Financing in building renovation: ESCO models

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WHAT IS AN ENERGY SERVICE ?

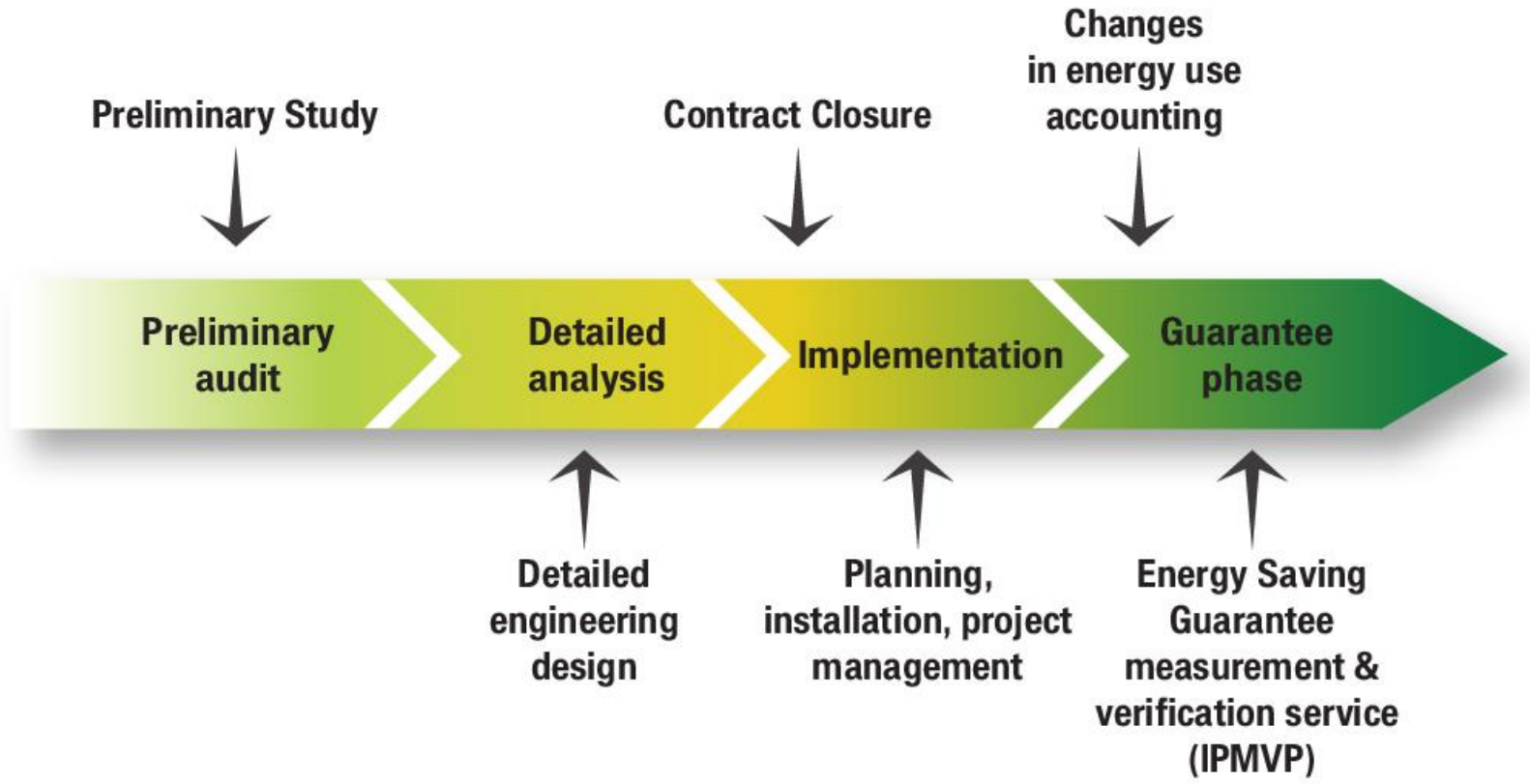
“Energy service” as defined in the Directive means physical benefit, utility or good derived from a combination of energy with energy efficient technology and/or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to lead to verifiable and measurable or estimable energy efficiency improvement and/or primary energy savings.

WHAT IS AN ESCO AND A EPC

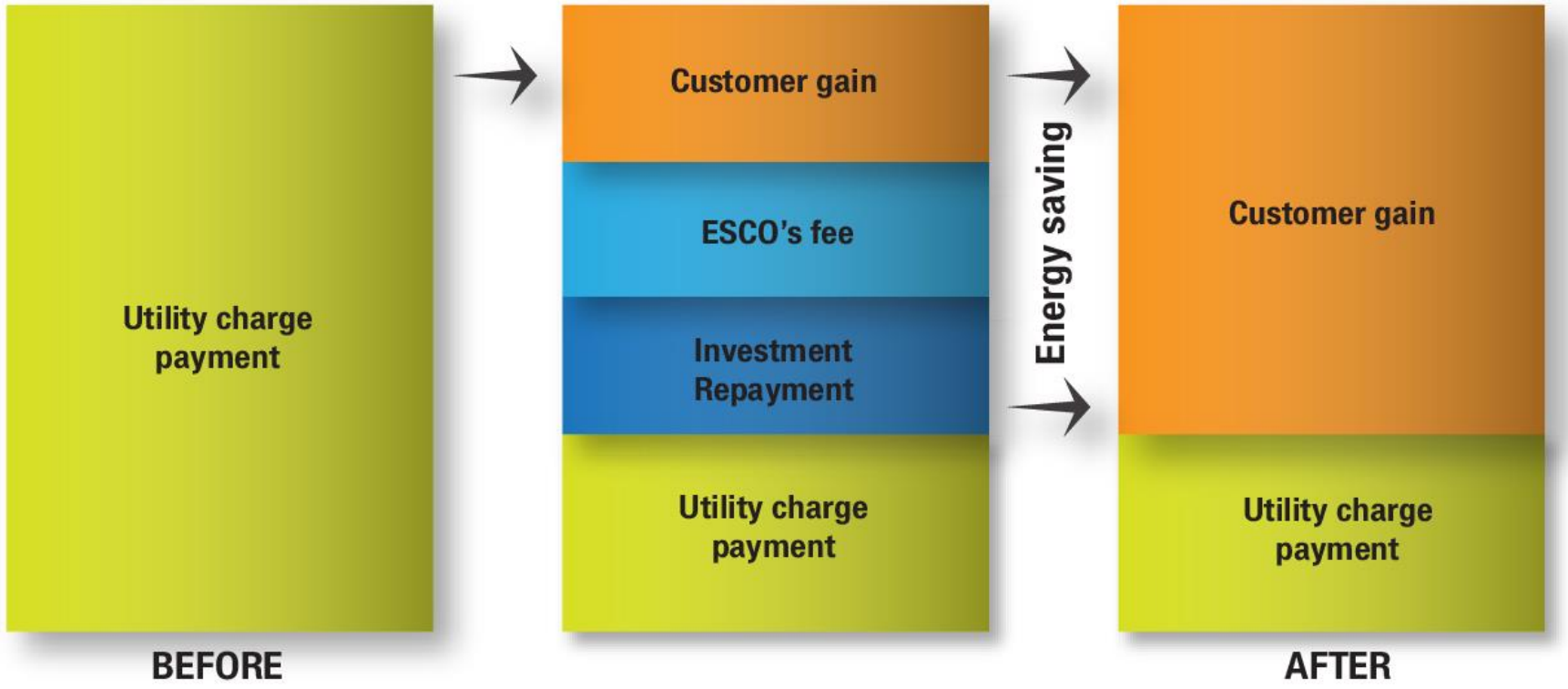
Energy Services Company (ESCO):
An ESCO is a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed upon performance criteria.

Energy Performance Contract (EPC):
An EPC is a contractual arrangement between the beneficiary and the provider (normally an energy services company) of an energy efficient improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement

TYPICAL PROCESS FOR ESCO

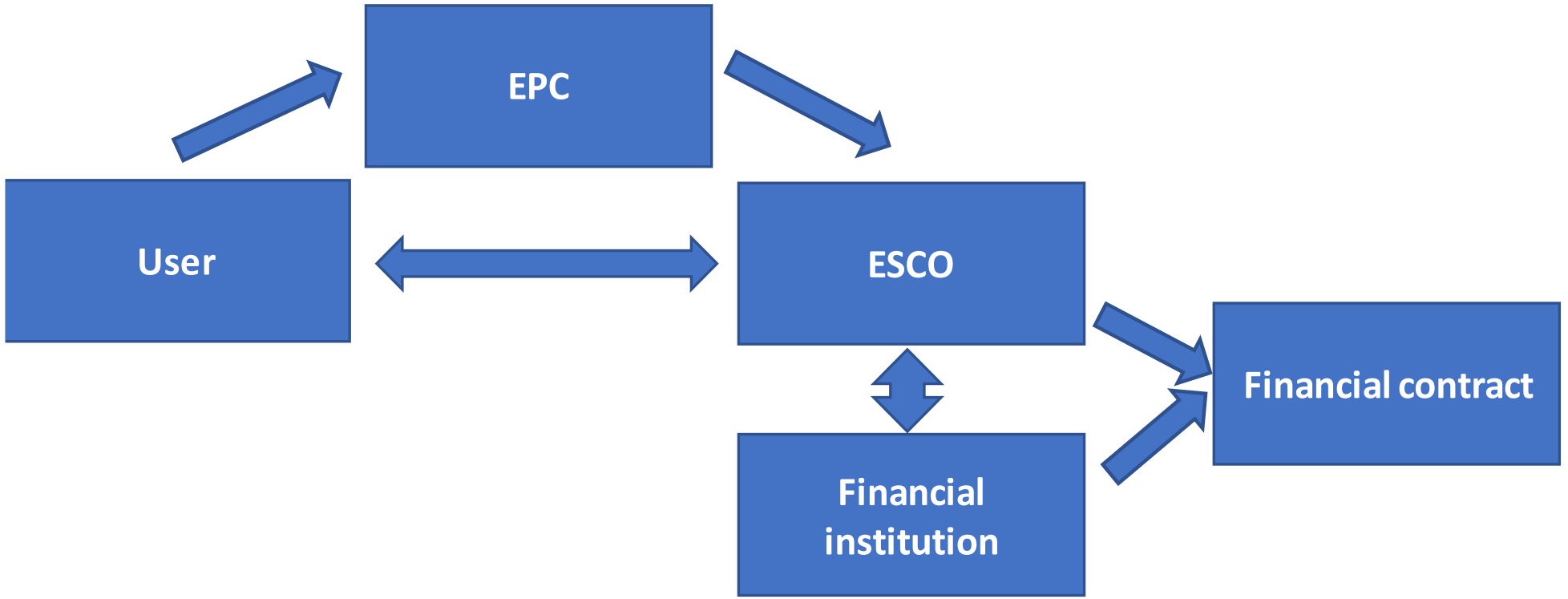


TYPICAL PROCESS FOR EPC



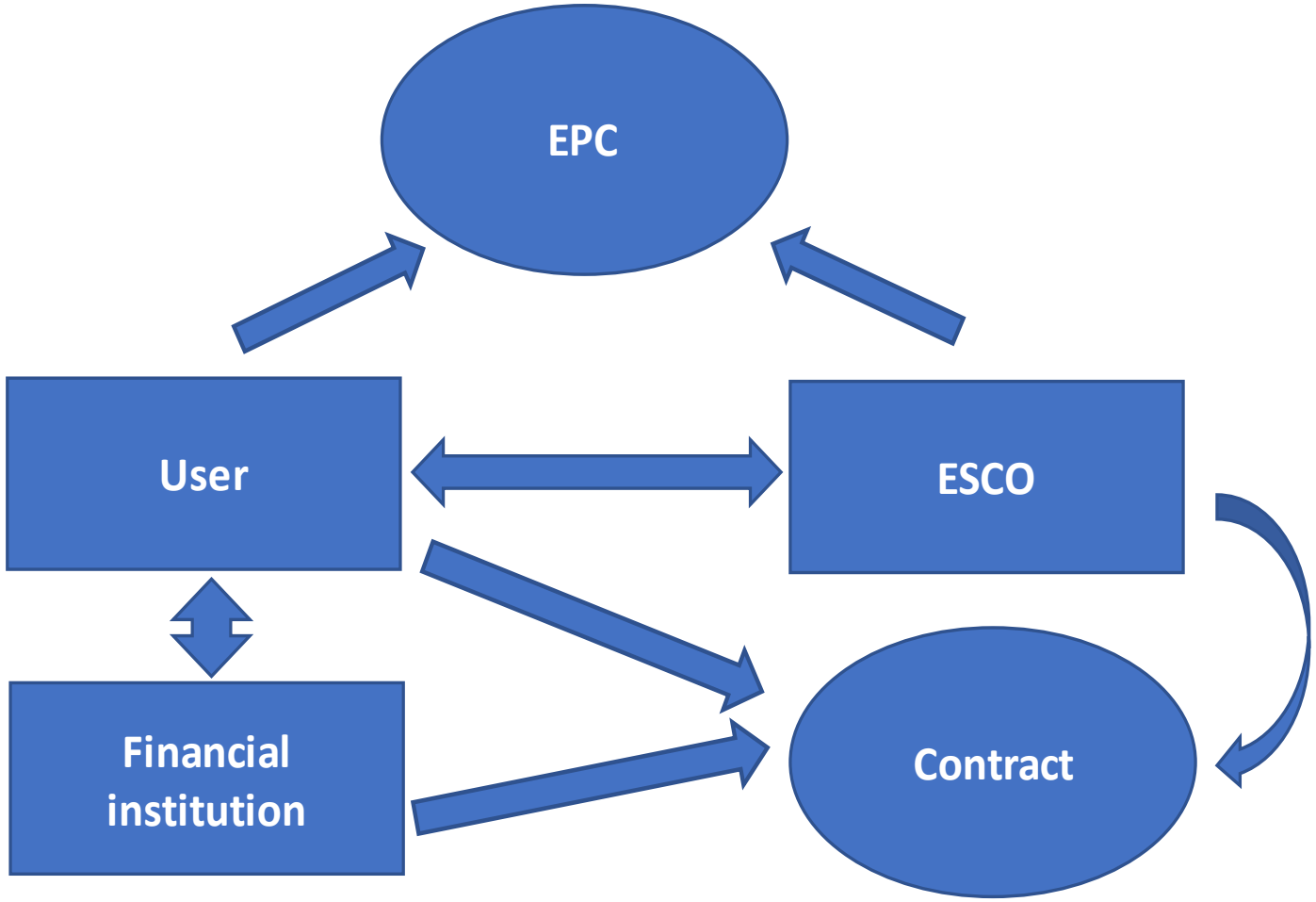
TYPICAL EXAMPLES FOR ESCO CONTRACTING

Shared Savings model



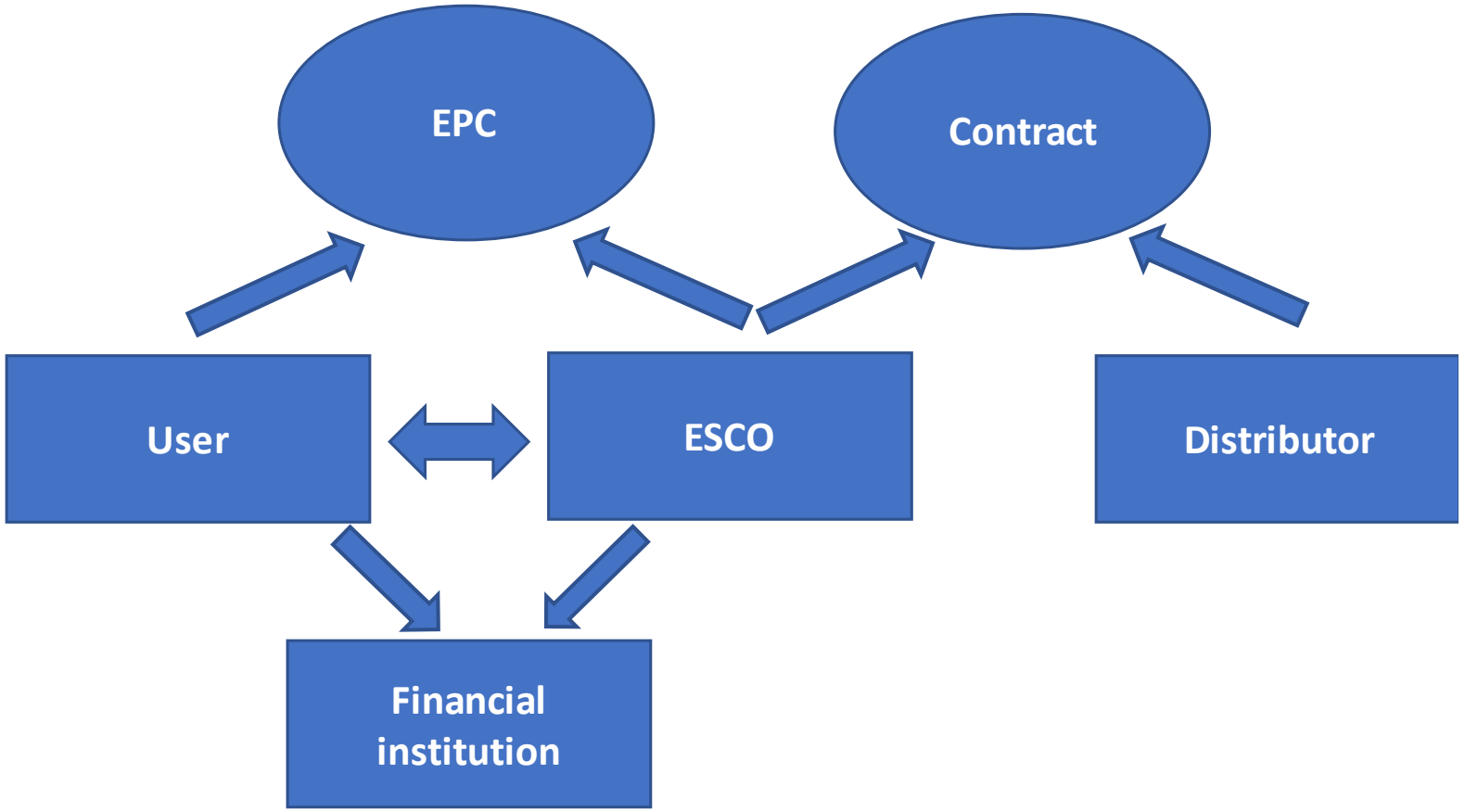
TYPICAL EXAMPLES FOR ESCO CONTRACTING

Guaranteed Savings Model



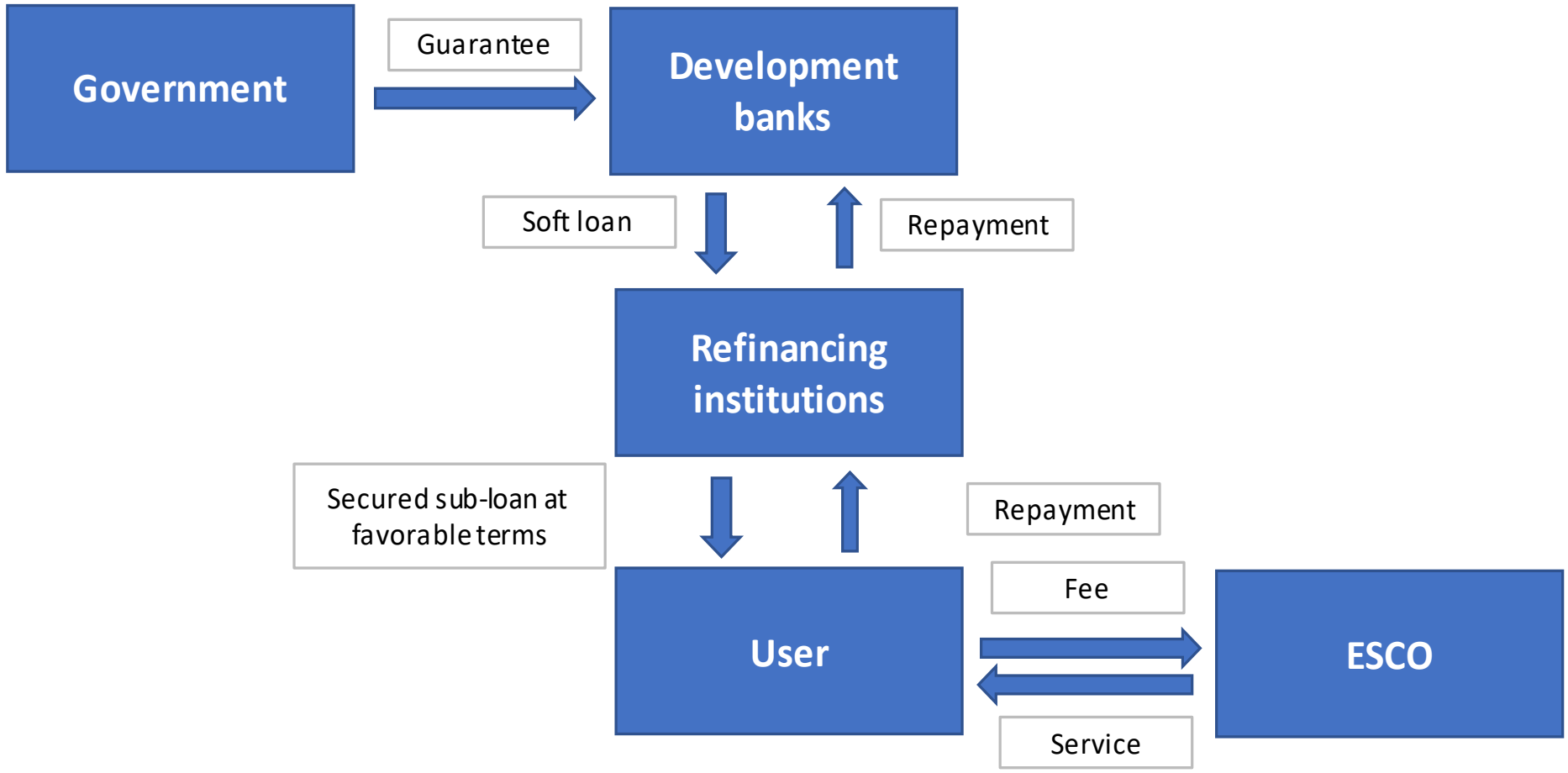
TYPICAL EXAMPLES FOR ESCO CONTRACTING

ESCO Provider Model



TYPICAL EXAMPLES FOR ESCO CONTRACTING

Development Finance ESCO Model



ARTICLE 18 EED

- 1. Member States shall promote the energy services market and access for SMEs to this market by:

- (a) disseminating clear and easily accessible information
- (b) encouraging the development of quality labels, inter alia, by trade associations;
- (c) making publicly available and regularly updating a list of available energy service providers

- (d) supporting the public sector in taking up energy service offers, in particular for building refurbishment, by:
- (i) providing model contracts for energy performance contracting which include at least the items listed in Annex XIII;
- (ii) providing information on best practices for energy performance contracting

ARTICLE 18 EED

- 2. Member States shall support the proper functioning of the energy services market, where appropriate, by:
- (b) taking, if necessary, measures to remove the regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models for the identification and/or implementation of energy saving measures;
- (c) considering putting in place or assigning the role of an independent mechanism, such as an ombudsman, to ensure the efficient handling of complaints and out-ofcourt settlement of disputes arising from energy service contracts; (d) enabling independent market intermediaries to play a role in stimulating market development on the demand and supply sides.

ARTICLE 18 EED

- 3. Member States shall ensure that energy distributors, distribution system operators and retail energy sales companies refrain from any activities that may impede the demand for and delivery of energy services or other energy efficiency improvement measures, or hinder the development of markets for such services or measures, including foreclosing the market for competitors or abusing dominant positions.

TYPICAL ESCO PROJECTS

In order to gain full picture and possibilities for ESCO penetration in the market, a wide range of types of buildings and possible measures were chosen. The possible projects were also chosen by economic criteria's, like wide range of simple payback, different investment costs etc.

The following types of buildings / institutions were chosen:

- Industry
- Multifamily residential building
- Single-family residential building
- Public building
- Public lightning

The following types of projects / measures were analyzed:

- Change of fuel
- Preparation of domestic hot water
- Full renovation of the building envelope
- Installing of thermal façade
- Heating control
- Replacement of old and inefficient lightning

TYPICAL ESCO PROJECTS

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

External walls - The building had 5cm of insulation in a cavity wall construction. Still, several major thermal bridges were detected, so additional 5cm insulation material (EPS) will be installed.

U_{old} = 0,57 W/m^{2}K U_{new} = 0,27 W/m^{2}K

Flat Roof - The building also has 5 cm of mineral wool on the roof. But the insulation material is positioned between wooden beams with 10cm thickness and they react as a thermal bridge. Additional 5 cm of mineral wool above the beams will remove the thermal bridges.

Tilted Roof – Installation of suspended ceiling with 10cm mineral wool.

U_{old} = 0.39 W/m^{2}K U_{new} = 0.25 W/m^{2}K

U_{old} = 0.35 W/m^{2}K U_{new} = 0.17 W/m^{2}K

Windows – The building has double frame wooden windows with double glazing. The new windows will be PVC frames and triple glazing.

U_{old} = 2.65 W/m^{2}K U_{new} = 1.85 W/m^{2}K

Domestic Hot Water – no existing system for central preparation of hot water. It is planned to be installed 3 solar thermal collectors with 150l tank.

TYPICAL ESCO PROJECTS

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

1.1 Profitability Calculations

Name	Residential Envelope + DHW	
Total Investment	418476	MKD
Annual Savings	79762	MKD
Annual O&M Cost	1417	MKD
Net Savings	78345	MKD
Economic Lifetime	20	yr
Maximum Pay-Off	20	yr

Payback	5,34	yr
Pay-off		yr
Internal Rate of Return	17,9%	
Net Present Value	836181	
Net Present Value Quotient	2,00	
Maximum Investment	1254657	

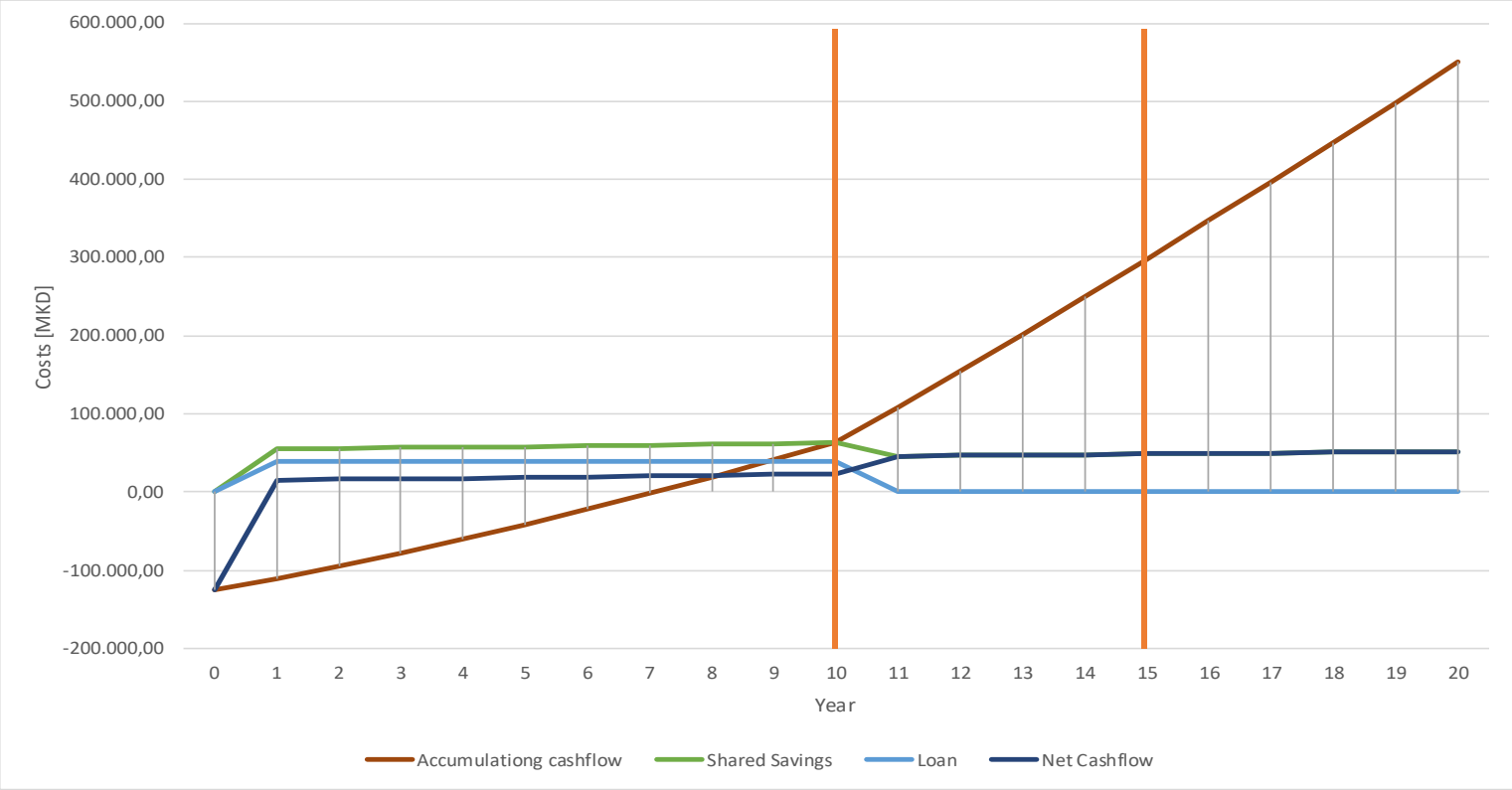
1.1 Cashflow input data

Economic Conditions		
Alternative Name	Residential Envelope + DHW	
Cashflow Period	20	yr
Equity Capital	125543	MKD
Grant	0	MKD
Total Loan	292933	MKD
Annual Savings	79762	MKD
Annual O&M	1417	MKD
Annual ESCO costs	0	MKD
Net Savings	78345	MKD
Inflation Rate	1,5%	

Loan Conditions		
Loan From	Bank 1	
Ammount	292933	MKD
Interest	6%	
Years	10	yr
Term	1 month	month/yr
Grace Period	0	month/yr
Total Investment	418476	MKD

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

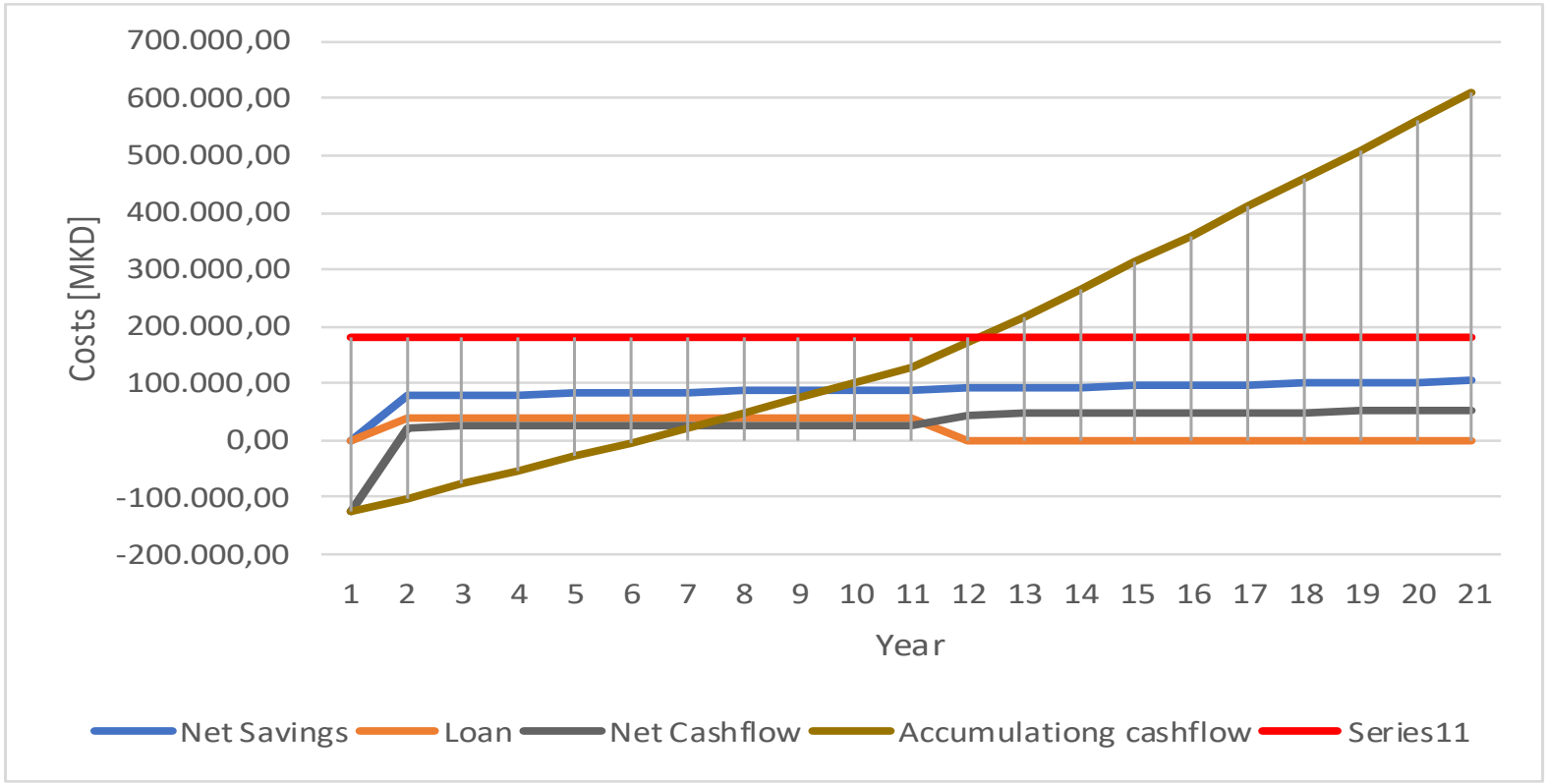
Shared Savings model



The chart shows that the payoff for the project is in the 8th year and at the end of the 3 durations of the contracts (10, 15 and 20 years), the project will be with positive balance. Even though the project has relatively small payback period, and even though after 10 years the project is positive in financial terms, the profit is significantly below the determined baseline. That is not the case if the contract length is longer – 15 or 20 years.

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

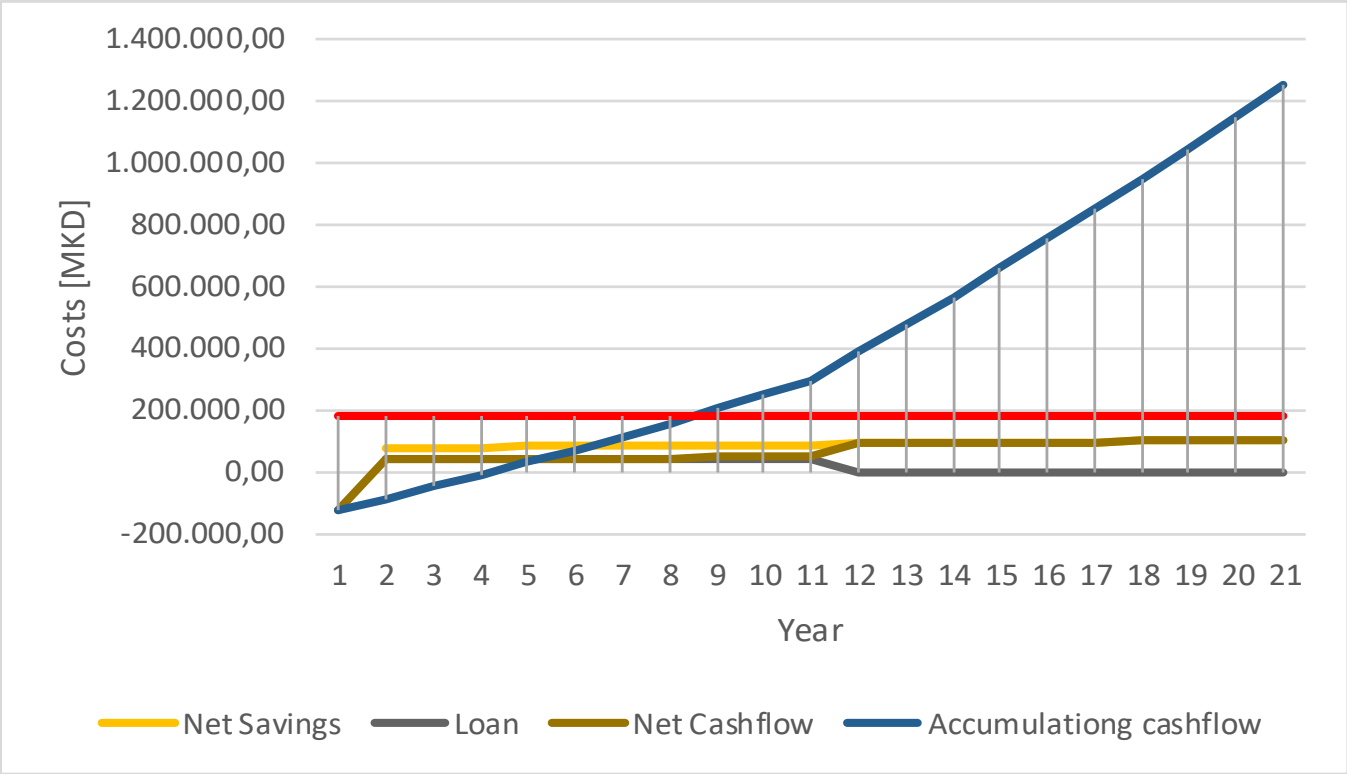
Guaranteed Savings Model



The chart shows that the payoff for the project is in the 6th year and at the end of the 3 durations of the contracts (10, 15 and 20 years), the project will be with positive balance. Even though the project has relatively small payback period, and even though after 10 years the project is positive in financial terms, the profit is significantly below the determined baseline. That is not the case if the contract length is longer – 15 or 20 years, since the accumulating cashflow passes the baseline after the 12th year.

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

ESCO Provider Model

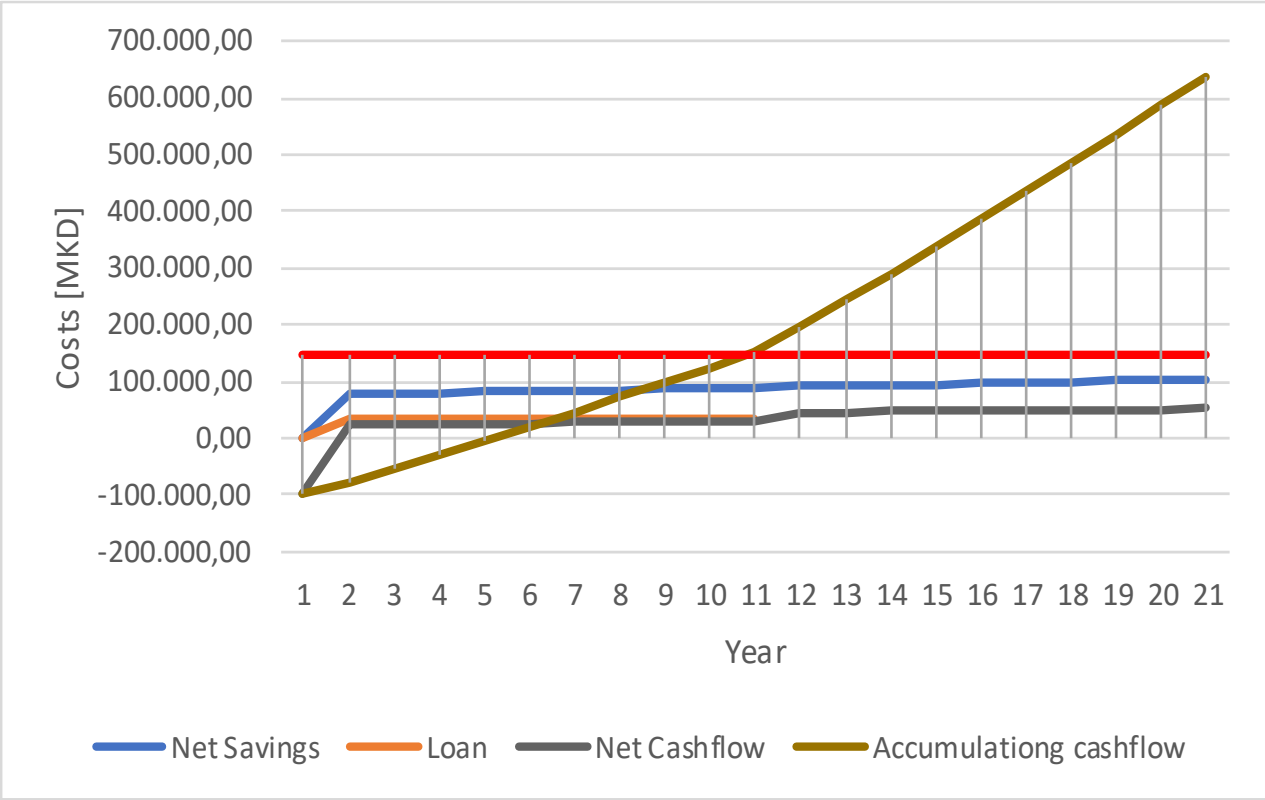


ESCO Provider data		
Electricity consumption	59405	kWh/yr
Electricity Cost	392073	MKD/yr
Electricity Price	6,6	MKD/kWh
Electricity Savings	12085	MKD/yr
Electricity Consumption After	47320	kWh/yr
Electricity Price After Measur	8,25	MKD/kWh
Electricity Cost After Measure	390390	MKD/yr
Consumer Savings After Meas	1683	MKD/yr
ESCO Savings After Measures	78078	MKD/yr

The chart shows that the payoff for the project is in the 4th year and at the end of the 3 durations of the contracts (10, 15 and 20 years), the project will be with positive balance. According to this chart, all project durations are acceptable for the ESCO side of the model. Also, the profits from the project is highest in this model compared to the other models.

RESIDENTIAL BUILDING ENVELOPE AND DOMESTIC HOT WATER

Development Finance ESCO Model



The chart shows that the payoff for the project is in the 5^{h} year and at the end of the 3 durations of the contracts (10, 15 and 20 years), the project will be with positive balance. The conclusions are similar to the ones in the Guaranteed Savings Model (which is taken as a basis for this model), but with slight improvements of the results.

ESCO PROJECTS RESULTS

Model	Baseline	10 yrs. EPC	15 yrs. EPC	20 yrs. EPC
Envelope and Preparation of Domestic Hot Water in Residential Building PB: 5.34 yr.				
Shared Savings Model	181.414,86	63.408,15	297.636,83	549.967,64
Guaranteed Savings Model	181.414,86	126.008,62	360.237,30	612.568,10
ESCO Provider Model	181.414,86	296.936,19	755.324,21	1.249.138,29
Development Finance ESCO Model	145.131,89	151.117,18	385.345,86	637.676,66
Envelope and Heating Control in School PB: 6.85 yr.				
Shared Savings Model	1.968.995,20	-717.763,65	2.055.845,61	5.043.810,51
Guaranteed Savings Model	1.968.995,20	765.083,42	2.746.232,90	4.880.493,54
ESCO Provider Model	1.968.995,20	101.449,15	3.332.737,73	6.813.753,22
Development Finance ESCO Model	1.575.196,16	1.037.600,42	3.018.749,90	5.153.010,54
Solar Thermal Collectors for multifamily building PB: 11.12 yr.				
Shared Savings Model	2.392.992,77	-3.187.506,09	-1.110.085,80	1.127.885,85
Guaranteed Savings Model	2.392.992,77	-62.386,36	1.421.485,27	3.020.036,45
ESCO Provider Model	2.392.992,77	-2.285.428,69	295.965,85	3.076.860,89
Development Finance ESCO Model	1.914.394,22	268.813,64	1.752.685,27	3.351.236,45

ESCO PROJECTS RESULTS

Model	Baseline	10 yrs. EPC	15 yrs. EPC	20 yrs. EPC
Change of fuel in industry PB: 0.11 yr.				
Shared Savings Model	106.644,24	16.549.621,36	25.967.536,57	36.113.305,99
Guaranteed Savings Model	106.644,24	7.150.793,99	13.877.876,29	21.124.854,44
Development Finance ESCO Model	85.315,39	7.165.553,99	13.892.636,29	21.139.614,44
Public Lighting – Installing of Sodium Lighting PB: 2.21 yr.				
Shared Savings Model	16.229.789,90	56.615.775,42	96.818.705,40	143.606.768,09
Guaranteed Savings Model	16.229.789,90	72.221.284,60	100.251.796,02	133.926.706,90
ESCO Provider Model	16.229.789,90	30.798.379,70	56.577.599,84	87.827.230,65
Development Finance ESCO Model	12.983.831,92	74.921.524,60	102.952.036,02	136.626.946,90
Public Lighting – LED PB: 11.98 yr.				
Shared Savings Model	5.566.829,48	-8.037.167,60	-3.551.988,45	1.279.823,31
Guaranteed Savings Model	5.566.829,48	-411.726,10	2.791.973,30	6.243.267,42
ESCO Provider Model	5.566.829,48	-5.088.002,68	1.044.821,33	7.651.614,53
Development Finance ESCO Model	4.453.463,59	358.745,90	3.562.445,30	7.013.739,42

THANK YOU

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