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K. Y. DEDELYUK

ENERGY PROJECT MANAGEMENT SYSTEM: BENEFITS, PRINCIPLES AND RISKS

The essence of an effective energy project management system was described, as well as the main benefits of its implementation at the company level were characterized. Such outcomes as possible savings unlocking, improving risk management, reliability and productivity, reputational issues where described as key results from realization of an energy project management system. Among the main principles according to which an effective energy project management should be implemented the fallowing aspects were discussed: leadership and responsibility, energy policy and energy performance, communication and continuity of energy policy. The conclusions about the main risks that may occur during implementation of an effective energy project management system were also systematized in this article.

Keywords: energy project, management system, benefits, improvement, principle, energy efficiency.

Introduction. Energy is an essential business input and often constitutes a significant and growing line item of company operating expenses. Improving energy efficiency whole introducing energy management systems is one of the most cost-effective strategies a company can use to manage rising energy costs and provide better competitiveness.

Projects are usually provided in order to deliver a specific product which meets the customer's quality defined characteristics. Utilization of project management allows the firms to develop and provide their services and products at a higher quality, faster, and at lower costs. Any global firm which fails to remain competitive will be interested in providing effective energy system. Within this competitive business environment that deals with rapidly advancing opportunities, benefits, challenges, and risks project managers should employ efficient energy components in their projects [1].

Research base and methods of investigetion. Resent investigations in project management are rarely specified in energy sector. In order to provide a research on specific features of different project implementation and management that are aimed at energy efficiency we used a method of complex and comparative analysis of analytical reports (from the Energy Efficiency Exchange website, UNEP, UNIDO) as well as foreign scientists investigations (M. Henrie, A. McIntyre, J. Karp, J. Wrathall, M. Gerard, Wu Y., Wang J. etc.) concerning peculiarities of theoretical and practical aspects of effective energy project management system implementation.

The aim of the research is to provide complex investigation of an effective energy project management system. In order to achieve this task it is important to discuss such issues: to characterize the essence of energy project management system, to analyze the main benefits from its implementation, to discuss the main principles and risks that may occur during providing energy project management system.

Results. Many corporations have historically placed energy management within the environmental function, as energy usage is often used to report environmental compliance. However, corporations that have achieved significant cost savings and reduced greenhouse gas emissions have cross-functional responsibility for energy management including the financial, operational and environmental roles within the business. Placing energy management responsibilities within the improvement part of the business has also led to more effective outcomes.

Economic system can realize many benefits through effective ongoing energy management. Implementation of the systems and processes to achieve best practice in energy management can provide:

- unlocking of significant savings (organisations that have taken a strategic approach to energy efficiency often find project opportunities with attractive payback periods and ongoing reductions in energy expenditure);
- reducing exposure to future energy price increases (energy-efficient organisations are less vulnerable to future price increases and deliver financial benefits);
- improved risk management and productivity (minimize operating cost risks, supply chain risks, energy security and climate change risk, it is also accompanied by improvements in the use of other resources);
- reducing maintenance costs and improving reliability (improve production uptime, reduce labour and equipment costs, and extend the useful life of the asset);
- reputational benefits (energy management can demonstrate good corporate citizenship and attract investors), etc [2].

In practice, effective energy management help to develop better understanding of energy sources, mechanism of their supply and procurement, as well opportunities for more efficient energy use in systems, processes and technologies. An energy management system (EnMS) is an ongoing process of identifying, planning and implementing improvements in the way an organisation uses energy.

An effective EnMS provides a framework of practical processes and procedures to deliver on an organisation's energy objectives. Using an information data base from The Energy Efficiency Exchange website which shares best-practice information on energy efficiency, case studies and resource materials from Australia and overseas, we would like to present a structure of key principles of an energy management system that are essential to establish and operate an effective system [2; 3].

Leadership and responsibility is a fundamental principle to an effective energy management system. An organization needs clear energy performance objectives and must allocate sufficient resources to implement and manage the system if it is to succeed. Project managers are considered to depend on the four competencies of knowledge, skill, ability and motivation [1]. Communicating the commitment of senior management and the resources that have been assigned establishes energy management as an important priority at all levels of the organisation.

Energy policy that includes energy performance means that an energy policy would state how energy management aligns with the organisation's broader improvement goals and explain how energy relates to broader sustainability objectives and policies of the organisation. It demonstrates that an organisation, including its senior management, is committed to improving energy performance. The policy can clarify what the energy management objectives of the organisation are and the timeframes within which they are expected to be achieved. As with any business policy, the energy policy should be periodically updated and performance assessed against it on an ongoing basis. The use of key performance indicators (KPIs) is effective for evaluating energy performance for a business, site, or specific process and communicating when potential problems need to be addressed. Development of effective KPIs also yields insight into the key variables affecting energy efficiency [3].

One should bear in mind that each organisation is unique, and it is important that an EnMS is aligned with existing business priorities and systems. It should be a key component of an organisation's continuous improvement efforts. It can be implemented at different levels of an organisation, depending on the size and structure of the business (it can be developed for an entire organisation, a business unit, a facility, or even an individual process or functional group) [2; 4]. The precedence set by other management systems, such as quality or environmental systems, can be used as a guide to determine where the EnMS should sit within the organisation. An EnMS can include processes and procedures to ensure compliance with legal and contractual energy requirements, or can be adapted to integrate with existing compliance systems.

The division of energy project management functions may depend on the type, characteristics and scope of this project. Using the criteria of the project-level in the organization, energy projects can be divided into dependent projects and emergency projects, operational projects, strategic projects [4]. Dependent project means a project need to run to meet the general conditions in some area, so it is known as "must do" project. For example, a region is lack of mineral resources and needs to develop wind power projects, otherwise it will affect the production and life in that region, and then wind power project is a dependent project. Rebuilding a power plant which was destroyed by fire satisfies the "must do" standard, so the project is called emergency project, which has urgent needs. Operating projects are energy projects that support the current operational needs, designed to improve system efficiency and reduce energy costs and improve performance, such as the project that a power plant providing electricity or power generation is an operating project. Operating energy projects primarily restructures energy projects in the original operation, and improve the productivity of the original. Strategic projects directly support the long-term mission of the organization, such as new energy research and development projects.

Another energy project classification criteria deals with the type of energy, energy projects can be divided into traditional energy projects and new energy projects, and also can be divided into intermittent and non-intermittent energy projects [4]. Traditional energy projects are technically mature projects that have been widely used, such as coal, oil, gas, water, wood, etc. New energy means all forms of energy other than traditional forms of energy, such as nuclear, solar, wind, biomass, geothermal, ocean energy, hydrogen and so on. Intermittent energy means solar and wind energy that have intermittent power generation, for example, when a cloud covered the sun, a solar photovoltaic power plant generating capacity can be reduced near zero within a few seconds, as the weather turned fine and the power output will rise rapidly. Nonintermittent energy embraces various forms of energy other than intermittent energy. As another example, thermal power generation projects belong to traditional energy, but also a nonintermittent energy projects; and wind energy is new energy project, but also intermittent energy project.

Energy performance can also be incorporated into an organisation's design and procurement practices for new products, facilities, equipment and processes. Another scoping consideration is the relevant timeframe of the EnMS. Specifying time-bound objectives and activities of the EnMS over the short, medium or long term can affect many facets of the EnMS, such as resource allocation and decision-making criteria.

An energy manager is typically responsible for overseeing the development and implementation of the EnMS and acting as the link between senior management and the rest of the organisation. Best practice in energy management requires the involvement of staff from many different areas and roles across the organisation (personnel with specific technical and operational knowledge, staff from financial, environmental and other departments, as well as senior managers with the authority to make significant business decisions) [3]. Negotiating energy contracts may require close collaboration among the procurement team, energy manager and operational staff. Implementing an EnMS can also reveal where additional training, skills development or resources, may be required to deliver on objectives set out by senior management. Besides, raising awareness across the organisation and opening communication channels on energy management can encourage individuals to contribute ideas that could further improve energy performance. Engaging stakeholders means that groups and individuals can significantly influence energy use through behavioural patterns and decision-making processes.

Undertaking an energy efficiency assessment is the key activity to gaining a deeper understanding of how

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energy is used in the organisation, and where opportunities exist to improve performance. An EnMS provides a structure for how the outcomes of the assessment can be evaluated by key decision-makers including which energy efficiency projects should be pursued and how they should be implemented [3; 4]. This includes assigning responsibilities, allocating resources and outlining how cost-effective opportunities can be implemented to achieve identified savings. Energy efficiency assessments should be undertaken on a regular basis, and should allocate resources to the areas where the greatest energy performance improvements can be achieved.

High-quality communication practices are a key factor in the successful operation of an EnMS. Companies should be regularly tracking their energy performance against energy management objectives, evaluating how the outcomes of energy efficiency assessments and implemented projects are helping them [2]. There should be created communication channels for sharing findings and outcomes, like formal reporting procedures, adding energy as a standing agenda item at regular meetings and establishing reporting templates which easily communicate key metrics.

In order to provide perseverant and consistent management it is necessary to present consistent implementation of action plans, regular monitoring of energy use and efficiency, evaluation of the performance of projects that have been investigated or implemented, and planning for future energy assessments. A continuous feedback process should be used, promoting the flow of information on policies, plans, ideas, decisions and performance. The EnMS itself should be reviewed on a regular basis to improve the value it delivers to the business and its conformance with any applicable standards [3].

In practice, projects that include energy issues face many challenges in meeting the customer's quality needs. When analyzing or working on an energy project or a project that includes elements of some renewable technologies, the project manager faces some unique efforts which transcend the usual project success iron triangle of schedule, product (quality), and costs. Project managers also face significant challenges and risks, and at times, a severe lack of broad based knowledge pools [1].

While providing an effective energy management system, especially in case of introducing renewable energy projects, it is also important to take into account some risks that may occur during their implementation.

According to the UNIDO investigation four problems are often identified as the cause for the failure to implement energy projects: lack of a rational and feasible approach to finance these projects; lack of a rational internal management approach in the enterprise to package these projects in such a manner that they can be identified and implemented while the "plant is running"; the high perceived risk of these projects; and the fact that management is often simply unaware of the existence of any EE projects of value [5].

One should also pay great attention to financial risk instruments that can help transfer specific risks away from project sponsors and lenders to insurers and other parties better able to underwrite or manage them. In a special report od UNEP a diverse range of risk management approaches are considered, including: insurance/reinsurance; alternative risk transfer; risk finance; contingent capital; and credit enhancement products [6].

It is worth stressing that when considering a project, a financier will usually prepare a risk/return analysis to assess each major risk and the means to mitigate its potential impact on the project. Assessing the returns involves verifying the potential 'downside' cost ('what might go wrong') and 'upside' revenue projections ('what might go right'), and then comparing the financials of the project with the cost of financing to be used. This practice of risk allocation and due diligence is necessary but often expensive and is carried out to provide the financial community with a better understanding of applicable technologies, relevant markets and any new approaches to managing risks. The most significant risk allocation tools are the contracts governing each project participant's responsibilities. Ultimately the investors and lenders attempt to strike a deal that allocates risks cost-effectively and provides adequate transparency as well as monetary safeguards to protect themselves.

The group of authors from Sullivan & Worcester Counsel have studied the developing countries experience and systematized some of those risks into fallowing groups: geo-political, legal and corruption risks, currency inflation risk, physical risk (due to some weather/climate conditions), etc [7].

We would like to stress attention that partnering with an international organization like the World Bank or International Finance Corporation (IFC) may ease some of these above mentioned risks since a lot of countries look to these international organizations for financial stability and support in the global markets. Developers should also ensure that their energy project development will be provided by arbitration in a neutral venue. Additionally, involvement by the World Bank or IFC could also help developers to navigate some counterparty risk.

It is important to distinguish some barriers associated with investment in energy projects that includes:

- cognitive barriers, which relate to the low level of awareness, understanding and attention afforded to energy financing and risk management instruments;
- political barriers, associated with regulatory and policy issues and governmental leadership;
- analytical barriers, relating to the quality and availability of information necessary for prudent underwriting, developing quantitative analytical methodologies for risk management instruments and creating useful pricing models for environmental markets such as carbon emissions permits;
- market barriers, associated with lack of financial, legal and institutional frameworks to support the uptake the energy projects in different jurisdictions [6].

In order to provide an effective risk management of energy projects according to the recommendations of UNIDO one should introduce the following:

- reliable measurement so that a company understands its baseline energy consumption, including how much of its energy is used to actually provide useful work rather than waste;

- management systems and responsibilities to identify win-win energy efficient (EE) projects, including approaches to rational project evaluation and project management;

- tested and stable technologies to harvest EE and credible demonstration projects that promote trust in their profitability;

- financial and technical expertise that will provide the necessary competence and resources for project implementation [5].

It is important to understand the great role of project managers in providing an effective risk management during energy projects implementation. It will support a valuable framework for identifying and implementing cost effective projects.

Conclusions. In order to improve better understanding of energy sources and their supply mechanism, as well as to provide more efficient energy use in systems, processes and technologies an effective ongoing energy project management should be introduced. The support and involvement of senior managers in a medium-to-large organization is an essential element of energy management.

Such system should be based on strong commitment from senior executives, integration of energy management, appropriate resourcing, implementation of measurement and reporting systems, risk reducing measures, providing an effective internal and external communication. All these measures will lead to establishing the sustaining energy project management practices.

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Відомості про авторів / Сведения об авторах / About the Authors

Деделюк Катерина Юріївна – кандидат економічних наук, старший викладач кафедри міжнародних економічних відносин та управління проектами, Східноєвропейський національний університет імені Лесі Українки, м. Луцьк; тел.: (097) 817-07-40; e-mail: delyuk@ukr.net.

Dedelyuk Kateryna Yurivna – Candidate of Economic Sciences (Ph. D.), Senior Lecturer of International Economic Relations and Project Management Department, Lesia Ukrainka Eastern European National University, Lutsk; tel.: (097) 817-07-40; e-mail: delyuk@ukr.net.