

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR

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ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR

SUMMARY:

- Institutional approach
- Statistical approach
- Approaches in the power generation business
- Approaches in the transport business (railway, urban rail transport)
- Environmental approach

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Institutional approach

- The President Medvedev has stated for several times that “*the energy efficiency is a strategic theme for the country’s development*”. He called on to implement new energy saving technologies with an “*iron fist*”.
- 40%: figure of the energy efficiency improvement by 2020 (“Development strategy of Russia by 2020)
- The law “On the energy saving and energy efficiency improvement” was approved by the Council of Federation last week (18th November) → Russian companies’ demand for services in the energy saving area should increase sevenfold (*RSPP estimation*).

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Statistical approach

- Annual energy consumption in Russia (2007): 990 M tons of coal equivalent (much more than in Europe and the USA). If Russian industry uses the same equipment and technologies as Europe, annual energy consumption in Russia would decrease to 650 M tons of

c.e. →



35%: annual energy losses



- Industrial sector is the most important energy consumer in Russia: 48% of energy and 26,4% of fuel
- The most important losses are registered in the processing industry: 33%. Potential of energy saving in this sector: 14%

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR:

WHY?

Four key factors:

- Lack of **incentives** for energy saving: cheap resources (eg gas price); cross subsidies; weak regulatory Framework (law on Energy Efficiency)
- Lack of **information** within business community: no idea about the real financial “capacity” of energy saving technologies ;
- Lack of **financing** from banks and government: too expensive credits, so far no institutional financial support to companies implementing energy saving technologies;
- Lack of **harmony** in the legislation: no energy related “connections” between different legislation areas (building, public purchases etc.)

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR:

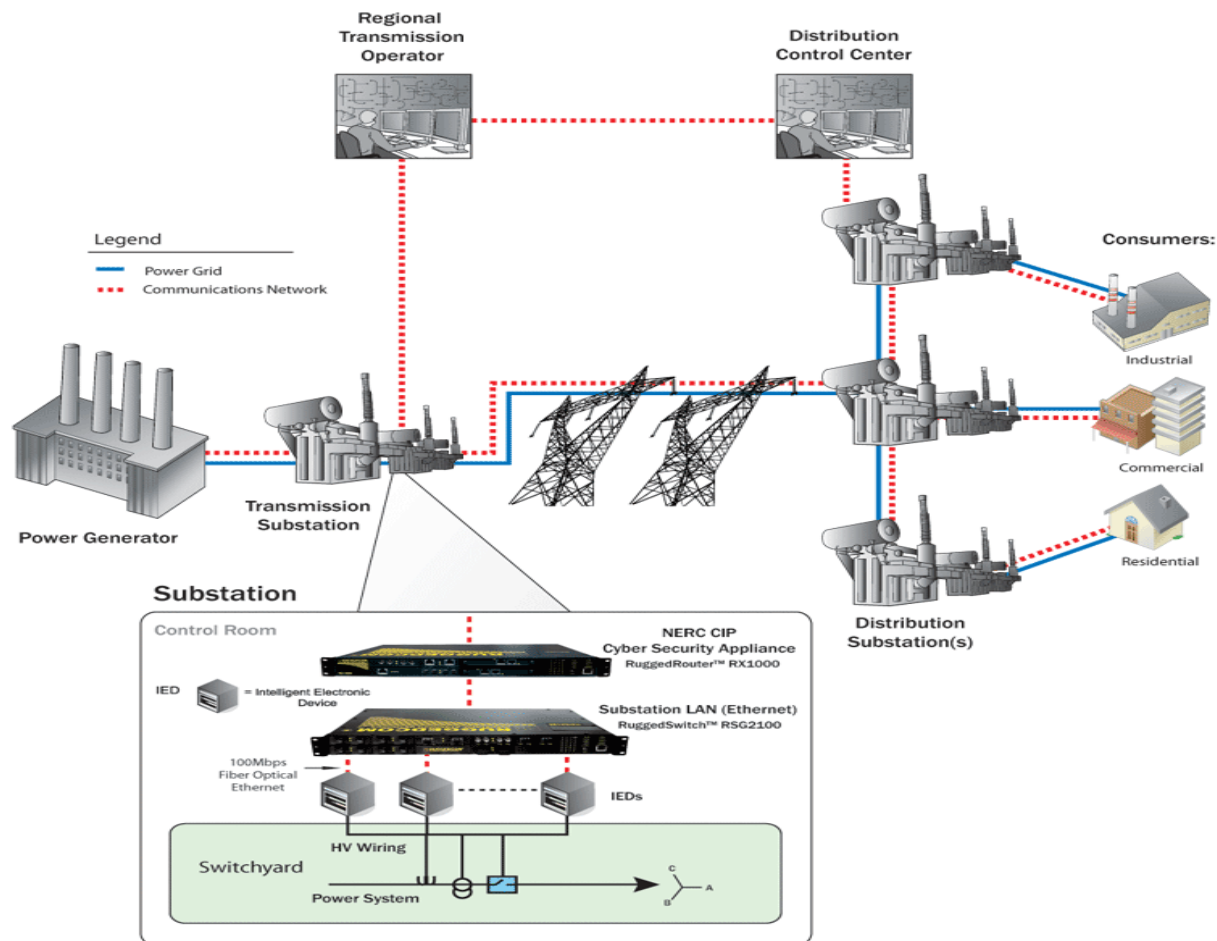
WHAT TO DO?

- **Better use of resources** (fuel) by increasing **energy efficient** equipment;
- **More renewables ?**
 - Current accessible renewable resources in Russia = about 24 bn tons of c.f.
 - Only 1% of electricity was generated in Russia in 2008 with renewable resources (without taking into account HPPs with capacity > 25MW) and only 3% of heat.



ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Approaches in the power generation business

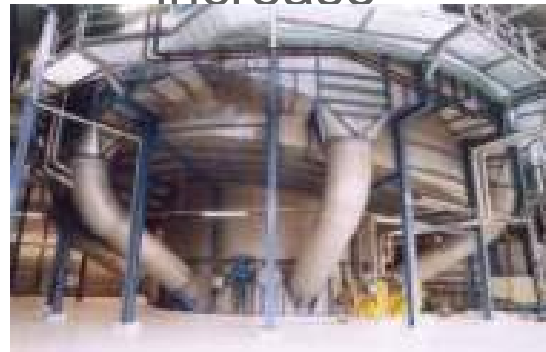
- Use of the “smart grid”:



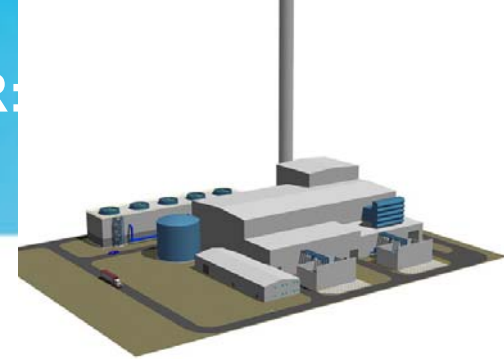
ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Approaches in the power generation business



- **Modernization of existing plants:**
 - Gas fueled : large-scale repowering of steam turbine plants
 - Steam plants : boiler and Steam turbine retrofits (partial modernization) aimed at efficiency increase



ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Approaches in the power generation business



Example of ALSTOM: TPP-26

Full EPC in consortium with EM Alliance

- **Alstom Power Train:** 1-KA26-1, GT26 gas turbine with generator, steam turbine with generator
Multishaft arrangement for higher operation flexibility
- HRSG made in Russia by partner to Alstom design
- **Output:** 420 MWe
- **El. Efficiency:** 59 % (highest efficiency at Russian combined-cycle power plant)
- **District Heating:** 2 DH heat exchangers (heated by IP exhaust gas from steam turbine)
- **Output:** 265 MWt (in full DH mode)
- **Overall Efficiency:** 89 % (combined generation and district heating)
- **Operating modes:**
- Unit can work either in fully condensing mode or cogeneration (power and heat) mode with very good flexibility at part loads;
- This “block 8” of TPP-26 power plant will boost the total installed capacity from 1,400 to 1,820 MWe.
- A plant with low emissions, meeting the most stringent applicable environmental regulations;
- The operational efficiency of the new combined-cycle will reduce the consumption of natural gas by 30 % in comparison with the average Russian power plant.
- Based on 2011 expected gas prices, this fact would result in a reduction of gas consumption by 326 Mio m³ natural gas in the first year of operation, allowing savings of RUB 1,381 Mio (US\$ 55 Mio).

ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Approaches in the transport business (railway, urban rail transport)

- to improve effectiveness of traction systems;
- to lighten trains in order to reduce their energy consumption;
- to recover power during



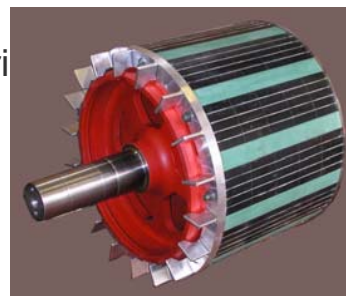
ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Approaches in the transport business (railway, urban rail transport)

Examples of ALSTOM:

Permanent Magnet Motor:

- Provides more efficient traction than an asynchronous electric motor
- Reduced energy consumption: 97% output
- New Citadis are equipped with PMM (ex: Istanbul)

Permanent magnet rotor motor →



↑
Permanent magnet motor stator

Electricity production during the braking phases:

- All our new trains are equipped with regenerative braking and restitution of energy to the catenary
- Power feedback can reach 8 MW

Weight reduction:

- Materials, traction systems, articulated architecture
- 15% reduction in energy consumption

Inverter tramway substations: the HESOP project:

- Re-inject the braking generative power of the trains into the power grid even if there is no other train on the line
- Under development for 750v DC power supply

Ecodriving:

TICA (Trainborne Improved Consumption Assistant) programme:

- Real time onboard energy management
- Driving assistance for saving traction power and energy
- Ongoing validation



ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Environmental approach

- Modernization and consequent intensification of the economy leads to higher load to the environment. Thus no breakthrough in economy possible without proper assessment and addressing of environment impact.
 - **positive environmental impact** in lowering CO₂ and others pollutants (Sox, NO_x, particles, etc)



ENERGY EFFICIENCY IN THE INDUSTRIAL SECTOR: Environmental approach

Example of ALSTOM:

- Alstom possesses the full range of air quality control systems and pioneers CO2 capture technologies for the future. We can assist in making studies and expertizing in environmental and CO2 compliance for new industrial and power plants to let from the conceptual design and layouting take into account future trends and requirements for the industries.

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