



# PÖYRY



ATOMEX-EUROPE

Forum of Nuclear Industry Suppliers

Praha, 25-26 October, 2011

Attila Bodon

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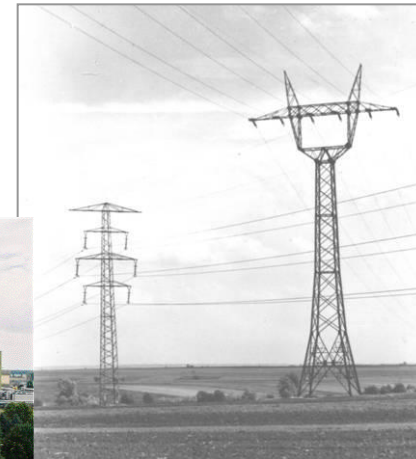
# TRADITIONS

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Erőterv designed 85% of the presently available installed capacity (8500 MW).  
Conventional PPs (Coal, HFO, Gas, CHPs) and **Nuclear PP**

ETV designed the high voltage National Grid (all the substations and 10.000 km OHL  
120-750 kV) and a number of middle voltage facilities

ETV played a significant role in the system planning from the beginning to nowadays



# ERŐTERV IN A NUTSHELL

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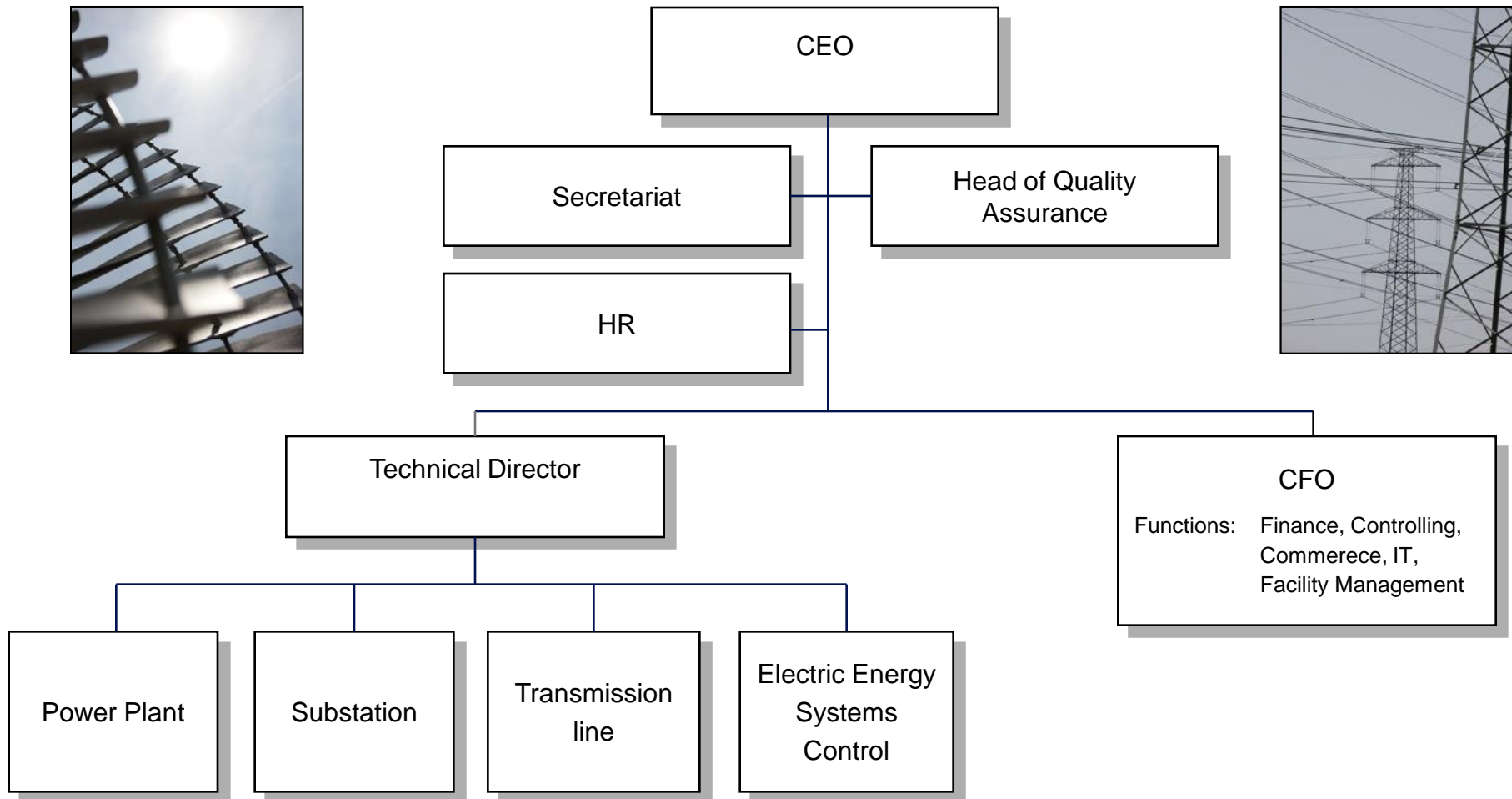
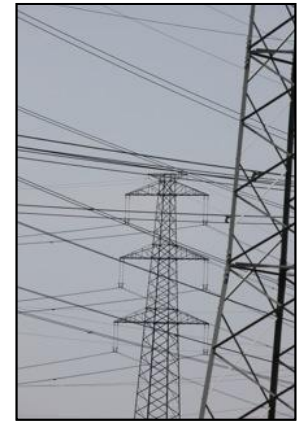


History	
Foundation	1950
Legal restructuring	1992
Privatisation (FORTUM)	1995
MBO	2004
Member of Pöyry PLC	2010

Business figures (255 Ft/Euro)	2005	2006	2007	2008	2009	2010
Turnover (MEURO)	12.6	17.0	16.0	15.3	12.9	10.9
Staff number	186	180	175	175	169	152

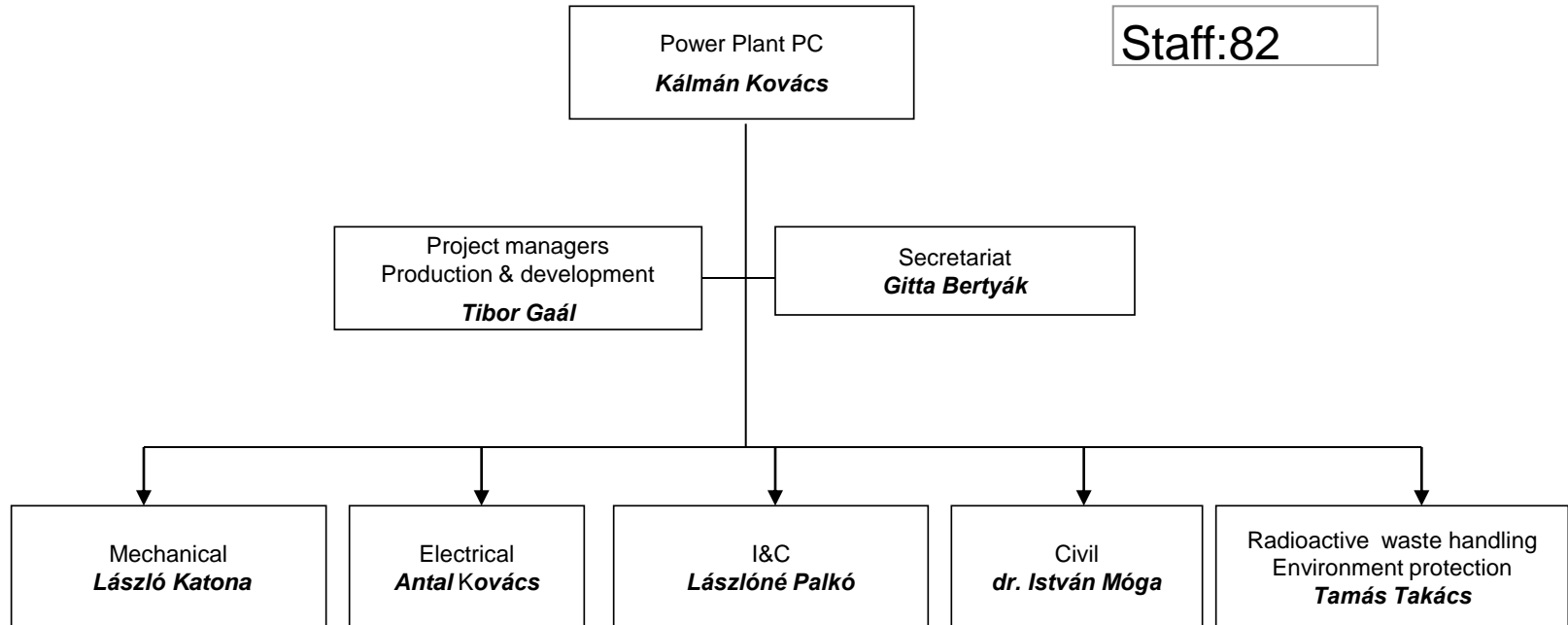
# ORGANISATION CHART AND PRODUCT AREAS OF ERÖTERV

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# POWER PLANT PROFIT CENTER

## COMPLEXITY



# MAIN CLIENTS



- PURAM
- MVM Group
  - Paks NPP
  - ERBE
  - OVIT
  - MAVIR (TSO)
- BME NTI
- Power Plants
  - E.ON
  - RWE
  - Tractebel
  - AES
- Distribution Co.
  - E.ON
  - RWE
  - EdF
- Industrial Co.
- Others
  - Banks
  - Investors

# SERVICES (FROM CONCEPT TO DISMANTLE)

Erőterv offers the following services:

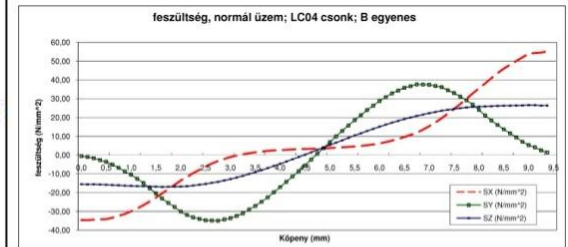
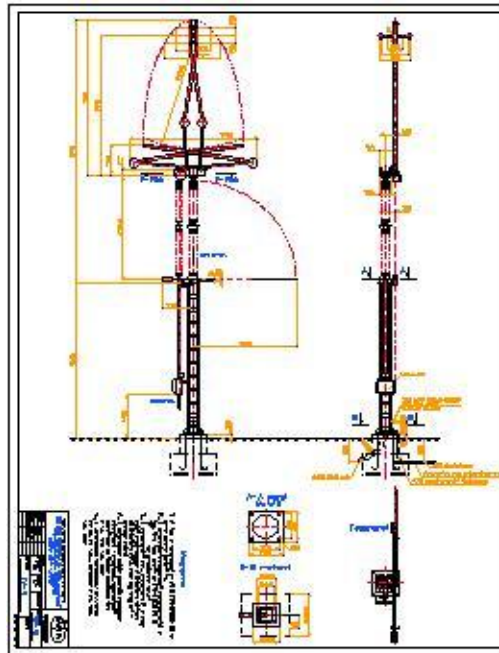
- Conceptual studies
- Feasibility studies
- Network planning
- Environmental studies
- Impact assessments
- Licensing documents
- Tender documentation
- Owner's engineering
- General design
- Basic design
- Detail design
- Project management support
- Construction and commissioning supervision
- As-built documentation
- Software application developments
- Decommissioning, dismantling studies



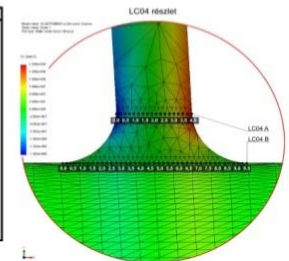


# TOOLS

- Mechanical engineering
  - PDMS 3D
  - AutoCAD
  - Caepipe (static test)
  - Solid edge 3D
  - Cosmos (finite element)
  - Gate cycle
  - Flowserve
- Electrical and I&C engineering
  - EPLAN
  - WSCAD
  - Phoenix
  - OmegaCAD
  - GREENLine
  - PSS/E
  - PLS CAD
- Civil engineering
  - ArchiCAD
  - Nemetschek (statical)
  - Axis
  - Winwatt
  - RFEM 2D
  - GSTRUDL
- IT based doc. management



Peremfeltételek	
Külső átmérő:	1910 mm
Falvastagság:	4 mm
Belső túlnyomás:	1,50E+04 N/m <sup>2</sup>
Önsúly:	figyelembe véve
Földrengés:	
OBE x gyorsulás:	nincs figyelembe véve m/sec <sup>2</sup>
OBE y gyorsulás:	nincs figyelembe véve m/sec <sup>2</sup>
OBE z gyorsulás:	nincs figyelembe véve m/sec <sup>2</sup>
Csontkerhelések:	
Erek:	
X irány:	-132 N
Y irány:	-431 N
Z irány:	-129 N
Nyomatek:	
X irány:	-95 Nm
Y irány:	14 Nm
Z irány:	-126 Nm



A csontkerhelésnél a Z irány a tartály függőleges tengelye

# LICENSES

- MSZ EN ISO 9001:2009
- MSZ EN ISO 14001:2005
- KM 31/2011 ABOS (Paks NPP Certificate)
- ÉMI
- Qualified for Public Procurements
- Hungarian Engineering Chamber membership



A PAKSI ÁTOMERŐMŰ ZRT. SZAJDOLJA, HOGY  
KÖVETELMÉNYEINK A  
**PÖRY ERŐTERV ZRT.**  
MINŐSÍRGYANTÁSI RENDSZERE  
**MEGFELLEL.**

Minősített terület:

*ABOS 1. 2. 3. létesítmény területére és az területre sorolt technológiai rendszerek, rendszerelemek karbantartásának, üzemeltetésének, javításának szakszerű, szabványos elvégzése, valamint generátortervezési tevékenységek végzése.*

*ABOS 2. 3. létesítmény területére és az területre sorolt technológiai rendszerek, rendszerelemek üzemeltetésének, karbantartásának, javításának szakszerű elvégzése.*

*Atomerőművel összefüggő gépmunkák, építménykarbantartási munkákra vonatkozó gépmunkák üzemeltetésének szakszerű elvégzése.*

A MINŐSÍTÉS ÉRVÉNYESÉGE DDL: 2013.05.31.  
A MINŐSÍTÉS SZÁMA: KM 31/2011  
EZZEN MANDÁTUM LAP A MELLELLELLEL JÖVŐTT ÉRVÉNYES.

Paks, 2011. május 04.

*[Signature]*  
BLAZS JÓZSEF  
Előszámlázó

*[Signature]*  
KOVÁCS GYULA  
Üstályvezető

**m p** paksi atomerőmű

# NUCLEAR FACILITIES IN HUNGARY

- BME NTI
  - Nuclear Technical Institute of Budapest Technical University
  - 0,1 MWth; atmospheric; open surface; teaching aid; fresh water cooled
- KFKI AEKI
  - Nuclear Energy Research Institute (Budapest)
  - 20 MWth; atmospheric; open surface; research projects and industrial radiation; dry cooling tower
- PURAM
  - Interim Spent Fuel Storage (ISFS) (next to Paks NPP)
  - Low and Intermediate Radioactive Waste Repository in Bábaapáti
  - Radioactive Waste Repository in Püspökszilágy (medical and other industrial wastes)
- PAKS NPP
  - Paks Nuclear Power Plant
  - VVR440; 4x440 MWe increased to 4x500 MWe; fresh water cooled



# PÖYRY ERÖTERV IN THE NUCLEAR FACILITIES (1)

## BME NTI

- 1975 The plant (except reactor vessel) was designed by Eröterv mechanical, electrical, I&C, civil engineering
- 1984 Load increasing
- 2011 Refurbishment of electrical systems
- 2012 Refurbishment of I&C



# PÖYRY ERŐTERV IN THE NUCLEAR FACILITIES (2)

## KFKI AEKI

- 1958-1962 Designed by Erőterv, KFKI, USSR
- 1986-1990 Retrofit and load increasing (mechanical, electrical, I&C, civil)



# PÖYRY ERÖTERV IN THE NUCLEAR FACILITIES (3)

## PURAM



- Organization plans for construction
- Assignment plans, task specifications, system plans
- General engineering
- Comprehensive design on nuclear, mechanical, electrical, I&C, civil and environmental fields
- Comprehensive design of Radiation Monitoring System (RMS)
- Software application developments
- Low and intermediate Radioactive Waste Repository surface and subsurface research

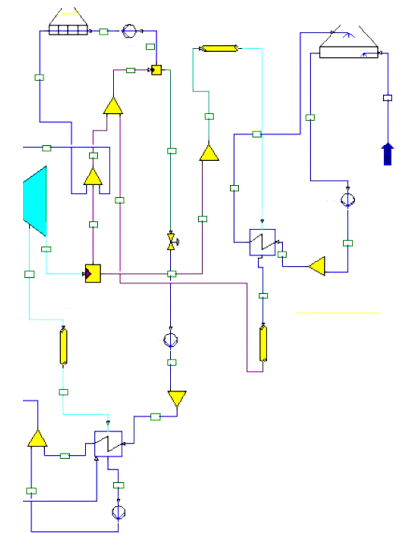
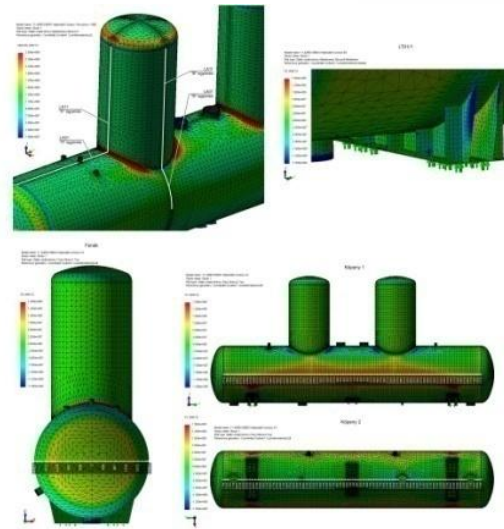
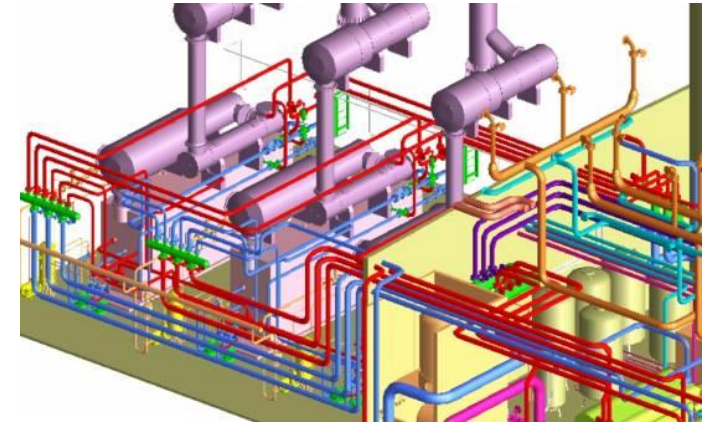
# PÖYRY ERŐTERV IN THE NUCLEAR FACILITIES (4)

## Paks NPP



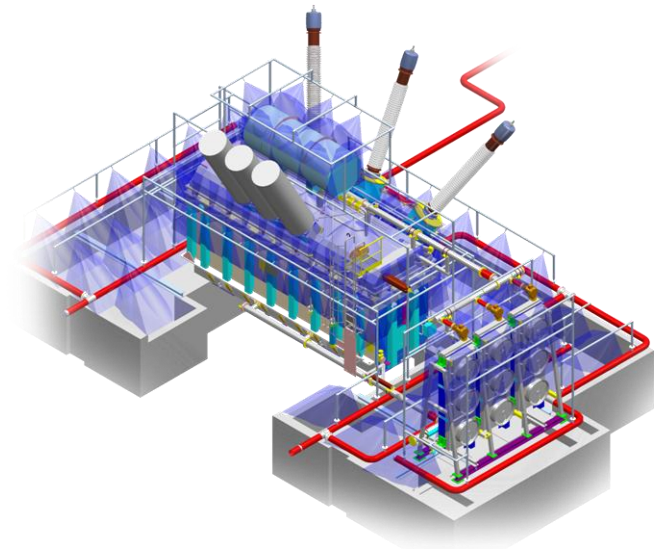
- 1975 - General designer of the plant
- FSAR (Final Safety Analysis Report) (annual renewal)
- Power generation increasing
  - New tubes in the condensers
  - Modification of LP turbine last blade row
  - Modification of zone configuration (Paks NPP and KFKI experts)
  - Retrofit of Generator auxiliary system
  - etc
- Basic and detail design of new Radiation Monitoring System (RMS) (technology and work places)
- Data acquisition for Load Catalogue (p;T) at several designed operation
- Frame contracts (mechanical, electrical, I&C); log-book orders
- Plant lifetime extension (PLEX) to be finished till the end of 2012
  - Review of ageing management of technological equipment affected by licensing procedure
  - Review of ageing management (status monitoring) buildings and load bearing structures affected by licensing procedure
  - Stress and fatigue analysis and calculations of safety relevant technological equipments to determine the remaining lifetime
- Lévai project 2x(1000-1600) MWe units in Paks

- Feasibility study
- Environmental Impact Assessment
- Licensing services
- Business plan
- Hazard and Operability Studies
- Optimisation for steam, heat parameters, boiler, turbine unit
- Boiler island design
- Turbine island design
- BoP system design
  - Civil,
  - Underground piping,
  - Building electrical system,
  - HVAC,
  - Oil system
  - Water treatment
- General plan of the Plant
- Mechanical design
  - Heat balance calculation
  - Piping route design in 3D
  - Piping dynamic calculation





- Electrical design
  - Low voltage electrical cubicles
  - Cable design
  - Layout design
  - Circuit drawing
- I&C design
  - Conventional measurement and control system
  - Process engineering (PLC, SCADA, DCS)
  - Software development and installation (Allan Bradley, Schneider, GE, OMRON, Phoenix Contact, Siemens, Metso, Emerson)
  - Database of electrical consumption, measurement and signal list
  - KKS coding
- Civil design
  - Energy facilities
  - Technological buildings
  - Steel- and reinforced concrete structures
  - Statical computations
  - Vibration control of foundations (turbine)
  - Dynamic analysis for foundation
  - Roads
  - Utilities
  - Ageing management



# PRODUCTS - SUBSTATION

- Full range of design and engineering of open air and SF<sub>6</sub> substations in the range of 0,4-750 kV
  - Civil and architectural engineering
  - High voltage & high current engineering
  - Control, protection and measurement
  - Telecommunication
- Site selection and licensing of substations
- Substation design
  - Primary and secondary equipment specification
  - Harmonization of technical data supply from the manufactures
  - Civil and structural engineering
  - Architecture engineering
  - Primary disposition plans
  - Secondary plans
  - AC/DC auxiliary systems
  - Fire protection
- Railway electrification, 120/25 kV substations
- Network calculation (load flow, short circuit analyses)
  - Power plant connection
  - Wind power connection
- Asset evaluation and technical audit



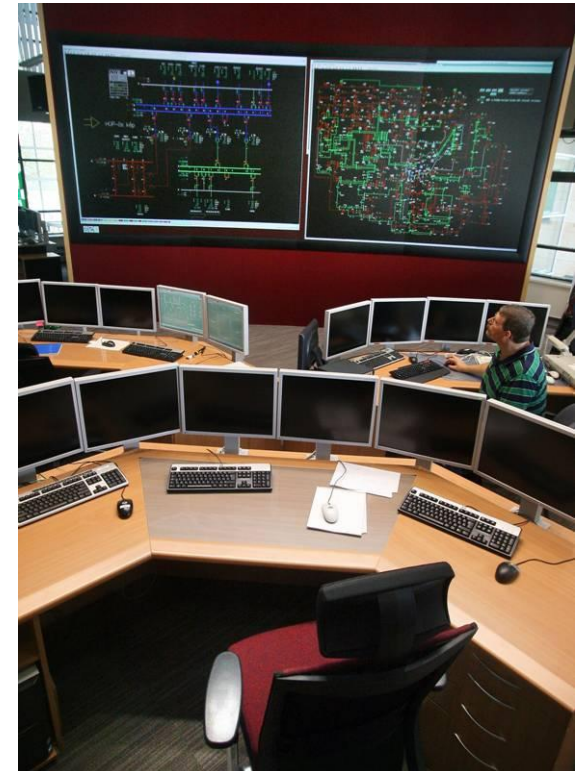
# PRODUCTS - OHL/CABLES

- Full range of design and engineering of overhead lines and cables in the range of 0,4-750 kV
  - Licensing
    - Environmental impact studies
    - Agreements with authorities
    - License for using of land
    - Route licensing
  - Design
    - Construction design
    - Transposition designs
    - Landscape design
    - Tower construction design
    - Workshop design
    - Foundation design
    - Status assessment of structures
    - Structural expertise
- Increasing of transmitting capacity of OHL
- Design of pole-mounted transformer stations
- Equipment standardisation on low- and middle-voltage levels
- Calculation of influence on telecommunication lines
- Design of earthing and shock protection
- Technical and economical consulting, asset evaluation



# PRODUCTS - EMS/SCADA/MANAGEMENT CONSULTING

- OE of the System Operator (TSO), Distribution Companies (DSO)
- SCADA/EMS/DMS
- Functional specification
- Database generation
- Technical support of Factory and Site Acceptance Test procedures for EMS/SCADA systems
- Technical support for projects in the implementation phase as OE
- Business Process Reengineering (BPR) along the main functionalities, including Business Continuity Plan (BCP)
- Balance Circle Management
- Energy Efficiency Consulting





**Thank you for your  
attention!**

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