	I3E ***South East Europe TCP***

Best Practice Report

KIBERsik– Electricity Peak Shedding System for energy efficiency in industry

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Everybody please state revision index and short description of what has been done + partners involved and date.

Final approval	Name	Partner
Reviewer	Mitja Bizjak	INEA

1. Best Practice Title

KIBERsik– Electricity Peak Shedding System for energy efficiency in industry

2. Location of Best Practice

Country, region, town

Slovenia

3. Best Practice Executive Summary

Describe briefly (max 10 lines) the GP context (partnership, funding, objectives, approach followed, results)

KIBERsik is part of the KIBERnet family designed to meet demanding challenges of the future SmartGrid technologies. The system KIBERsik will be built and demonstrated at four industrial consumer sites. It will enable lower energy bills and efficient use of energy. KIBERsik was developed by research teams of INEA, Jozef Stefan Institut and Faculty for Electrical Engineering in Ljubljana. The project is co financed by the European structural funds and Slovenian Ministry of Higher Education, Science and Technology.

4. Best Practice Classification

Best Practice Theme

x Research Transformed to Innovative Product

□ *Research Transformed to Innovative Service*

□ *Research Transformed to Innovative Methodology*

□ *Research Transformed to Innovative Production Process*

□ *Financial Mechanism for Transformation of Research to Innovation*

□ *Support Mechanism for Transformation of Research to Innovation*

□ *Other (describe)*

Best Practice Research / Application Areas

x Industrial / Manufacturing Systems

- ***X Industrial Informatics and Communications***
- □ *Intelligent Devices*
- ***X Distributed Control Systems***
- □ *Flexible Manufacturing Systems*

□ *Embedded Systems*

- □ *Industrial Embedded Systems*
- □ *Nomadic Environments*
- □ *Private Spaces*
- □ *Public Infrastructures*

5. Description of Best Practice

5.1 Best Practice Context

Overall background of the Best Practice. Location, socio-economic, technical & policy background of the BP (max 10 lines)

The KIBERsik system is part of KIBERnet family. It uses the technology of targeting the power consumption in fifteen-minute intervals, which considerably reduces electricity bills in a not well balanced or adapted consumption. As the on-going project it is installed on 4 locations in Slovenia,

while the market locations are all over the world. KIBERsik systems can be used in all types of industries but also other types of companies, for example in metal industry, wood industry, textile industry, glazier industry, paper industry, rubber industry, metallurgic industry, food industry, ...
KIBERsik is part of SmartGrid technology and enables consumer and producer of electrical energy to become inter-active with electricity networks.

5.1.1 Policy Elements

What are the policy initiatives that have influenced the contextual environment of BP: innovation promotion policies, research funding policies, certification ect as well as relevant tools (max 10 lines)

INEA is one of the leading slovenian companies in the fields of control of industrial processes. In 22 years of existence, INEA successfully finished more that 750 projects. INEA has also very successful research team and with connections with other research organizations, like Jozef Stefan Institute, Faculty for Electrical Engineering and others, can established research team for different research projects. We started with this project knowing that we need solution which will be part of SmartGrid technology which enables operating of renewable energy sources. It is a plan of EU to use energy only from renewable sources by the year 2050. That goal is impossible without systems like KIBERsik is. The very important part of a decision to start this project was that the project was chosen for partly financing from EU and Slovenian government.

5.1.2 Socio-economic & Other factors

Other contextual factors such as customer / target market addressed, international validity, customer density, economic conditions, customer values, research area addressed (max 10 lines)

KIBERsik systems can be used in all types of industries but also in other types of companies, for example in metal industry, wood industry, textile industry, glazier industry, paper industry, rubber industry, metallurgic industry, food industry,... Market locations are all over the world. KIBERsik system is already selling in Mitsubishi sellers grid in Europe and South Africa.

KIBERsik systems are part of KIBERnet family which was chosen on SET-plan conference in Madrid 2010 as one of the 20 best energetic solutions. It was chosen also as one of the best innovation in Slovenia in 2010.

The predicted savings in electrical energy expenses, apart of other effects of the system on production costs and quality, are in average at 13% peak demand reduction and 0.9 years pay-back period; with highs in energy intensive industries at over 20% reduction; and the longest paybacks registered at 2.2 years.

5.2 Objectives

Aim of the project, specific objectives & strategies to achieve these objectives (max 10 lines)

The aim of the project is to develop technological modern, efficient system which is interesting for customer and can be sold all over the world. We achieved that with creating the research team from different research and industrial environments. We established structured research team for each included industry and IT solutions. IT solutions include communications, hardware and software.

In order to help utilities and industrial consumers to cope with future SmartGrids challenges, INEA has developed the third generation of electricity peak shedding systems – KIBERsik.

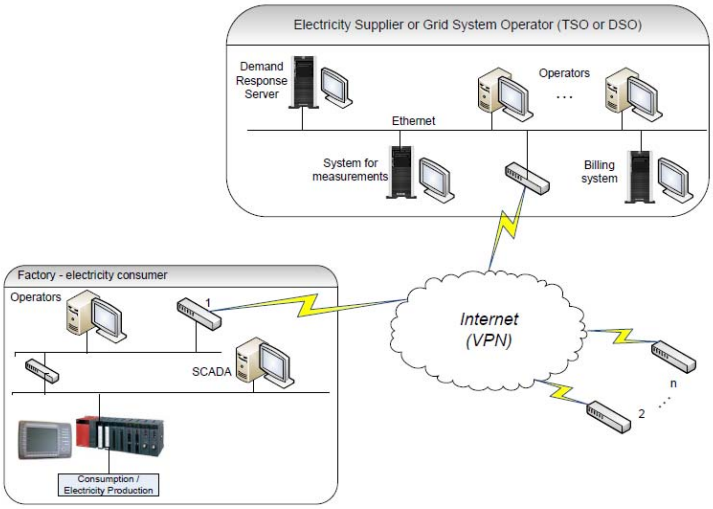

Figure 1: KIBERnet – family of SmartGrid technologies

The KIBERsik system as a part of KIBERnet family uses the technology of targeting the power consumption in fifteen-minute intervals, which considerably reduces electricity bills in a not well balanced or adapted consumption. Companies can have different contracts on supply as well as on the measurement of peaks, and our system cover all the possibilities enabled by the tariff system. Based on the use of advanced methods of predicting energy consumption and scheduling, the peaks are reduced by load shedding - switching off or discharging loads, by scheduling of operations and by using own electric power generation sources. The KIBERsik system is composed of one or several industrial controllers to which measurements and loads are connected, and of one or several control computers. All computers are interconnected in a network.

These systems can be extended also to include the measurement and control of the consumption of other energy carrying media and fuels such as air, water, heat, etc. Thus we get an overview and control of them all in one place.

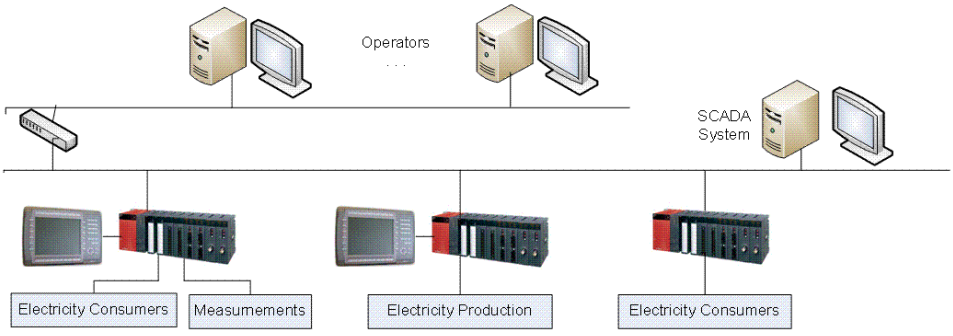

Figure 2: System KIBERsik for major users

6. Process

Describe the project including key concepts and the overall approach followed. Indicate project end users, target market, main project phases, problems encountered and solutions, problem resolution (max 10 lines)

KIBERsik project end users are also included into project consortium, which can sell the project product and TSO, DSO, aggregators, consumers and producers of electrical energy all over the world. The project has 6 workpackages which included work from accepted plan, through specifications and algorithms to evaluation of systems on 4 industrial locations and on the location of electrical distributer. Project was well designed and we have not encountered any serious problems.

6.1 Project Design

Project design based on targeted market complete understanding, project structure, policies and procedures, management and implementation actions (max 10 lines)

The project has 6 workpackages. 1st workpackage includes plan of the project which was accepted from all participations, analysis and idea specifications of project product and specification of optimizing algorithms. 2nd workpackage includes specifications for paperboard and processing industry and for distributor of electrical energy. 3rd workpackage includes specifications for paper and foundry industry and specifications of electrical grid model and predicted algorithms. 4th workpackage includes algorithms for paperboard, foundry and processing industry. 5th workpackage includes algorithms for paper industry, distributor of electrical energy, electrical grid model and predicted algorithms. 6th workpackage includes system evaluation.

6.2 Project Management

Activities relevant to project coordination and management, project documentation and reporting, quality control, validation and verification (max 10 lines)

The project structure was: project manager, managers of groups distributor of electrical energy, industry and electrical grid model. The group Industry has subgroups paper, paperboard, foundry and processing industry. The working teams included PLC specialists, SCADA specialists, technologists for optimization, technologists for electrical grid model and predicted algorithms, specialists for IT, specialists for economic optimization, specialists for power plants, specialists for loads shedding and specialists for reliability.

Each workpackage has its own documentation/deliverables. Reporting and validation was done internally by project managers and externally by Slovenian Technology Agency. The project was done following the ISO 9001 standard.

6.3 Project Implementation

Main elements associated with the project implementation. Realization of new idea, or new technological realization or improvement / novelty to known technology and means to achieve this. Innovation associated with the project realization in terms of new products, services, methodologies. Marketing, advertising and customer service. (max 10 lines)

KIBERsik system enables loads shedding, loads scheduling, optimal control of producers power plant which can be different type (only electrical, cogeneration, three-generation, renewable, etc.). This system can be extended also to include the measurement and control of the consumption of other energy carrying media and fuels such as air, water, heat, etc. Thus we get an overview and control of them all in one place. KIBERsik system is a part of KIBERnet family which is SmartGrid technology for demand side management and enables generation of electrical energy without CO_2 and use of distributed renewable energy sources.

During the lifetime of the project, we are already selling KIBERsik system all over the Europe, South

Africa and USA.

6.4 Project Evaluation

Project feedback mechanisms and evaluation mechanisms. (max 10 lines)

The project evaluation was done on 5 locations. 4 locations are representatives of paper, paperboard, foundry and process industry and the 5th location is a distributor of electrical energy. On KIBERsik systems in representative industries are implemented loads shedding and control of producer's cogeneration power plants. KIBERsik systems are connected to KIBERnet control center on the distributor of electrical energy location. KIBERsik systems on 4 locations enable adjusting of electrical consumption from public grid from 250 kW to 3000 kW.

7. Description of Research team/Institution

Short description of R&D team and institution (max. 10 lines)

KIBERsik was developed by research teams of INEA, Institut Jozef Stefan and Faculty for Electrical Engineering in Ljubljana.
The company INEA is one of the leading Slovenian companies in the fields of control of industrial processes. In 22 years of existence, INEA successfully finished more that 750 projects.
INEA was founded in February 1987 by the Jozef Stefan Institute, the leading research and development institution in natural and technical sciences in Slovenia. The company was formed as one of the institute's projects to promote transfer and application of research achievements of the Institute in the fields of industrial internal energy management and control of industrial processes.
INEA's research team (registered by The Slovenian Research Agency, the research code 0220) was established more than 20 years ago. In this time the research team participates in many research national and international projects, including projects founded by EU (6th and 7th EU Framework Programme, Structural Funds).
INEA is a member of the Technology Park Ljubljana, the core of which represents the spin-off companies of the Jozef Stefan Institute and start-ups from University of Ljubljana. The membership in the Technology Park represents the institutional background to the alliance Technology Vertical (TechVert) in Process Control: Faculty for Electrical Engineering in Ljubljana (FE), Jozef Stefan Institute (JSI) and INEA. This association enables coordination, research strategy, application development and implementation, exchange of knowledge and people, close cooperation in process control development and implementation.

8. Applied Financial Mechanism

Describe financial mechanisms applied in transformation of research into innovation within BP, as well as means of connecting scientific research team and financiers (max. 1000 char.)

The research activities were financed by company INEA, consortium industrial partners - potential end users. The project was also co-funding by European structural funds and the Slovenian Ministry of Higher Education, Science and Technology.

9. Impact and benefits

Describe achieved benefits of R&D team and/or enterprise implemented innovation, as well as impacts on institutional and policy levels. (max. 1000 char.)

The reference list of performed installations contains more than 60 systems in a wide variety of industries. The achieved savings in electrical energy expenses, apart of other effects of the system on production costs and quality, are in average at 13% peak demand reduction and 0.9 years pay-back period; with highs in energy intensive industries at over 20% reduction; and the longest paybacks registered at 2.2 years.

10. Sustainability

Provide information on sustainability of innovation after financial aid within implemented financial mechanisms, and some multiplier effects as replication and extension of the action performed in BP. Expected use of Best Practice and lifecycle considerations. (max. 1000 char.)

INEA designed and installed KIBERsik system in a large company, which is an important consumer of electrical energy as well as other energy carrying media. System KIBERsik supervises and controls a number of electrical furnaces (melting, annealing, drying, etc), boilers, fans, HVAC units. System includes measuring, monitoring and control of systems for thermal energy production, water, compressed air and lightning measurements. An evaluation after final installation and run-in showed savings of approximately 20% of electrical energy and substantial reduction in consumption of major energy carrying media in production.

11. Repeatability and transferability

Lessons learned from the project implementation team. Repeatability and transferability of the project. (max. 1000 char.)

People from the project's team got a lot of additional knowledge from SmartGrid technology, IT technology, paper, paperboard, foundry and process technology, loads shedding technology, control of power plants technology, optimizing algorithms, reliability algorithms and electrical grid modeling and predictive algorithms.

The next step is to upgrade this project to new one, which will include additional functionalisms from demand side management technology. These new functionalisms of KIBERsik and KIBERnet system will make SmartGrid and demand side management much smarter and easy to use.

12. Evaluation

Describe reasons and evaluation criteria why the described example is a best practice. (max. 1000 char.)

The evaluation criteria for each installation:
- Energy savings,
- Return of investment.

13. Contact of research team/institution	14.Contact of financial mechanism facilitator
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