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ENERGY EFFICIENCY
A KEY DRIVER FOR CLEAN ENERGY TRANSITION

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Intelligence Energy Efficiency in industrial sector

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Energy Efficiency in Industry: benefits & barriers

Benefits to industries:
- Energy savings leads to lower costs and thus increased competitiveness
- Reduce environmental impacts => powerful marketing tool for green industries
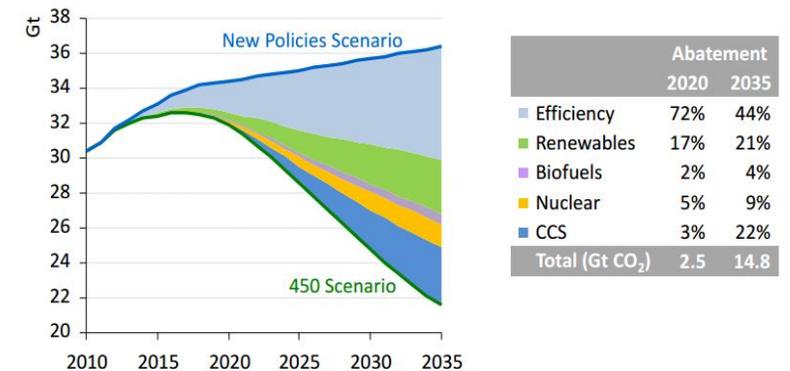
Barriers implementing Energy Efficiency projects:
- Lack of awareness and perceived risks
- Conflict of investment priorities
- Lack of Benchmarking (Best Practices)
- Absence of Technologies
- Regulating pressure

Efficiency gains can contribute most to emissions reductions

WORLD ENERGY OUTLOOK

World energy-related CO_2 emissions abatement in the 450 Scenario relative to the New Policies Scenario

	Abatement	
	2020	2035
Efficiency	72%	44%
Renewables	17%	21%
Biofuels	2%	4%
Nuclear	5%	9%
CCS	3%	22%
Total (Gt CO_2)	2.5	14.8

Energy efficiency measures – driven by strong policy action across all sectors – account for 50% of the cumulative CO_2 abatement over the Outlook period

Source: BP Statistics

The era of Digitalization in EE

- The **Digital Revolution** in EE is fully underway, with the introduction of sensor technology, cloud computing, apps, robotics, data analysis, artificial intelligence, storage capacities and processor performance have become affordable to industries.

- This means that digitalization and data-driven business models are going to become notable in this period of energy transition.

The era of Digitalization in EE

Following are a number of trends in digitalization:

❑ **Artificial Intelligence**: S/W makes machines to "think & act" autonomously

❑ **BIM**: Building Information Modelling, a digital planning tool for construction projects

❑ **Blockchain:** an enabling technology which documents the digital exchange of information in a decentralized manner

❑ **Large data**: large quantities of digital data provide additional findings and insights by the use of analysis software

❑ **Internet of Things**: an increasing number of daily objects are being outfitted with processing capacity and S/W allows them to communicate with each other.

❑ **Smart contracting**: In combination with blockchain, an automatic billing for energy quantities can become possible.

❑ **Smart meter**: an energy counter that records energy consumption and displays the resulting costs in real-time, permitting the grid operators to develop price models and manage the loads.

The importance of Intelligence Efficiency in Industry

- Intelligent Efficiency is the incremental energy saving measure, made possible by using information and communication technologies (digitalization). It is used to automate the measurement of project and program energy savings and impacts.

- Typical example can be applications range from Internet-connected building automation systems to production processes that employ machine learning to optimize material and energy.[1]

- In many cases, program administrators are using intelligent efficiency incorporated into continuous improvement programs, as strategic energy management (SEM), energy management information systems (EMIS) and ISO 50001, that train workers to identify and quantify opportunities and justify energy efficient solutions.

1. NEEA (Northwest Energy Efficiency Alliance). 2015. "Selecting an Energy Management Information System. Guide for an Industrial Customer." Portland, OR:
. https://neea.org/docs/default-source/default-document-library/neea-guide-to-selecting-an-emis.pdf

Introduction to EMIS

- An Energy Management Information System (EMIS) provides relevant information that makes energy performance visible to various levels of an industry, enabling professionals to plan, make decisions and take effective action to manage energy.

- An EMIS can lead to productivity improvements through the continuous monitoring of energy performance, and savings opportunities that, are sustained over the long term.

- Important part of an EMIS: Intelligent efficiency,
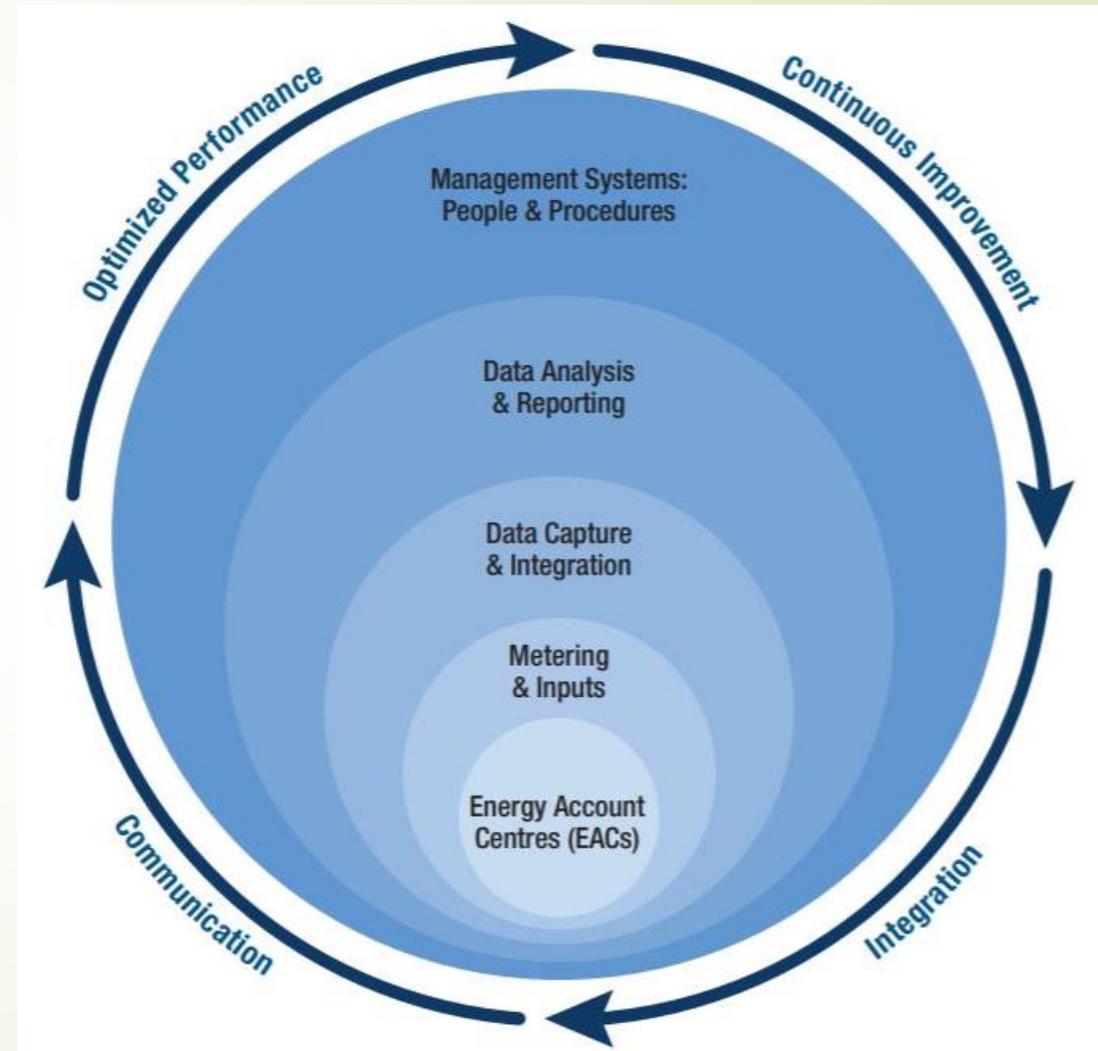
EMIS application

- Internet of Things (IoT), combined with cloud and edge computing, are enabling EMIS to collects, stores, analyzes and displays in real-time energy consumption data on any device connected to the network and equipped with appropriate sensors or meters.

- EMIS-based program, applied in an industry, is installed following three distinguished steps:

  - EMIS audit

  - EMIS implementation plan, including training to operators on how to determine key performance indicators and how to enter relevant product data into EMIS

  - EMIS final implementation.

- At its full implementation, EMIS translates various data streams into information that operators can use to develop and carry out energy efficiency plans[1].

1. Henwood, A., and P. Bassett. 2015. "EMIS Program Design, Delivery and Results with Efficiency Nova Scotia." In *Proceedings of the ACEEE 2015 Summer Study on Energy Efficiency in Industry*, 1:1–13. Washington, DC: ACEEE. aceee.org/files/proceedings/2015/data/papers/1-88.pdf

Energy Management Information System
Real Time Monitoring System

http://ems-undp.rs/en-us/Blog/ISEM
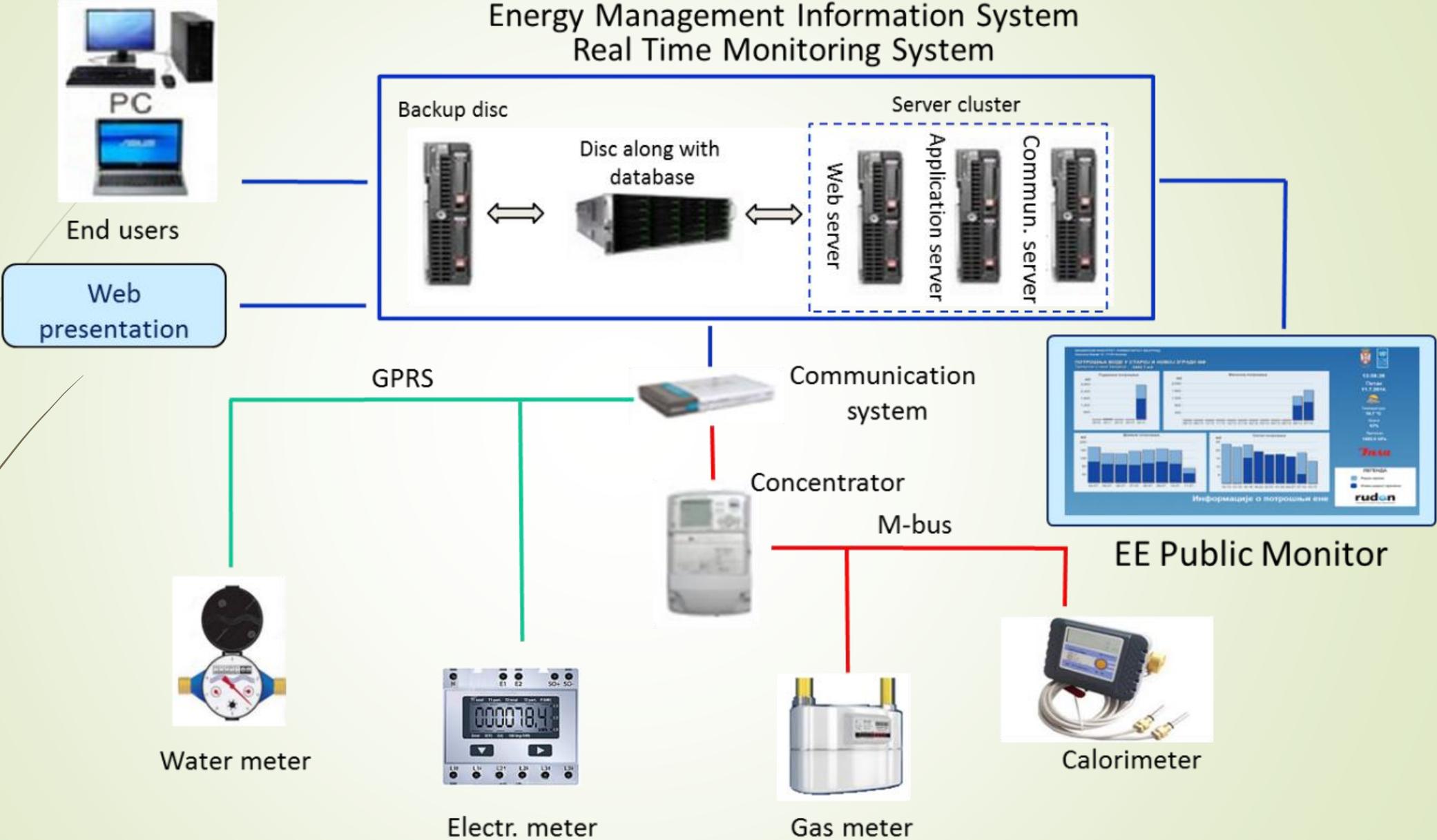
Intelligent Efficiency: Example

- Installation of an EMIS system in a new large hotel, in the US [1]

- The program targeted to the lighting system (internal & outside) and HVAC system.

- In lighting: sensors are installed in the hallways and in the external lighting fixtures

- In HVAC: new controls for packaged terminal air conditioners and networked both with the EMIS

- Cost of investment: 7,500 US$

- Payback period: 2,5 years

- Estimated energy savings: 3000 US$/yr

Xcel, 2015. *Motion Sensors Keep Energy Costs Down for New Candlewood Suites Hotel*. Denver, CO: Xcel Energy. xcelenergy.com/staticfiles/xe/Marketing/Files/EMS-CO-Case-Study-Candlewood-Suites.pdf

Intelligent Efficiency: Some Considerations

- Traditionally, financing EE programs is based on incentives for specific types of equipment (motors, lighting, etc.)

- In an EMIS case, the connection between energy saving and software is less tangible than with efficient devices and is more easier to document and verify installation and operation of a device than a S/W program.

- Also, an EMIS package has an installed "software-as-a-service" component, which automatically updates S/W removing any risks of locking, and it is managed by vendor experts rather than local staff[1].

- An EMIS is a low-consuming process, but it controls many devices consuming energy, so it save energy by operating devices less frequently.

1. Rogers, E., R.N. Elliott, S. Kwatra, D. Trombley, and V. Nadadur. 2013. *Intelligent Efficiency: Opportunities, Barriers, and Solutions*. Washington, DC: ACEEE. aceee.org/research-report/e13j

Final Thoughts and Considerations

- According to IEA (Energy Efficiency, 2018) Annual energy efficiency must double to 2025 and then double again to 2040.

- Policy will need to facilitate finance and business model innovation to stimulate the investment, with attention to Industry and buildings.

- Energy efficiency improvements are possible across all industry sub-sectors and IE plays important role.

- **Don't forget:** In Industry 60% of electricity is used by motors. 25% of electricity reduction would save 7% of world electricity!! IE has a great role to play!

Thank you for your attention!