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A.L. Smirnov

INNOVATIONS IN ENERGY SECTOR

Article addresses the innovative investment project based on the heat recovery and energy saving technology. The author - who took part in the project structuring - indicates that an adequate financial support is the key factor to successful implementation of environmentally meaningful investment projects. However, the profitability rate and payback periods of such projects - the energy sector being a spectacular example - may fail meeting the investor and lender expectations. Meanwhile, the international and Russian practices include examples of successful implementation of relatively small investment projects that, being socially and economically significant and handling evident environmental issues, do meet the requirements of both state-owned and private financial institutions and do not seek for a targeted government support. Author-made schemes and drawings are incorporated.

Ключевые слова: energy saving technologies, heat recovery, performance contract, polluting emissions.

Preface

The growth of energy prices stimulates the real sector companies to pay increasing attention to raising the power consumption efficiency and to make direct investments in energy-saving. The need to carry out energy-saving projects having a high social, economic and strategic significance is confirmed with the colossal potential of energy-saving in Russia's national economy. According to the RF Ministry of Energy calculations, the energy saving potential amounts to 40% or at least 400 million tons of reference fuel, of which 60 million tons can be saved while generating the electricity, 80 million - at its consumption by the industry and 130 million - through reducing the non-production indoor energy losses. Most of the fuel is burnt by municipal boiler stations which number in tens of thousands. Large-scale promotion of such technologies in the Russian Federation will ensure enormous annual saving of heating costs in various sectors which is equivalent to increasing the export potential by USD10-12 billion (see fig. 1).

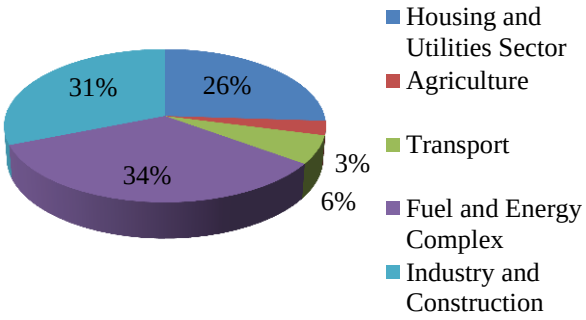

Fig. 1. Sectoral energy saving potential

1. Heat energy recuperation

Energy-saving projects are based on lower rate of fuel consumption at power generation and the possibility of using secondary heat (energy recuperation), which reduces its cost significantly compared to traditional heat generation technologies. The technology im-

plies an efficient solution of reducing the emitted smoke heat losses through the use of chimney-installed innovative heat exchangers which make possible the recuperation or reuse of emitted heat. It has been successfully tested at a variety of enterprises, including thermal power plants, pulp and paper mills, steel works, etc. and has found wide application in a number of European countries **(see fig. 2-6).**

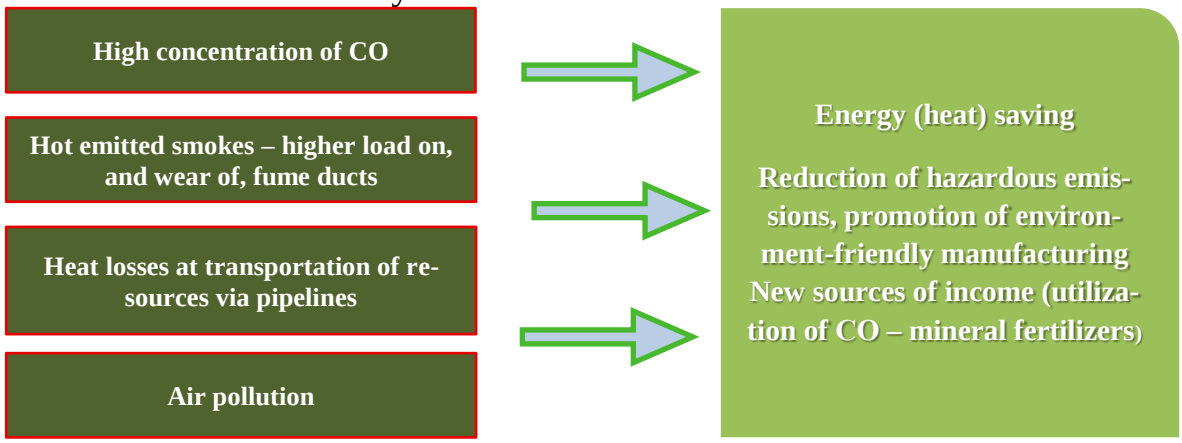

Fig. 2. Heat energy recuperation results

2. Energy-efficient systems - pilot project

Heat-generating equipment supplier - Delta-T Energy, Italy

Customers – municipal boiler stations

Term of equipment manufacture and delivery – 60 days

Term of the "turn-key" installation – 10 days

Table 1

Information required to prepare a technical proposal comprises

		Измерения Measurements	**Ед.** **unit**	**Кол.** **quant.**
1		**Capacity of the Generator** ***Мощность котла***	Kcal Ккал	
2		Average consumption (type of the fuel)_____ *Среднее потребление топлива (тип топлива)*_____	_____ /h _____/ч	
3		Cost of the Fuel Стоимость топлива	Euro/_____ Евро/_____	
4		Cost of the Fuel per hour *Стоимость топлива в час*	Euro Евро	
5	**X**	Operating hours of the Generator per year *Количество часов работы котла в год*	Hours часов	
6	**X**	TOTAL COST - EUR/ANNUM *ОБЩАЯ СТОИМОСТЬ – ЕВРО/ГОД*	Euro Евро	
7	**X**	**General data of the fumes/ emissions** ***Общие данные по выходящему дыму/парам***		
8		Fuel consumption of the Generator (burner) *Потребление топлива котлом*	_____ /h _____/ч	
9		Outgoing fumes *Объем выходящего дыма*	m^3 /h $м^3$/ч	
10	**X**	Velocity of outgoing fumes *Скорость выходящего дыма*	m/Sec м/с	

Continuation of table 1

		Измерения Measurements	**Ед. unit**	**Кол. quant.**
11	**X**	Temperature of outgoing fumes from the Generator (burner) *Температура дыма на выходе их котла*	C°	
12		Temperature of outgong fumes from the Chimney *Температура дыма на выходе их трубы*	C°	
13		Internal diameter of the Chimney *Внутренний диаметр трубы*	Mm мм	
14		High of the Chimney *Высота трубы*	M м	
15	**X**	**General data of the sewage system** ***Общие данные по водоснабжению***		
16	**X**	Temperature of the water coming into the system from the well *Температура воды на входе в систему из скважины*	C°,average C°, средняя	
17		Quantity of the water coming out from the system into a sewage *Количество воды, сбрасываемой в канализацию*	M^3/h $м^3$/ч	
18	**X**	Temperature of the water coming out from the system into a sewage *Температура воды при сбросе в канализацию*	C°	
19	**X**	Lenght of the main sewage pipe coming from the factory to the switch of the main public sewage system *Длина главной канализационной трубы, идущей от завода до городского коллектора сточных вод*	M м	
20		Scheme of the sewage system *Схема (план) канализационной системы*		
21		*Width of the sewage pipe* *Ширина канализационной трубы*	mm мм	
22		**Chimney N 1** ***Труба № 1***		
23		Outgoing fumes *Объем выходящего дыма*	m^3 м3	
24		Velocity of outgoing fumes *Скорость выходящего дыма*	m/Sec м/с	
25	**X**	Temperature of outgoing fumes from the Chimney *Температура дыма на выходе их котла*	C°	
26	**X**	Internal diameter of the Chimney *Внутренний диаметр трубы*	Mm мм	
27	**X**	**Chimney N 2** **Труба №2**		
28	**X**	Outgoing fumes *Объем выходящего дыма*	m^3 $м^3$	
29		Velocity of outgoing fumes *Скорость выходящего дыма*	m/Sec м/с	
30	**X**	Temperature of outgoing fumes from the Chimney *Температура дыма на выходе их котла*	C°	
31	**X**	Internal diameter of the Chimney *Внутренний диаметр трубы*	Mm мм	

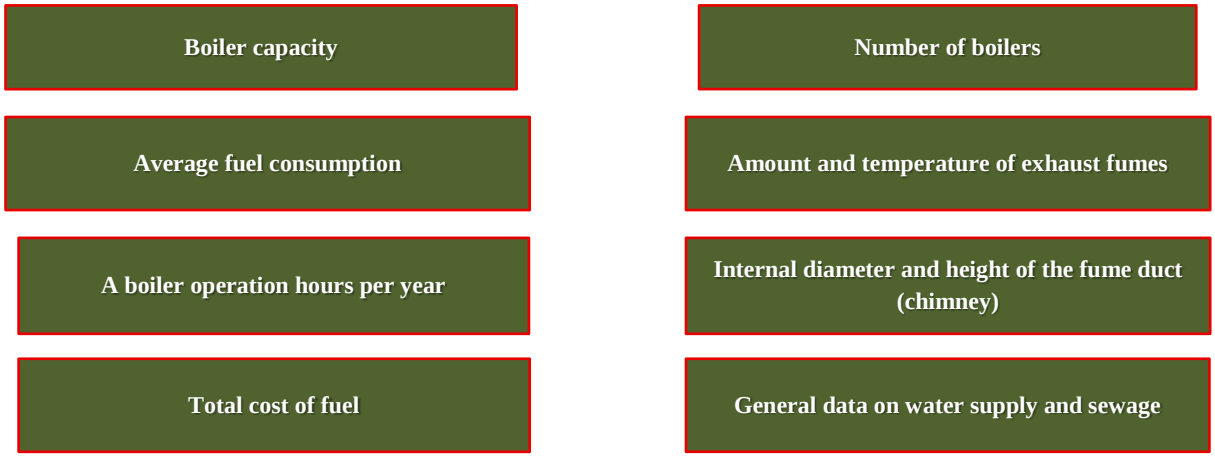

Fig. 3. Customer technical audit

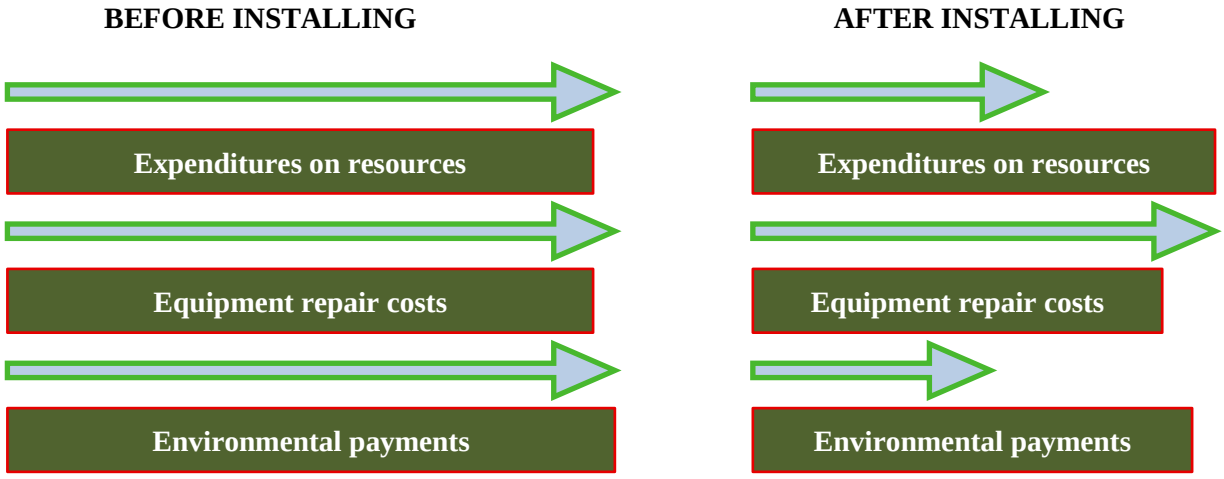

Fig. 4. Financial flows

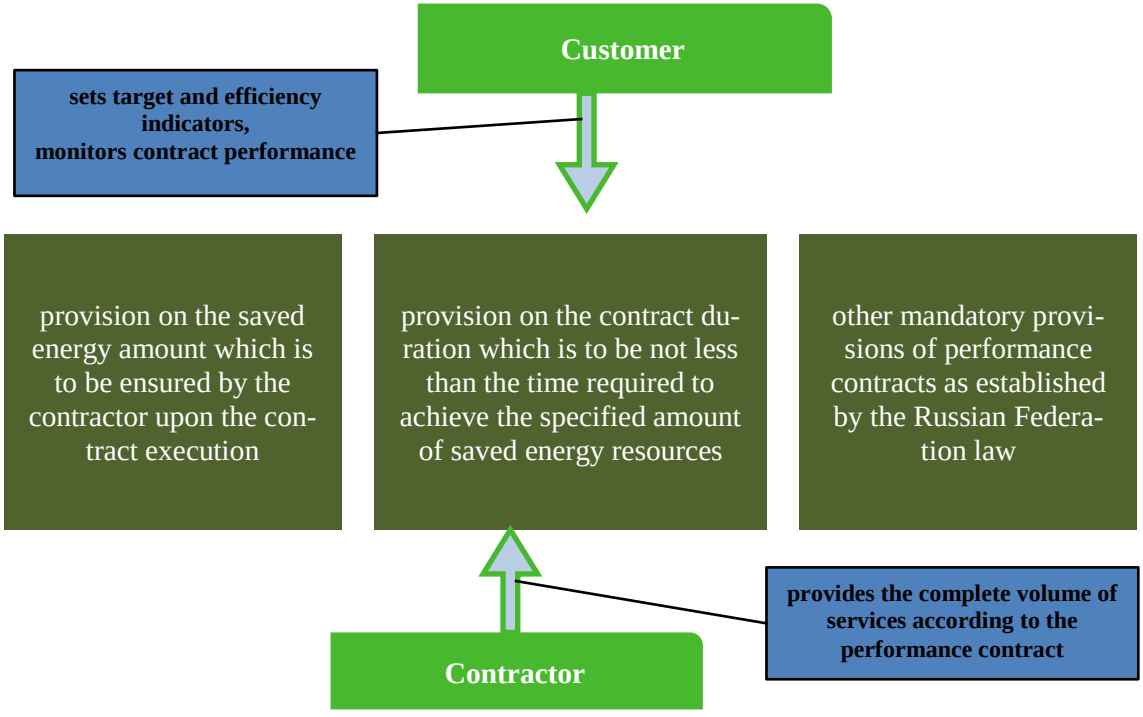

Fig. 5. Performance contract

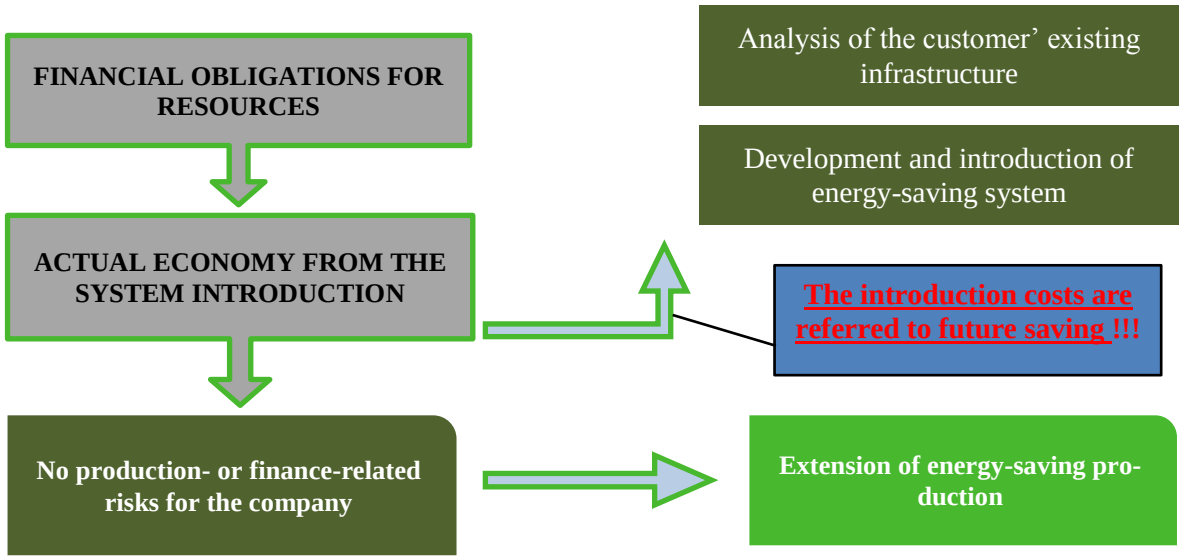

Fig. 6. The system introduction algorithm

The system introduction synergetic effect comprises:

- the consumed fuel economy and, consequently, consumed energy reduction from using the up-to-date power-saving technologies amounts to 50-60%;
- an aggregate financial effect results from decreased costs of maintenance and current repair, as well as elimination of penalties (if any) for hazardous air emissions:
- significant reduction of polluting emissions and carbon dioxide release into the atmosphere;
- considerable financial benefits (given the adequate project capacity) under international agreements and the Kyoto Protocol procedures;
- the possibility of processing the catchable exhaust into mineral fertilizers, entailing a further income.

3. FINANCE STRUCTURING

Project in caption finance structure incorporates the components and benefits as follows:

- delivery and installation of heat recuperation complex on the temporary import basis when supplier remains the owner of energy-saving equipment for a certain period of time;
- the ownership of energy-saving equipment is transferred to customer through a negotiated scheme of stage-by-stage (e.g., within 2-3 years) payment by customer of both the equipment cost and the amounts gained from fuel saving;
- the costs (payment for the works performed) of introducing the heat recuperation system shall be financed from future economy of financial resources, so the customer actually bears neither operational, nor financial risk related to the project;
- the principal advantage of pilot projects and financial technologies used is in the possibility of ensuring to foreign partners of up to 100% project financing, including the expenses on manufacture, delivery, supervision and warranty servicing of equipment

CONCLUSION

Implementation of energy-saving programs results in:

- shaping a steady economy of customer's financial resources;
- providing a complete repayment of costs incurred;
- funding the investment pro-

grams with borrowed funds;

- reduction and balanced split of project risks between investment programs' participants;

- actual limitation of customer's expenses with nominal payments for customs clearance documentation.

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А.Л. Смирнов

ИННОВАЦИИ В ЭНЕРГЕТИЧЕСКОЙ ОТРАСЛИ

В статье анализируется инновационный инвестиционный проект, в основе которого лежит рекуперация тепловой энергии. Автор, принимавший участие в его разработке, подчеркивает, что уровень рентабельности и сроки окупаемости проектов в энергетической отрасли могут не соответствовать ожиданиям инвесторов и кредиторов. Тем не менее, в международной практике имеется опыт реализации энергетических проектов, которые, эффективно решая задачи энергосбережения и экологические проблемы, отвечают требованиям финансовых учреждений и могут быть осуществлены без государственной финансовой поддержки. Использованы авторские схемы и рисунки.

Ключевые слова: энергосберегающие технологии, рекуперация тепловой энергии, сервисный договор, вредные выбросы в атмосферу.

СМИРНОВ АЛЕКСЕЙ ЛЕОНИДОВИЧ, кандидат экономических наук, Консалтинговая группа «Бизнес-КРУГ», партнер, член Комитета по международной деятельности Ассоциации российских банков
alsmirnov@bkrug.ru