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Network Modernization - Getting the Most out of the Energy Efficiency Program

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Investing
in future!



Ministry
of science,
education
and sports

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OVERVIEW

Croatian Telecom

- Croatian telco incumbent operator, major shareholder Deutsche Telekom
- Provider of all telecommunications services: fixed telephony, Internet, IPTV and international communications
- Strong brand and tradition, market leadership in all segments: fixed network, dominating the Croatian broadband market, leading the Croatian mobile market, global top 5 IPTV operator by household penetration (MAXtv - one of the most successful introductions of IPTV in Europe)

Energy market

- Croatia is EU member since July 1st, 2013
- Energy laws are harmonized with EU requirements
- Open market for the supply of electricity
- El. energy prices are among lowest in Europe

ENERGY EFFICIENCY PROGRAM

Energy efficiency program started in 2011

Challenging factors:

1999: separation between Croatian Post and Croatian Telecom

1999 – 2011: transformation from traditional telco incumbent company to service company

- Large number of real estates/locations
- Separating and then merging fixed and mobile business
- Significant change in the number of employees (outsourcing, reorganization)
- Strong step into new ICT business
- Liberalization of energy market
- Modernization of networks

Activities in EE program

- Croatia is EU member since July 1st, 2013
- Energy laws are harmonized with EU requirements
- List of measures created from the entire organization
- Evaluation and ranging upon savings potential and needed investments
- Execution and realization of quick wins
- Long term measures: identification and wider view approach
- Identification of main drivers on financial result
- Getting the benefits from open energy market
- High level of participation and acceptance in company

CATEGORIZATION OF THE MEASURES

❑ Savings in energy consumption (in kWh)

- Without investments, result of internal consolidation

Quick wins!

❑ Savings due to modernization

- CapEx is needed for realization

❑ Financial savings

- No impact on energy consumption, savings due to better contractual conditions

Quick wins!

SAVINGS THROUGH PREVENTION

control of the invoices: analysis of each electricity bill for each location, wrongly calculated invoices are returned and challenged, direct influence on cash flow

QUICK WINS

Internal consolidation

- PSTN ports optimization
- Switching off redundant transit exchanges
- Switching off equipment out of use
- Optimization of rectifiers
- Switching off SDH/PDH
- Increase of the working temperature on mobile network locations
- Virtualization
- Exclusion of old platforms

Financial savings

- Negotiation with electricity suppliers – better conditions
- Change of tariff models (adjustment of the tariff models according to the real consumption, follow up of changes in consumption and adjustment of tariff model)
- Replacement of control counters on leased locations

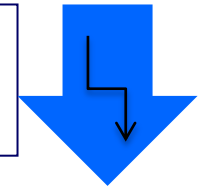


ENERGY MARKET

SUPPLY

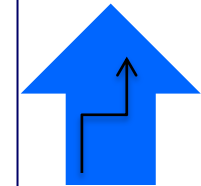
- negotiable prices, liberalized market

Price: financial trend



DISTRIBUTION

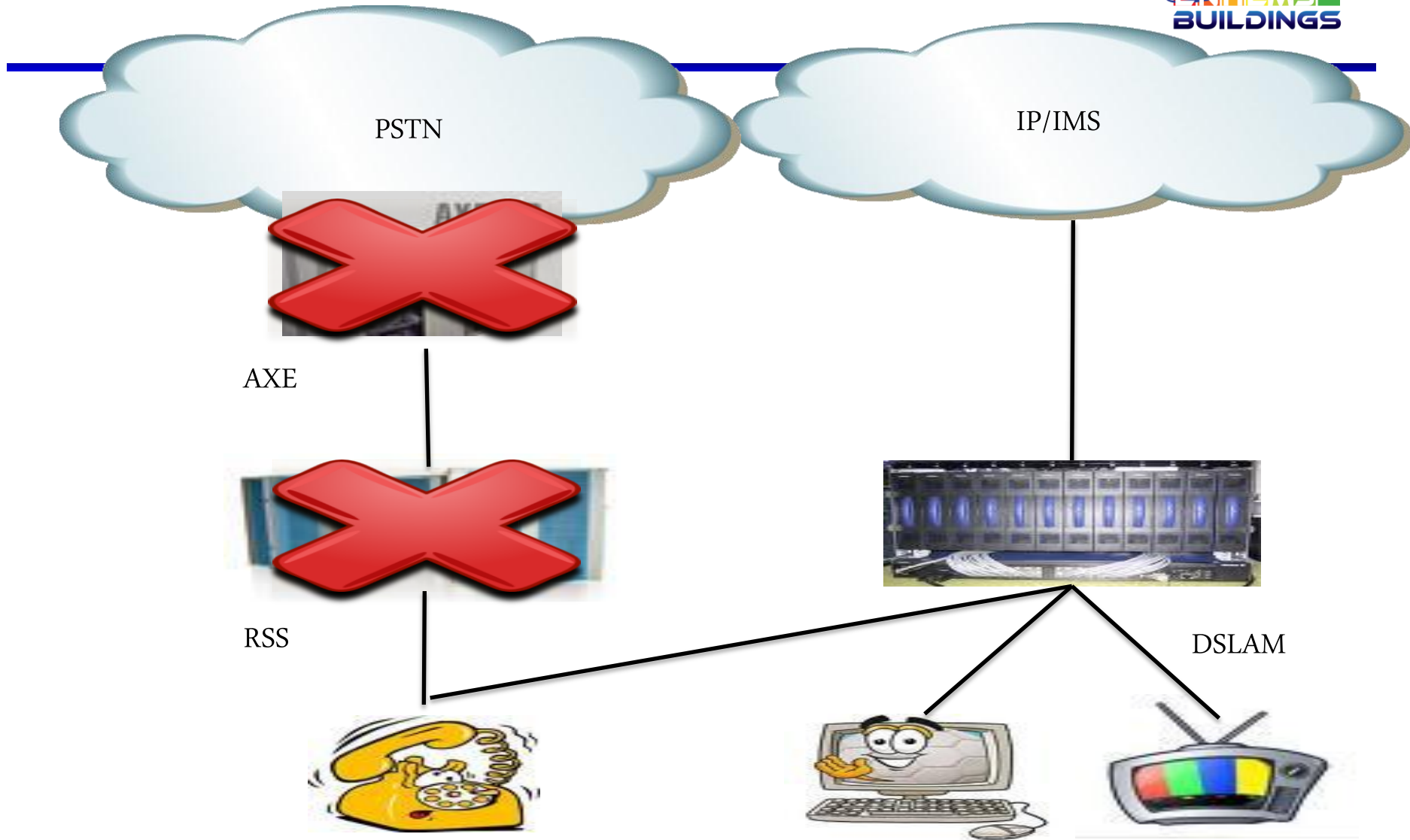
- Regulated market
- Non-negotiable prices (governmental decision)
- Several prices increase in last 2 years
- Example: duty for renewable energy sources was increased by 600 %



LONG TERM MEASURES

- Strategic measures, where energy saving is just one of the drivers, usually not the main one
- Measures with significant Capex , ROI is usually quite long
- Example: PSTN migration in fixed network (All IP platform)
- After 30 years of service, digital telephone exchanges are gradually replaced with new, IP-based technologies. The PSTN we know it today will eventually disappear.
- Different technical solutions/platforms for different services which resulted in higher maintenance costs and longer development time of services. Difficulties with new services.
- Optimization of network infrastructure and the establishment of a unified multi-service platform based on Internet Protocol (IMS - IP Multimedia Subsystem)
- Voice, data and IPTV services will be enabled through an all-IP solution – one broadband port





ENHEMS BUILDINGS PROJECT



- Research and investment in new science findings
- Actual consumption in buildings usually shows significant deviations from the declared, because of inadequate power management. The reason lies in the way of management on the rooms level, human factor and the slow system response on changing external conditions (system is too slow to recognize and react to changes)
- Main goal of this project is reduction of energy consumption by developing software for building energy management that will take into account thermal dynamics of buildings, weather forecast and human factor, will be predictive and reactive on expected changes
- **Grant Agreement No:** IPA2007/HR/16IPO/001-040510
- **Funding Scheme:** Science & Innovation Investment Fund
- **Project start date:** April 10, 2013, project duration: 24 months
- The project is coordinated by University of Zagreb Faculty of Electrical Engineering and Computing, the partners are Meteorological and Hydrological Service of Croatia, ELMA Kurtalj Ltd and Hrvatski Telekom
- More information: <http://www.fer.unizg.hr/enhems-buildings>

Short overview

- Enabled systematic design of energy efficiency measures in buildings by combining them and evaluating their effects through ICT, in dynamic building conditions and real-use scenarios
- Reduced building operational costs at least 10 % through sole BEMS operation
- Enabled solar irradiance measurement and forecast support in designing and control of highly weather dependent systems throughout Croatia, with possibility of drastic savings
- Initial prediction for pilot location is that up to 20 % of energy can be saved, with small investment in sensor technology

Weather forecast

Sensors in the rooms

Automatic adjustment
of heating/cooling
commands

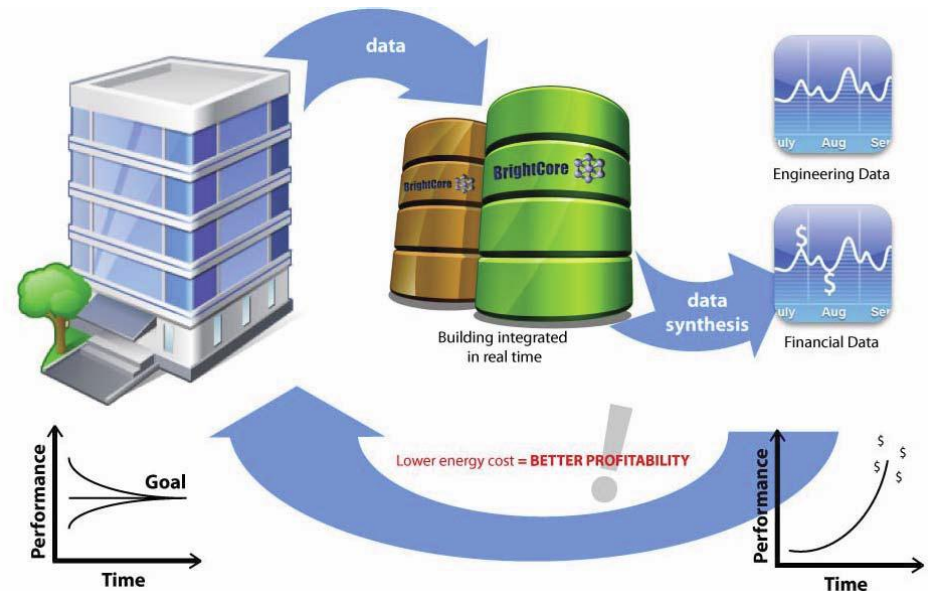
Energy savings

Software available to users

BEMS within an open building automation platform

Opportunity form new businesss development in area of energy efficiency and ICT

- Management of equipment from different manufacturers and integration with ICT systems - Brightcore, <http://brightcore.biz>
- Development of the solution for easy and transparent integration of one or several buildings into advanced control network
- Possibility for telecom operators for new services and new scope of business: energ management in buildings and buildings maintenance based on ICT services, opportunity for new business solutions with energy distributors and suppliers, engineering of collaborative systems in a city with possibilities of autonomous reactions on minute-hour time scales



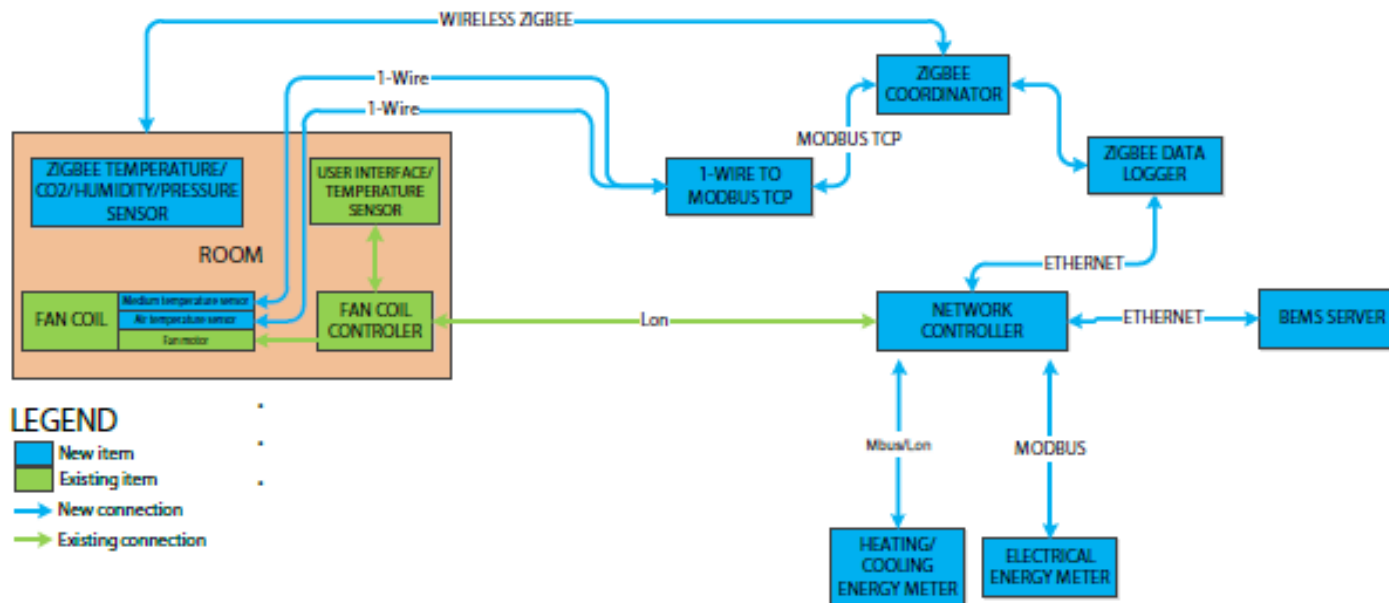
Meteorological data

- Meteorological data are necessary for realization of optimal control strategies (Model Predictive Control).
- Model Predictive Control uses prediction of meteorological data to fully exploit natural resources that we have at a certain moment of the day in order to minimize energy consumption.
- Depending on the prediction horizon, it is necessary to know the required weather conditions in the future.
- In order to maximize efficiency and achieve better optimization results it is necessary to know the weather conditions at least 24 hours in advance, with hourly resolution.
- Weather forecast communication – telecom business opportunity

No.	Data	Expectation	Variance	Prediction horizon	Resolution
1.	Outer air temperature [$^{\circ}C$]	✓	✓	24 hours	1 hour
2.	Diffuse solar radiation on horizontal surface [Wh/m^2]	✓	✓	24 hours	1 hour
3.	Direct solar radiation (on the surface perpendicular to the Sun's rays) [Wh/m^2]	✓	✓	24 hours	1 hour
4.	Absorbed solar radiation (by horizontal surface) [Wh/m^2]	✓	✓	24 hours	1 hour
5.	Wind speed and direction at a height of 60 m [m/s]	✓	✓	24 hours	1 hour
6.	Relative air humidity [%]	✓	✓	24 hours	1 hour
7.	Precipitation forecast	✓		24 hours	1 hour
8.	Fog forecast	✓		24 hours	1 hour

Pilot location – FER skyscraper, 9&10th floor

- rooms, equipped with different sensors (temperature, humidity, pressure, electricity consumption, window opening, etc.)
- Central-management based on ICT solution (implemented in Brightcore)



Acknowledgement



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<http://www.fer.unizg.hr/enhems-buildings>

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