REPORT ABOUT THE SELECTION OF TYPICAL RENEWABLE ENERGY SYSTEMS

D.T.3.2.1 Information for D3.2.1 Report about the selection of typical renewable energy systems

Version 1

Content

1. Introduction

The Information for D3.2.1 Report about the selection of typical renewable energy systems of RURES project based on the information from D3.1 (D3.1.1 – D3.1.3).
All necessary information were combined by the external sources, eg. www.iea.org and also interesting similar information about RES.
The P11 – VŠB-TU Ostrava is specialist on the field energy utilization and especially RES.
All information from D3.1 (D3.1.1 – D3.1.3) are there not repeated.

2. Process of looking for RES systems important selection principes

Selected studied web pages and calculators as support for the decisions indicated at the Chapter 4 (the author used more information, but in minor form):

Links are not sorted by relevance!

- Surveys of web portals, businesses and resources that use calculators to calculate their bids

Inspiration - sources of information, graphic design, etc.https://www.novazelenausporam.cz/jak-na-to/

- Interesting inspiration, solution by using the menu + help

https://svt.sfzp.cz/

- List of products and technologies - we can use it

https://restep.vumop.cz/?core=account

- Interactive map of renewable resources for regional sustainable planning

- Registration required

https://restep.vumop.cz/encyklopedie/index.php/Hlavn%C3%AD_strana

- - Encyclopedia RESTEP, useful as a source of information

http://www.calla.cz/atlas/index.php

- database of facilities using renewable energy sources in the Czech Republic, we could add this atlas to the calculator, the user of the calculator could get contact with the operator in his neighborhood (consultation, advice, exchange of experience), interesting option to extend the maid calculator

http://ekowatt.cz/library/kalkulacky/01_NPVoptimal/01_NPVoptimal.htm

- Calculation of return on thermal insulation of the building

https://www.clear2-project.eu/

- a project focused on testing equipment / technologies for RES, also includes Czech dTest

http://www.energysavingtrust.org.uk/renewable-energy

- a complete procedure for selecting a suitable RES source is not a calculator, it can be used to create a "system" how the calculator should work

Models for calculating the use of photovoltaics / wind at a specific location in Europe / CR / World

https://www.renewables.ninja/

- - Calculation of wind / photovoltaic power anywhere in the world

https://pvwatts.nrel.gov/index.php

- PVE output

http://re.jrc.ec.europa.eu/pvgis/

Model created by the European Commission's research center. It is focused directly on the use of photovoltaic applications, allowing the calculation of electricity production at a particular location anywhere in Europe and Africa. It is available online and free of charge. The computational model uses both satellite measurements and meteorological data.

https://solargis.info/pvplanner/#tl=Google:hybrid&bm=satellite

Simulation tool for planning and optimizing photovoltaic systems using relatively accurate climatic and geographic data. High-performance new-generation algorithms are used for processing. The simulation methods used include the latest knowledge (both theoretical and practical) in the field of solar and PV models.

Calculators

https://www.cezesco.cz/cs/oblasti/firmy-a-obce

- ČEZ ESCO - calculator for photovoltaics, heating and electric cars for companies and municipalities

http://dotacenaakumulaci.cz/

- Accumulation Subsidy, Inspiration for Logical Sorting - "Step by Step"

http://kalkulacka-rd.novazelenausporam.cz/default/form

- Program calculator new green savings, graphically interesting (for example, to calculate house savings), a similar principle applicable to a family house (in the case of a calculator for individuals)

http://www.uhlikovastopa.cz/kalkulacka

- Carbon foot – just for inspiration

https://vytapeni.tzb-info.cz/kotle-kamna-krby/15570-kotlikova-kalkulacka-2017

- - Cauldron Calculator at tzbinfo.cz, Evaluating the annual savings when replacing an old heat source with a new heat source from the viewpoint of fuel or electricity costs, an interesting EXCEL file as an inspiration for us

https://stavba.tzb-info.cz/tabulky-a-vypocty/110-financni-kalkulator-pro-hodnoceni-ekonomicke-efektivnosti-investic

- Simple Financial Calculator to Evaluate Economic Efficiency of Investment - Inspiration

http://www.ceska-solarni.cz/kalkulacka2011.php#

- Solar calculator

https://docplayer.net/89234285-Ngia-renewable-energy-calculator-user-manual.html

- - Instructions for NGIA Renewable Energy Calculator (no longer on-line), but see the structure in the manual, we can be inspired / used

Problem being solved by a municipality Solution - Disponsible RES

"1) Reduction of the the energy intensity and environmental burden of communal objects"

a) thermal isolation project of a energy consuption reduction

b) heating sun, wind

"c) lightening" sun

2) Wastage management separation of wastage

e) communal waste wastage energy

f) biodegradabable waste

g) subsite fraction of communal wastage

3) Mobility Initiatives "biogas, solar / wind energy for electric cars"

4) Municipality Development as a result of energy savings multiplier effect, savings invested in other projects

Conclusions regarding the availability of renewable energy sources can be formulated as follows:

- The use of biomass is advisable to implement in the vicinity of growing and collecting biomass. Another condition is the introduction of specific biomass processing technology and the biomass use logistics system (ie cultivation, collection, storage, collection, treatment and transport to the consumer). That offer biomass combustion and biogas units utilization
- The use of dry rock energy or geothermal energy depends on the geological conditions and the way heat is available. The degree of suitability increases with the amount of heat flow in the territory.
- The use of ambient air or heat pump water is basically possible anywhere (if water is used near the source). However, the condition is need for a bivalent energy source (usually electricity).

- The use of solar energy is also possible throughout the territory and for any hot water consumer systems, but it is always necessary to have another energy source. At present, hot water heating can be considered more promising.
- The use of wind energy in the region is limited by inappropriate weather conditions. It is not excluded individual use, but hopefulness for systemic use is low.

Due to the variability of costs in individual countries, a study RENEWABLE ENERGY BENEFITS: MEASURING THE ECONOMICS was used as additional information.

Other interesting sources:

- https://edu.deloitte.cz/cs/Content/Download/accounting-news-1611
- http://www.financnisprava.cz
- http://www.businessinfo.cz/cs/clanky/ekologicke-dane-3532.html#plyn
- http://www.financnisprava.cz/cs/dane/dane
- *http://www.ksh.hu/docs/hun/xftp/idoszaki/nepsz2011/nepsz_03_20_2011.pdf*
- *http://www.ksh.hu/docs/hun/xftp/idoszaki/regiok/mesz/20_za.pdf*
- *http://www.ksh.hu/docs/hun/xftp/megy/173/index.html*
- https://energiaklub.hu/sites/default/files/negajoule_kutatasi_osszefoglalo_vegleges_eng.pdf
- *http://www.fu.gov.si/fileadmin/Internet/Davki_in_druge_dajatve/Podrocja/Trosarine/Opis/Podrobnejsi_opis_1_izdaja_Energenti_in_elektricna_energija.pdf*
- *http://www.fu.gov.si/davki_in_druge_dajatve/podrocja/okoljske_dajatve/*
- *https://eeagrants.org/content/download/12185/160146/version/2/file/FMO_170774+Blue+Book+Final+Update_2017_FIN.pdf*
- *http://www.energetika-portal.si/podrocja/energetika/podporna-shema-ove-in-spte/*

3. Suggested solutions

According the detailed analyses of D3.1 (D3.1.1 – D3.1.3), included own knowledges and studies of others sources (web pages, similar calculators, and discussion with partners and other companies specialized to the RES system installation we prepared a table for questioners. The fulfilled table follows.

SWOT analysis of RES Solutions

Strengths	Weaknesses	Opportunities	Threats
• The assumption of a change in the structure of energy sources in favor of RES • Reduction of emissions • Improvement of air quality especially in territories with deteriorated air quality • The current high level of centralization of the heat supply in the region with contrast of decentralization heat supply • The huge potential of RES within the regions • The current energy concept of the region and its support for RES • Research capacity and companies based in the region	• Distrust of the population in new forms and ways of heating family houses • Small promoting the potential use of RES in the rural areas • Lack (?) of motivation of the state/region for the introduction of RES • Reducing the levels of watercourses and water regime instability • High investment costs • Unevenness in the size of demand for energy in the various territorial parts of the region • Forced investments in the grid	• Possibility to draw national and EU funds for the development of RES and to support environmental education • Possibility of energy use of thermal water and geothermal wells • Utilization of alternative energy sources in suitable localities of the region • Increasing employment in rural areas due to the development of biomass production • Reduce energy demands due to a change in the structure of GDP generation • Expected new jobs	• The construction of central heat sources with renewable energy sources is burdening the budgets of small municipalities with high costs • Restrictive conditions for the development of RES in protected zones • Growth in the price of biomass due to increased demand • Rising electricity and gas prices encourage people to return to fuel with high emissions • Negative reactions of citizens to some RES projects • Uncontrolled construction of RES • Lack of skilled labor

Suggested table for suitability RES utilization in each country:

The value creation chains of renewable energy technologies examined		CR	HU	SL	PL	DE	CZ
Selection of 3 typical renewable energy system		Medimurje Country	Zala Country	Pomurje	Małopolskie	Saxony	Moravian Silesian Region
Renewable electric power							
1	Onshore wind energy systems						
2	Repowered wind energy systems					X	
3	Small photovoltaic systems		X				X
4	Large photovoltaic systems, room integrated		X		X	X	
5	Large photovoltaic systems, ground-mounted solar parks	X					
6	Small hydroelectric plants						
7	Small biogas plants	X		X	X	X	X
8	Large biogas plants		X				
9	Wood-fired units (chips)			X	X		
Renewable heating							
10	Small solar thermal energy systems						
11	Large solar thermal energy systems						
12	Geothermal pumps	X		X			X
13	Word-pellet heating						
Biofuels							
14	Plant oil						
15	Bioethanol						
16	Biodiesel						

4. Summaries

According the collected information were these representative RES selected

According this table and other information were selected for RES Calculator follows RES sources:

- Photovoltaic systems (small or in building integrated)
  - Max. units to 300 kW electric
- Wood-fired units
  - Max. units to 300 kW heat output (electric is also possible)
- Geothermal pumps
  - Max. units to 300 kW heat (cooling) output (electric is also possible, but hard), typical lower
- Biogas plants
  - Max. units to 300 kW heat and electric output

Some solution offer also other variation

In the D3.2.2. Analysis of value creation of selected renewable energy systems - The value creation of the selected RES will be analysed for different system sizes and steps in value creation chain will be integrated more details.