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Practical task 1

Creation of requirements for energy efficient legislation in construction sphere. Skills test

Practical task 1

Creation of requirements for energy efficient legislation in construction sphere. Skills test

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New construction

Residential building

Existing building stock

Municipal building

It is required to develop 5 steps to introduce a new standard for energy efficiency requirements (the sequence of implementation)

Practical task 1

Creation of requirements for energy efficient legislation in construction sphere. Skills test

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1

2

3

4

5

Practical task 1

Creation of requirements for energy efficient legislation in construction sphere. Skills test

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Main requirement and parameters for energy efficiency. Application area
(at least 10 items must be specified)

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Creation of requirements for energy efficient legislation in construction sphere. Skills test

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Could you please describe main stakeholders who will be obliged to comply with legal requirements

Could you please describe the main stakeholders and their role in the decision making process

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Creation of requirements for energy efficient legislation in construction sphere. Skills test

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Could you please describe the mechanism of implementation of the new energy efficient standard

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Practical task 2

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

Input data for some buildings, collected within technical inventory

Building type	Year of construction	Year of energy audits	Educated staff in terms of EE	Annual consumption of the natural gas, m3			Standard specific energy consumption of heat and ventilation, kW * h / m2 per year with HDD 2600 as per as code and norm	Total heated area, m2
				2015	2016	2017		
 **Multi Profile Medical Center №1**								
Hospital with Dep. 2 floors 24 hour operation	1980	No	No	55 400	61 000	51 800	105	3100
 **Multi Profile Medical Center №2**								
Hospital with Dep. 2 floors 24 hour operation	1988	Yes/2012	No	47 000	46 200	45 500	105	3250
 **Secondary school**								
Main building 2 floors	1993	Yes/2012	Yes	35 850	36 400	33 500	89	2 500
 **Children garden**								
Main building 3 floors	1969	No	Yes	36 000	32 000	30 150	102	2 400

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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STEP 1

Identify the base level of energy consumption of the buildings

and

Actual annual specific consumption kW*h/ m^2 per year

The formula for conversion of m3 of natural gas to kWh of heat energy:
(Basic level of gas consumption * 9.3)

Building type	Annual gas consumption, m3/h			Base level of the annual gas consumption, m3	Annual consumption of heat, kWh	Total heated area, m2	Actual annual consumption per square meter, kW*h/ m2 per year
	2015	2016	2017				
 **Multi Profile Medical Center №1**							
Hospital with Dep. 2 floors 24 hour operation	55 400	61 000	51 800			3100	
 **Multi Profile Medical Center №2**							
Hospital with Dep. 2 floors 24 hour operation	47 000	46 200	45 500			3 250	
 **Secondary school**							
Main building 2 floors	35 850	36 400	33 500			2 500	
 **Children garden**							
Main building 3 floors	36 000	32 000	30 150			2 400	

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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STEP 2

Please define and specify the energy efficiency class of the building

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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Energy efficiency classes of municipal and residential buildings		
Class		Deviation between the target value, %
Name	Symbol	
For new construction and for existing construction		
Highest	A++ A+ A	lower than –60 from –50 to –60 from -40 to -50
High	B+ B	from –30 to –40 from –15 to –30
Normal	C+ C C-	from -5 to -15 from +5 to –5 from +15 to +5
Only for existing buildings (under reconstruction)		
Low	D	from +15,1 to +50
Lowest	E	more than +50

Building type	Specific heat baseline consumption, kW*hour/ m2 annually	Normative specific heat consumption, kW*hour/ m2 annually	Deviation value,%	Class of energy efficiency
	 **Multi Profile Medical Center №1**			
Hospital with Dep. 2 floors 24 hour operation				
	 **Multi Profile Medical Center №2**			
Hospital with Dep. 2 floors 24 hour operation				
	 **Secondary school**			
Main building 2 floors				
	 **Children garden**			
Main building 3 floors				

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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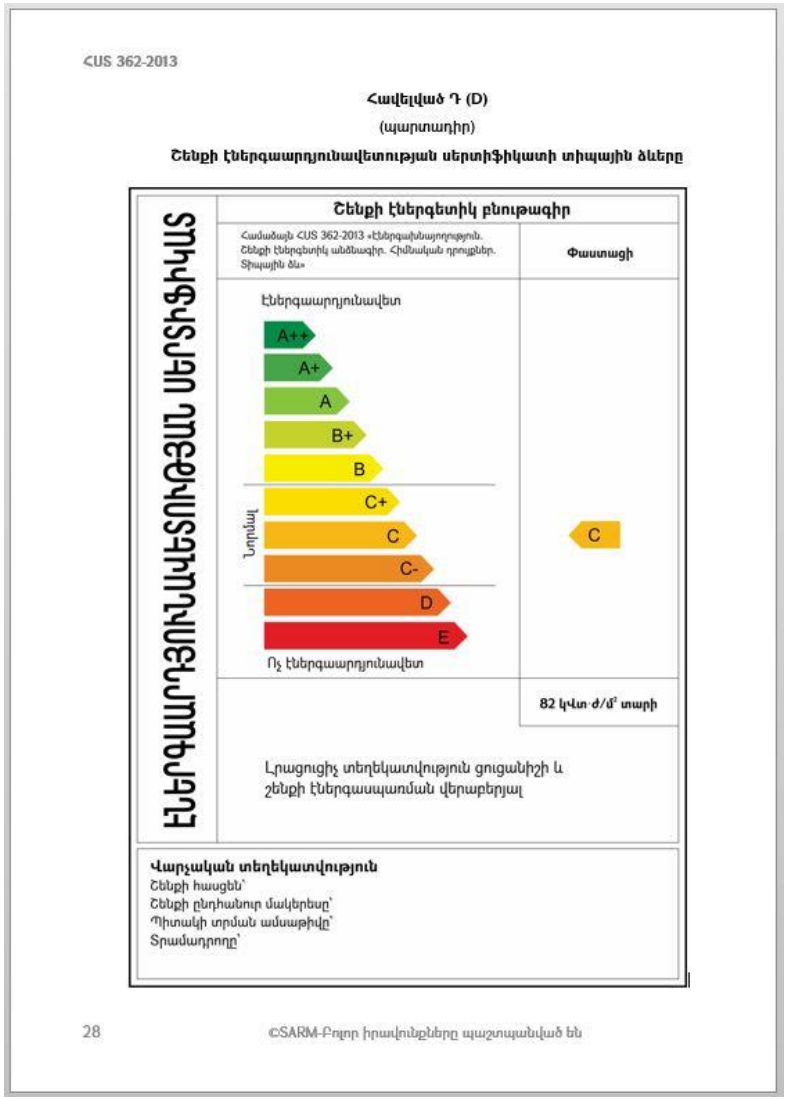

ՀՍՏ 362-2013

Հավելված Դ (D)

(պարտադիր)

Շենքի էներգաարդյունավետության սերտիֆիկատի տիպային ձևերը

ԷՆԵՐԳԱԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅԱՆ ՍԵՐՏԻՖԻԿԱՏ

Շենքի էներգետիկ բնութագիր

Համաձայն ՀՍՏ 362-2013 «Էներգախնայողություն. Շենքի էներգետիկ անձնագիր. Հիմնական դրույթներ. Տիպային ձև»

Փաստացի

Էներգաարդյունավետ

A++
A+
A
B+
B
C+
C
C-
D
E

Նվազում

C

Ոչ էներգաարդյունավետ

82 կՎտ·ժ/մ² տարի

Լրացուցիչ տեղեկատվություն ցուցանիշի և շենքի էներգասպառման վերաբերյալ

Վարչական տեղեկատվություն

Շենքի հասցեն՝
Շենքի ընդհանուր մակերեսը՝
Պիտակի տրման ամսաթիվը՝
Տրամադրողը՝

28

©SARM-Բոլոր իրավունքները պաշտպանված են

For each of the buildings, the energy efficiency class is fixed in the energy passport, reflected in the form of a table on the building, and it is also one of the key KPIs for ranking the buildings in the energy manager's work

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STEP 3

Please make the sorting of buildings based on KPI

Please specify KPI for sorting of municipal buildings

Please place the buildings (in descending or ascending order) based on the KPI

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	Ranking parameters 1	Ranking parameters 2	Ranking parameters 3	Ranking parameters 4
Name of building				

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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STEP 4

Please specify any other KPI for sorting of building

Analysis of data and ranking of municipal buildings in terms of energy efficiency classes and key performance indicators

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Residential building

Public building

Discussion among participants

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Practical task 3

Work with massive number of buildings
Skills test of financing package formation for buildings retrofit or capital repair

Practical task 3

Work with massive number of buildings

Skills test of financing package formation for buildings retrofit or capital repair

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Name of building	Ownership	Year of construction	Degree of deterioration, %	Total building serviced area, m^2	Mode of operation, hours	Presence of Energy Passport	Class of energy efficiency	Opportunity to use money for the next year saved as a result of energy consumption for the next year	Comments
Regional hospital	Municipality. Department of health	1995	20 (current repair is needed only)	5500	8500	Yes	D	Yes	Legal entity under partial financing by municipality with possibility of doing business by providing paid services.
Primary school	Municipality. Department of education	1985	50 (major capital repair in needed)	3000	3000	Yes	B	No	Could you please explain what kind of reason might be for the high class of energy efficiency - class B (please give an explanation)
Secondary school	Municipality. Department of education	1981	15	2000	4500	Yes	C	Yes	Insulation of facades of the building and replacement of window already implemented. Inefficient outdated heating system. Fluorescent and incandencent lamps
Multi appartment residential house	Privatized property Home owner association.	1960	60	5000	24hours/ heating system 5000	No	not identified	No	
Multi appartment residential house	Privatized property Home owner association.	2000	15	6000	24hours/ heating system 5000	Yes	D	Yes	Privatized property by inhabitants. Legal entity - home owner association
Hospital	Municipality. Department of health	2001	10	3000	8000	Yes	C-	No	Legal entity under fully financing by municipality without possibility of doing business by providing paid services.
City library	Municipality. Department of culture	1974	30	1000	4500	No	not identified	No	

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STEP 1

According to provided data please select buildings with the most attractive conditions for financing and put them in priority order

Please mark all key KPI which describe this selection of each building

Please explain your approach

Practical task 3

Work with massive number of buildings

Skills test of financing package formation for buildings retrofit or capital repair

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Name of building	Ownership	Year of construction	Degree of deterioration, %	Total building serviced area, m^2	Mode of operation, hours	Presence of Energy Passport	Class of energy efficiency	Opportunity to use money for the next year saved as a result of energy consumption for the next year

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STEP 2

According to provided data please select buildings which are suitable for capital repair. Please put them in priority order

Please mark all key KPI which describe this selection of each building

Please explain your approach

Practical task 3

Work with massive number of buildings

Skills test of financing package formation for buildings retrofit or capital repair

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Name of building	Ownership	Year of construction	Degree of deterioration, %	Total building serviced area, m^2	Mode of operation, hours	Presence of Energy Passport	Class of energy efficiency	Opportunity to use money for the next year saved as a result of energy consumption for the next year

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STEP 3

Please highlight the common features typical for buildings

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Building for investment

Building for capital repair

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Practical task 4
Financing of EE modernization / ESCO

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INPUT DATA

- Municipality implements a city energy action plan (long-term targeted EE modernization program)to increase the energy efficiency of budget buildings. The program is designed for 5 years
- The municipality is considering the possibility of attracting extra budgetary funds with the potential possibility of involving of ESCOs
- At the level of the municipality, amendments are made that allow flexible use of funds for the maintenance of budget buildings and for the provision of public services within the framework of performance contracts
- Legislation on public procurement allows the indication in the contract not a fixed price, but the procedure for determination it with the formula for calculating the price of the contract, depending on the change in the regulated tariffs for goods and services of communal organizations

- The city provides guarantees to the bank___ to fulfill the contract

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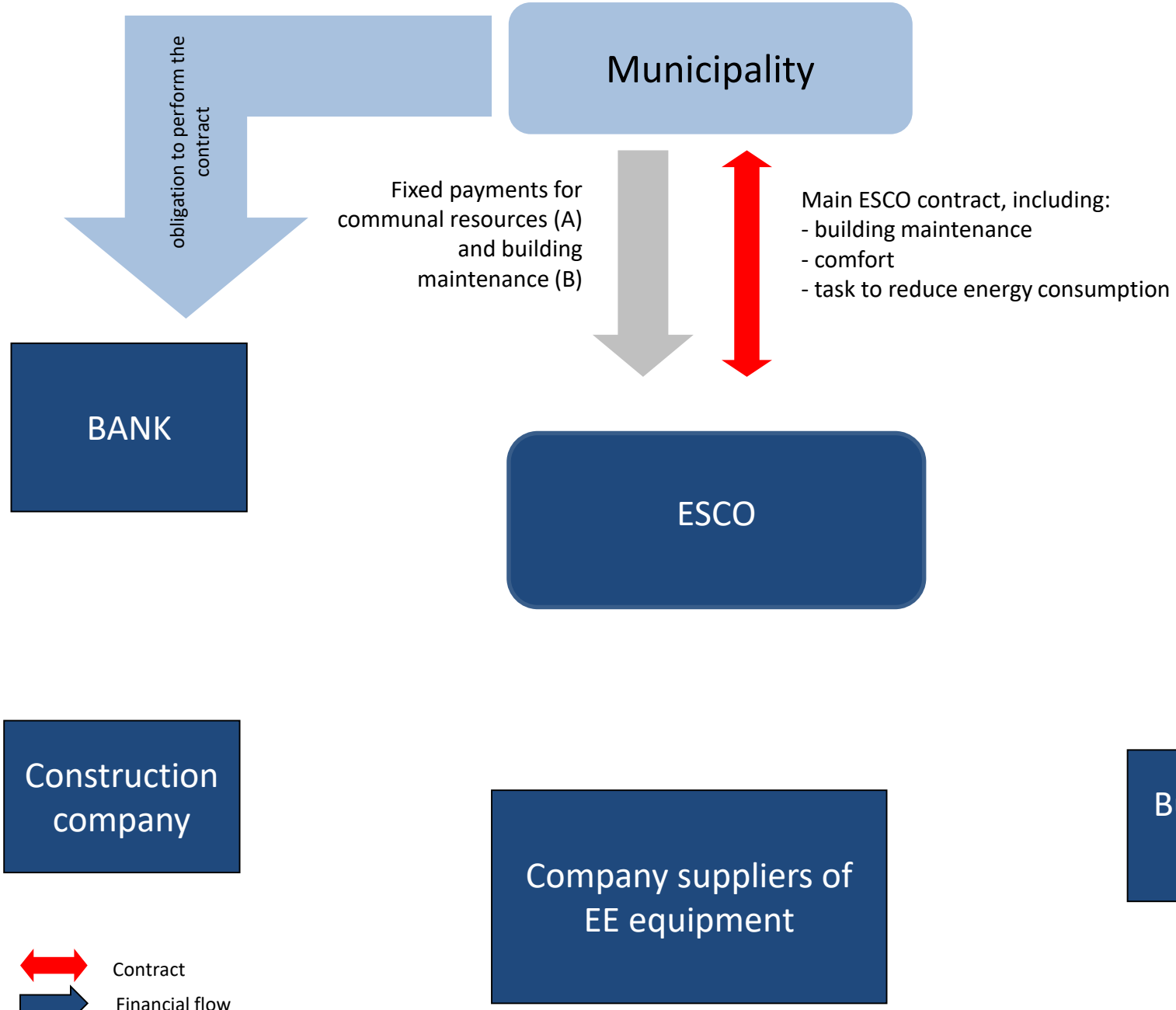
INPUT DATA

- Internal risks are minimized by the municipality and ESCO by including special provisions into the main contract
- External risks that are out of regulation under contracts and should be taken by ESCO
- Three groups of ESCO obligations: maintenance of the building, comfortable conditions; building energy efficiency
- The ESCO contract concluded a period for 5 years and fit to the long-term targeted EE modernization program implemented by municipality
- The price of the contract - the cost of works for the maintenance and current repair of buildings in the baseline year, taking into account the indexation and the cost of the base amount of utility resources and the changes in tariffs
- Payment of communal resources by ESCO - from own funds upon their consumption on the basis of contracts with energy supply companies


Municipality
obligation to perform the contract
Fixed payments for communal resources (A) and building maintenance (B)
Main ESCO contract, including:
- building maintenance
- comfort
- task to reduce energy consumption
BANK
ESCO
Energy supply companies
Construction company
Company suppliers of EE equipment
Building services companies
Contract
Financial flow

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WHAT TO DO:

- Identify and describe on the diagram the main contractual relationships with all stakeholders
- Identify and describe on the diagram all financial flows (express through variables) between the stakeholders
- Determine the main equation of the final cost of an energy service contract using variable of financial flows
- Specify independently the main possible related activities for energy-efficient modernization of municipal buildings (with a planning horizon of 5 years)
- Specify the main risks for the ESCO and for the municipality

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- Determine the main equation of the final cost of an energy service contract using variable of financial flows

$$P = A + B -$$

- Specify independently the main possible related activities for energy-efficient modernization of municipal buildings (with a planning horizon of 5 years)

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Specify the main risks for the ESCO and for the municipality

ESCO	Municipality

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Practical task 5

Identification of energy efficient solutions for multi apartment residential house

House equipped with common heat meter

yes

After installation of heat meter the real heat consumption became more than contract price (design anticipated heat consumption)

no

The internal heating system of your house is flushing on the regular basis

no

If NO please specify which solution must be applied first

If YES Please specify which solution must be applied first (next slide)

The distribution pipes of internal heating system in the basement have an insulation

no

There has been identified irregular distribution of heat among vertical risers of internal heating system

yes

The house has outdated heat individual point without automatic control of consumed heat

yes

The members of HOA wants to make individual regulation of heat for each flats and option to control of consumed heat

yes

After installation of heat meter the real heat consumption became more than contract price (design anticipated heat consumption)

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Activities related to the modernization of the common property in building

Activities related to the modernization of the property of inhabitants

Could you please list all EE measures according to sequence of implementation