INVESTMENT PORTFOLIO AND PORTFOLIO INVESTMENTS FOR A SUSTAINABLE DEVELOPMENT

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The Romanian Energy Efficiency Fund (the Fund) is a financial institution (FI), specialized in commercial co-financing of investments in rational use of energy (RUE) and renewable energy sources (RES). The Fund was created through the common initiative of the Romanian Government and the World Bank. Targeting the involvement of the banking sector in commercial co-financing of such investments, the Fund has continuously managed a well-balanced projects' and clients' portfolio. Base on it, the Fund has reported by the end of 2006 excellent financial results and marked significant steps towards a consolidated self-sustainability. Authors intend to present, in exclusivity for Romania, a realistic assessment of investment portfolio and two portfolio investments with impact upon the Romanian Energy Efficiency Fund self sustainability and market position, as well as upon perspectives of further institutional development.

Keywords: Financing, investment, loan, cash flow, profitability, sustainability

1. Investment portfolio: key issues

The Romanian Energy Efficiency Fund is providing commercial financing for investments aiming the rational use of energy (RUE) and, with certain restrictions, the use of renewable energy sources (RES). Targeting a more proactive involvement of the local banks in RUE and RES investments, the Fund has initiated and developed a well-balanced projects' and clients' portfolio.

In terms of gradual increase of the investment volume in energy efficiency measures, the Fund concluded 18 financing agreements amounting to US$ million 8.837 for investments of about US$ million 18. But the baseline for RUE investments is obviously larger as long as the Fund have identified in total 95 projects requesting investments of about US$ million 113. Moreover, having contracted more than US$ million 8, the Fund recently fulfilled another of its objectives by starting operate as a 'revolving fund'.

The Fund was created to enable companies in the industrial sector to adopt and utilize energy-efficient technologies: from the portfolio investments total size,

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14 investments in RUE are representing 78% and 4 investments in RES, only 22% (Figure 1). Regarding the investments by sector, 74% were made in industry, 13% in district heating, 7% in municipalities and 6 % in tertiary sector (Figure 2).

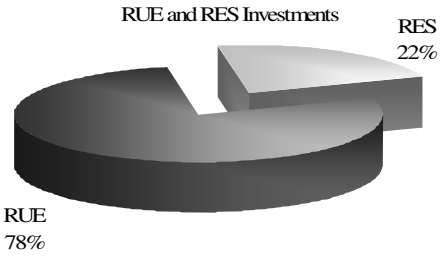

Figure 1 RUE and RES weights from the overall investment portfolio [3]

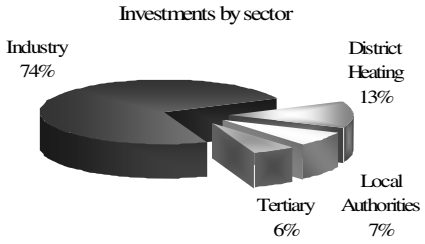

Figure 2 Investments by sector in the overall investment portfolio [3]

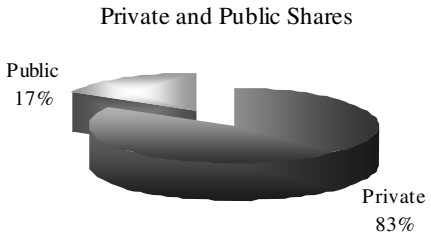

Figure 3 Private and public shares in the overall investment portfolio [3]

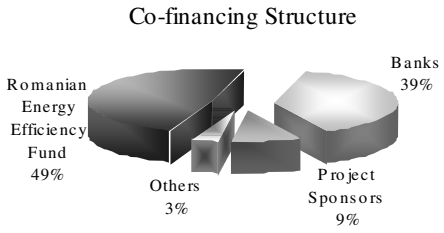

Figure 4 Co-financing structure of the overall investment portfolio [3]

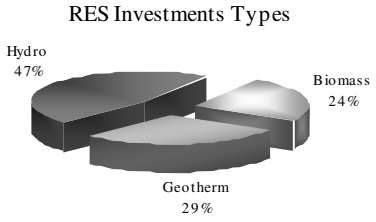

Figure 5 RES investments types in the overall investment portfolio [3]

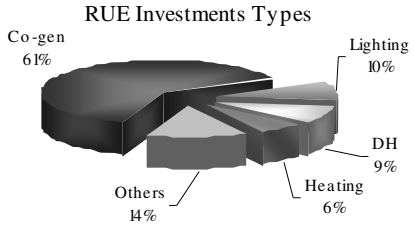

Figure 6 RUE investments types in the overall investment portfolio [3]

The Fund was supposed to target host enterprises from the private sector: 83% of investments were implemented in the private sector against 17% in the public sector (Figure 3). The gradual increase in the number of the Fund co-financiers and associate financing volume has finally determined a banks contribution to investment portfolio of 39% (Figure 4). Compared to RES investments containing only three types of projects (Figure 5), RUE investments are quite diversified; apart co-generation, public lighting and district-heating and local

heating, other types from Figure 6 include air compressors, steam and condensate systems, energy monitoring and equipment refurbishment.

The Fund has continuously selected creditworthy customers and targeted borrowers who reported good growth prospects and who agreed, where investments should generate positive cash flows from energy savings, to partially use cash flows to repay the loans. As presented in Table 1, with few exceptions, investments generate enough cash flow from energy savings to partially be used to repay the loans.

Table 1

Overall situation of possible loan repay from energy savings

No.	Client	Project (Commissioning Date)	Gross Payback Time (years)	FREE Loan Maturity (years)	Loan repay from savings (%)
1	Unio Satu Mare	Replacement of old air compressors with highly efficient screw air compressors (2005)	2.6	3.0	100
2	Transgex Oradea	Modernization of geothermal substation and 5 DH substation and related networks (2005)	2.5	3.0	100
3	CET Iasi	Modernization of 4 DH substation and related distribution networks (2005)	6.0	2.0	33
4	Ulerom Vaslui	New sunflower husk steam boiler (March 2006)	4.3	4.0	93
5	Somes Dej	Paper machine steam & condensate system modernization. Energy monitoring system installation (October 2006)	1.7	4.0	100
6	Rovinari LC	Modernization of lighting system (May 2006)	4.6	4.0	87
7	Dorohoi LC	Modernization of lighting system (May 2006)	3.1	4.0	100
8	Bran LC	Modernization of lighting system (September 2006)	3.0	4.0	100
9	Unio Baia Mare	Modernization of industrial local heating and installation of radiant tubes (November 2006)	1.1	2.5	100
10	M Eminescu LC	Modernization of lighting system (project cancelled)	3.9	4.0	n.a.
11	Arc Dorohoi	Technological modernizations (October 2006)	1.7	1.0	n.a.
12	Pecica LC	Modernization of lighting system (March 2007)	3.1	3.5	100
13	Refinery Steaua Română Câmpina	New saturated steam boiler (October 2007). Distillation oven modernization (March 2008)	2.1	3.0	100
14	County Clinic Hospital Oradea	Installation of new steam and hot water boilers fired with wooden pellets (October 2007)	5.6	3.0	54
15	Omnimpex Hârtia Buşteni	Modernization of micro hydro power unit for electricity generation (May 2009)	4.4	5.0	100
16	Termoelectrica Ploieşti	Automation and energy efficiency increase of lighting systems	5.6	4.0	71
17	Eneas Bucureşti	Installation, commissioning and operation of a co-generation unit to a third party (September 2007)	2.2	4.5	100
18	Chimcomplex Borzeşti	Installation of a co-generation system (October 2008)	2.8	4.0	100
	Investment Portfolio Average		**2.8**	**3.3**	**100**

There are reasons to consider that the Fund objective to enable companies and other energy end-users to adopt and utilize energy-efficient technologies financed under commercial criteria and co-financiers has been reached.

2. Portfolio Investment: ENEAS Bucharest (ESCO) Study Case

CarmOlimp Ucea de Jos, Brasov County is one of the major regional meat processors founded in 1993 on a family business basis. Presently, in CarmOlimp operate 2 Panini natural gas fired steam boilers and 2 warm water heaters. The steam is used for technological purposes, heating and hot water. In 2006, the natural gas consumption was of 360,604 Nm^3 and the electricity consumption was of 1,313 MWh_e. The company is buying the whole needed electricity.

Further business development requirements have revealed an increase of electricity consumption with 169% and heat with 63%. Consequently, CarmOlimp requested a 2007 founded Energy Services COmpany ENEAS Bucharest (ESCO), to install a co-generation unit in the factory. The rationale for such collaboration was to limit the energy bills by purchasing cheaper electricity and heat (released by exhaust gases and the unit's cooling circuits), than the electricity provided by the regional electricity supplier and the heat presently generated in the heat plant.

Figure 7 The co-generation unit installed in CarmOlimp Ucea de Jos [3]

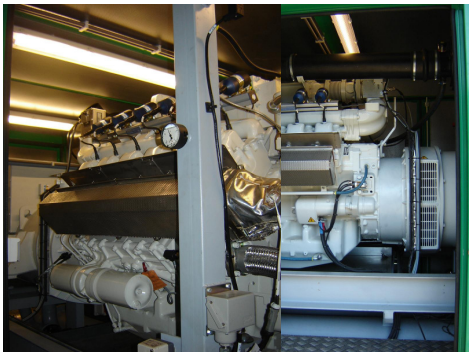

Figure 8 The co-generation unit: engine type MAN E 2842 LE312 [3]

For overcoming the lack of adequate information about the project implementation and to avoid the technology transfer barriers, the technology and financial risk and the difficulties in arranging financing, CarmOlimp decided to enter with ENEAS into an arrangement under a B.O.O.T. scheme. ENEAS should get the financing, implement and operate the co-generation facility. CarmOlimp will be supplied with cheaper electricity and heat for warm water generation purposes. When the investment sinks, the property right on equipment should be transferred no cost to CarmOlimp. CarmOlimp will pay ENEAS, based on a Shared Energy Savings Contract, smaller energy bills than those resulting by generating heat and purchasing electricity in current circumstances. Continuing generate heat under existing conditions, CarmOlimp factory would use 486,240 Nm^3/year to generate 3,186 MWh_t/year to partly cover the heat demand of the factory and would purchase additional 2,304 MWh_e/year to cover the electricity

demand. After the project completion, the natural gas consumption will increase to 657,660 Nm^3/year as the generated electricity amount would be the same 2,304 MWh_e/year and the recovered heat amount would be 3,186 MWh_t/year (2,740Gcal/year) either. CarmOlimp will consume more natural gas but will purchase less electricity (from 3,200 MWh_e/year to 896 MWh_e/year) and will partly cover the heat demand with no-cost residual heat (63% in average). The co-generation facility (figure 7 and 8) has the electrical output 384 kW_e and thermal output 531 kW_t. At full load, electrical and thermal efficiency are 37.0% and 51.0%, respectively. The total project cost was US$ 623,000 (Table 2). The estimated project energy savings are amounting to 574,464 Nm^3/year (i.e. the equivalent of 462 toe/year); all maintenance and personnel costs will be removed as long as ENEAS will operate the unit and will deliver maintenance, revision and repair works. The financial evaluation has been performed for both the project and the energy services company, respectively. The cash flow analyses have been considered for the next 10 years based on the 2007 energy costs. Evaluations have been performed for an actualization rate of 12%. For **project cash flow projection**, only benefits coming from energy savings for an annual operation of 6,000 hours (minimum stipulated in the Shared Energy Savings Contract) were considered (US$ 332,144/year). Table 2 is presenting the financial analysis. The Simple Payback Time for whole investment (VAT included) is to 2.2 years, the Net Present Value is US$ 1,135,000 and the Internal Rate of Return is 44%.

Table 2

Project Cash Flow Projection

Year	0	1	2	…	9	10
	kUS$	kUS$	kUS$	…	kUS$	kUS$
Investment Size	-742					
Project Cash Flow	-742	333	333	…	333	333
Accumulated Cash Flow	-742	-409	-77	…	2251	2584
Discount Factor	1.00	0.89	0.80	…	0.36	0.32
Present Value of Cash Flow	-742	-445	-180	…	1030	1,137
Payback Time	2.2	years				
Discount Payback Time	2.7	years				
Net Present Value	1,137	kUS$				
Internal Rate of Return	44	%				

ENEAS Cash Flow Projection

Year	0	1	2	…	9	10
	kUS$	kUS$	kUS$	…	kUS$	kUS$
Investment Size	-742					
ENEAS Cash Flow	-742	176	176	…	176	176
Accumulated Cash Flow	-742	-566	-389	…	844	1020
Discount Factor	1.00	0.89	0.80	…	0.36	0.32
Present Value of Cash Flow	-742	-585	-444	…	197	254
Payback Time	4.2	years				
Discount Payback Time	6.2	years				
Net Present Value	254	kUS$				
Internal Rate of Return	20	%				

Regarding **ENEAS,** for the cash flow projection only minimum financial revenues guaranteed by the Shared Energy Savings Contract were considered (US$ 176,219/year). The financial analysis is presented in Table 4. The Simple Payback Time for whole investment (VAT included) is estimated to 4.2 years, the Net Present Value is approximately US$ 254,000 and the Internal Rate of Return is 20%. The Shared Energy Savings Contract is valid for at least 5 years since the

commissioning date of the co-generation unit and the shared revenues are varying with the number of hours of annual operation. Thus, ENEAS executive decided to invest US$ 623,000 for installation of a co-generation unit in CarmOlimp location and to supply it with cheaper electricity and heat. Being an energy efficiency project implemented and operated by an energy services company, ENEAS applied for a loan of about US$ 499,000 (80%), the company's contribution being US$ 124,000 (20%). The loan is for 4.5 years, having a grace period of 3 months. Reimbursements will be made in quarter equal installments as ENEAS requested. The energy savings were estimated at 574,464 Nm^3/year of natural gas (i.e. 462 toe per year) and the related CO_2 emissions will be reduced with 1,101 tons.

3. Portfolio Investment: ARC Dorohoi Study Case

ARC Dorohoi is activating in the glass and porcelain industry. Several technological lines for glass and porcelain production requiring important quantities of natural gas are operating. Almost all technological equipment was out-of-date and the modernization aiming the company's market competitiveness increase consisted in an ambitious multi-component energy efficiency project.

Figure 9 The glass furnace installed in Arc Dorohoi [3]

Figure 10 The heating plant installed in Arc Dorohoi [3]

The annual natural gas and electricity consumptions were 3,689,640 Nm^3, i.e. US$ 726,859 and 1,392 MWh, i.e. US$ 108,603. Penalties of about US$ 3,705 were annually paid for the reactive power generation. The annual maintenance and personnel costs were US$ 23,500 and US$ 68,000, respectively. The implementation of this multi-component energy efficiency project implied the following operations: (i) two water wells have been drilled and the company was decoupled from the water supply municipal system; (ii) two new screw air compressors and fully automated reactive power compensation equipment were purchased and installed; (iii) part of the existing furnaces (figure 9) have been thermally rehabilitated and equipped with new conveyors and temperature

regulators, automation systems and new burners, recirculation exhaust gasses fans; (iv) a fully automated heating plant (figure 10) has been installed; (v) three new modern furnaces have replaced a previous existing tunnel furnace with conveyor; (vi) finally, a home-designed heat exchanger to recover a part of the heat from the exhaust gasses from furnaces was manufactured and installed. Compared to initial consumption, the following savings were expected: (i) electricity savings of about 35%, i.e. the equivalent US$ 41,571 per year; (ii) natural gas savings estimated at 25%, i.e. US$ 184,120 per year; maintenance and personnel savings estimated to US$ 80,100 per year. The 20 years cash flow analysis has been based on 2006 energy costs, an actualization rate of 12% and annual financial savings of US$ 305,789 (table 4).

Table 4

Cash Flow Projection

Year	0	1	2	3	4	5	…	19	20
Item	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD	kUSD
Investment size	-513.6	-	-	-	-	-	-	-	-
Cash Flow	-513.6	305.8	305.8	305.8	305.8	305.8	…	305.8	305.8
Accumulated Cash Flow	-513.6	- 208	98	404	710	1,015	…	5,296	5,602
Discount Factor	1	0.89	0.80	0.71	0.64	0.57	…	0.12	0.10
Present Value of the Cash Flow	-513.6	- 241	3	221	415	589	…	1,739	1,770
Payback Period	1.7	years							
Discount Payback Period	2.0	years							
Net Present Value	1,770	kUSD							
Internal Rate of Return	60	%							

The Simple Payback Time for whole investment (VAT included) is to 1.7 years, the Net Present Value is US$ 1,770,000 and the Internal Rate of Return is 60%. ARC has decided to invest US$ 513,600 for implementation of the ambitious multi-component energy efficiency project. ARC was awarded with a US$ 400,000 loan representing 78% of the entire investment, the company assuring the rest of 22%, i.e. US$ 116,300 from own sources. The loan maturity was for 4 years with a grace period of 12 months. A real estate leasing has provided ARC with financial resources to repay the loan in one single disbursement. With the new equipment, ARC SRL Dorohoi should manufacture high quality glass and porcelain with less natural gas and electricity. The company has significantly reduced the impact of natural gas and electricity prices increase on their energy bills. The total energy savings will be of 898 toe a year and the related emissions mitigation of 2,218 tons of CO_2.

4. Results and discussions

Presently, the Fund portfolio has 18 energy efficiency investments amounting to about US$ million 18.148. Over the whole portfolio the estimated

annual energy savings are amounting to 28,135 toe/year representing 70,438 tons of CO_2. As estimated, for each US$ 1 invested are resulting 1.55 koe/year and 2.5 tons of CO_2. As the portfolio payback time is 2.8 years, for each US$ 1 invested the annual financial benefits are 0.357 US$. For each US$ 1 invested by ENEAS Bucharest in a co-generation unit are resulting 0.74 koe/year and 1.76 tons of CO_2, compared to ARC Dorohoi where, by investing in a multi-component energy efficiency project, are resulting 1.74 koe/year and 4.31 tons of CO_2.

5. Conclusions

Since its creation, the Fund has developed a well-balanced projects' and clients' portfolio. Having concluded 18 financing agreements amounting to US$ million 8.837 for investments of about US$ million 18 contracted more than US$ million 8, the Fund recently started to operate as a 'revolving fund'.

The Fund was created to enable private companies in the industrial sector to adopt and utilize energy-efficient technologies: from the portfolio investments total size, 14 investments are in RUE and 78% of investments were realized in industry and 83% in private sector. The gradual increase in the number of the Fund co-financiers and associate financing volume has finally determined a banks contribution to investment portfolio of 39%.

The Fund has continuously selected creditworthy customers and targeted borrowers who reported good growth prospects (i.e. the case of ENEAS and ARC) and who agreed, where investments should generate positive cash flows from energy savings, to partially use cash flows to repay the loans (ENEAS). With few exceptions, investments generate enough cash flow from energy savings to be used to repay the loans (ENEAS). To date, every client has reimbursed the loan, including the interest and other incomes from investments, in due time.

Based on the information gathered from the existing Fund project portfolio, one should note that the profitability of investments was revealed and the Fund self-sustainability was properly consolidated.

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