SOUTH EAST EUROPE
Transnational Cooperation Programme

TRACE
Transnational Cooperation for the Improvement of Buildings Energy Performance and Efficiency

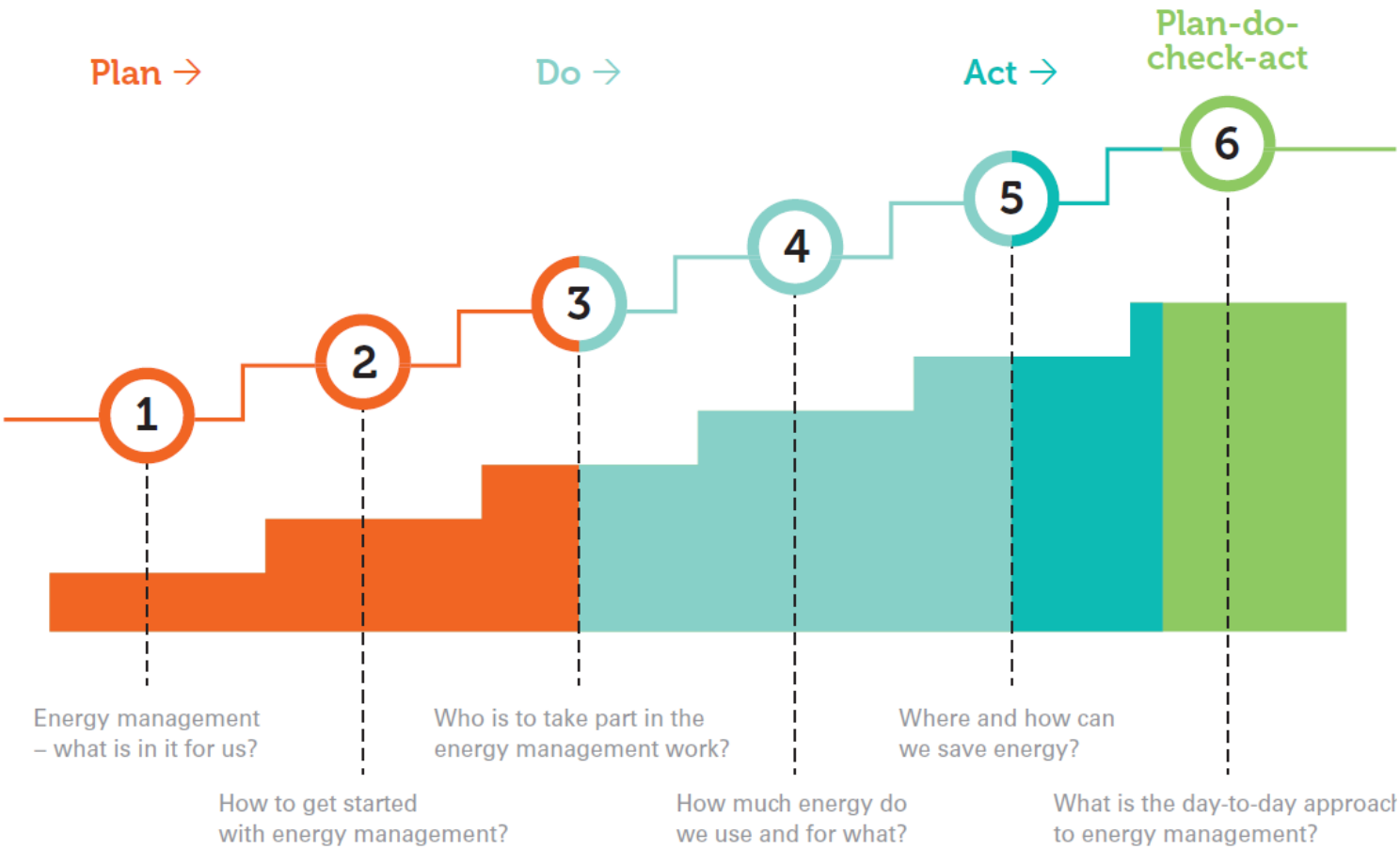
Programme co-funded by the EUROPEAN UNION

ICT solutions in SLOVENIA

Niko Natek

KSSENA

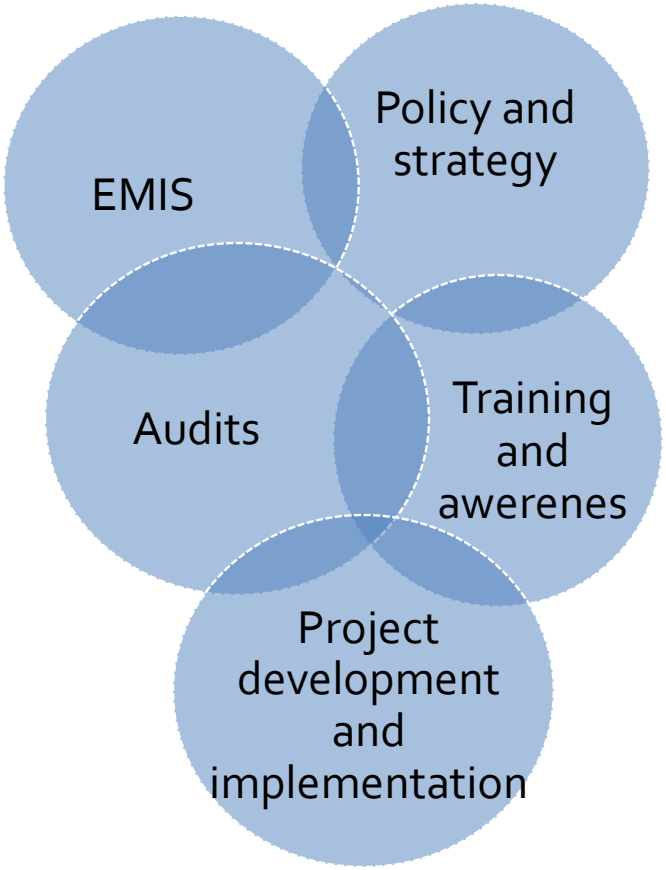
Energy management – step by step



Energy Management Program

An Energy Management Program consists of:

- **Policy and strategy** (define your long-term goals and energy saving strategy)
- **Energy audits** (identify and evaluate opportunities)
- **Project development** and **implementation** (develop and implement improvement opportunities)
- **Training and awareness**
- **Implement an Energy Management Information System** (EMIS)



Energy Management Information System (EMIS)

- EMIS is one of the key elements of a comprehensive energy management program. It provides relevant information to key individuals and departments that enables them to **improve energy performance**.

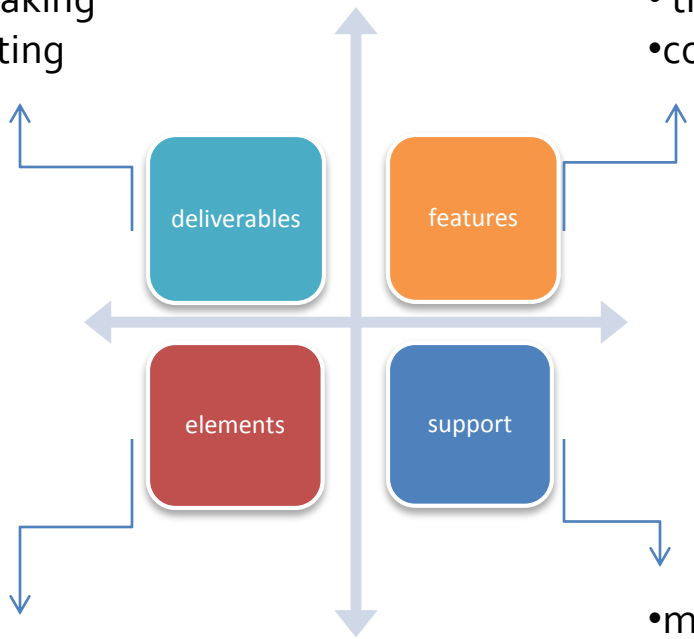
- It is often **integrated** with other allready existent IT equipment available, like human resource systems, bussines modeling systems, supply chain systems, etc.

- It is stated that a well designed EMS will save from **5 up to 10%** in overall energy consumption.

Energy Management Information System structure

•early detection of poor performance
•support for decision making
•effective energy reporting

•storage of data in a usable format
• the calculation of energy use targets
•comparison of actual consumption



•sensors
•energy meters
•hardware and software

•management commitment
allocation of responsibility
•procedures
•training
•regular audits

Best practice case of successful ICT integration (FPE)

Municipality of Velenje pursued the **Future Public Energy** project, that was set up within the common neighbouring country program Interreg IIIA in the years from 2006 to 2008, along with partners from:

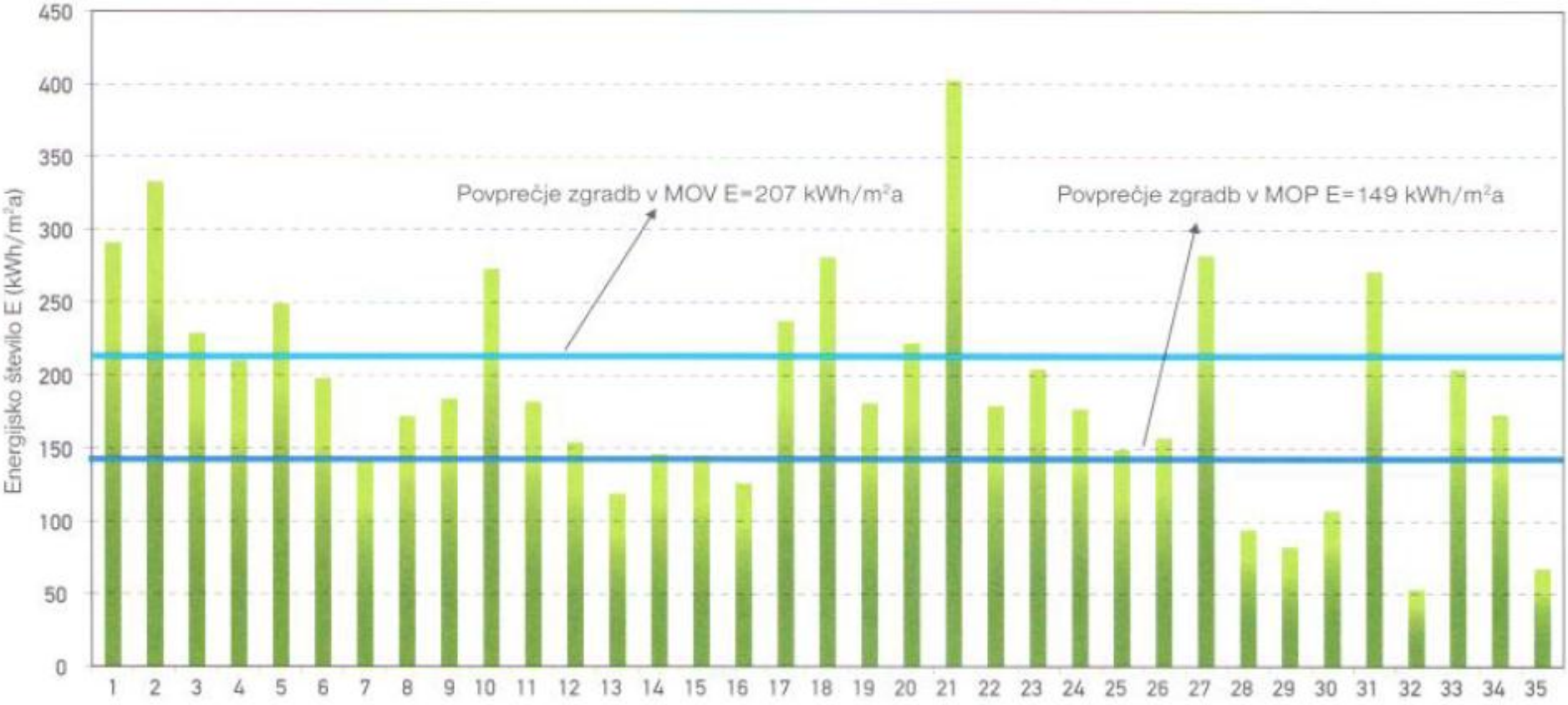
- Velenje School (education) center ,
- Municipality of Ptuj,
- Scientific research center Bistra Ptuj,
- Municipality of Varaždin (HR) and
- City of Čakovec (HR).

Best practice case of successful ICT integration in Velenje

- The first thing that is required in order to monitor the energy consumption progress of any object is to asses the status quo.

- This was done by executing out preliminary energy analysis of the buildings in question. Specificaly, there were 35 buildings where the preliminary energy analisys were carried out by KSSENA in Velenje and Ptuj, as well as 35 basic thermographic reviews of other public buildings.

Best practice case of successful ICT integration in Velenje (FPE)

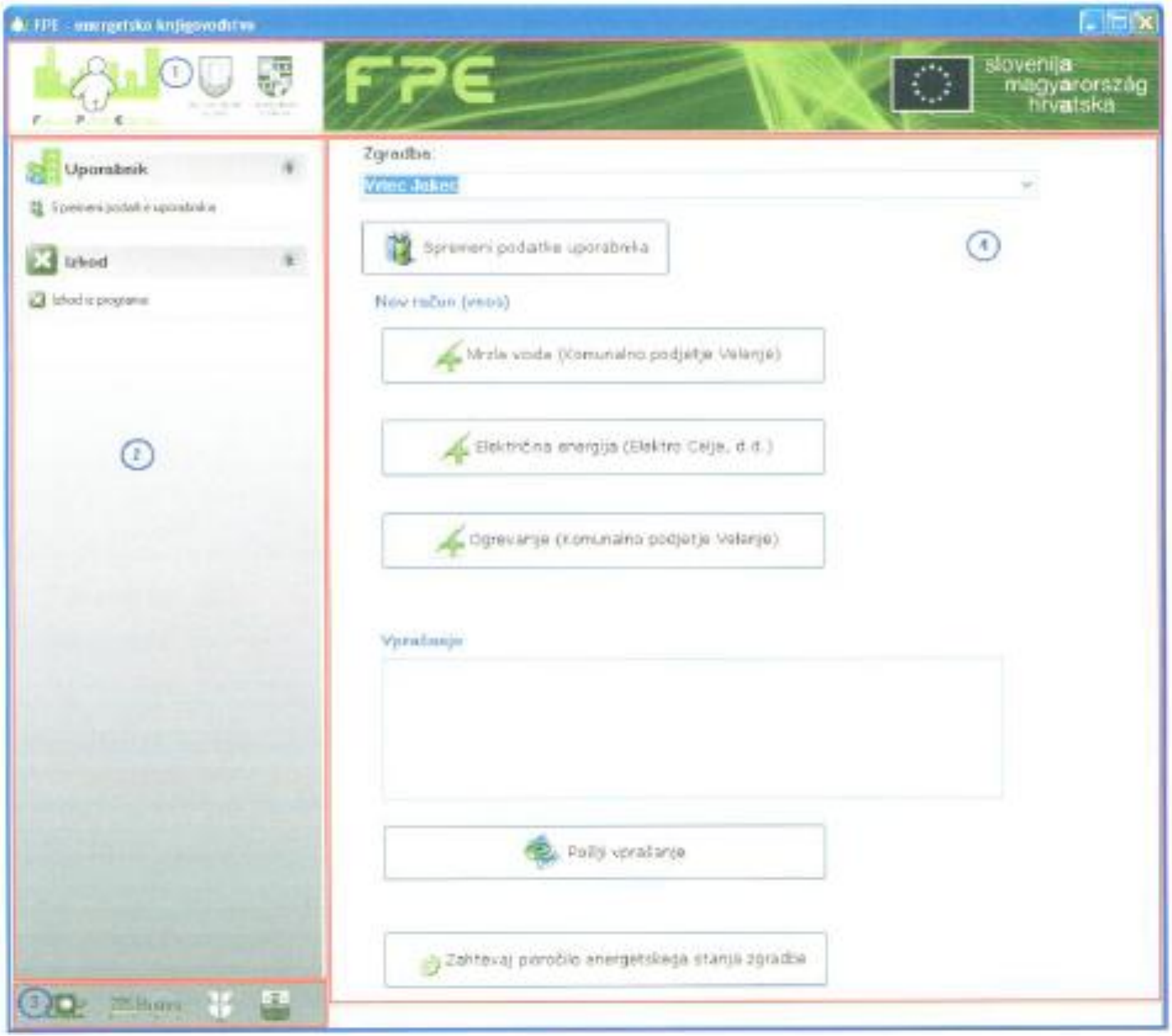


Internal energy bookkeeping

- Energy bookkeeping is a basic instrument for energy monitoring and management and represents the **convergence, processing** and **archiving** of energy usage data.

- The ability to evaluate actual energy costs provides a clear picture on the current status of consumption, that serves as a reference point for later optimization efforts. But perhaps the most important factor to consider is that by presenting the current energy costs, grater atention is given to reducing consumption and saving money.

- Energy bookkeeping was implemented in all 35 buildings that were studied within the FPE project. Today KSSENA monitors more than 50 public buildings in the region.


FPE - energetsko knjigovodstvo
FPE
slovenija
magyarország
hrvatska
Uporabnik
Spremeni podatke uporabnika
Izhod
Izhod iz programa
Zgradba:
Vilec Jakec
Spremeni podatke uporabnika
Nov račun (vnos)
Mrzla voda (Komunalno podjetje Velenje)
Električna energija (Elektro Celje, d.d.)
Ogrevanje (Komunalno podjetje Velenje)
Vprašanje
Poišči vprašanje
Zahtevaj poročilo energetskega stanja zgradbe

Vnos novega računa

Urejanje | Izgled

Zapri | Prekliči [ESC] | Pomoč

Vrtec Jakec => Mrzla voda (Komunalno podjetje Velenje)

Nov račun

Številka računa: XXX *

Datum računa: 31.12.2007

1

Račun za obdobje od: 1.12.2007 * do: 31.12.2007 *

Elementi iz postaje računa

EAN	Naziv	Dobavitelj	Enota	Količina	Cena brez DDV	Popust	DDV (%)	Znesek	Števec
2	mrzla voda	Komunalno podjetje Vel	m3	0.0000	86.4600	0.00	8.50	0.0000	
	RPI-voda	Komunalno podjetje Vel	m3	0.0000	45.8400	0.00	8.50	0.0000	
	republiški vodni prispevek	Komunalno podjetje Vel	m3	0.0000	13.1000	0.00	8.50	0.0000	
	taksa obrem. vode	Komunalno podjetje Vel	m3	0.0000	75.4800	0.00	8.50	0.0000	
	odvajanje odplak	Komunalno podjetje Vel	m3	0.0000	32.5500	0.00	8.50	0.0000	
	RPI-odplake	Komunalno podjetje Vel	m3	0.0000	22.9200	0.00	8.50	0.0000	
	čiščenje odplak	Komunalno podjetje Vel	m3	0.0000	33.9600	0.00	8.50	0.0000	
	stevnine vodomer	Komunalno podjetje Vel	kos	0.0000	1.103.3600	0.00	8.50	0.0000	
								0.0000	

Vneseni računi

Leto	Mesec	Št. računa	Datum računa	Obdobje od	Obdobje do	Znesek računa
2008	1	454545	17.1.2008	18.1.2008	17.1.2008	0.00
2007	12	XXX	31.12.2007	1.12.2007	31.12.2007	157.76
2007	12	XXX	31.12.2007	1.12.2007	31.12.2007	0.00
2007	12	XXX	31.12.2007	1.12.2007	31.12.2007	1.776.71
						38.521.17

3

EMIS implementation in Velenje

MESTNA OBČINA VELENJE

- The energy bookkeeping software that has been developed within the FPE project later on served as a foundation on which **ADESCO** designed their **DEM** and **E2 manager** ICT software.

- For the implementation in Velenje the DEM software was choosen for the main part, from Adesco , which is a local SME company that specialized in energy management software development.

DEM (Remote Energy Manager)

- DEM was the first version of EMIS development that gained a wider commercial acceptance in Slovenia.

It offers many functional features like financial and energy planing, identifying the economicaly viable efficient energy use investments and also acts as a central monitoring system for an optional number of objects.

This program is also used by our organization (KSSENA) for monitoring the energy and water consumption of our clients.

- DEM is aimed at serving to the needs of building owners and maintenance staff, that desire all of the relevant information regarding energy efficiency indicators in one comprehensive software package.

DEM (Remote Energy Manager)

- The software is appropriate for **municipalities**, **national government**, as well as **educational**, **cultural**, **healt care**, **sport**, **rehabilitation** and other institutions. It is also higly recomendable for companies of various sizes, from hotel, stores, restaurants and other manufacturing and service providing companies.

- The DEM software provides the users to **obtain** various kinds of information, to **resolve** any inconsistences that might occur as well as the ability to financialy and energy wise **plan** investment and organizational projects.

- The main advantage of DEM software is the **simplicity**, **flexibility** and **automatization** that allows the software to adapt to all types of users, from recreational to proffessional. With the use of this software it is possible to conect all the infrastructure that is owned, rented or maintained into one central sistem, that allows the control to monitor and manage energy cost.

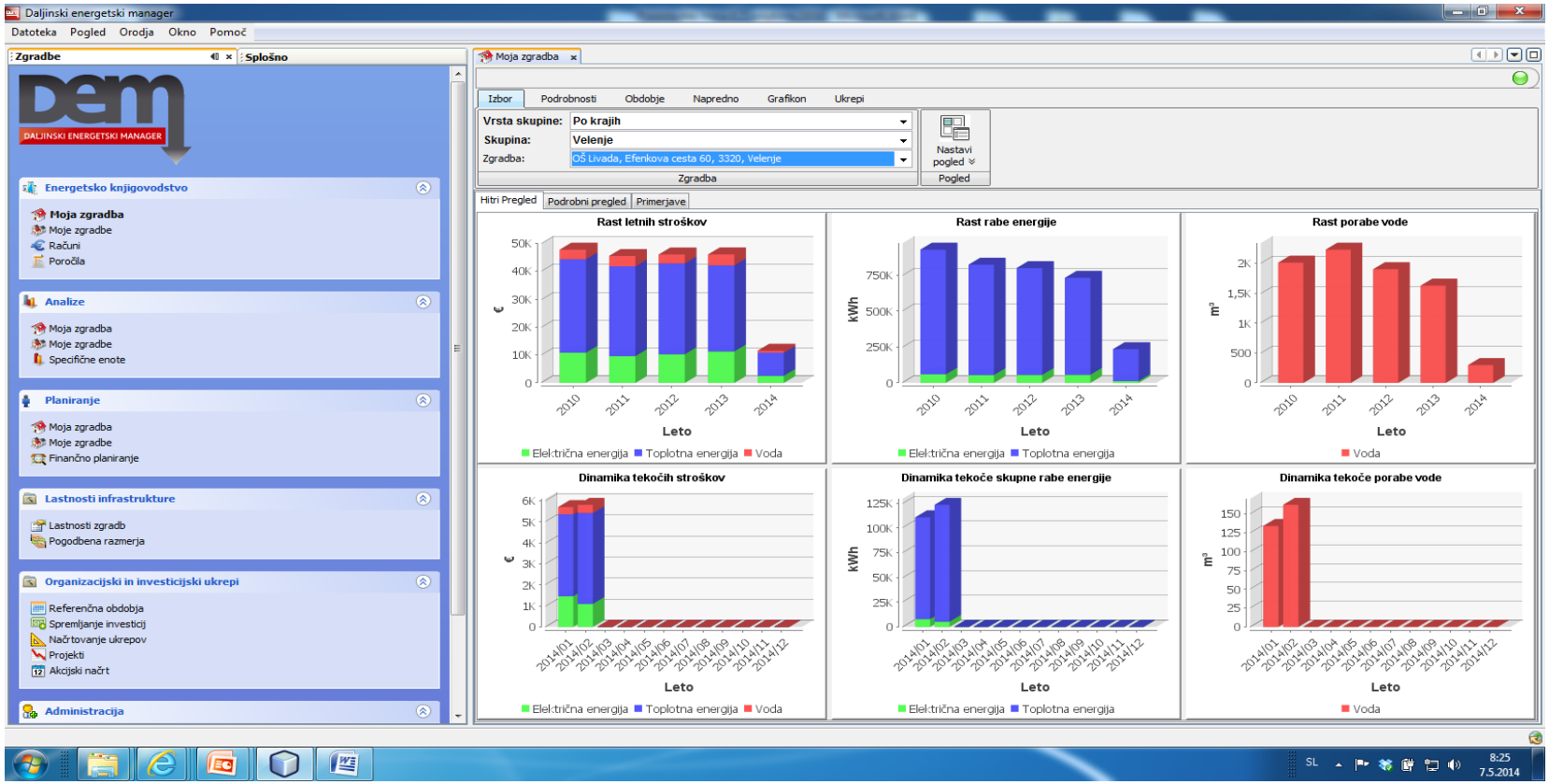
DEM (Remote Energy Manager)

- The folowing example of the software is based on the results from one of the primary schools for which KSSENA provides energy management services.
- The building in question is the Livada primary school in Velenje

http://www.os-livada.si/index.php?option=com_content&view=frontpage&Itemid=43

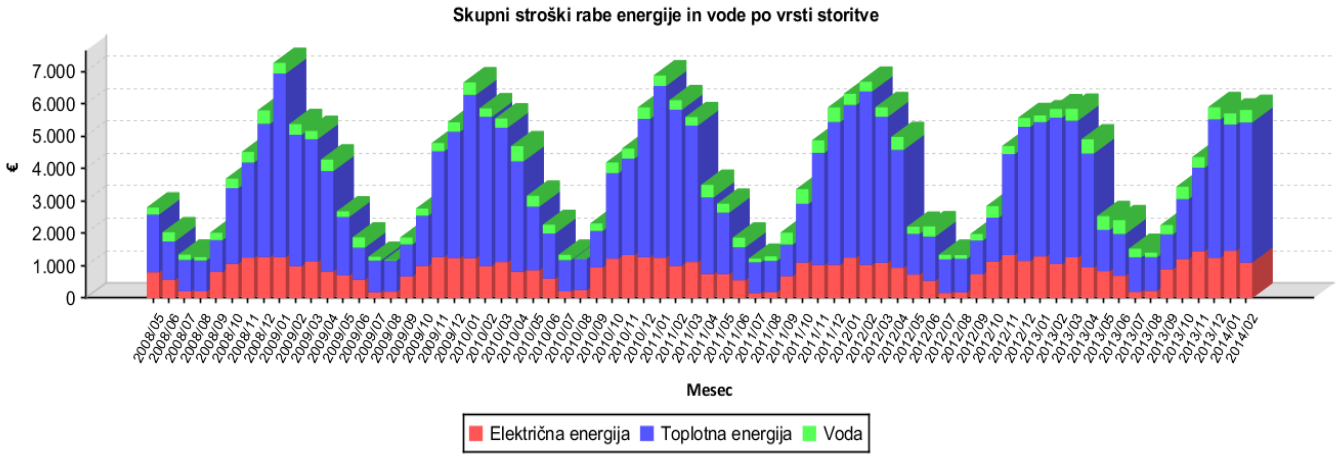
DEM (Remote Energy Manager)

- The user display ilustrates an overview of relevant consumption data of the building



DEM (Remote Energy Manager)

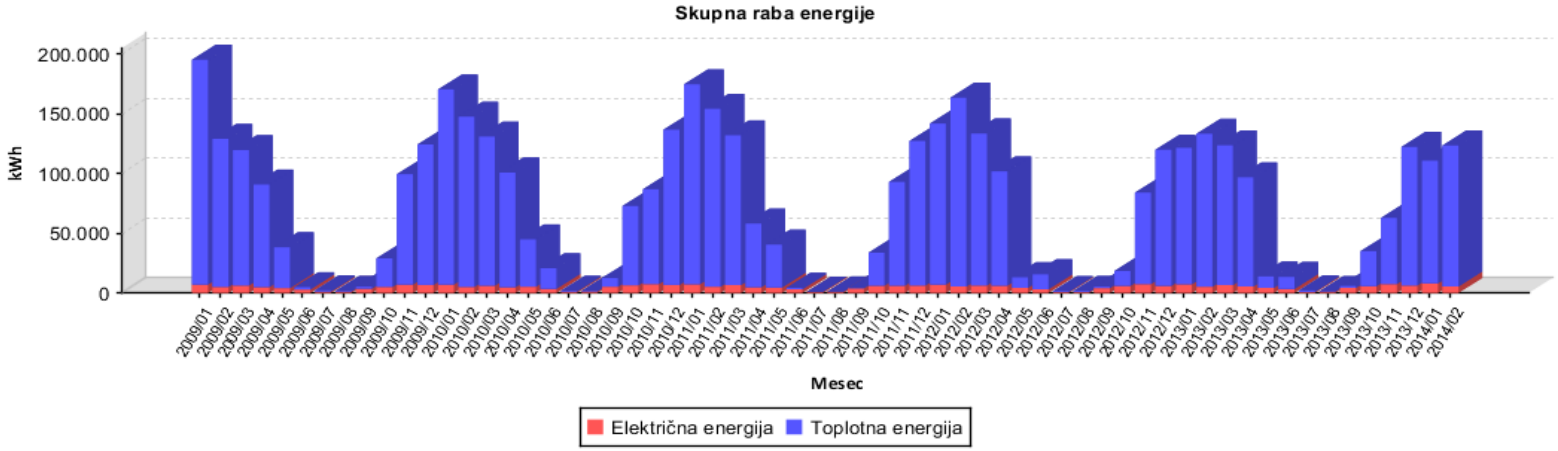
- Dinamic overview of total cost per month in the time period from Maj 2008 till present.



	Januar	Februar	Marec	April	Maj	Junij	Julij	Avgust	September	Oktober	November	December	Skupaj
2008					2.796,73 €	2.032,15 €	1.342,3 €	1.265,27 €	2.017,92 €	3.688,06 €	4.510,96 €	5.792,78 €	23.446,17 €
2009	7.257,7 €	5.368,5 €	5.158,28 €	4.274,45 €	2.677,16 €	1.874,88 €	1.276,25 €	1.174,47 €	1.872,76 €	2.762,91 €	4.785,8 €	5.425,14 €	43.908,3 €
2010	6.656,83 €	5.856,22 €	5.542,93 €	4.689,11 €	3.158,53 €	2.264,11 €	1.338,26 €	1.224,32 €	2.306,98 €	4.187,77 €	4.616,45 €	5.883,66 €	47.725,16 €
2011	6.870,35 €	6.109,33 €	5.586,48 €	3.497,32 €	2.912,56 €	1.868,17 €	1.218,58 €	1.287,7 €	2.022,04 €	3.362,52 €	4.871,66 €	5.886,53 €	45.493,26 €
2012	6.302,98 €	6.678,78 €	5.889,74 €	4.972,54 €	2.203,04 €	2.214,95 €	1.337,6 €	1.327,38 €	1.983,36 €	2.840,02 €	4.692,43 €	5.559,83 €	46.002,66 €
2013	5.637,53 €	5.835,18 €	5.840,75 €	4.898,58 €	2.531,25 €	2.405,22 €	1.527,51 €	1.402,09 €	2.257,71 €	3.438,71 €	4.355,08 €	5.889,04 €	46.018,65 €
2014	5.699,73 €	5.805,48 €											11.505,21 €

DEM (Remote Energy Manager)

- Dinamic overview of total energy consumption per month in the time period from January 2009 till present:



	Januar	Februar	Marec	April	Maj	Junij	Julij	Avgust	September	Oktober	November	December	Skupaj
2009	195.204 kWh	128.929 kWh	119.538 kWh	90.692 kWh	38.201 kWh	4.726 kWh	2.174 kWh	1.656 kWh	5.283 kWh	28.924 kWh	99.366 kWh	124.237 kWh	838.930 kWh
2010	170.323 kWh	147.467 kWh	130.863 kWh	100.744 kWh	44.747 kWh	20.670 kWh	1.789 kWh	1.718 kWh	12.423 kWh	72.744 kWh	86.774 kWh	136.547 kWh	926.809 kWh
2011	174.525 kWh	154.067 kWh	131.925 kWh	57.997 kWh	40.341 kWh	4.248 kWh	937 kWh	1.164 kWh	4.005 kWh	33.665 kWh	92.890 kWh	127.134 kWh	822.898 kWh
2012	141.790 kWh	163.429 kWh	133.439 kWh	101.677 kWh	13.078 kWh	15.541 kWh	1.463 kWh	1.650 kWh	5.262 kWh	18.362 kWh	83.875 kWh	119.861 kWh	799.427 kWh
2013	121.441 kWh	133.173 kWh	123.463 kWh	96.736 kWh	13.753 kWh	13.341 kWh	2.048 kWh	1.449 kWh	5.809 kWh	34.918 kWh	62.775 kWh	122.258 kWh	731.164 kWh
2014	110.788 kWh	123.420 kWh											234.208 kWh
Povprečje	152.345 kWh	141.748 kWh	127.846 kWh	89.569 kWh	30.024 kWh	11.705 kWh	1.682 kWh	1.527 kWh	6.556 kWh	37.723 kWh	85.136 kWh	126.007 kWh	725.573 kWh

DEM (Remote Energy Manager)

- An overview of entered and missing cost statements shown on the example for heat energy bookkeeping:

Zavod Energetska agencija za
Koroška 37a, 3320 Velenje

EK01B - Manjkajoči računi

Zgradba: OŠ Livada, Efenkova cesta 60, 3320, Velenje
Obdobje: 2012 - 2014

Toplotna energija: Odjemno mesto 4

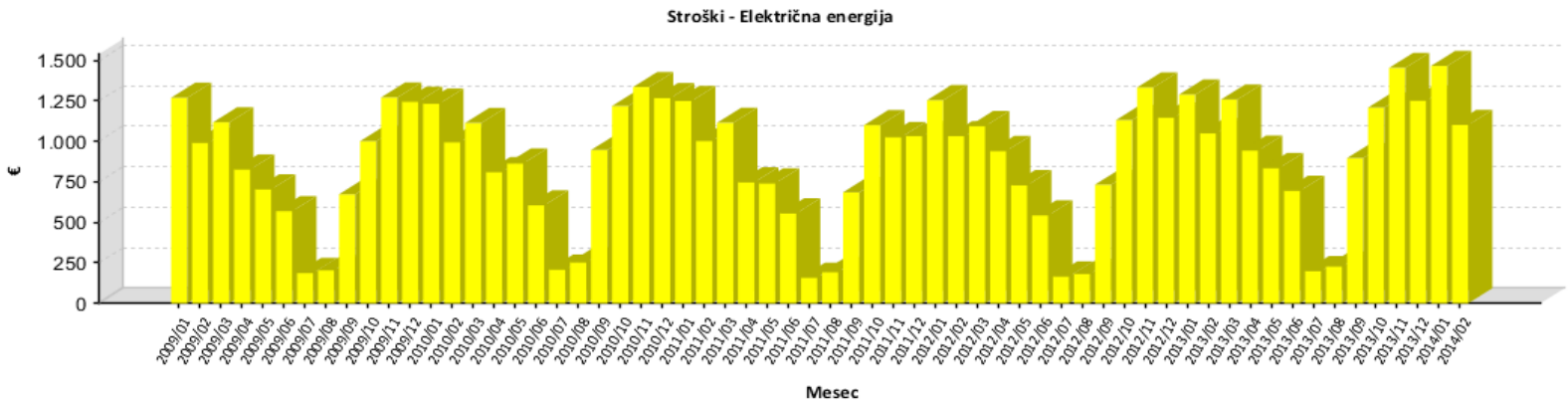
	Januar 2012	Februar 2012	Marec 2012	April 2012	Maj 2012	Junij 2012	Julij 2012	Avgust 2012	September 2012	Oktober 2012	November 2012	December 2012
Komunalno podjetje Velenje, št. MM 003401 OŠ LIVADA OV Mer.top.en.	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)

	Januar 2013	Februar 2013	Marec 2013	April 2013	Maj 2013	Junij 2013	Julij 2013	Avgust 2013	September 2013	Oktober 2013	November 2013	December 2013
Komunalno podjetje Velenje, št. MM 003401 OŠ LIVADA OV Mer.top.en.	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)	✓ (Di+Do)

	Januar 2014	Februar 2014	Marec 2014	April 2014	Maj 2014
Komunalno podjetje Velenje, št. MM 003401 OŠ LIVADA OV Mer.top.en.	✓ (Di+Do)	✓ (Di+Do)	01.03.2014 - 31.03.2014 (1)	01.04.2014 - 30.04.2014 (1)	01.05.2014 - 07.05.2014 (1)

DEM (Remote Energy Manager)

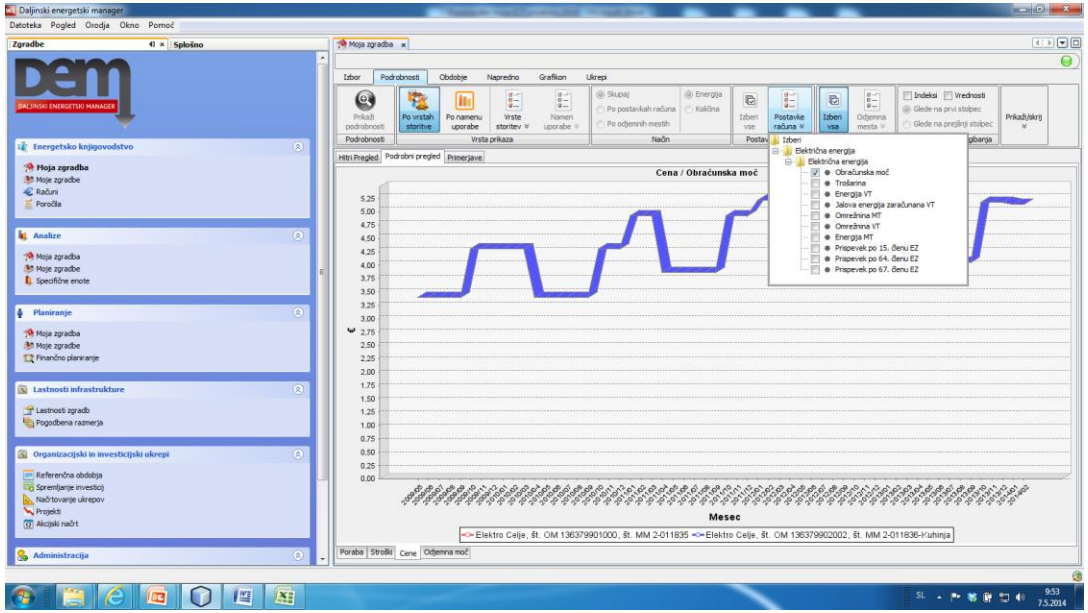
- Dinamic overview of total electrical energy costs per month in the time period from January 2009 till present:



	Januar	Februar	Marec	April	Maj	Junij	Julij	Avgust	September	Oktober	November	December	Skupaj
2009	1.269,9 €	991,87 €	1.117,88 €	827,15 €	704,58 €	569,4 €	187,43 €	204,24 €	673,33 €	1.001,67 €	1.271,7 €	1.245,79 €	10.064,95 €
2010	1.233,72 €	994,78 €	1.114,21 €	810,85 €	864,14 €	605,01 €	208,94 €	253,87 €	946,51 €	1.218,95 €	1.335,43 €	1.267,91 €	10.854,34 €
2011	1.249,26 €	1.003,11 €	1.115,11 €	748,12 €	740,98 €	555,77 €	158,59 €	193,56 €	685,25 €	1.100,6 €	1.027,16 €	1.033,15 €	9.610,65 €
2012	1.254,83 €	1.032,02 €	1.095,12 €	941,26 €	729,68 €	543,42 €	166,46 €	182,5 €	732,9 €	1.132,07 €	1.333,18 €	1.147,64 €	10.291,08 €
2013	1.289,65 €	1.050,38 €	1.258,6 €	943,62 €	835,51 €	695,77 €	199,32 €	228,54 €	896,71 €	1.209,21 €	1.453,88 €	1.252,5 €	11.313,69 €
2014	1.466,03 €	1.101,56 €											2.567,6 €
Povprečje	1.293,9 €	1.028,96 €	1.140,19 €	854,2 €	774,98 €	593,88 €	184,15 €	212,54 €	786,94 €	1.132,5 €	1.284,27 €	1.189,4 €	9.117,05 €

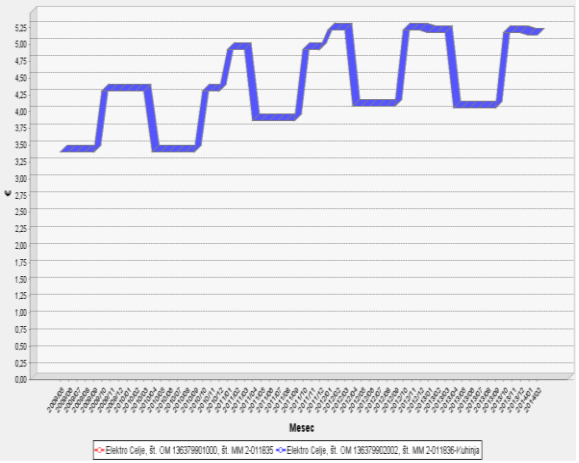
DEM (Remote Energy Manager)

- It is evident from the previous charts shown, that overall electrical energy costs have risen despite the decline in consumption. We used the feature of the software that alows us to monitor the prices our utility company has been charging us for various rates

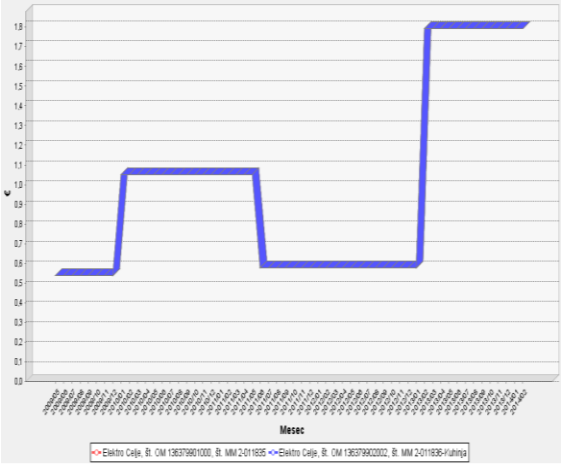


DEM (Remote Energy Manager)

- We are therefore able to quickly identify the underlying causes for the rise in our electricity bill:



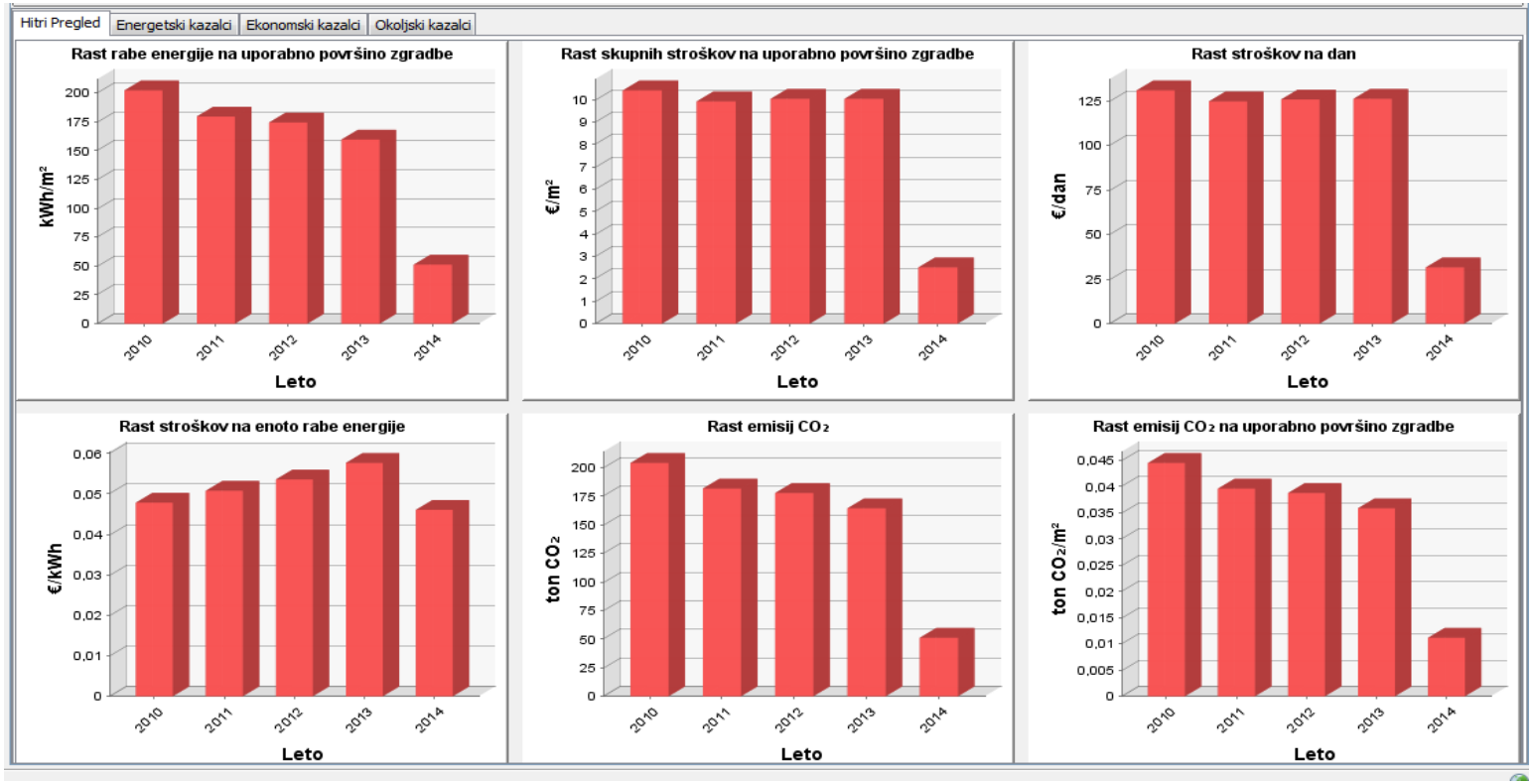
Power delivery charge



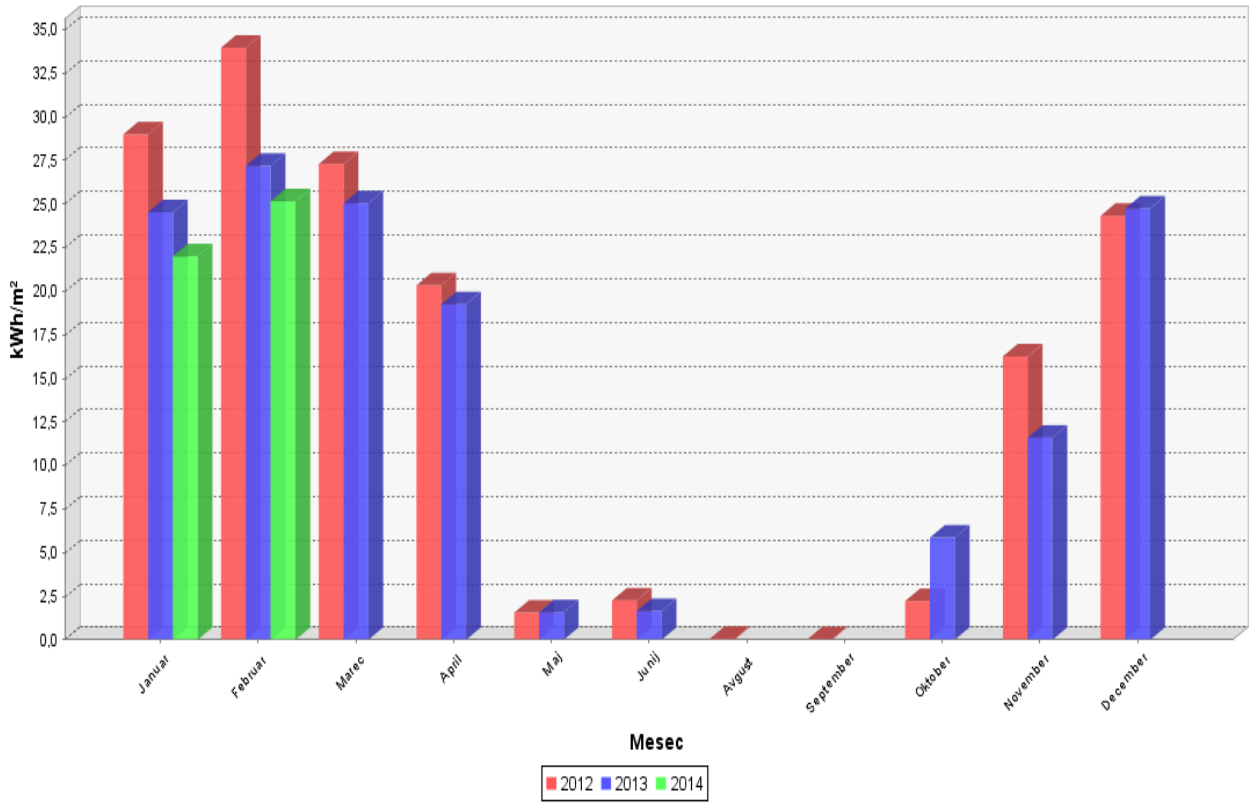
Contribution according to the 64. gazette of the Energy law

Excise duty cost

- In the analysis section the user obtains insight on the trends of energy consumption, costs and GHG emmissions:



- The folowing charts presents a comparative analysis of heat energy consumption per years from 2012 till present:



E2 MANAGER

E2 Manager

- A newer version of DEM was recently developed by ADESCO - **the E2 manager**

- The E2 MANAGER is an updated version of the DEM program and addreses some shortcomings of his predecesor.

- The E2 MANAGER software is mainly focused on simplifying the data interpretation and energy management in buildings. It is also easier to customize the user interface of the program to meet the requirements on various levels of complexity.

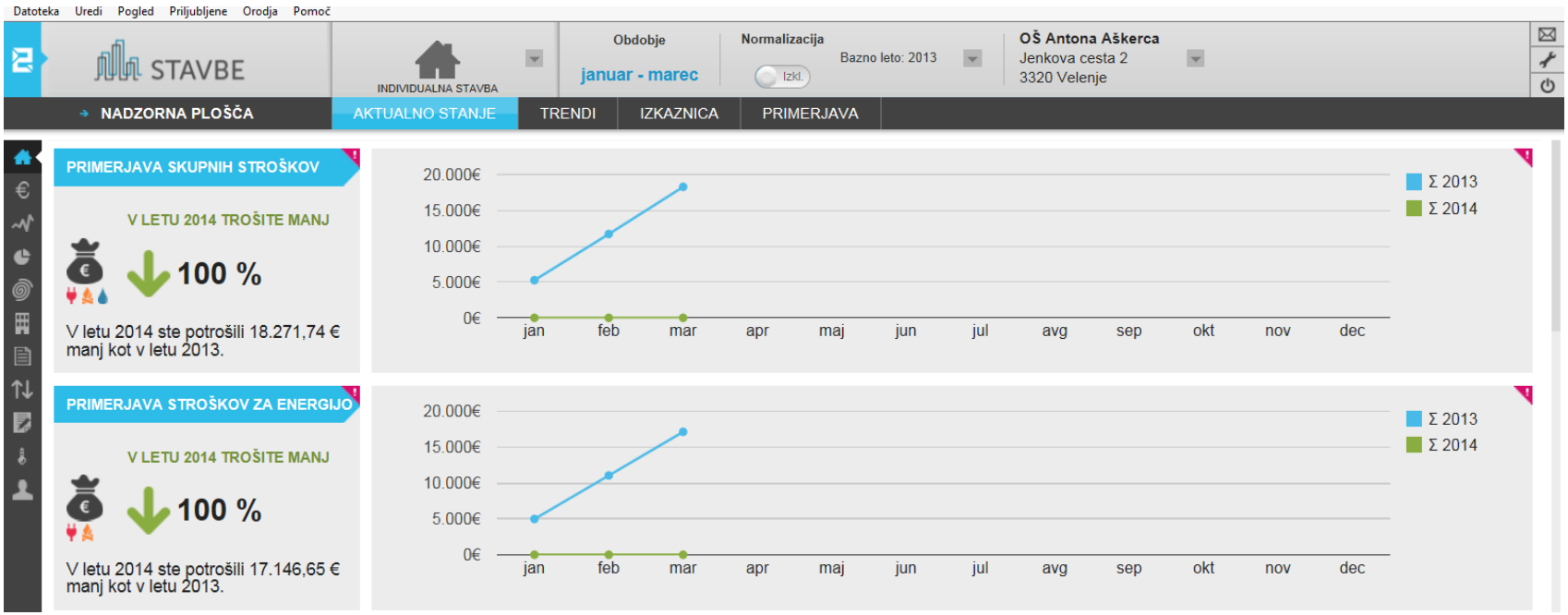
- Within the program there are more than a thousand bussines buildings being monitored with over 100 million € in annual energy and water expenses.

E2 MANAGER

E2 Manager

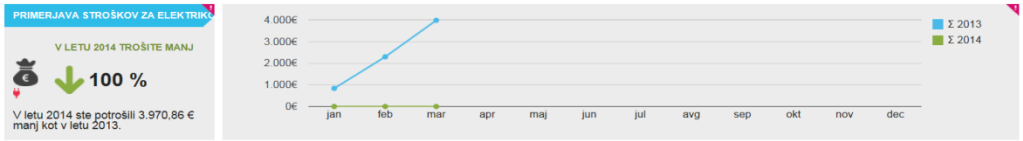
- Control panel
- Statement (Bill) display
- Energy profile
- Energy analysis
- Carbon footprint
- Infrastructure
- Reports
- Parameters and indicators
- Contract prices
- Temperature influence
- User control

E2 Manager

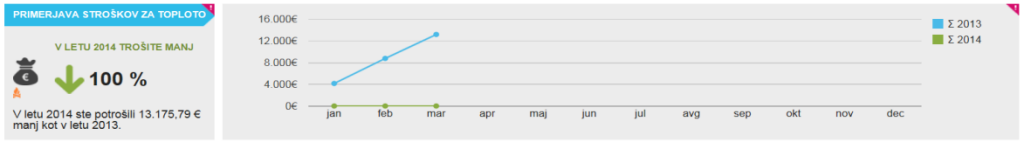


- Main user interface of the control panels, where on the left side are simple indicators of use in comparison with the previous year. On the right side there are charts that graphicaly display the costs/source quantity per month.

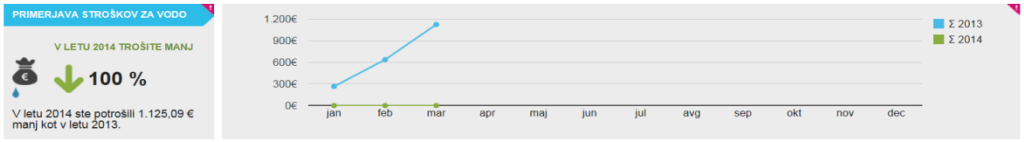
E2 Manager



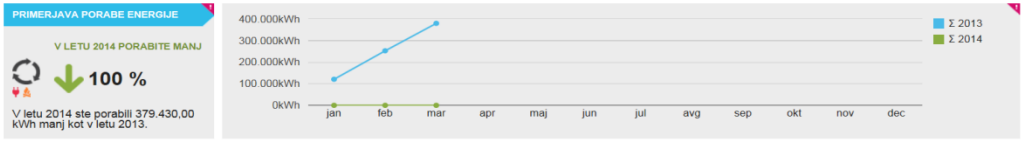
Cost of electricity



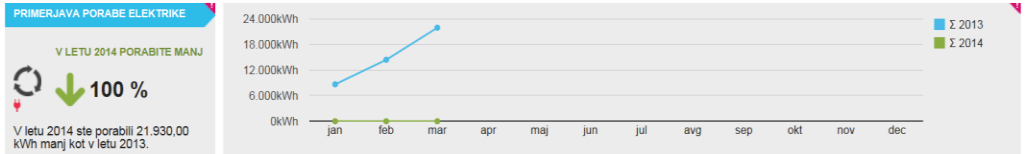
Cost of heat energy



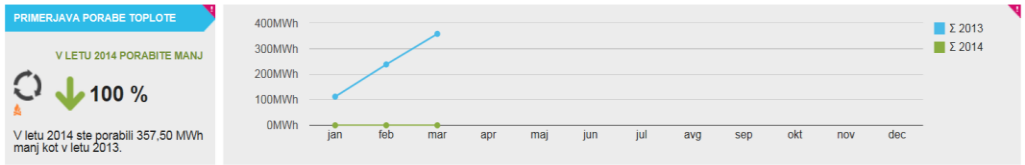
Cost of water



Combined energy consumption



Electricity consumption



Heat energy consumption

Other ICT systems that support the energy inspection of buildings in Slovenia

ELTEC Energy Watch

ELTEC PETROL

The ELTEC Energy Watch is an aggregate monitoring and managing system for district heating/cooling, water distribution systems, efficient lighting systems and energy management of buildings. It allows a systematic approach to energy and water use rationalization. It uses the folowing tools that are typical for an EMIS:

- **ELTEC EnergyWatch Alarming**

A system for process and energy alert management

- **ELTEC EnergyWatch Portal**

Energy bookkeeping, the overview of SCADA objects online, statical energy analysis

- **ELTEC EnergyWatch Analysis**

Advanced (dinamical) energy analysis in real time

Other ICT systems that support the energy inspection of buildings in Slovenia

GemaLogic

Solvera Lynx Clear view on energy

•GemaLogic is yet another ICT program for energy management, which enables the users to reduce their energy costs. It brings state of the art solutions for energy data acquisition and monitoring, energy data analyses and implements continuous improvements in energy efficiency.

• GemaLogic consists of software and hardware packages, comprising a uniform system. It was developed in accordance with the demands and standards that had been widely used and tested in harsh production conditions.

• The Solvera Lynx company was acquisitioned by Iskra Zaščite d.o.o., a manufacturer and technological innovative company in the field of overvoltage protection, who is now the majority owner. The long term strategy of the companies is the research and developement of ICT solutions for controlling devices and infrastructure in Smart Grid applications.

In conclusion:

- ICT tools are essential when addressing the issue of energy efficiency
- The **human factor** is most important
- With the use of ICT tools to increase energy efficiency, the organization in question actually **saves money**

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Thank you !

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