP JOSIPOVIĆ**  
Zagrebačka avenija bb  
10 000 ZAGREB

**Podaci o kupcu:**

Ugovorni račun: 2212345678  
Poslovni partner: 1000034567  
Kupac: JOSIP JOSIPOVIĆ  
Ulica i kbr.: Zagrebačka avenija bb kat: 1 stan: 1  
Mjesto: ZAGREB  
OIB: 11111111111111

**2**

**RAČUN br: 2212345678-180120-3, razdoblje: 13.06.2017. - 28.12.2017.**

Opis	Jed. mjere	Količina	Jed. Cijena kn	Iznos kn
Električna energija viša dnevna tarifna stavka	kWh	###	0,84	2.470,44
Električna energija niža dnevna tarifna stavka	kWh	###	0,41	604,34
Naknada za obračunsko mjerno mjesto	mjesec	6,5	17,40	112,75
<b>Iznos za električnu energiju</b>				<b>3.187,53</b>
Naknada za poćicanje proizvodnje iz obnovljivih izvora	kWh	###	0,105	463,58
Solidarna naknada	kWh	###	0,03	83,97
Popust za solidarnu naknadu				-83,97
Porezna osnovica				3.651,11
PDV 13% (osnovica: 3.651,11)				474,64
<b>A. UKUPAN IZNOS RAČUNA</b>				<b>4.125,75</b>
<b>B. Zbroj izdanih rata za obračunsko razdoblje 13.06.2015. - 28.12.2016.</b>				<b>3.507,60</b>
<b>C. RAZLIKA (A-B)</b>				<b>618,15</b>
<b>D. Dugovanje na dan obračuna (31.12.2017.)</b>				<b>0,00</b>
<b>Ukupno za platiti (C + D)</b>				<b>618,15</b>

Oslobođeno od plaćanja trošarine sukladno članku 101. stavku 8. točki 5. Zakona o trošarinama.

#### DRUGA STRANA RAČUNA:

##### OBRAČUN POTROŠNJE

Obračunsko mjesto: JOSIP JOSIPOVIĆ ZAGREB, Zagrebačka avenija bb  
Broj obračunskog mjesta: 12345677890 Kategorija potrošnje: Kućanstvo Tarifni model: BIJELI Obr.:1

Broj brojlja	Tar. Stavka	Datum od	Datum do	Br. mjeseci	Stanje od	Stanje do	Konstanta	Potrošak
6 A 1111111	RVT R1	13.6.2017	1.10.2017	3,61	72.020	73.097 - procjena	1	1.077
	RVT R2				44.962	45.521 - procjena	1	539
	RVT R1	1.10.2017	28.12.2017	2,87	73.097	74.961	1	1.864
	RVT R2				45.521	46.456	1	935

Source: [https://www.hep.hr/elektra/UserDocs/Images/dokumenti/cesta-pitanja/Pojasnenje\\_racuna\\_2\\_2018.pdf](https://www.hep.hr/elektra/UserDocs/Images/dokumenti/cesta-pitanja/Pojasnenje_racuna_2_2018.pdf)

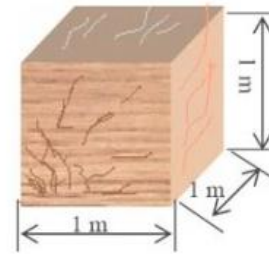


## PART III: Household energy performance

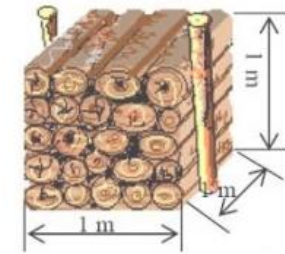
### 4. Understanding energy and electricity utility I

- Cubic meter vs spatial meter of wood
- When buying wood, spatial meter measure is used
- 1 spatial meter of wood is  $\sim 0.7\text{m}^3$ , depending on cutting shape
- 1 "spatial meter of wood" = 1575 kWh
- 1 kWh derived from burning wood:  $\sim 0.03\text{EUR/kWh}$

- Wood must be properly dried before being used as fuel (less than 20% humidity)
- burning wet wood causes energy loss and can lead to deposits of creosote building up in the chimney
- Wood should be stored exposed to south, exposed to wind, protected from rain and snow, separated from the ground, with enough space around it to allow enough airflow



1m<sup>3</sup> wood



1 spatial meter wood

Drying time	Oblice (cylindric pieces of wood) outdoors	Oblice (cylindric pieces of wood) stored after 3 months	Cjepanice (1/4 oblice) stored after 3 months
Starting humidity	76%	76%	76%
6 months	46%	44%	28%
12 months	35%	32%	23%
15 months	32%	27%	20%
18 months	27%	22%	15%
24 months	24%	18%	14%

Sources:

<http://kamin.16mb.com/savjeti/kupovina-drveta-za-ogrijev/>

<https://algoritam.home.blog/2020/01/19/zasto-kubik-drva-nije-isto-sto-i-metar/>





# MODULE SUMMARY

Key takeaways

Exercise (if applicable)

References and further reading



# Module Key Learnings

Supporters and mentors learned all about:

- EU legislation related to energy poverty
- National legislation related to energy poverty
- Case studies/actions/best practices in their country
- Tools and tips to understand household energy performance

# Module Exercise

- **Discussion/debate**

Discuss the following issues with your fellow participants: Which energy policy from another country do you like most? How could you compare it to national policies from your country? Which case study from a different country should be replicated in your country?

- **Role play and simulation of a home visit and simple energy audit**

Form a group of two people – one will act as the energy supporter and the other as a citizen. The energy supporter will conduct a simple energy audit based on the information given to him by the citizen and recommended best simple energy measures to the citizen.

- **Reading electricity and heating bills**

Each country will choose an example of its own electricity and heating bill. Based on what they have learned in Part 3 of Module 2, participants will individually analyse each bill component.



# References and further reading

- POWERPOOR Online Library: <http://powerpoor.eu/library>

**Thank you for your attention!**

