EKONERG

BUSINESS PROFILE

Selected references

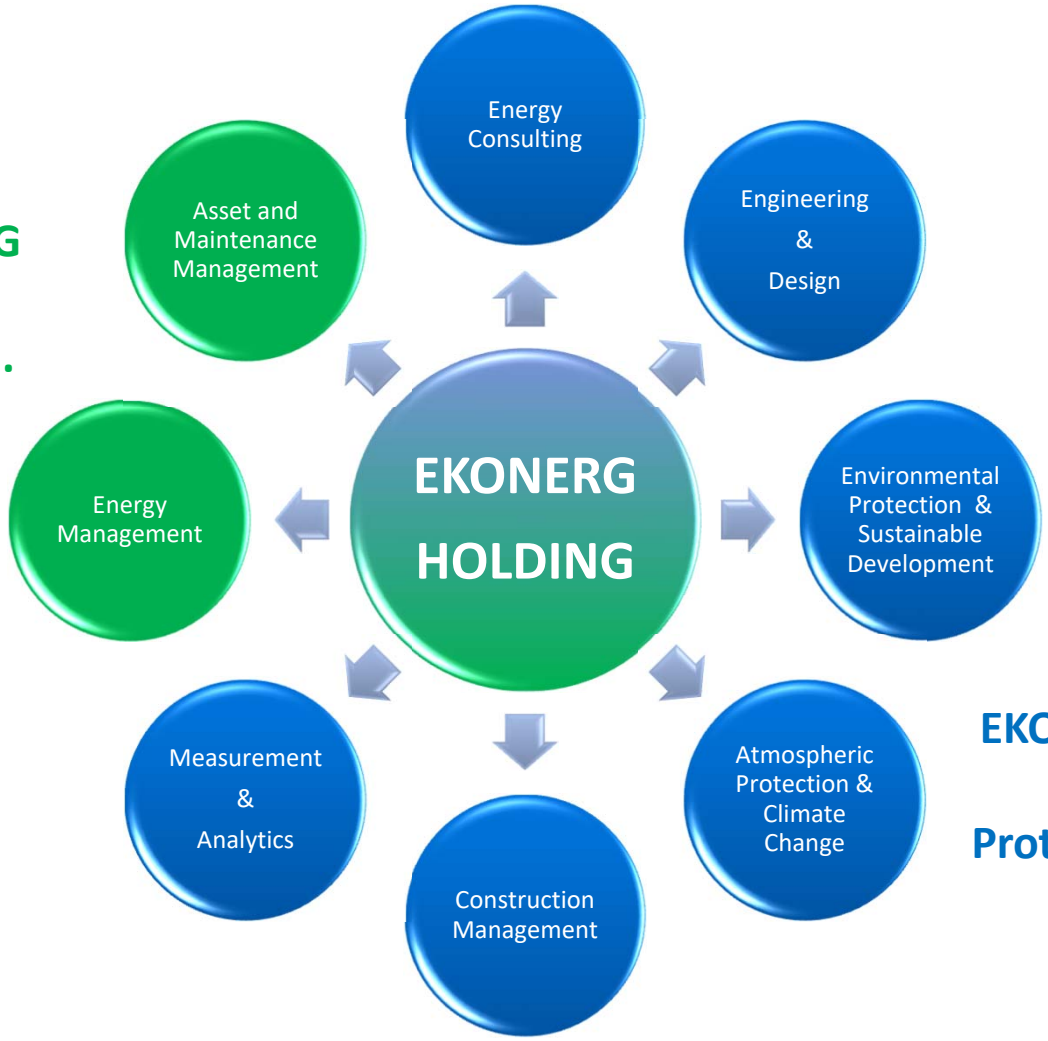



TÜV CERT RWTÜV ESTABLISHED 1953

EKONERG

EKONERG GROUP PROFILE

EKONERG KONZALTING for digital services Ltd.

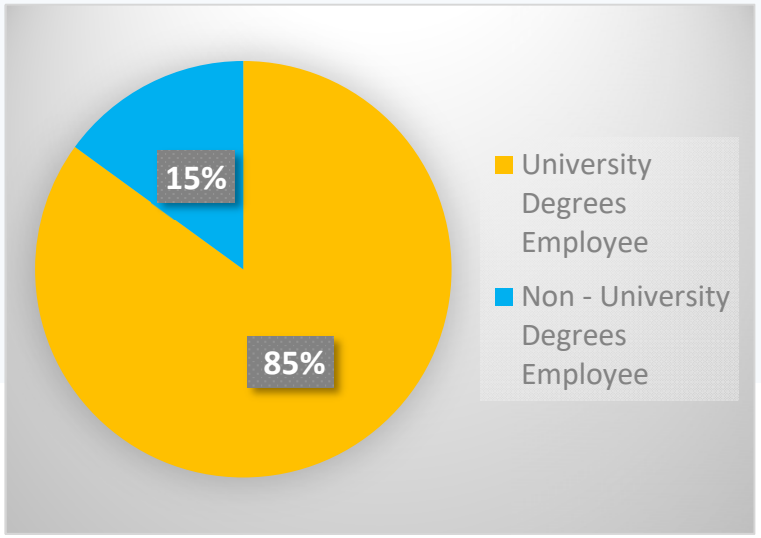


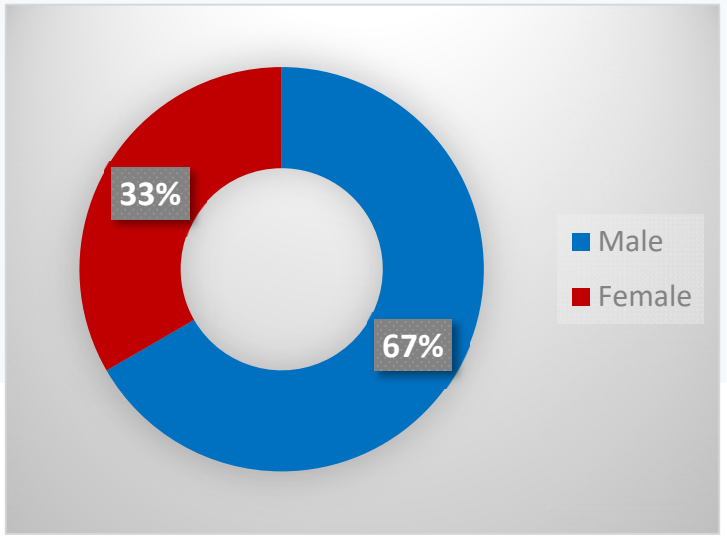
EKONERG - Energy and Environmental Protection Institute Ltd.

EKONERG

KNOWLEDGE DRIVE US

- EKONERG is **knowledge based** company
- **Accumulated intellectual capital** – reason why we are successful in the most complex projects
- **Leading Croatian and regional** engineering and consulting company
- **Multidisciplinary teams** for **successful services** in sector of:
  power, oil & gas, pharmaceutical, industry and utilities
- **One-stop shop** partner

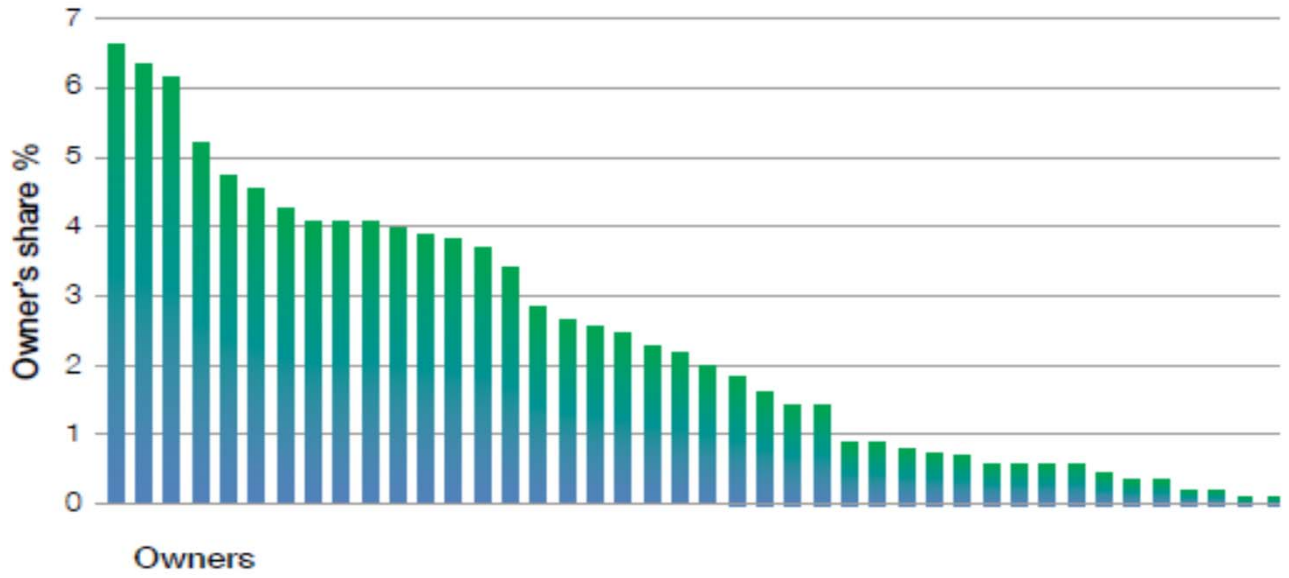




EKONERG

SUCCESS DEFINE US

- **70+** years of professional successful history
- **200+** engineers & consultants (Ph.D., M.Sc., M.Eng., M.Econ.)
- **19** disciplines
- **Matrix** organization, **fully integrated 3D working environment** (**BIM**)
- **7 Departments** acting like Profit centers
- **Private company** owned by its lead consultants
  (ESOP implemented - ownership share per each owner)



EKONERG

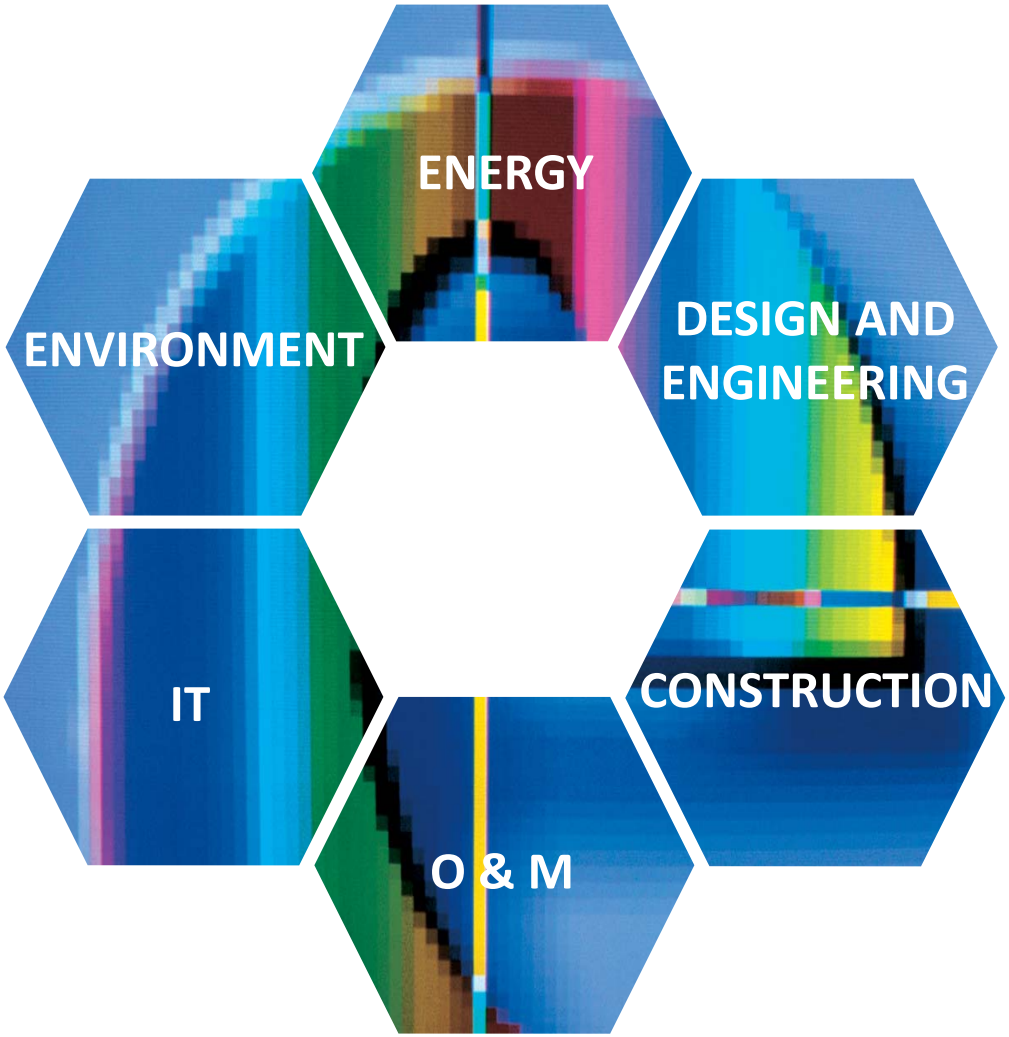
QUALITY IS OUR ROOT

EKONERG's governing principle is **quality**

- **EN ISO 9001: 2015**
  (System was established at **1995 as a first engineering and consulting company in Croatia with ISO 9001** certificate)
- **EN ISO 14001:2015** - The Environmental Management Systems
- **EN ISO 45001:2018** - The Occupational Health and Safety Management Systems has been developed in conformity with the
- **EN ISO 50001:2018** - The Energy Management System

EKONERG

CORE COMPETENCIES



EKONERG

ONE-STOP SHOP PARTNER

EXPERTIZE IN PRE-CONSTRUCTION, CONSTRUCTION, COMMISIONING AND O&M

	Pre-construction	Construction	Commissioning	O&M
Documentation	✓ Siting investigation ✓ Technical concepts ✓ Feasibility analysis ✓ Preliminary studies ✓ Applications for funding ✓ Conceptual design ✓ EIA studies ✓ Environmental permit ✓ Basic design ✓ Location permit application documentation ✓ Design documentation validation (compliance assessment)	✓ Detailed (construction) design ✓ Site organization ✓ Work methods ✓ Work procedures ✓ QA/QC programs /plans ✓ Construction programs and schedules (materials, investment)	✓ Quality documentation on works performed ✓ Supervisor's reports ✓ Commissioning packages ✓ Functional testing programs ✓ Baseline inspection of equipment and systems ✓ Trial run programs ✓ As-built documentation	✓ Maintenance management system implementation ✓ Prevention maintenance program ✓ Operating QA program ✓ Environmental monitoring program
Licencing	✓ Location permit ✓ General consent ✓ Building permit ✓ Property-right issues		✓ Operating permit	
Work performance	✓ Field work and investigations	✓ Project management ✓ Equipment procurement ✓ Equipment transportation management ✓ Construction site organization ✓ Civil work management ✓ Equipment installation management ✓ QA/QC activities ✓ Construction supervision	✓ Project commissioning ✓ Functional tests ✓ Baseline inspection and testing ✓ Trial run ✓ Technical inspection ✓ Operating license application and approval	✓ Implementation of inspections and tests according to the preventive maintenance program ✓ O & M management

EKONERG

ATMOSPHERIC PROTECTION AND CLIMATE CHANGE DEPARTMENT

EKONERG

ASSISTANCE IN CARBON NEUTRALITY JOURNEY AND AIR POLLUTION REDUCTION

- Energy industry
- Manufacturing industry
- Households and services (buildings)
- Transport
- Agriculture
- Waste management
- Land use, Land use Change and Forestry (LULUCF)
- Organizations and institutions
- Products
- Sustainable investment and financing

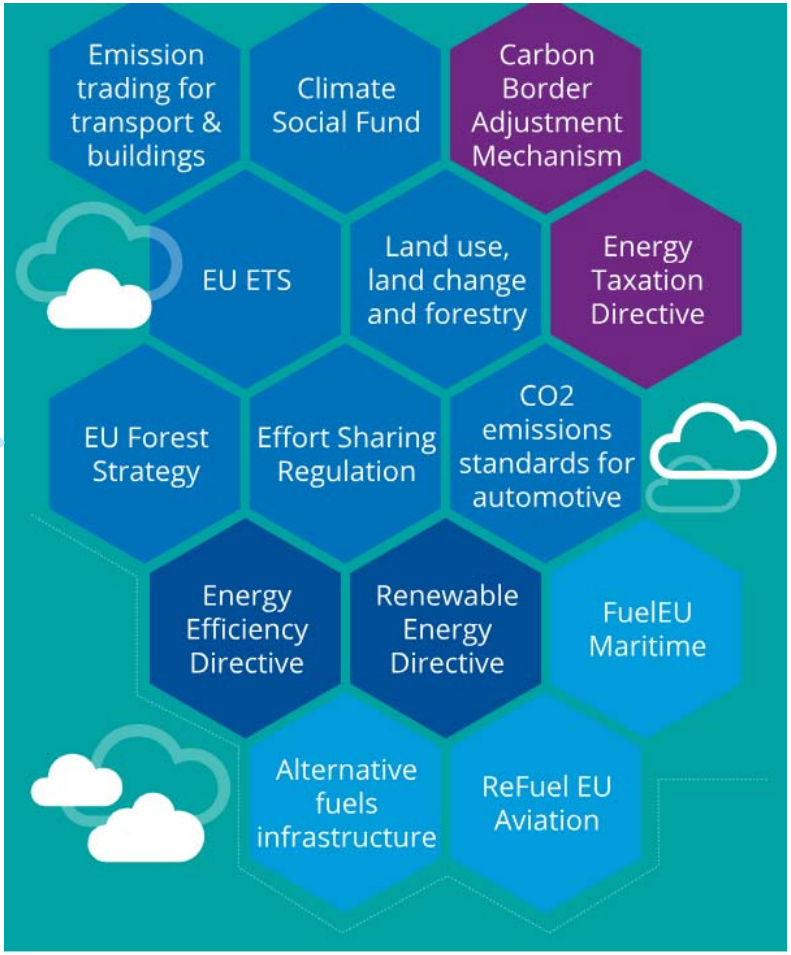
EKONERG

SUPPORT TO INSTITUTIONS AND ECONOMY FOR THE IMPLEMENTATION OF THE EUROPEAN GREEN PLAN

EKONERG consultancy support

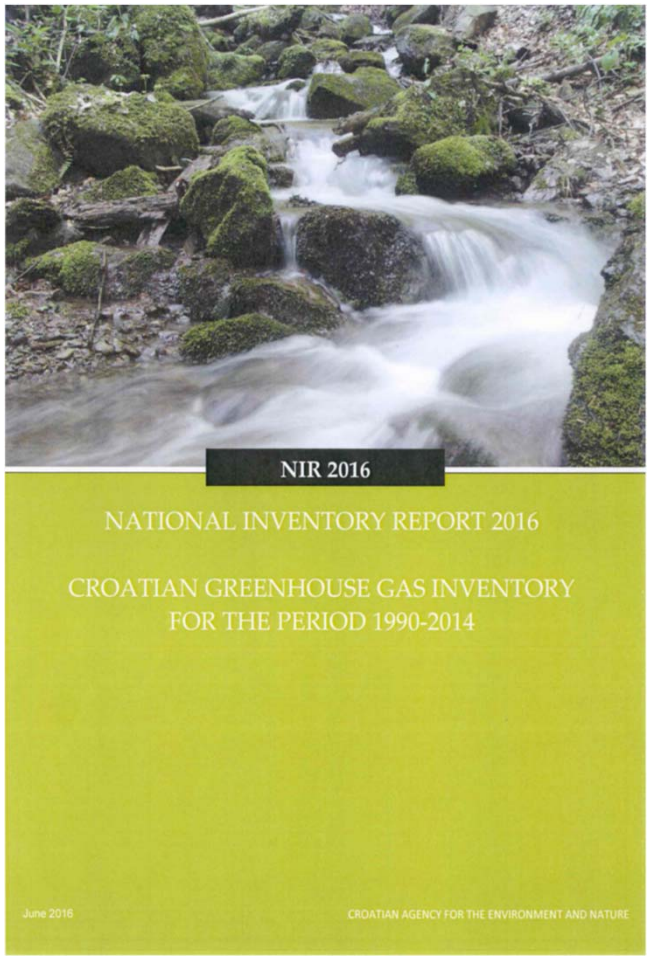
- National GHG emission inventory and projection
- Reporting to EU and UNFCCC
- GHG mitigation policy and measures reports
- ETS reporting and buliding of verification system
- CBAM reporting
- Carbon footprint calculation for organizations and products
- Sustainability of renewable fuels (biofuel, biomass and renewable hydrogen)
- Sustainable investment proofing (EU taxonomy implementation)
- High resolution spatial emission mapping
- Remote sensing and GIS for land use and land cover
- Capacity building project for green transition (EU financed projects)
- Development of tools and IT solution
- Consultancy in international negotiation (Kyoto, LRTAP, Paris agreement)

Fit to 55 EU legislative package



EKONERG

CROATIAN GREENHOUSE GAS INVENTORY



Gasses: CO_2, CH_4, N_2O, SF_6, HFCs, PFCs, NF_3

Client: Ministry of Environmental Protection and Green Transition

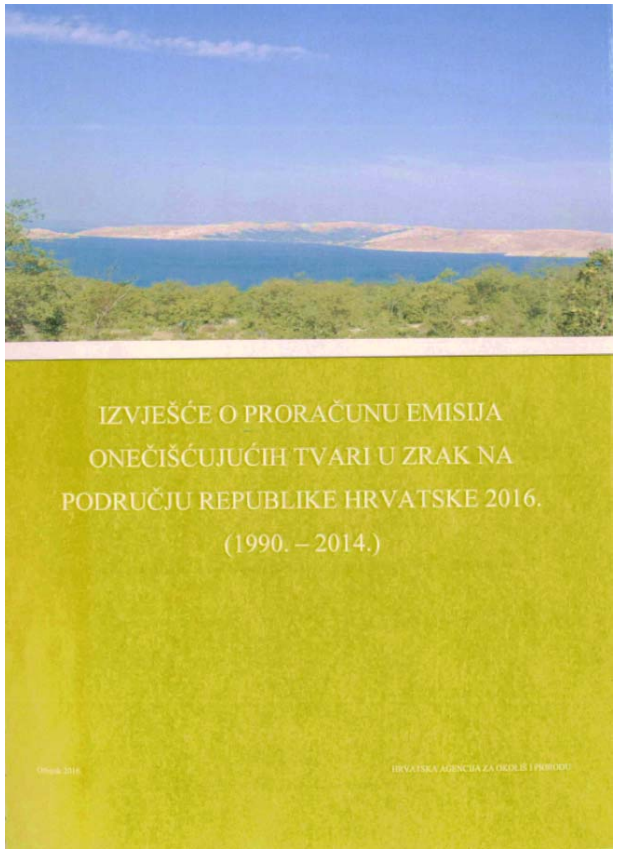
Coverage of reporting: emissions inventory for the period from 1990 to X-2 (X = current year)

Methodology: according to Intergovernmental Panel on Climate Change, IPCC 2006 Guidelines

QA/QC: national annual review (EKONERG and Ministry), international annual review (UNFCCC and European Commission)

EKONERG

INVENTORY REPORT ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION



Pollutants: SO2, NOx, NMVOC, CO, NH3, TSP, PM10, PM2.5, BC, heavy metals, dioxins and furans, PAHs, PCBs, HCB

Client: Ministry of Environmental Protection and Green Transition

Coverage of reporting: emissions inventory for the period from 1990 to X-2 (X = current year)

Methodology: according to the EMEP / EEA Guidebook for Reporting emissions and projections to the UNECE Convention on Long-range Transboundary Air Pollution (LRTAP Convention)

QA / QC: national annual review (EKONERG and Ministry), international annual review (EMEP Centre for Emission Inventories and Projections (CEIP))

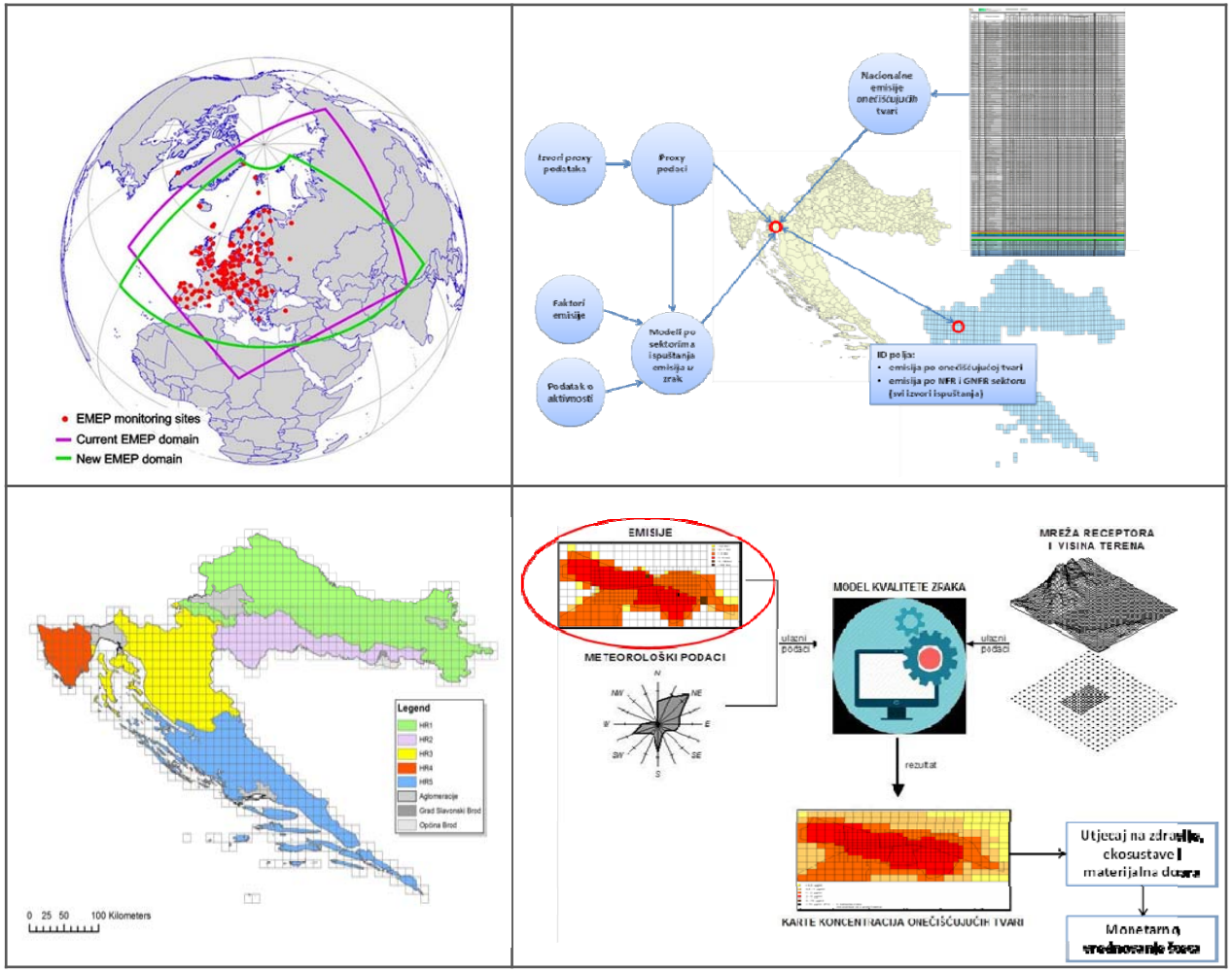
EKONERG

LOW-CARBON DEVELOPMENT STRATEGY OF THE REPUBLIC OF CROATIA UNTIL 2030 WITH A VIEW TO 2050

STUDY OF THE SCENARIO FOR ACHIEVING CLIMATE NEUTRALITY IN THE REPUBLIC OF CROATIA UNTIL 2050

EKONERG

THE SPATIAL DISTRIBUTION OF POLLUTANT EMISSIONS IN THE HIGH-RESOLUTION NETWORK



- The methodology of the spatial distribution of emission
- Defining and preparing of the proxy data
- The engineering mathematical models for all sources of emissions
- Digital integration of the emission database and spatial proxy data

EKONERG

CLIENTS IN SERBIA

Company	Activities
NIS a.d. Novi Sad Rafinerija Pančevo HIP Petrohemija Skladište naftnih derivata Novi Sad Postrojenje za pripremu i transport nafte i plina Tvornica sintetničkog kaučuka Elemir	• GHG emission inventory • carbon footprint calculation • measures to reduce GHG emissions • preparation of monitoring plan and reporting for ETS system • education for GHG calculation, carbon footprint calculation and ETS reporting
Toyo Tires Serbia d.o.o.	• carbon footprint calculation • preparation of monitoring plan and reporting for ETS system

Faculty of Mechanical Engineering of the University of BelgradeBeograd	• monitoring, reporting and verification (capacity building for reporting according to UNFCCC)
	  • improvement of national GHG emissions inventory
	  • preparation of national projections of GHG emissions until 2030
	  • building QA/QC system
	  • preparation of the Biannual report to UNFCCC

EU - TAIEX - Ministry of Environmental Protection	• climate policies in EU approximation • lectures and knowledge transfer

EKONERG

OPPORTUNITIES FOR CONSULTANCY IN SERBIA

ISEM	Integration of carbon footprint calculation, monitoring and reporting in the existing system	Ministry and responsible authorities
	System for monitoring, measuring and verifying energy savings and reducing GHG emissions	Ministry and responsible authorities
	Support and establishment of a reporting system to ETS	ETS operators
	Carbon Border Adjustment Mechanism (CBAM)	Exporters to the EU
	ESG reporting, sustainable Investment (SFRD, CSDR, and EU taxonomy)	Financing institutions (banks, investment funds, assurance companies)
	Carbon footprint calculation (Scope 1, Scope 2 Scope 3) for organizations and products	Large companies SMEs Organizations Events Products
	Development of tools for carbon footprint reporting and ERP integration	Large companies SMEs Events Products
	Proof of sustainability for biomass, biofuel and renewable hydrogen	Energy companies
	European Sustainability Reporting Standard (ESRS), ESR Disclosure Standard for Climate change	Large companies SMEs
	Remote sensing techniques and GIS for land use, physical planning and renewable resources	National and regional authorities

EKONERG

ENERGY CONSULTING DEPARTMENT

Energy Consulting Department continues the tradition of the Thermoenergetic Systems Department of the Institute for Power Industry, forming the foundation of development and research activities within Ekonerg. The Energy Consulting Department (ECD) engages in analysing new markets, identifying, and preparing potential projects, especially in the fields of energy production, distribution, and consumption, with development potential in other departments.

The department's activities can be summarized into three main areas:

1. **Consulting**
2. **Digital support for energy transition**
3. **Research and development**

EKONERG

ENERGY CONSULTING DEPARTMENT

Consulting Services

- Preparation of prefeasibility and feasibility studies (FS)
- Cost-benefit analyses (CBA) and other documentation for co-financing
- Technical due diligence of energy facilities
- Development of strategies and plans (energy, low-carbon, renewables)
- Energy management and energy efficiency

Engineering Services

- Conceptual solutions for energy facilities
- Owner's Engineer (OE) and Lender's Engineer (LE) services during project execution
- Decommissioning studies for energy facilities

Regulatory Support

- Harmonization of laws with EU standards; drafting regulations, decrees, and methodologies

EKONERG

ENERGY EFFICIENCY

EECGB PROGRAMME IN THE REPUBLIC OF SERBIA

Energy certification and detailed energy audits of central government buildings

The purpose of this assignment was **to perform elaboration of the baseline energy certificates (passports) and to conduct detailed energy audits for 12 CGBs with the purpose to get deep insight into energy consumption and other related issues**, as a part of preparatory activities for the Programme "Energy Efficiency in Central Government Buildings", implemented by the United Nations Development Programme (UNDP) in partnership with the Ministry of Mining and Energy (MME) of the Republic of Serbia (RS) and Council of Europe Development Bank (CEB) and in close cooperation with the Administration for Joint Services of the Republic Bodies (UZZPRO).

The EECGB Programme encompasses renovation of up to 27 central government buildings in Belgrade of a total floor surface of 206,280 m2, most of which are protected as heritage buildings and should result in a minimum of 30% of primary energy consumption reduction, some 20% of CO2 reduction, improved working conditions, improved safety at work and app. 29% savings in operating cost for energy. In addition, the Programme should contribute to the protection and preservation of cultural heritage buildings.

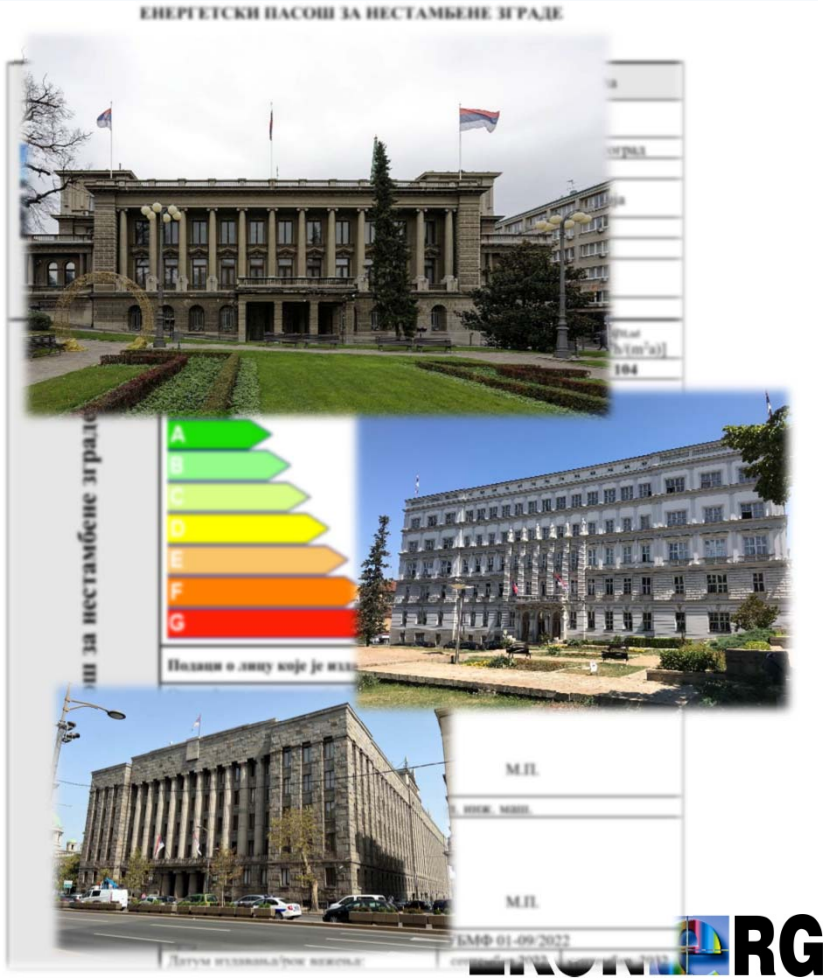
For the EER of the CGBs, an EUR 40 million loan from the Council of Europe Development Bank was negotiated and agreed by the Government of Serbia and the MME.

Origin of funding: Grant provided by CEB Trust Fund donors, namely the Kingdom of Spain and Republic of Slovakia, through CEB to the MME, i.e. UNDP

Local partner: Faculty of Mechanical Engineering, University of Belgrade

EKONERG SCOPE:

Analysis and modelling of energy consumption in the buildings, proposing and analysing investment packages of EE and RE measures which will be implemented in the scope of EE renovation of buildings



ENERGY EFFICIENCY

EECGB PROGRAMME IN THE REPUBLIC OF SERBIA

Feasibility Study on EE Renovation of SIV 3 building

The purpose of this assignment was **to perform elaboration of feasibility study on energy efficiency renovation of one CGB - SIV 3 in Belgrade**, as a part of preparatory activities for the Programme “Energy Efficiency in Central Government Buildings”.

The Feasibility Study aimed to determine the optimal investment packages comprising energy efficiency (EE) and renewable energy (RE) measures for implementation within the building's energy efficiency renovation. The optimization of these investment packages focused on achieving energy and operational cost savings, reducing negative environmental impacts, preserving architectural heritage, enhancing occupational safety and health, and improving the quality of services provided in the building. **Geothermal heat pumps have been considered**, in accordance with the results of geological explorations of petrogeothermal potential.

Implementation of the proposed investment packages is required to ensure compliance with the minimum energy efficiency requirements for Central Government Buildings (CGBs) as mandated by the Government of the Republic of Serbia (Decision no. 312-01-393/2021 dated 26th August 2021)..

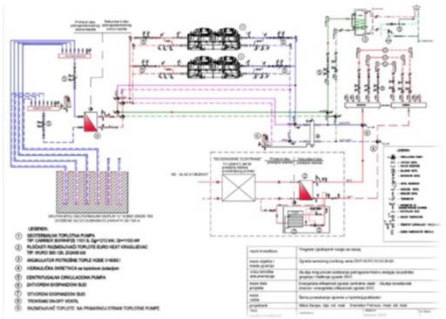
Origin of funding: Grant provided by CEB Trust Fund donors, namely the Kingdom of Spain and Republic of Slovakia, through CEB to the MME, i.e. UNDP

Local partner: Faculty of Mechanical Engineering, University of Belgrade

EKONERG SCOPE:

Analysis and modelling of energy consumption in the building, proposing and analysing investment packages of EE and RE measures which will be implemented in the scope of EE renovation of building

	П-1 134,5 kWh/(m2 a)	П-2 201,5 kWh/(m2 a)	П-3 201,6 kWh/(m2 a)
Инвестиције почетна	491,5	468,8	462,2
Инвестиције након животног века	108,9	99,1	99,1
Преостала вредност објекта	-95,4	-88,6	-87,7
Енергија	239,0	294,7	294,8
Вода	15,1	15,1	15,1
Одржавање	110,5	103,5	103,5
Трошкови емисије	44,8	70,1	70,2
Укупни трошак	914,2	962,6	957,1



EKONERG

POWER & NUCLEAR

CHP PLANT IN THE COAL PROCESSING PLANT VREOCI (KOLUBARA), SERBIA

Conceptual design of reconstruction of the heat plant Toplana Vreoci (Serbia)

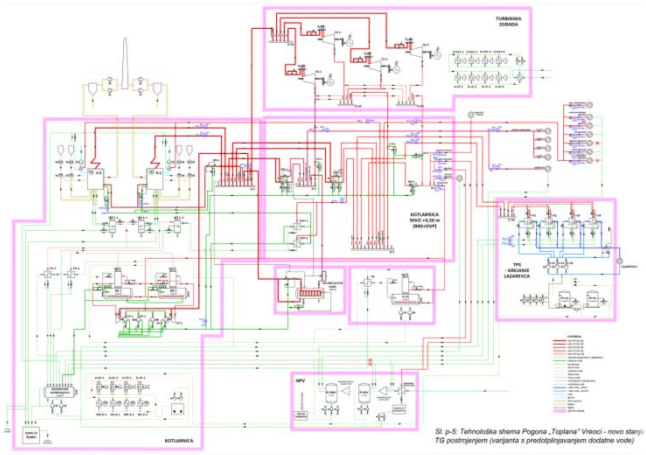
Heat plant Toplana Vreoci reconstruction aimed to enhance energy efficiency by integrating an electricity generation unit and replacing the current steam pressure reduction system with steam turbines thus turning the plant into combined heat and power (CHP) plant using steam for electricity generation.

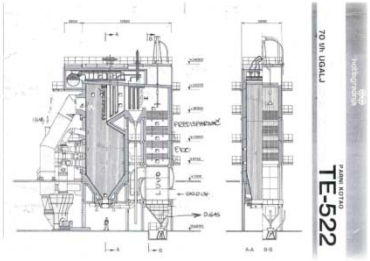
Installation of four steam turbines with generators with total output of 9,9 MWe and new pressure reducing stations has been proposed. Each turbine was planned to be integrated into different steam stream flow. Mass and energy balance of the plant was calculated based on steam demand using measured data from SCADA system. Steam turbines were selected according to the steam consumption and power plant electricity generation was calculated.

Conceptual design included technical description of the plant and integration of new steam turbines into the existing plant. Results were compared to the results of previous studies and final recommendations for reconstruction were made.

Client: EPS

Local partner: EnergoON Novi Sad





EKONERG SCOPE

- Feasibility study
- Conceptual design

EKONERG

POWER & NUCLEAR

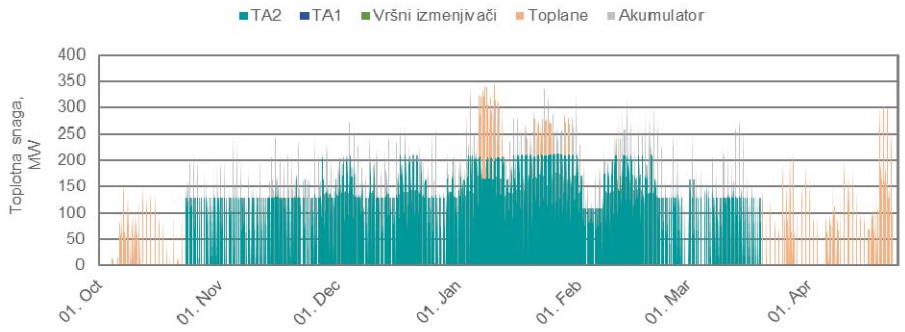
TE-TO NOVI SAD POWER PLANT

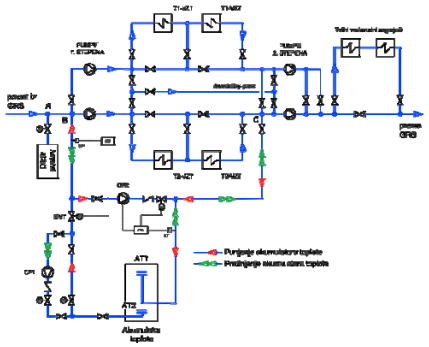
HEAT ACCUMULATOR 900 MWh/150 MW, TE-TO Novi Sad, EPS

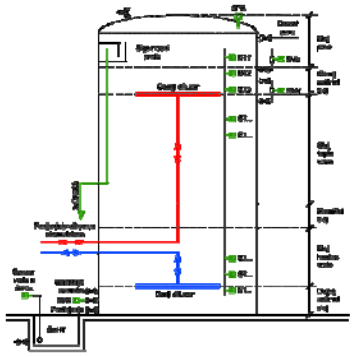
The project aims to assess the feasibility and benefits of constructing a heat accumulator at the Novi Sad Combined Heat and Power Plant (TE-TO Novi Sad). This system would store excess heat generated during off-peak hours and release it during peak demand, enhancing efficiency and operational flexibility. The accumulator, a large thermal storage unit, allows decoupling of heat and power production, enabling the plant to respond better to fluctuating energy demands and pricing. Two primary scenarios are evaluated: one with current network configurations covering specific areas and another, hypothetical, where the accumulator serves additional zones. Key analyses include optimizing the accumulator's capacity (from 300 to 1200 MWh) and assessing technical and financial viability through sensitivity tests on energy prices and emissions costs. This analysis aims to identify the optimal size and configuration to maximize financial returns while ensuring reliable heat supply during variable demand periods

Client: EPS

Local partner: EnergoON Novi Sad







Ekonerg Scope

- Feasibility study
- Conceptual design

EKONERG

POWER & NUCLEAR

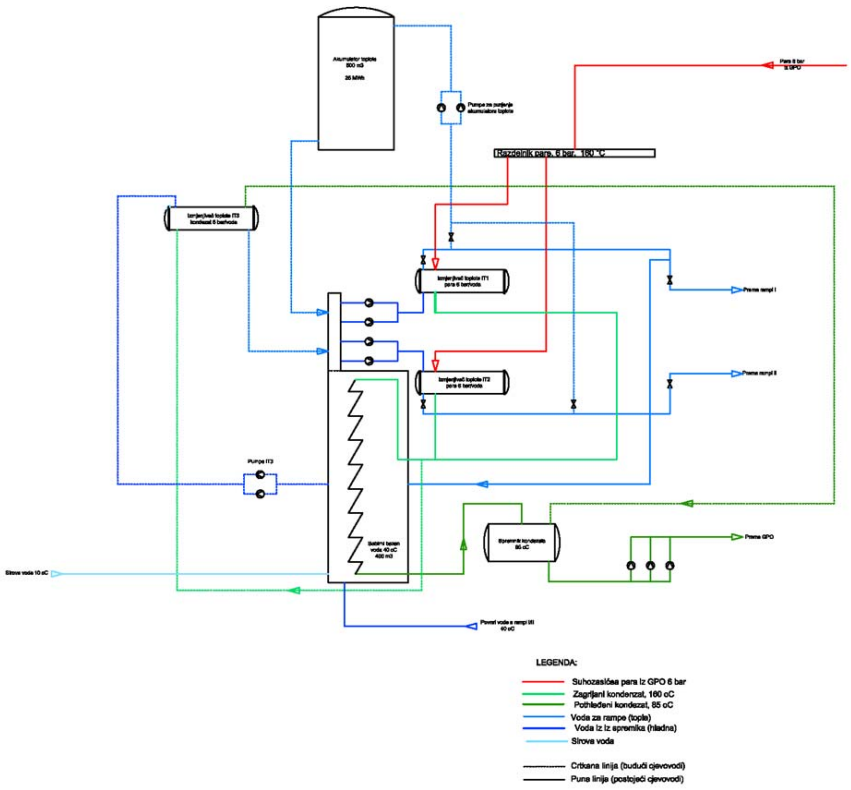
TPP “NIKOLA TESLA” (TENT)

OPTIMIZATION OF CARRIAGE DEFROSTING SYSTEM FOR UNIT A

The project entails improving the wagon defrosting system at the Nikola Tesla Thermal Power Plant (TENT), Block A, to ensure effective operation even at low external temperatures. Currently, the system uses heated water sprayed onto wagons to prevent coal from freezing during winter, which can disrupt operations. Due to low temperatures, the system struggles to maintain the required water temperature of 88°C. The proposal includes two main options:

Option 1: Install a new heat exchanger (IT3) and add a thermal storage unit to store and supply additional heated water. This approach would allow for more stable water temperatures, ensuring the system reaches the desired 88°C even under cold conditions.

Option 2: Increase the flow rate of dry-saturated steam from the main operating facility to raise the heating capacity of the current system. This solution would enhance the efficiency of existing equipment without significant structural changes.



Ekonerg Scope

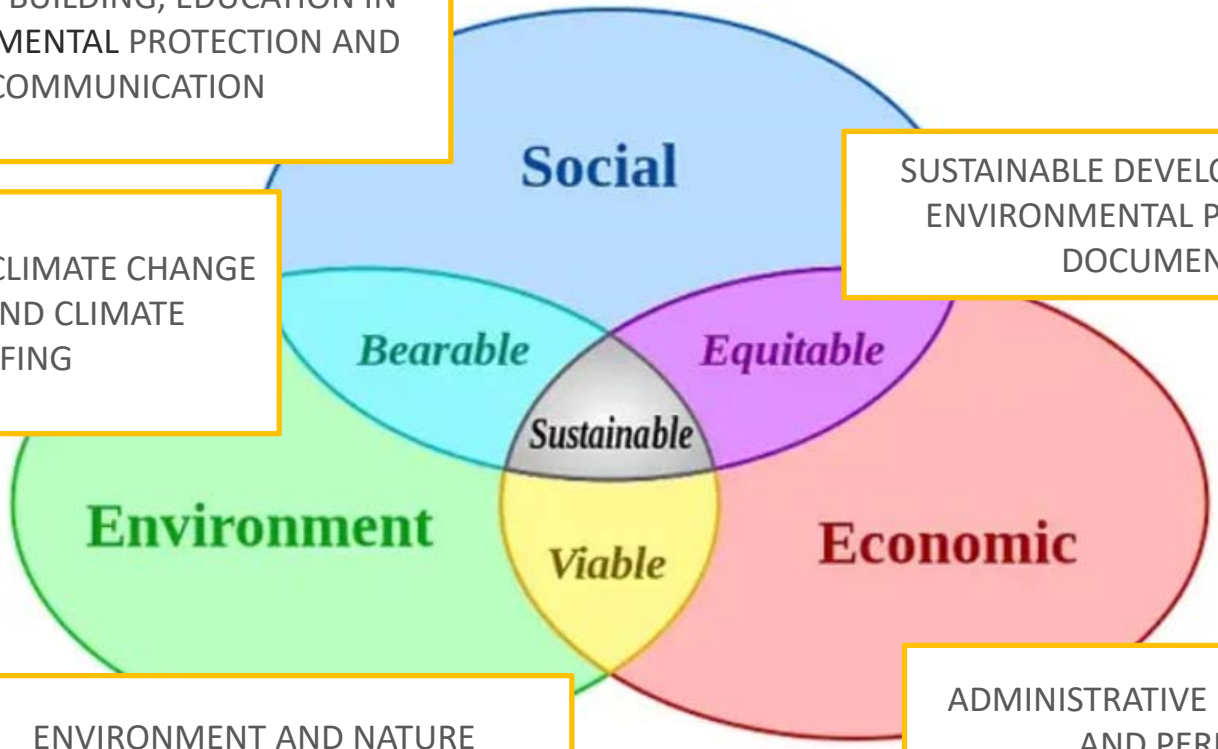
- Feasibility study
- Conceptual design

EKONERG

ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

CAPACITY BUILDING, EDUCATION IN ENVIRONMENTAL PROTECTION AND COMMUNICATION

ASSESSMENT OF CLIMATE CHANGE RESILIENCE AND CLIMATE PROOFING



SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION DOCUMENTS

ENVIRONMENT AND NATURE MOINTORING, RESEARCH WORKS AND IMPACT MODELING

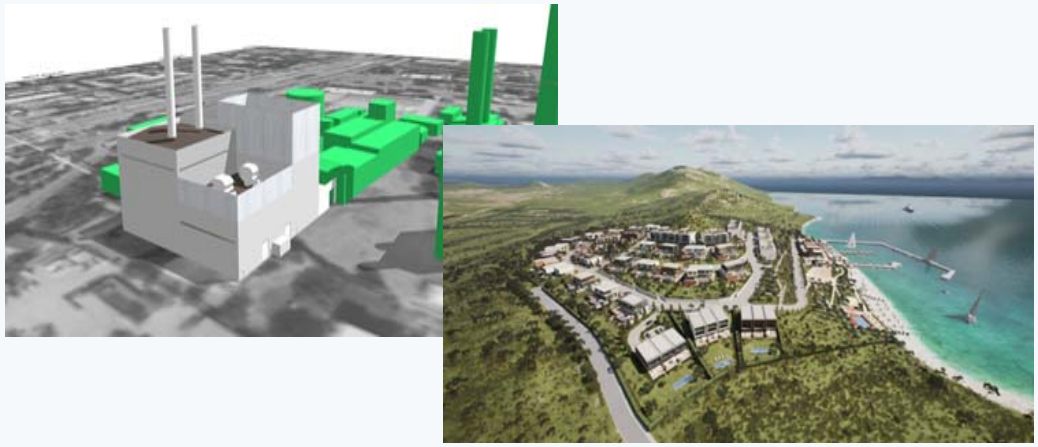
ADMINISTRATIVE PROCEDURES AND PERMITS

EKONERG

ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

ADMINISTRATIVE PROCEDURES AND PERMITS

Environmental Impact Assessment and Environmental Permit: Preparation of EIA studies and reports for assessing the environmental impact of projects in industry, energy, construction, municipal infrastructure, and assistance in procedures for obtaining Environmental permits.



PROGRAM ZAŠTITE OKOLIŠA GRADA SISKA ZA RAZDOBLJE 2023. – 2026.

Program zaštite zraka Grada Siska za razdoblje 2023. – 2026.

Program ublažavanja klimatskih promjena, prilagodbe klimatskim promjenama i zaštite ozonskog sloja Grada Siska za razdoblje 2023. – 2026.

Programmatic and Strategic Documents in the Fields of Environment, Air, Climate, and Waste

Environmental protection programs, including Air protection programs and Climate change mitigation programs, Climate change adaptation, and ozone layer protection, Action plans for air quality improvement, Waste management Plans and Strategies

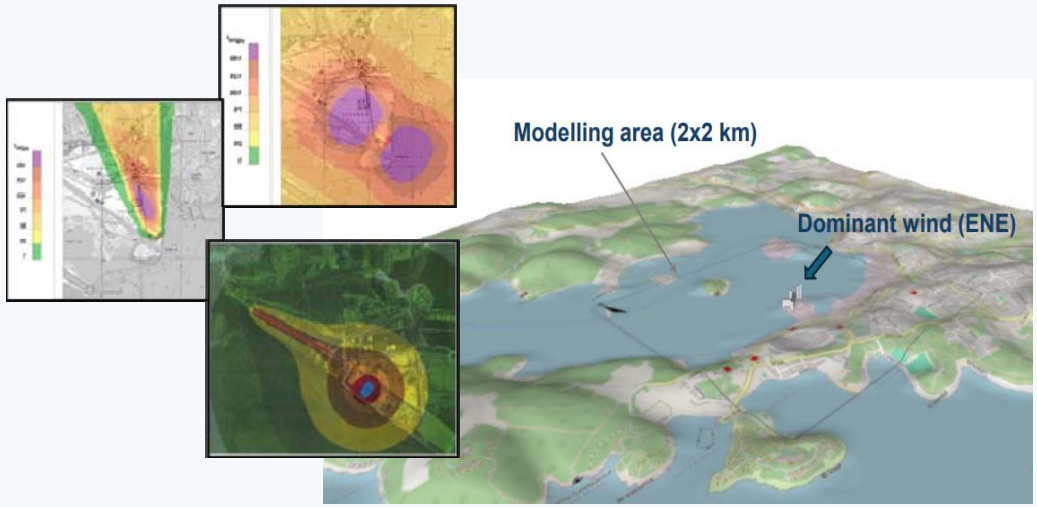
EKONERG

ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

ENVIRONMENTAL AND NATURE STATUS MONITORING, RESEARCH, AND IMPACT MODELING

Air Quality Monitoring Systems: Implementation of sensor technology for monitoring air quality in urban and industrial areas. Analysis of air quality data and preparation of reports for public and private users. Development and application of models to predict changes in air quality in urban and industrial areas.

Biological Monitoring: Monitoring biodiversity and the impact of climate change on flora and fauna.



EKONERG

ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL PROTECTION DOCUMENTS

Strategies and Plans for Sustainable Development: Development of strategies that integrate environmental goals with economic and social aspects of sustainability.

Annual Sustainability Reports: Preparation of reports on progress toward sustainability goals, including the reduction of greenhouse gas emissions and efficient resource management.

EKONERG

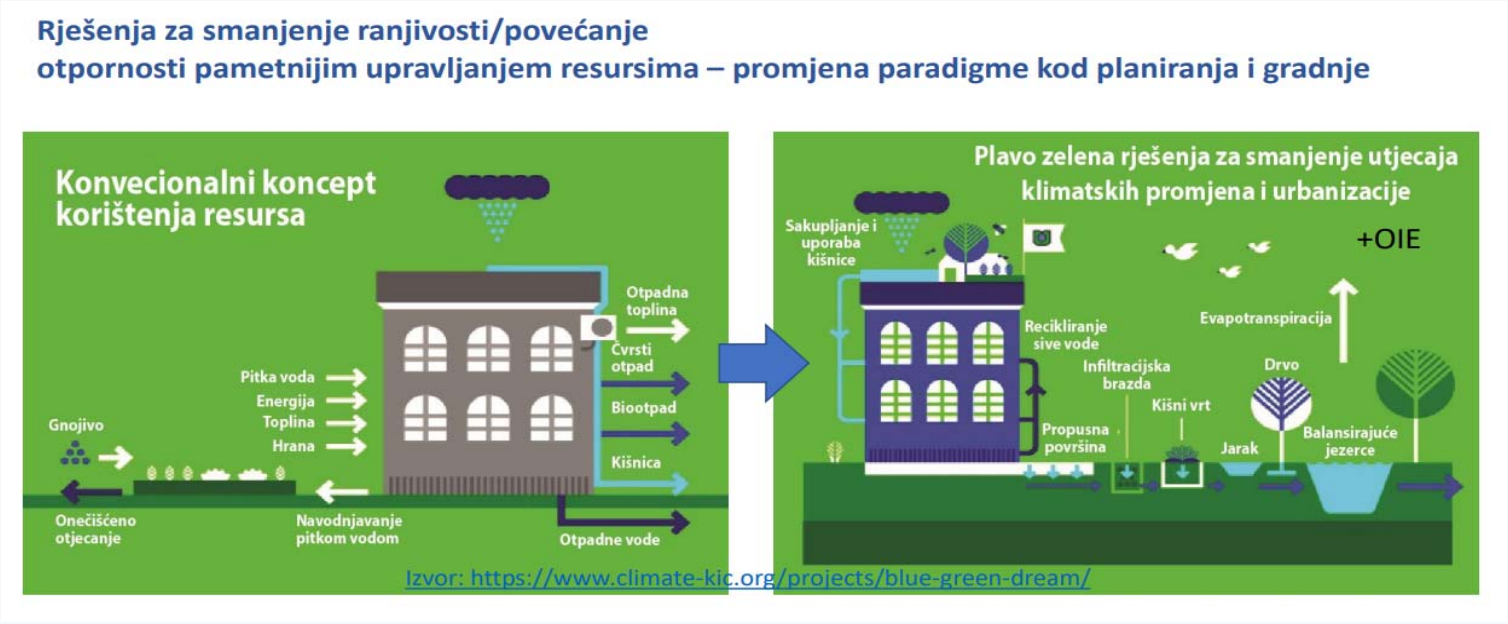
ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

ASSESSMENT OF CLIMATE CHANGE RESILIENCE AND CLIMATE PROOFING

Assessment of the project climate resilience in accordance with the Technical Guidelines for Infrastructure Preparation for Climate Change (2021–2027)

Climate proofing according to the Do No Significant Harm (DNSH) principle

Preparation of documentation and project review aimed at reducing emissions and enhancing resilience to climate change



ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT DEPARTMENT

CAPACITY BUILDING, EDUCATION IN ENVIRONMENTAL PROTECTION AND COMMUNICATION

- Organization of education and training sessions for the public sector, local communities, and private companies
- Strengthening capacities and knowledge in the areas of environmental protection, climate change, and sustainability
- Collaboration with domestic and international partners to enhance knowledge of environmental policies and technologies

EKONERG

SELECTED REFERENCES BY INDUSTRY

POWER & NUCLEAR

POWER

- **HEP - CCCGPP 140 MW** EL-TO Zagreb,
- **HEP - Heat accumulator** 750 MWh and 100 MW at TPP TE-TO Zagreb
- **HEP - Reconstruction of the TPP Plomin** 2 boiler flue gas denitrification system
- **HEP – TPP PLOMIN C 500 MW**
- **E.ON – Combined heat and power plant – DSS Smith/Belišće**
- **CRODUX – CCCGPP 600 MW**, Slavonski Brod

NUCLEAR

- **NEK – COOLING TOWERS EXTENSION**
- **NEK - BUNKER BUILDING 2** WITH AUXILIARY SYSTEMS
- **NEK - TURBINE BUILDING CLOSE CYCLE** HEAT EXCANGER REPLACMENT

RENEWABLE

HYDROGEN

- **PV power plants 15 MW & green hydrogen plant 8,7 MW – TPP Plomin**
- **Green hydrogen production – TPP JERTOVEC**
- **Battery energy storage system (BESS) –TPP JERTOVEC**

WIND

- **Wind power plant –VE LIČKI MEDVJED (VELM)**

SOLAR

- **PV power plant KUKULJANOVO**
- **PV power plant INA MAZIVA**

GEOTHERMAL & BIOMASS

- **Geothermal program KUTNJAK - LJUNKOVEC**
- **Geothermal power plant LEGRAD - 1**
- **Biomass cogeneration power plant – BE-TO VELIKA GORICA**

EKONERG

SELECTED REFERENCES BY INDUSTRY

GAS - LNG

LNG

- **LNG FSRU Terminal Krk** (capacity of 2,5 bcm/year) – **off shore** terminal
- **LNG Terminal Krk** (capacity of 5 bcm/year) – **on shore terminal**

GAS

High Pressure Gas Pipelines:

- More than **1200 km of high-pressure gas pipelines engineering**, consultancy, design (conceptual-main-detail design)

PRESSURE REDUCING AND METERING STATIONS

- **More than 30 PRMS station**: engineering, consultancy, design (conceptual-main-detail design)

OIL

OIL STORAGE

- **JANAF** - Reservoirs for crude oil **8x80000 m3**
- **JANAF** - Tanker Loading Plant at Oil Terminal JANAF, Omišalj
- **INA** - Revitalization of **Bitumen production plant**

PIPELINES

- **JANAF** - **Offshore oil pipeline** The island of Krk – land
- **JANAF** - Refined **product pipeline** Slavonski Brod-Bosanski Brod

REFINERIES

- **Biodiesel refinery** 100.000 t/year at Port of Ploče - BIOM Croatia
- **Propane – Propylene production**, storage and interconnections project in INA Oil Refinery Rijeka

EKONERG

SELECTED REFERENCES BY INDUSTRY

PHARMA & PROCESS

PHARMA INDUSTRY

- **Pfizer DS3** - Greenfield Production Plant
- **HOSPIRA Zagreb** – Greenfield Multi-purpose storage of pharmaceutical products
- **PLIVA / TEVA** – Greenfield multi-purpose API plant **SM2**
- **PLIVA / TEVA** – Brownfield multi-purpose API plant **SM1**
- **PLIVA / TEVA -** Greenfield wastewater treatment plant
- **BELUPO** - Greenfield **OSD & SSD** production plant

PROCESSING INDUSTRY:

- ROCKWOOL – Greenfield stone wool insulation factory
- NAŠICECEMENT – Upgrade of grinding plant
- INTERCAL – Upgrade of lime factory

EKONERG

POWER & NUCLEAR

COMBINED CYCLE COGENERATION GAS POWER PLANTS

CCCGPP 140 MW, EL-TO Zagreb, HEP

Combined cycle cogeneration gas power plant CCCGPP 140 MW will be located within EL-TO Complex HEP Zagreb.

Combined cycle cogeneration gas power plant CCCGPP 140 MW is designed as a flexible power unit and will consists of:

- Gas turbine plant 101 MW (2X50,5 MW)
- HRSG; two pressure water/steam cycle (2 units for each gas turbine)
- Steam turbine plant 40 MW
- Maximum thermal power in cogeneration mode of operation is extraction of 70 t/h of steam (11 bar, 245 °C) will be used in industrial process plants and 100 MW for district heating system

EKONERG SCOPE

- Feasibility study
- Conceptual design
- Environmental impact assessment study
- Basic design
- Location permit obtaining

EKONERG

POWER & NUCLEAR

HEAT ACCUMULATOR AT HEP TE-TO ZAGREB POWER PLANT

HEAT ACCUMULATOR 750 MWh/150 MW, TE-TO Zagreb, HEP

Heat accumulator is located at power plant TE-TO Zagreb (HEP) and has energy of 750 MWh and power of 150 MW.

Power plant TE-TO has installed capacity of 440 MWe and 850 MWt. Heat accumulator will contribute to overall efficiency of power plant TE-TO Zagreb and to overall safety of thermal power delivery to district heating system to City of Zagreb.

Heat accumulator has volume of 20.500 m3 (diameter 24 m, height 51 m).

Ekonerg Scope

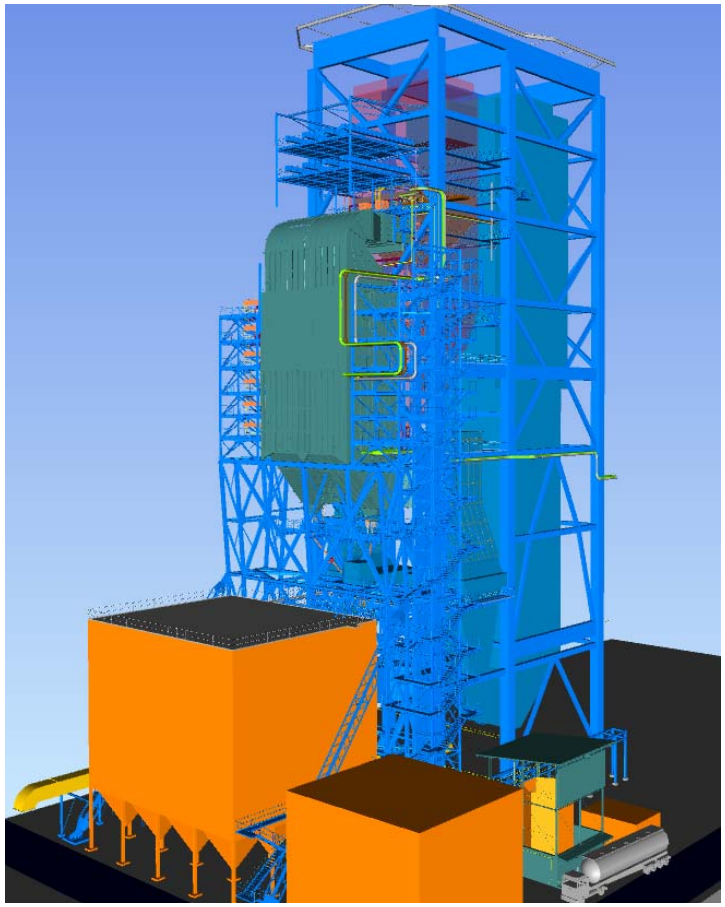
- Feasibility study
- Conceptual design
- Environmental impact assessment study
- Basic design
- Location permit obtaining
- Main design
- Construction permit obtaining
- Detailed design and workshop design of overall heat accumulator
- Functional testing and overall technical-technological guarantee
- Trial run and HEP personnel training

EKONERG

POWER & NUCLEAR

RECONSTRUCTION OF THE TPP PLOMIN 2 BOILER PLANT INSTALLING

HEP - BOILER FLUE GAS DENITRIFICATION SYSTEM



HEP (Croatian Electricity Utility), Thermal Power Plant Plomin 2 (210 MW, coal fired) contracted with ALSTOM Italy construction of the **DeNOx** plant as an EPC contract.

DeNOx plant is based on SCR technology with emission limit of NOx up to 80 mg/m3.

EKONERG SCOPE as a subsupplier to ALSTOM:

- Preparing of environmental elaborate
- Conducting of soil investigation works
- Preparing the fire protection, HSE and noise elaborate
- Preparing of conceptual, main and detail design
- Compliance validation of technology design
- Mechanical and piping design
- Complete civil and structural design – structural analysis, detail drawings
- Workshop drawings for steel structure
- Designer supervision during the erection
- Construction site management (as EPC contractor's representative)

EKONERG

POWER & NUCLEAR

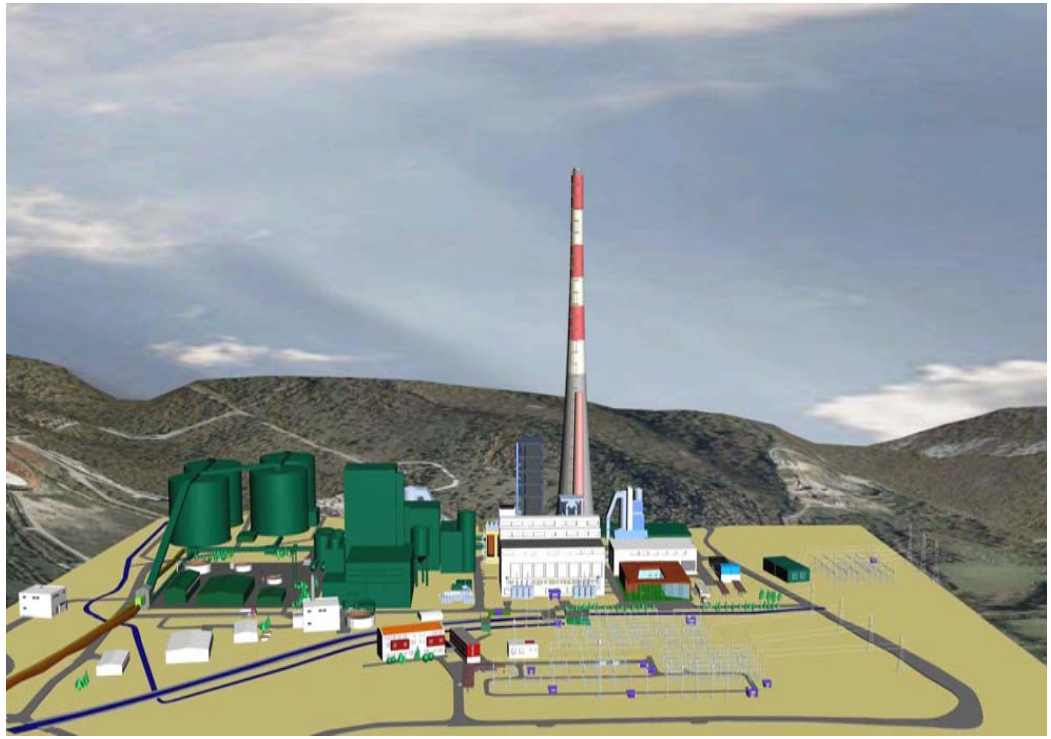
COAL FIRED THERMAL POWER PLANT

TPP PLOMN C 500 MW, CROATIA

HEP, Croatian power utility, has decided to construct a coal fired Power plant PLOMIN C, 500 MW at existing location.

TPP Plomin C consists of:

- Steam boiler supercritical plant for coal firing
- Steam turbine plant with electric generator 550 MW
- Auxiliary systems
- Coal storage (closed cupola storage)
- Cooling system
- Coal transportation system
- Switchyard
- Reconstruction of existing chimney (340 m high)
- Other auxiliary systems



Ekonerg Scope

- Analysis and optimization of cold end system and other auxiliary systems
- Conceptual design of TPP Plomin C 500 MW
- Environmental impact assessment study

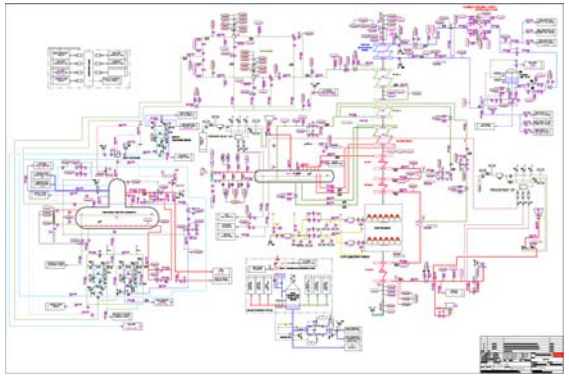
EKONERG

POWER & NUCLEAR

E.ON C4B (New CHP plant) Belišće, 43 MWe/ 60 MWth

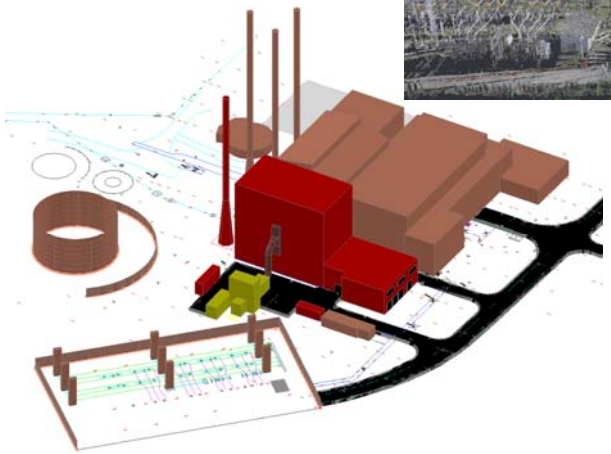
DS Smith Belišće Croatia d.o.o. contracted with E.ON Energy Projects GmbH design and construction of new gas CHP plant as a new primary source for electrical and thermal energy. **E.ON selected EKONERG as local partner.**

Existing CHP Plant is consisting of two high pressure boilers (K3 and K4) with single steam capacity of 100 t/h and two steam turbines (TG2 and TG3) with electrical output 15 and 16 MW.
Existing CHP remains in operation as stand-by plant after construction of C4B Plant.



Ekonerg Scope

- Feasibility study
- Conceptual design
- Environmental impact assessment study
- Basic design
- Location permit obtaining
- Main design
- Construction permit obtaining



EKONERG

POWER & NUCLEAR

COMBINED CYCLE COGENERATION GAS POWER PLANTS

CCCGPP 600 MW CRODUX PLIN, Slavonski Brod Croatia

- Combined cycle cogeneration gas power plant CCCGPP 600 MW is designed as a flexible power unit and can produce:
- 600 MWe
- 100 t/h of fresh steam (7,5 bar, 300 °C) for industrial process
- 20 MWt for district heating city net

Ekonerg Scope

- Conceptual design
- Environmental impact assessment study
- Basic design
- Location permit obtaining

EKONERG

POWER & NUCLEAR

NUCLEAR POWER PLANT

Krško – Cooling towers system extension

In Nuclear power plant Krško, Slovenia, CSE consortium founded by Ekonerg and SPX Cooling technologies contracted NPP cooling system extension at "turn-key" basis. CS system is being expanded from 12 to 16 cooling towers, existing towers are being modified to improve their thermal characteristic, new recirculation gate is being installed and CS system MV&LV switchgear substation (including I&C) is being completely reconstructed.

New cooling tower system has capacity of 14400 m3/h, with cooling power of 167 MW.

Ekonerg Scope

Ekonerg scope is consisting of design, engineering, procurement, civil works, construction, erection and start up of the plant.

SPX Cooling technologies is delivering cooling equipment for 4 new cooling towers, equipment for retrofitting the existing towers and have responsibility for overall performance of the expanded CT system.

EKONERG

POWER & NUCLEAR

BUNKER BUILDING 2 WITH AUXILIARY SYSTEMS

NEK - SAFETY UPGRADE – ASI, AAF & BB2

Nuclear power plant Krško, Slovenia contracted with Ansaldo Nucleare s.p.a turn-key service for Phase 3 Safety Upgrade Project, including Alternate Safety Injection System (ASI), Alternate Auxiliary Feedwater System (AAF) and Bunkered Building 2 (BB2). Consortium founded by IBE-EKONERG-SIPRO as subcontractors, were responsible for design and permit obtaining.

EKONERG SCOPE

Ekonerg scope is consisting of design, coordination and engineering for:

Mod. 1024-BS-L **electrical and mechanical design** in BB2 and yard for systems: water well (PW), floor drain (FD), fire protection (FP) as well as civil design of all yard underground systems connected with BB2.

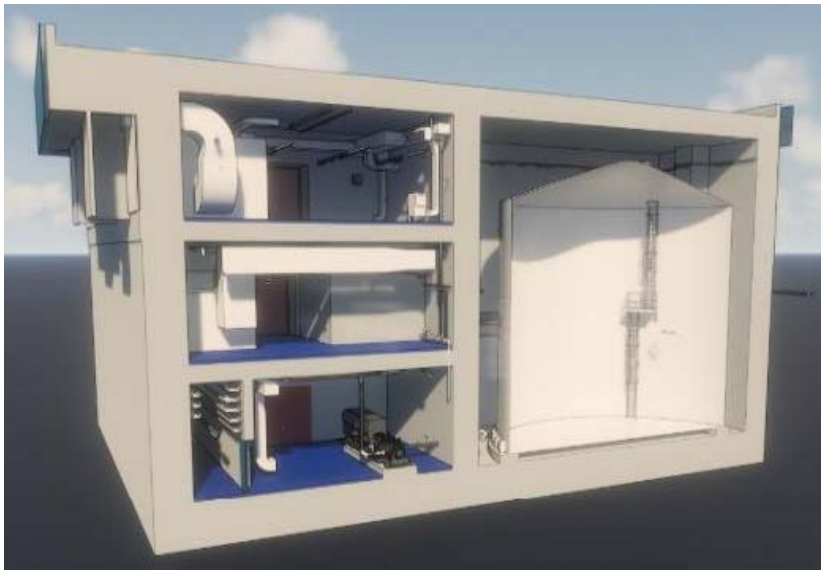
Mod. 1005-SI-L and 1010-AF-L **mechanical and civil** design of Demi Water (DD), Alternate Safety Injection (ASI) and Alternate Auxiliary Feedwater (AAF) in yard between BB2 and CCB

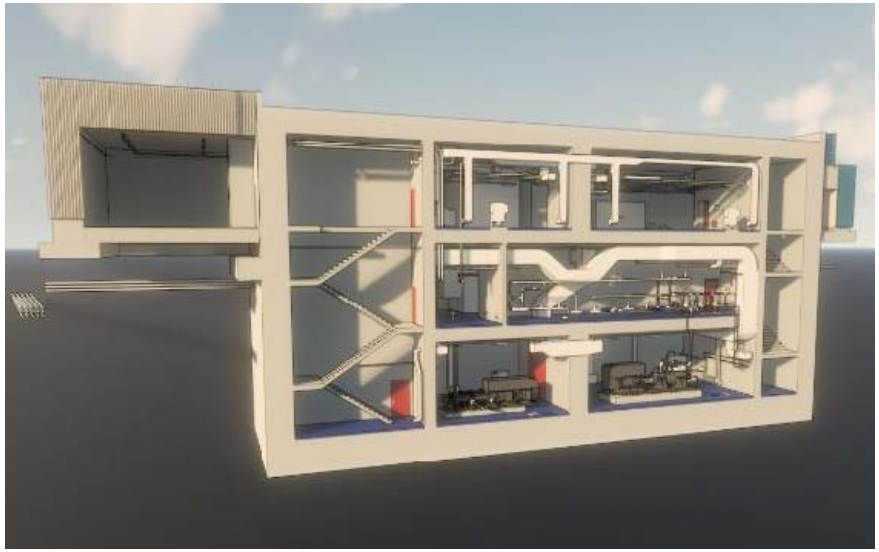
EKONERG

POWER & NUCLEAR

BUNKER BUILDING 2 WITH AUXILIARY SYSTEMS

NEK - SAFETY UPGRADE – ASI, AAF & BB2





EKONERG

POWER & NUCLEAR

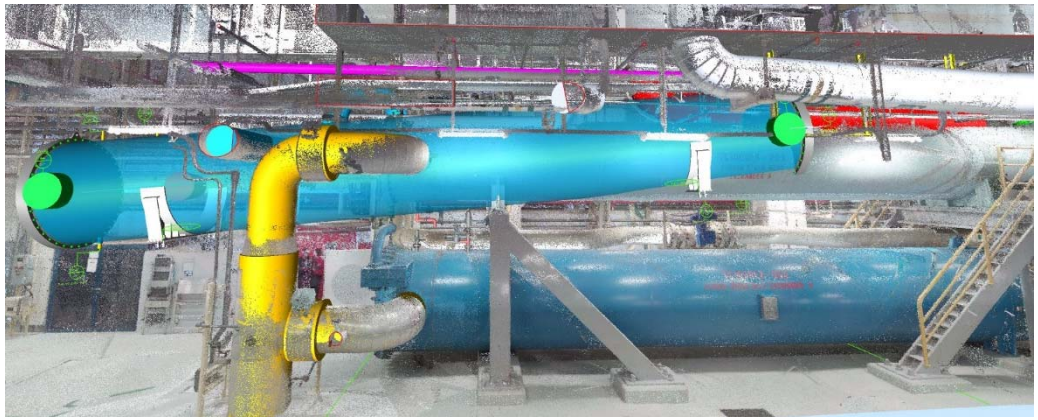
TURBINE BUILDING CLOSED CYCLE

NEK - HEAT EXCHANGER TC100HEX-001 REPLACEMENT

Nuclear power plant Krško, Slovenia,contracted with **Korea Hydro & Nuclear Power Co**., Ltd turnkey service for Design, Manufacturing, Delivery, Installation and Commissioning of Turbine Building Closed Cycle Heat Exchanger. EKONERG as subcontractor was responsible for design and installation services.

EKONERG SCOPE

Ekonerg scope is design, engineering and electrical installation services for mod. Turbine building closed cycle heat exchanger TC100HEX-001 replacement. The function of the Turbine Building Closed Cycle Cooling Water System is to removing heat from the turbine, generator and auxiliary equipment coolers in the turbine building.

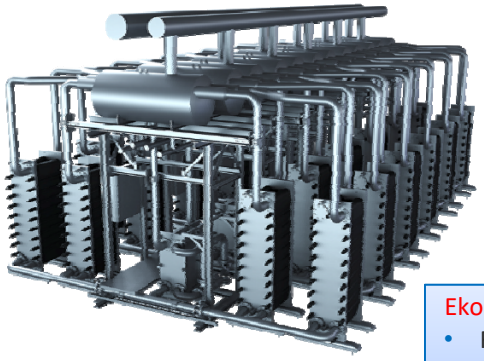


EKONERG

RENEWABLE

PV POWER PLANTS 15 MW & GREEN HYDROGEN GENERATION PLANT 8,7 MW IN PS PLOMIN

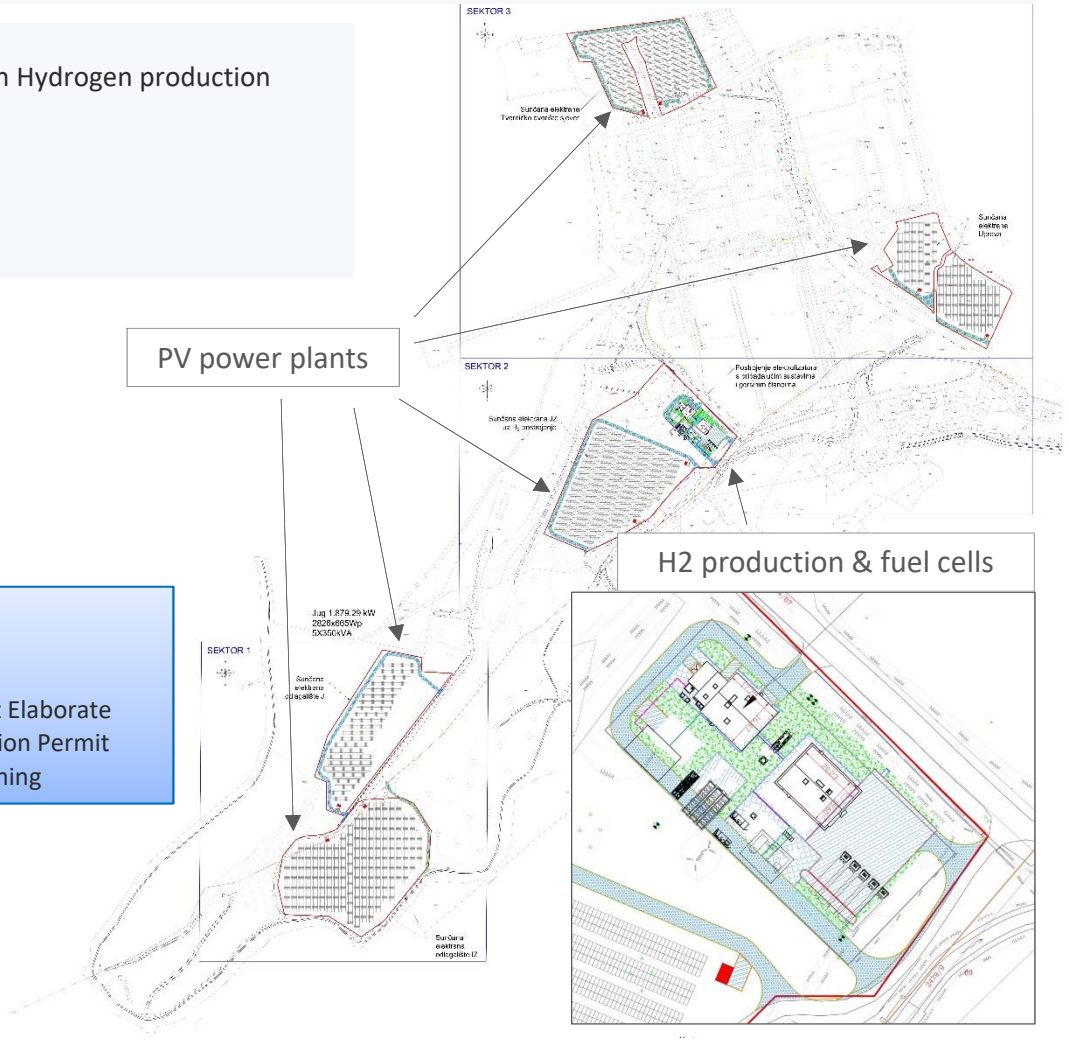
- Phase 1: 5 PV POWER PLANTS – 15 MW total – for Green Hydrogen production
- Phase 2: PEM electrolyzer – 8.7 MW
- Phase 3: PEM fuel cells – 1 MW – for ancillary services



Ekonerg Scope

- Feasibility Study
- Conceptual Design
- Environmental Impact Elaborate
- Basic Design for Location Permit
- Location Permit obtaining

PV power plants



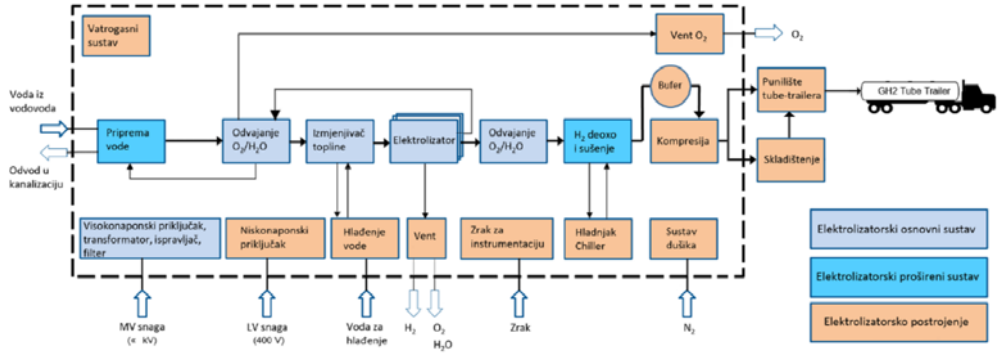
H2 production & fuel cells

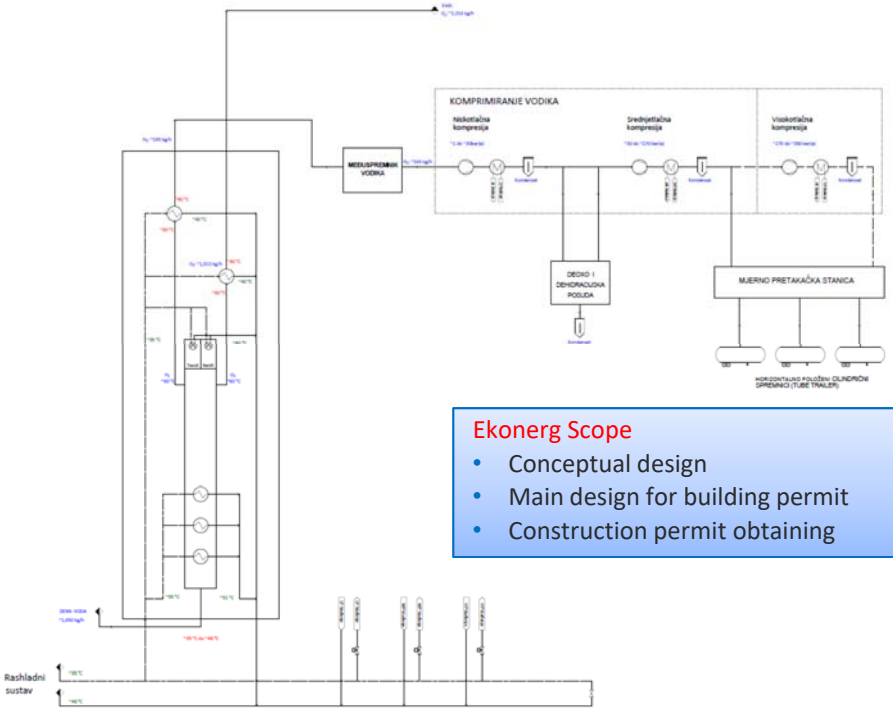
EKONERG

RENEWABLE

GREEN HYDROGEN GENERATION PLANT 10 MW IN TPP JERTOVEC

- PEM electrolyzer
- Hydrogen production 660 kg/day
- Hydrogen distribution via tube trailers





Ekonerg Scope
- Conceptual design
- Main design for building permit
- Construction permit obtaining

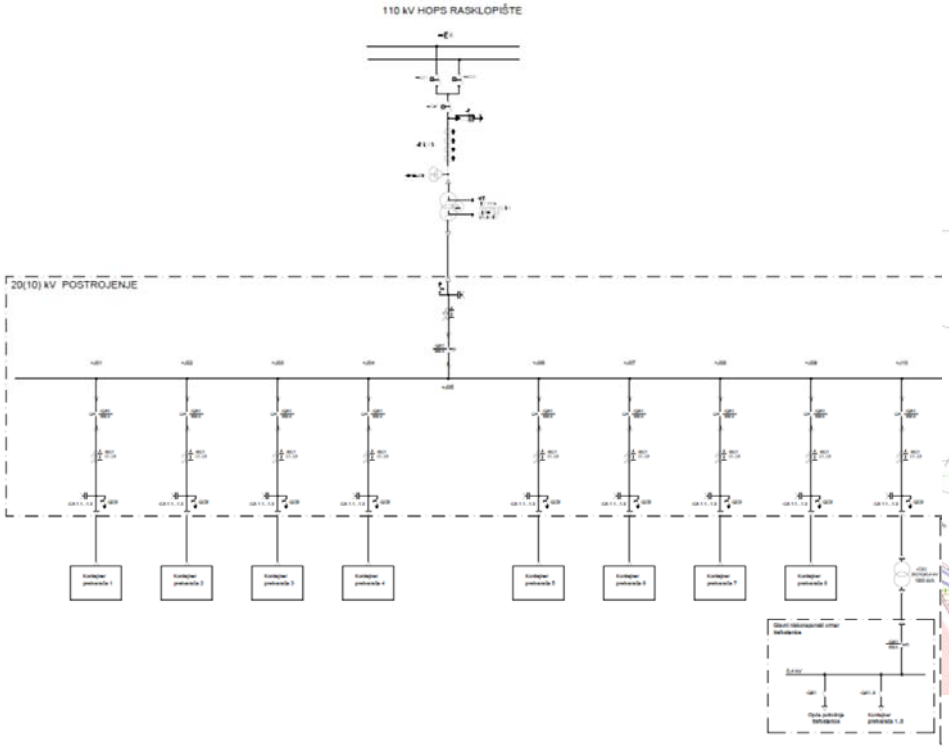
EKONERG

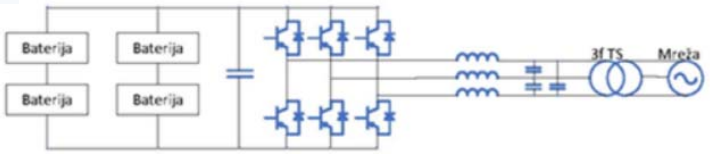
RENEWABLE

BATTERY ENERGY STORAGE SYSTEM (BESS) IN TPP JERTOVEC

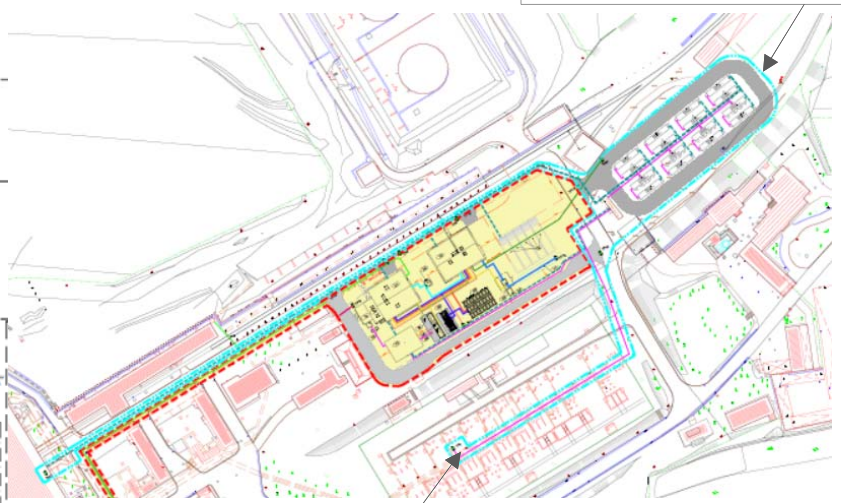
- BESS 16 MW/16 MWh
- Ancilliary services - balancing service for transmission grid
- Connection to 110 kV S/S via new S/S 110/20 kV

Ekonerg Scope
- Conceptual design
- Main design for building permit
- Construction permit obtaining





BESS 16MW/16MWh



110 kV S/S

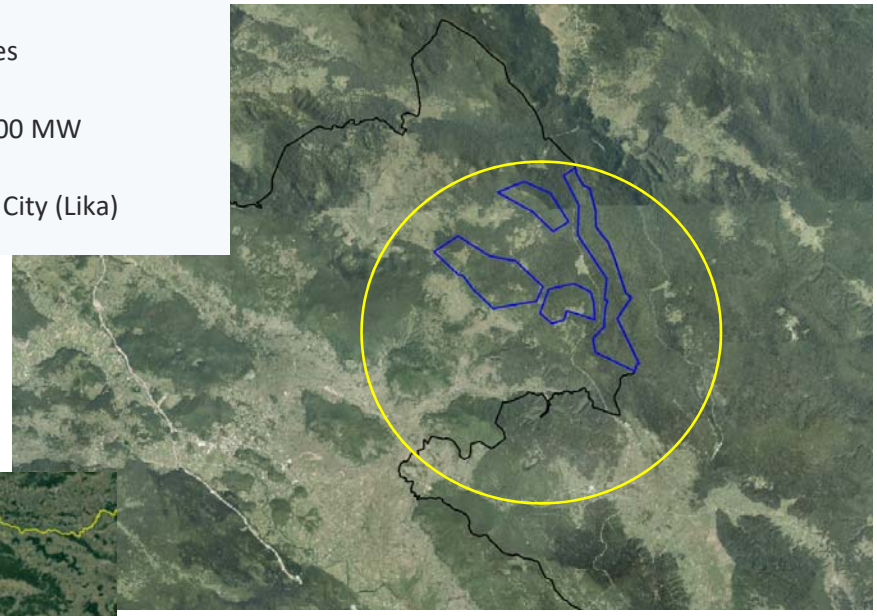
EKONERG

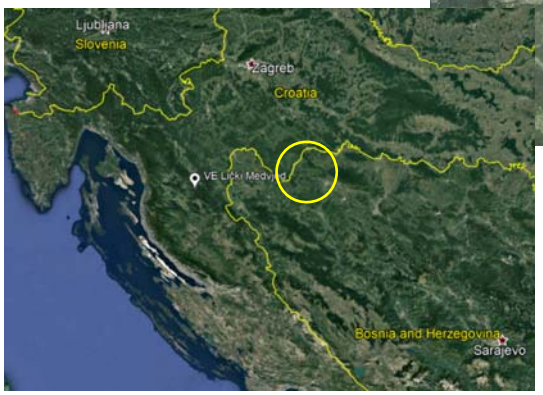
RENEWABLE

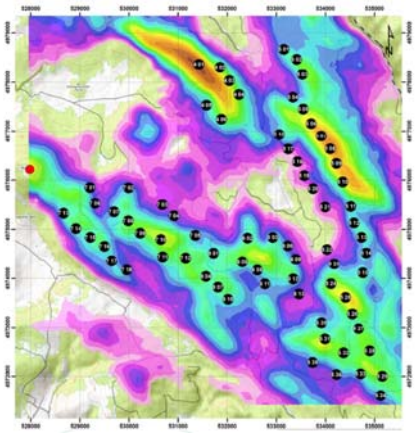
WIND POWER PLANT

VE Lički Medvjed (VELM)

- Potential up to 65 wind turbines
- Potential installed power ca. 500 MW
- Location: in the east of Otočac City (Lika)





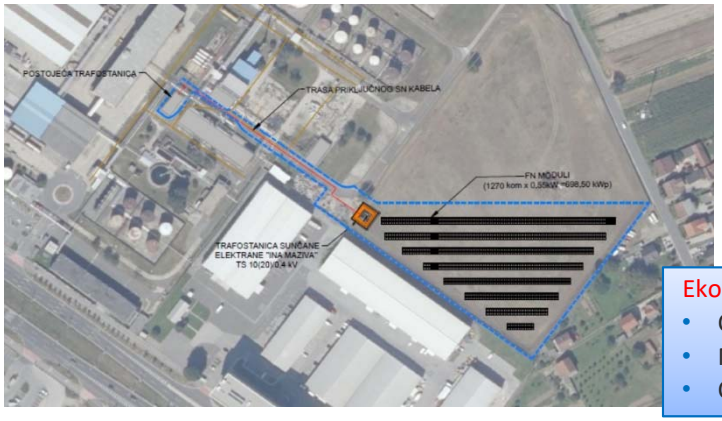


Ekonerg Scope

- Feasibility study
- Conceptual design
- Basic design for location permit
- Location permit obtaining
- Main design for building permit
- Building permit obtaining
- Consultancy services

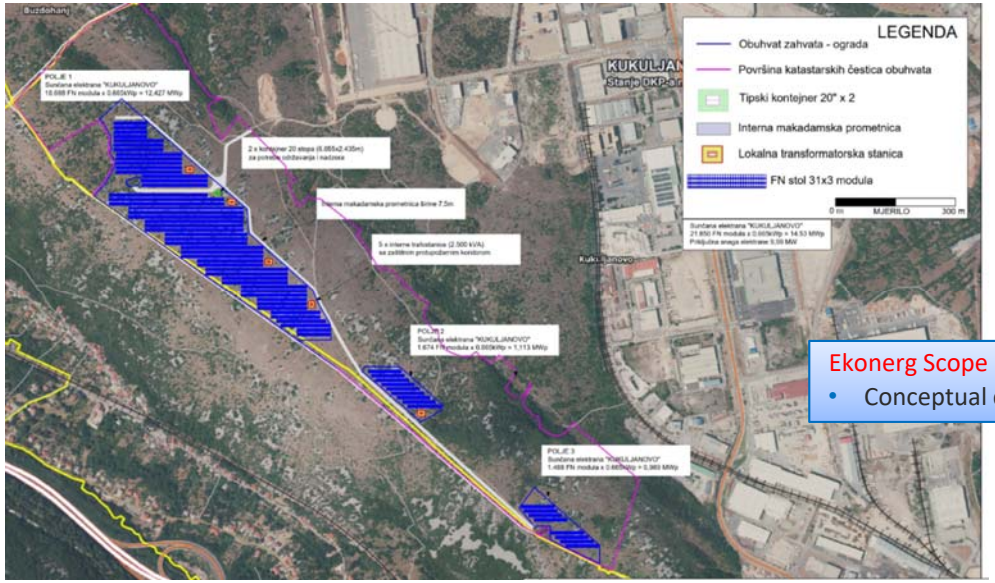
RENEWABLE

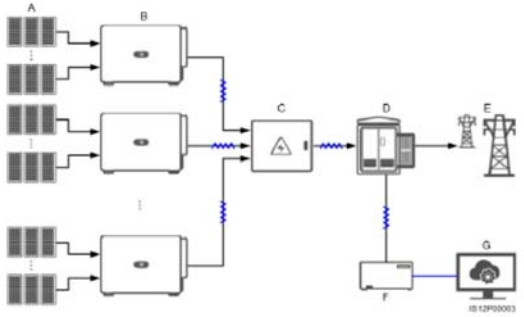
PV POWER PLANT INA MAZIVA 500 kW



Ekonerg Scope
- Conceptual design
- Main design for building permit
- Construction permit obtaining

PV POWER PLANT KUKULJANOVO 10 MW



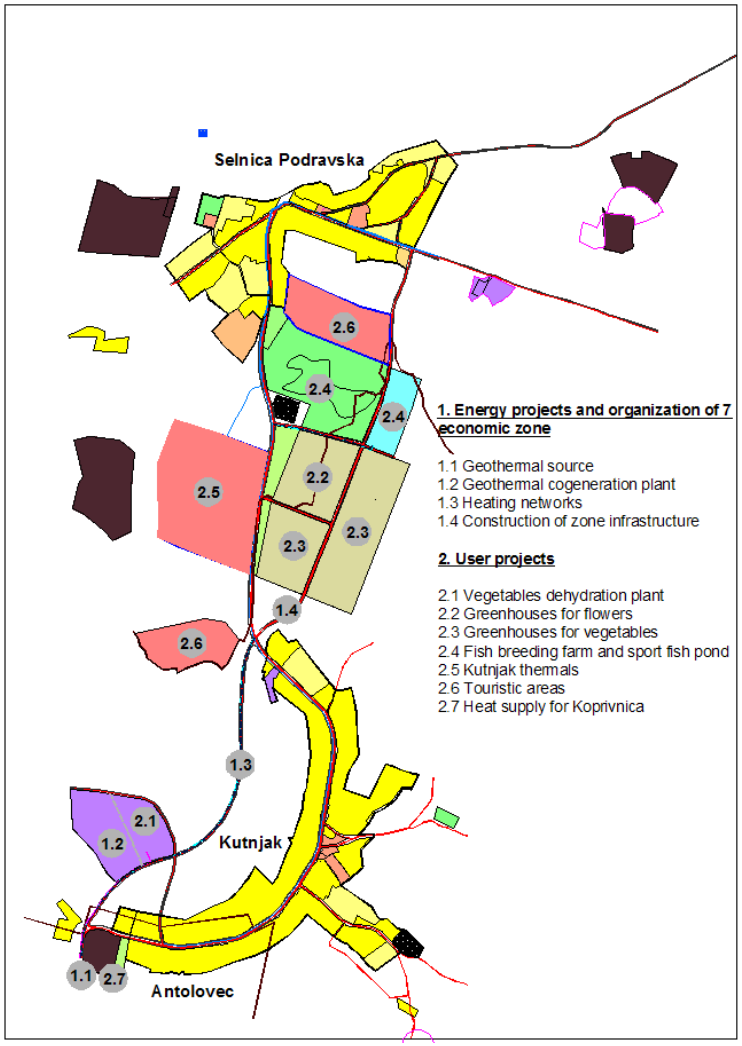


Ekonerg Scope
- Conceptual design

EKONERG

RENEWABLE

GEOTHERMAL PROGRAM KUTNJAK-KLUNJKOVEC



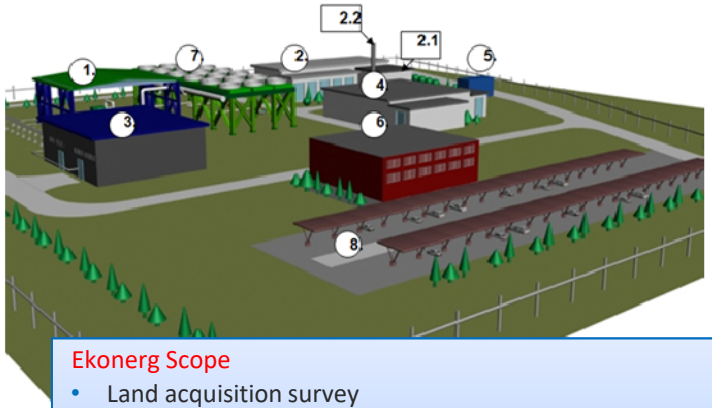
Geothermal power plant (10 MW)

Hot water boilers (50 MW in total)

District heating network

LEGEND:

1. Main turbine building – Phase I
2. Transformer station(TS)
2.1.Gas boiler building
2.2. Chemney of boiler building
3. TO Kutnjak – Phase I
4. Water make up – Phase I
5. Water-well
6. Adminstration building
7. Air cooling system GTE – Phase I
8. Parking



Ekonerg Scope

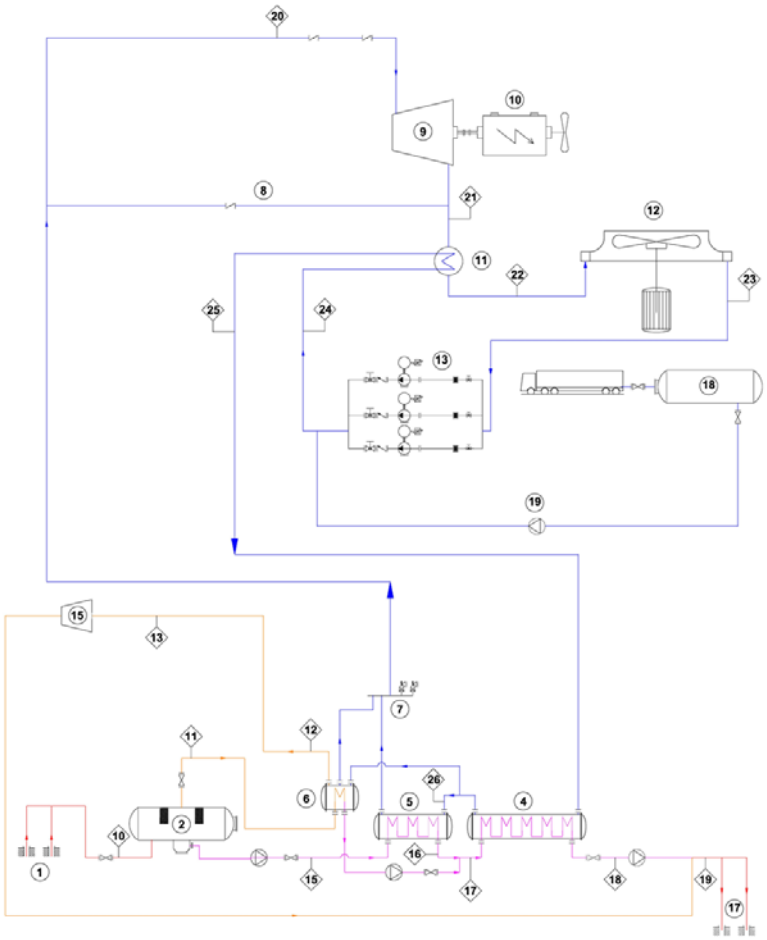
- Land acquisition survey
- Project documentation for new geothermal well
- Physical planning of economic zone
- Basic design and Environmental Impact Study for Geothermal Cogeneration Plant and heating network
- Basic design and location permit for infrastructure
- Feasibility study of investments into energy projects and organization of economic zone of Geothermal Programme

EKONERG

RENEWABLE

GEOTHERMAL POWER PLANT LEGRAD-1

Geothermal power plant (20 MW)



Ekonerg Scope

- Conceptual design
- Environmental Impact Elaborate
- Basic design for location permit
- Main design for building permit

EKONERG

RENEWABLE

BIOMASS COGENERATION POWER PLANT

BCPP BE-TO Velika Gorica 20 MWe and 35 MWt, Croatia

HEP OIE, Croatian power utility, has decided to construct a biomass cogeneration power plant in Velika Gorica consisting of a steam boiler plant for biomass firing and steam turbine plant. It is the first biomass cogeneration power plant of such size in Croatia. Electric power of BCPP is 20 MW and thermal power is 35 MW.

BCPP consists of:

- Steam boiler plant for biomass firing with CFB – circulating fluidized bed and with steam reheating; (fresh steam 70 t/h 124 bar, 522 °C)
- Steam turbine plant with electric generator 20 MW with reheated steam and extraction of steam at 2 bar
- Heating station 35 MW for district heating system with auxiliary boilers
- Auxiliary systems 3x12 MW

Ekonerg Scope

- Analysis and optimization of energy production in accordance with thermal power of district heating system for City of Velika Gorica
- Conceptual design
- Feasibility study
- Environmental impact assessment study
- Basic design
- Location permit obtaining

EKONERG

GAS - LNG

FSRU LNG IMPORT TERMINAL KRK CROATIA

LNG HRVATSKA - Floating Storage & Regasification Unit (FSRU) based LNG Import Terminal on Krk island (Croatia)

Floating Storage & Regasification Unit (FSRU) based LNG Import Terminal on Krk island (Croatia) will be capacity up to 7,8 BCMA.

LNG Terminal will have:

- Jetty to accommodate FSRU from 150,000m3 up to 265,000m3 (QMax) for HP NG unloading;
- FSRU to accommodate LNG carriers alongside from 150,000m3 up to 265,000m3 (QMax) for LNG transfer – Ship to Ship basis via cryogenic hoses;
- FSRU Regasification capacity of 7.8 BCM (billion cubic meters) per year
- The jetty structure is located and orientated to suit the bathymetric and wind/wave conditions.
- There is 2 x 12" HP NG unloading arms.

EKONERG SCOPE

- FEED (Consortium Tractebel-EKONERG-INP)
- EIAS
- Basic design and location permit obtaining
- Main design and construction permit obtaining

EKONERG

GAS - LNG

FSRU LNG IMPORT TERMINAL KRK CROATIA

LNG HRVATSKA - Floating Storage & Regasification Unit (FSRU) based LNG Import Terminal on Krk island (Croatia)

EKONERG

GAS - LNG

LNG TERMINAL KRK

Capacity of 5 bcm/year

LNG Terminal Krk will be capacity of 5 bcm/year of the natural gas. LNG Terminal will have:

- Flexible berthing and unlading services, with abilities to manage ships and LNG carriers ranging from 15,000 to 265,000 m3
- Unloading rate of 12,000 m3/h via 3 big arms and min 1,000 m3/h via 1 arm
- 2 x 150,000 m3 net LNG tank working capacities in cold conditions
- Evaporators: 3 + 1 SCV's with the capacity of 200,000 m3(n)/h net send-out per each. Overall send out capacity 600.000 m3/h
- Truck bunkering services will be provided through 2 bays with 75 m3/h of LNG flow each

EKONERG SCOPE

- Basic and Main design
- Construction permit obtaining
- Preparation of technical specifications for EPC tendering
- Tender documentation preparation

EKONERG

GAS

PIPELINES

High pressure gas pipeline Pula – Karlovac DN 500/75 bar

The main gas pipeline Pula-Karlovac is part of the gas pipeline system incorporating the North-Adriatic offshore gas fields into the pipeline system of Croatia and connecting it with the Italian pipeline system. Length is 191 km. Total contract value was 90 million EUR. Project also included the connection for main gas pipeline Bosiljevo-Split which will enable gas supply to Dalmatia

Pipeline specificities

Pipeline corridor very close to the Adriatic Oil Pipeline (Janaf) made job more demanding, requiring special protection measures. Other demanding parts were including crossings of rivers (were excavated), as well as some extremely steep parts in rocky terrain.

Ekonerg Scope

Ekonerg scope was consisting of:

- Environmental Impact Assessment Study (EIAS)
- Main and detailed design
- Preparation of specifications
- Tender documentation preparation
- Designer's supervision during construction

Design scope

Ekonerg part of design in designing consortium included:

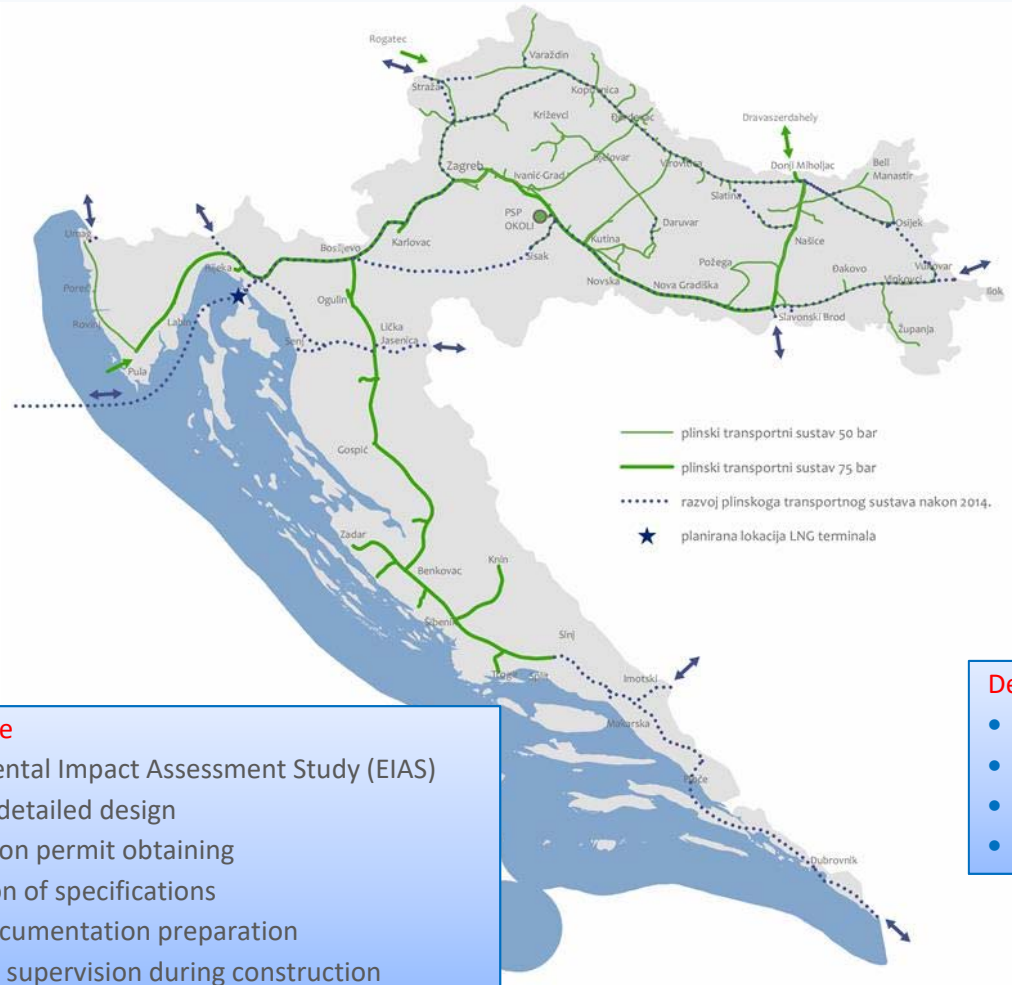
- Main gas pipeline
- 3 pig launch/receive & block valve stations
- 10 block valve stations
- installation of pig launching/receiving station into existing gas node with interconnection to existing pipeline DN 300 to Karlovac and DN 700 to Zagreb.

EKONERG

GAS

PIPELINES

High pressure gas pipeline Slobodnica-Donji Miholjac DN 800/75 bar



Interconnection gas pipeline Croatia–Hungary is an integral part of the Plan of Development, Construction and Modernization of Gas transmission system in the Republic of Croatia by the year 2011. On Croatian side this project includes gas pipelines Slobodnica-Donji Miholjac and Donji Miholjac-Dravaszerdahely with total length of 88 km, while on Hungarian side it includes gas pipeline Dravaszerdahely–Bata–Városfold with total length of 210 km. It will be built as unique pipeline system with dimension of DN 800, capacity of 6,5 billion m3/year, operating pressure of 75 bar and bi-directional gas transmission under same conditions. It is planned to be interconnected and operational by the end of 2010. Total estimated investment is 443 million EUR.

Ekonerg Scope

- Environmental Impact Assessment Study (EIAS)
- Main and detailed design
- Construction permit obtaining
- Preparation of specifications
- Tender documentation preparation
- Designer's supervision during construction

Design scope

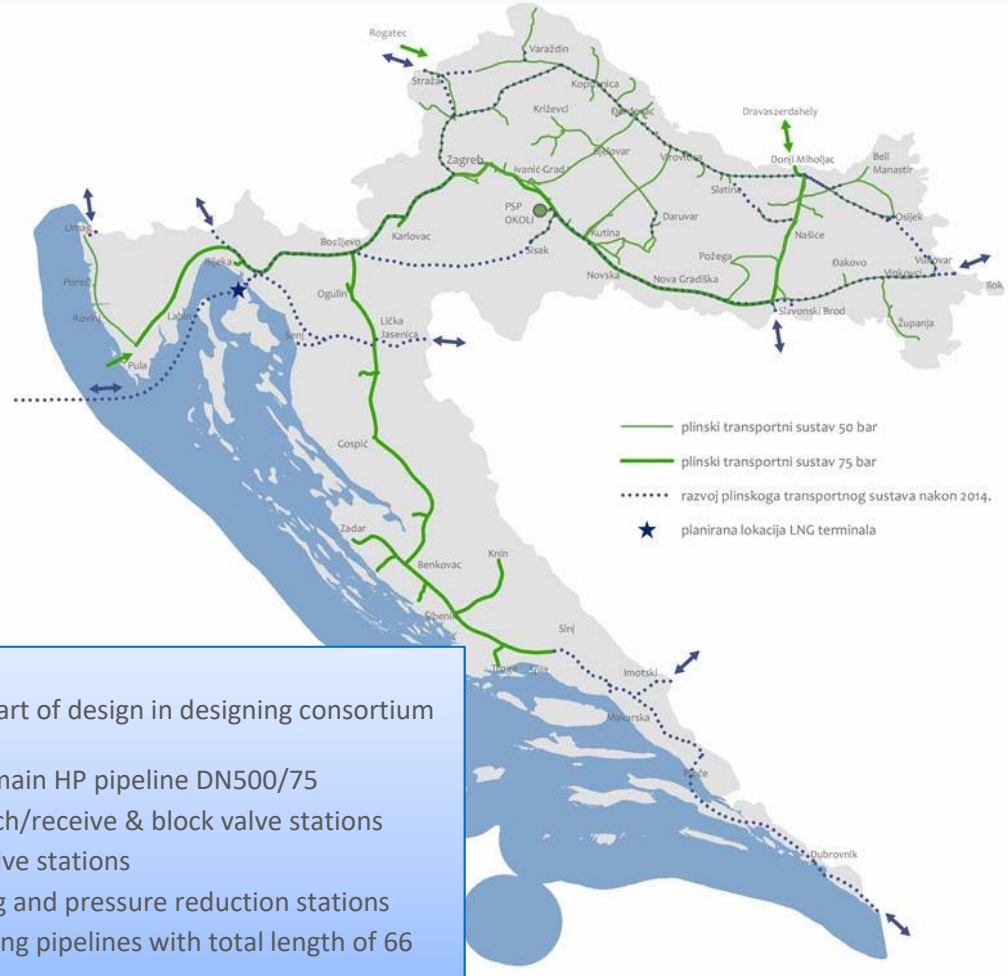
- Ekonerg design includes:
- 73 km of main HP pipeline DN800/75
- 3 pig launch/receive & block valve stations
- 4 block valve stations

EKONERG

GAS

PIPELINES

High pressure gas pipeline Bosiljevo – Split DN 500/75 bar



Ekonerg Scope

- Environmental Impact Assessment Study (EIAS)
- Main and detailed design
- Construction permit obtaining
- Preparation of specifications
- Tender documentation preparation
- Designer's supervision during construction

Design scope

- Ekonerg part of design in designing consortium includes:
- 84 km of main HP pipeline DN500/75
- 2 pig launch/receive & block valve stations
- 6 block valve stations
- 6 metering and pressure reduction stations
- 4 connecting pipelines with total length of 66 km

EKONERG is member of designing consortium of the gas transmission system of Lika and Dalmatia.

It is the most significant project of the second phase of the construction and modernization of Croatian national gas transmission system. Its construction will significantly cover Croatia by the gas system and enable the utilization of natural gas in Lika and Dalmatia. The possibility of utilizing natural gas, ecologically and economically acceptable energy source, will enable a new significant development of the economy in this area.

Length of main pipeline is 292 km. Length of associated pipelines is 160 km. There will be 14 measuring–reduction stations. Total project value is 145 million EUR. Pipeline is scheduled for completion in spring 2011.

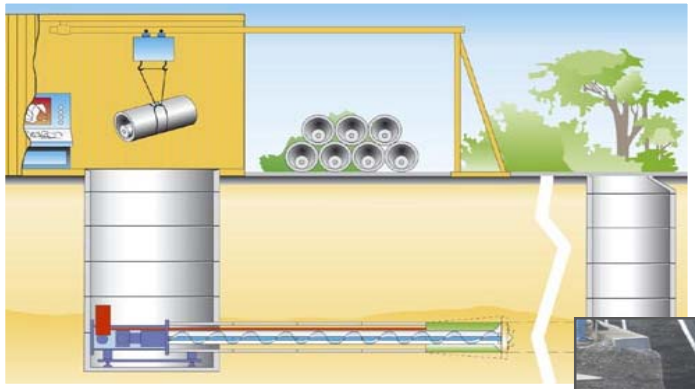
EKONERG

GAS

PIPELINES

High pressure gas pipeline Lučko-Ivanja Reka DN 700/75 bar

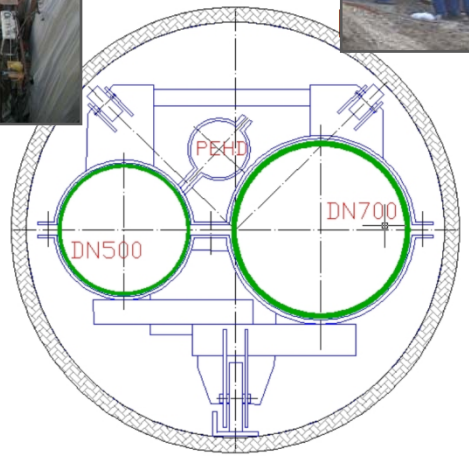
The main gas pipeline Lučko-Ivanja Reka is passing by Croatian capital Zagreb connecting gas pipeline system of central/eastern Croatia with pipeline Pula-Karlovac, North-Adriatic offshore gas fields and future pipeline to Dalmatia. Length is 20 km. Total contract value was 18 million EUR (without pipes).



Project specificity - microtunneling

The largest natural barrier on the pipeline route was the river Sava. Due to length of the crossing (1050 m) and required depth (10 m under the bottom of the river bed), microtunneling technology was applied. The tunnel diameter is 1600 mm.

It is sophisticated, remotely controlled and laser guided drilling procedure with thrusting in the hole protective concrete pipe segments. This is the first pipeline in Croatia that crossed under the river.



After completion of the drilling and protective pipe assembling, the pipes of gas pipelines Lučko-Ivanja Reka DN 700/75, Zagreb East-West DN 500/50 and optical cables were inserted into it.

Microtunneling with so large pipe profile and length, including the subsequent insertion of the gas pipes and installations was performed for the first time in Europe.

Ekonerg Scope

- Conceptual design
- Obtaining of location permit
- Main and detailed design
- Preparation of specifications
- Tender documentation
- Construction permit obtaining
- Designer's supervision.

Design scope

- 2 block valve stations
- installation of pig launching/receiving station into existing gas node Ivanja Reka with interconnection to existing pipeline DN 600/75 to Kutina
- reconstruction of the existing pipeline Zagreb East-West DN 500/50 bar

EKONERG

OIL

OIL STORAGE FACILITIES

Crude oil terminal JANAF – Omišalj, Croatia
Crude oil revervoirs 8 x 80.000 m3

Construction of new reservoirs 8 x 80000 m3 for storage of crude oil, including new transformer station, all safety & control equipment and infrastructure facilities for reception and dispatch of crude oil and derivates.

EKONERG SCOPE

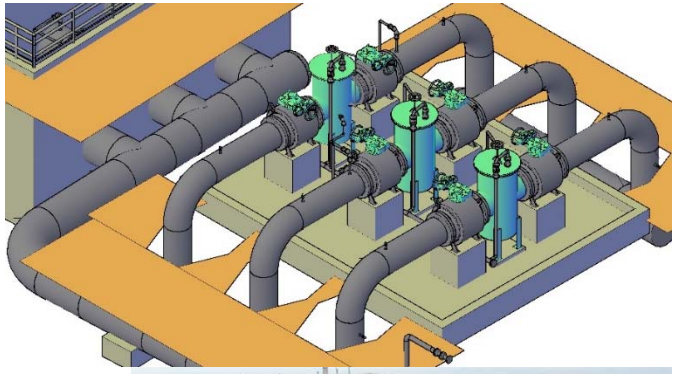
- Main and detailed design
- Workshop documentation
- Tender documents for contracting
- Construction permit obtaining
- Designer's supervision during construction
- Preparation of As-built documentation
- Engineering and consultancy activities
- Start up and trial run

EKONERG

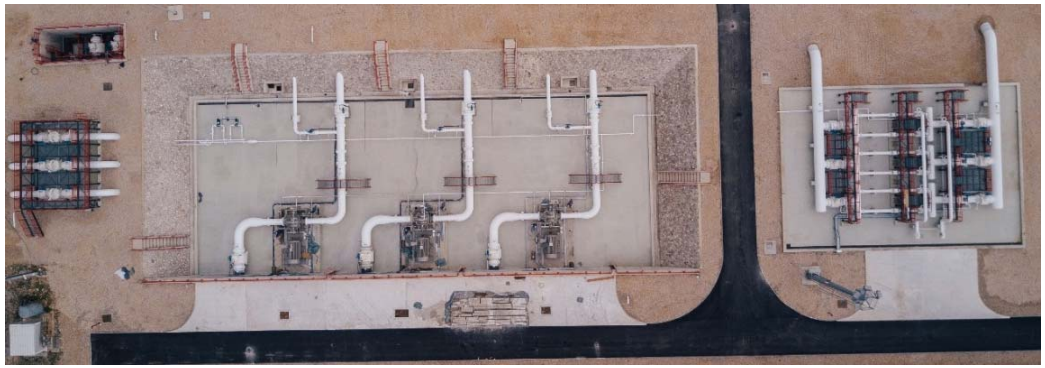
OIL

OIL STORAGE FACILITIES

JANAF - Tanker loading system and VOC incinerator system at Port and Terminal Omišalj, Island of Krk, Croatia



- **Loading pump station** consists of 3 fixed speed horizontal centrifugal pumps located in an excavation area of approx. 60 m x 24 m x 2.7 m, capacity per pump 5000 m3 /h
- **Filter station** - three basket filters installed in parallel (2+1 configuration)
- **Fiscal metering consists** of three flow metering runs (2+1 configuration)
- **New 42" loading line** from the metering system to the loading arms
- **Surge protection system** – bladder type surge vessel
- **VOC incineration plant** (KO drums, vapour blowers, enclosed ground flare system)
- **VOC utility systems** – LPG storage and supply, Nitrogen storage and supply



EKONERG SCOPE

- Main and detailed design (2015 - 2018)
- Construction permit obtaining
- Designer's supervision during construction
- Preparation of As-built documentation
- Engineering and consultancy activities
- Start up and trial run

EKONERG

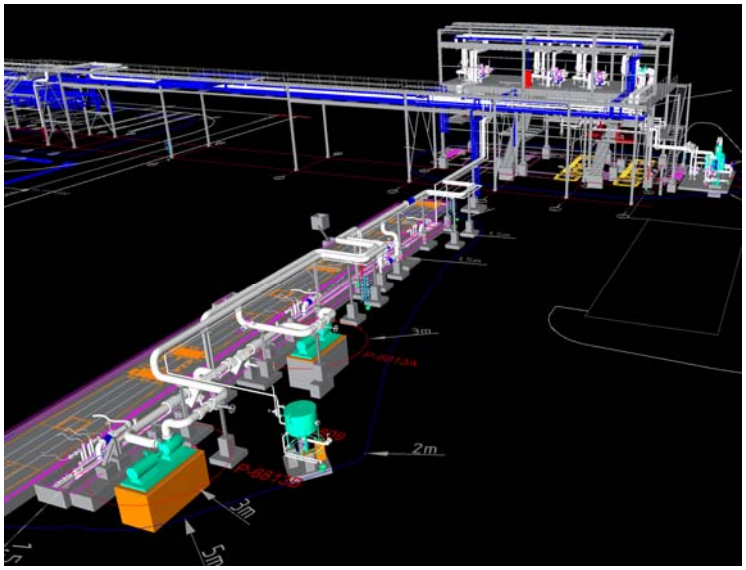
OIL

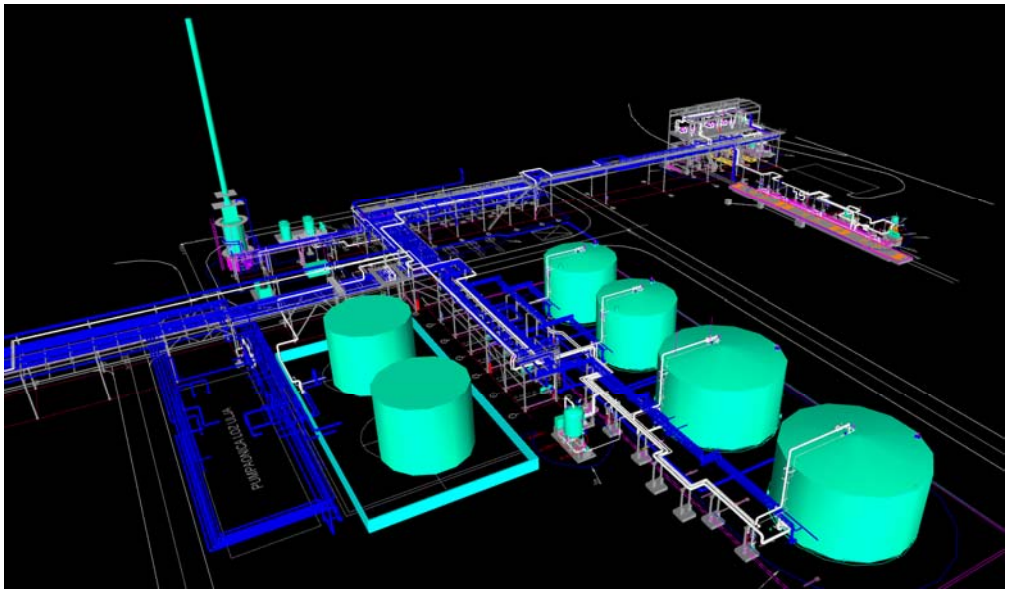
REFINERIES

INA - Revitalization of Bitumen production plant in the Sisak Refinery

Overall revitalization of Bitumen production plant, including:

- **Unloading railway station** (raw material delivery)
- **Loading railway station** (Bitumen shipment)
- **Six tanks with pumps and pipelines**
- **Incineration system**





EKONERG SCOPE

- Basic and Main design
- Detail Design and Workshop
- Construction permit obtaining
- Consultancy activity to the Client INA

EKONERG

OIL

REFINERIES

Condensing turbines replacement by electric drives in Rijeka Oil Refinery

Stricter emission regulations, higher process availability, improved fuel utilization and reduction of OPEX are some of the reasons to think about alternative ways to modernize old/conventional turbine trains.

Replacing a steam or gas turbine with an electric drive requires clarification and pre-engineering to analyse the existing drive train, electric grid, foundation, processing machine and process control system and to confirm the technical feasibility and savings

Ekonerg Scope

- Conceptual Design
- Main design (2021)
- Construction permit obtaining
- Consultancy activity to the Client INA

EKONERG

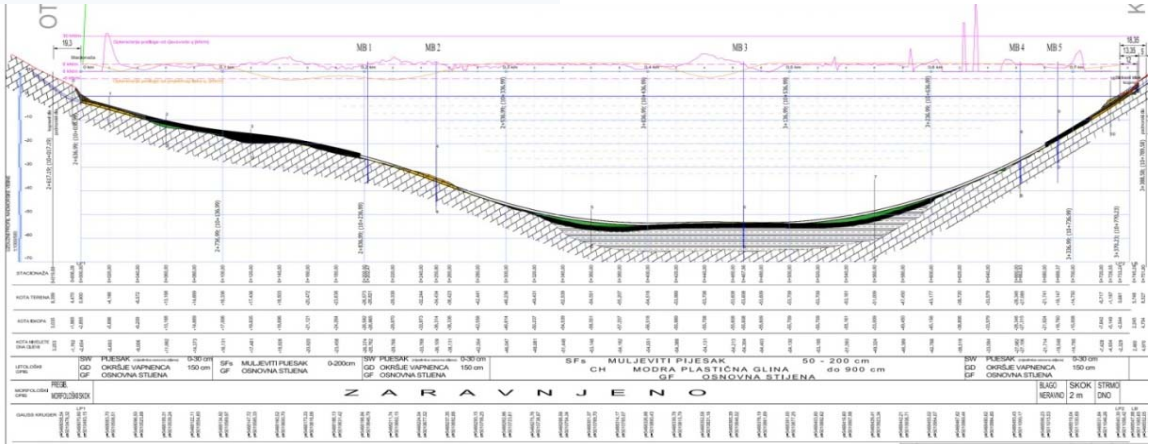
OIL

PIPELINES

Offshore oil pipeline the island of Krk-land, Croatia

Croatian company JADRANSKI NAFTOVOD ltd. (Janaf) is managing the crude oil transportation and storage system for Croatian and foreign users. Janaf is owner of an international oil transport system from the Port and Terminal Omišalj on island of Krk to local and foreign refineries in Central Europe.

As a part of transportation system, Janaf decided to construct of approximately 6 km pipeline 36" witch bypass the Krk bridge. The new pipeline route runs about 2,6 km over the Island of Krk and continue under the sea. The offshore length through the sea channel is about 0,8 km and the length on the other side of the land to the tie in is about 1,6 km. Thereby the 4 km of existing pipeline which now goes through Krk bridge will be eliminated.



Ekonerg Scope

- Basic design
- Location permit obtaing
- Main and detailed design
- Construction permit obtaining
- Tender preparation
- Designer 's supervision

EKONERG

OIL

PIPELINES

Refined product pipeline Slavonski Brod – Bosanski Brod

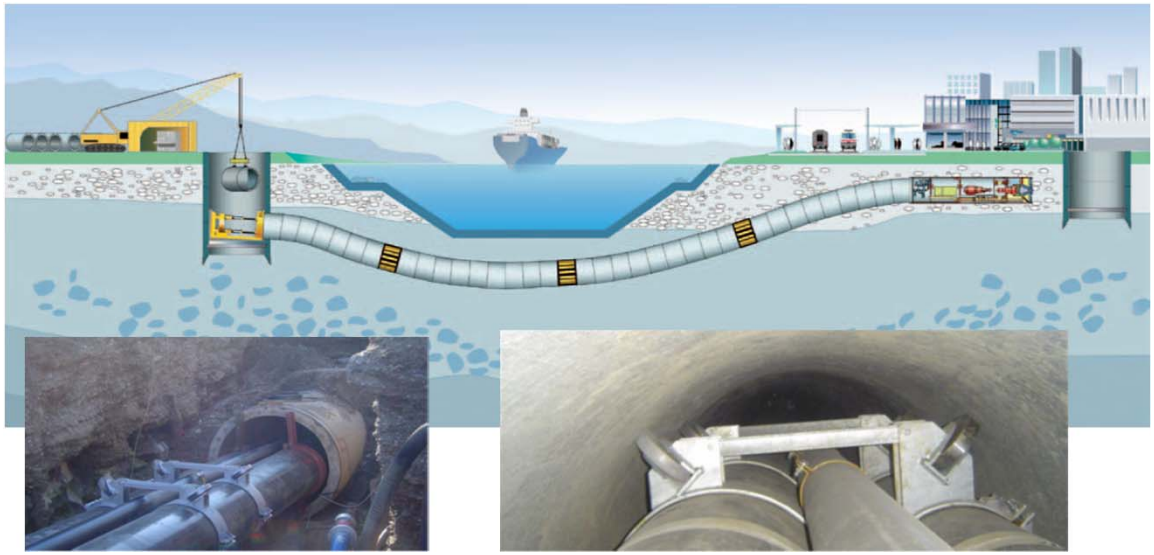
Croatian company JADRANSKI NAFTOVOD ltd. (Janaf) is managing the crude oil transportation and storage system for Croatian and foreign users. Janaf has a plan to reconstruct of existing oil pipeline section from Oil Refinery Bosanski Brod to Oil Terminal Slavonski Brod and upgrade of existing oil pipeline transport corridor in a way that along with the crude oil, transport the oil products (diesel and petrol fractions), along with the upgrade of optical cable, by with the oil transport would be managed and controlled

In the area of the Republic of Croatia, the reconstruction in the existing oil pipeline corridor is planned from Terminal Slavonski Brod to the state border on Sava river within the length of 6.2 km, while from Terminal Bosanski Brod (B&H) is within the total length of approx. 13.5 km.

It will be designed with design pressure of 25 bar and transport capacity of 1.4 MTG.

In the existing oil pipeline corridor there will be three pipelines parallel conducted within the common trench in a following way:

- petrol fraction transport pipeline, DN 200
- diesel transport pipeline, DN 200
- oil transport pipeline, DN 250.



Ekonerg Scope

- Basic design
- Location permit obtaing
- Main and detailed design
- Construction permit obtaining
- Tender preparation
- Designer ‘s supervision

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

Pfizer DS3 - Greenfield New Production Plant

The existing Pfizer Zagreb manufacturing site in Croatia expands its current manufacturing drug substance capability with the construction of a new facility.

The two-story facility, 5,800 square meters, inclusive of a mezzanine levels, will house both up and down stream process unit operations, a locker area on the ground floor, an in-process testing laboratory and office area on a mezzanine level. There will be a warehouse with cold room storage and stand up freezers at the ground level.

- Technical design delivered within a fully coordinated, clash free 3D model (**LOD 350 – 400**)
- **IFC deliverables** issued to support multi-discipline design and field construction schedule

EKONERG Scope

- **Conceptual, Basic, Detail & Workshop (IFC) Design**:
  - Architectural
  - Structural
  - Civil
  - Firefighting & Fire Detection
  - HVAC including Dedusting System (more that 70 tons of sheet steel for ducting)
  - Mechanical Black Utilities Piping (more then 10 km ISO's)
  - Electrical & Instrumentation (more than 50 km of kabels)
  - BMS & LSS
- Environmental Protection Elaborate
- Procurement (Equipment related to Blac Utilities systems)
- Construction permit obtaining
- Supervision During Construction

Collaboration with JACOBS Engineering from USA during detail design stage.

Process design and process automatization done by **JACOBS all other discipline by EKONERG.**

EKONERG contributed with more than 150.000 mhours.

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

Pfizer DS3 - Greenfield New Production Plant

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

HOSPIRA Zagreb - Green field new pharmaceuticals warehouse building and new office building

Warehouse has been designed and constructed according to GMP and GSP(Good Storage Practice) requirements given in EU, US FDA WHO standards also following FM Global requirements and recommendation. The main warehouse building gross floor area is 5.500 m2 divided in:

- CONTROLLED ROOM TEMPERATURE AREA (15 – 25 °C), area of 1.360 m2 with 3.060 Euro plate places organized on 6 levels pallets at controlled room temp. mainly for storage of starting materials (row materials and packaging materials) with receipt and dispatch area of all materials and separated SAMPLING AREA (sampling room with separated entrance and airlock for material and people, with air cleanness D grade as per Annex 1 EU GMP).
- COLD ROOMS: 4 cold-room storage areas (chambers approx. 350 sq.m.) in operating range 2 – 8 °C
- COLD STORAGE AREA 8 °C -15 °C, approx 50 sq.m for storage of materials with separated area for retained samples
- LABORATORY AND OFFICE SPACE; approx. 420 sq.m. of office space with area for storage of on GMP materials

Outside the main building separated area for flammable materials has been provided as (ATEX-proved).

New office building as three level self standing structure where in ground floor canteen for aprox. 80 person is foreseen and on other floors office area.

Also all required infrastructure (new roads with crossing bridge and parking area, receiving and dispatching area for lories and vans) and utilities (firefighting system, DG network, HVAC system, hot water, sanitary sewage etc..) has been designed and constructed.

EKONERG Scope

- EIA – Environmental impact assessment
- Conceptual, Basic, Detailed and Workshop design
- Preparation of tender documentation
- Purchasing support to the Client
- Location permit obtaining
- Construction permit obtaining
- Operating permit obtaining
- Construction supervision in behalf on the Client
- Designer's supervision during construction
- CM services
- Consultancy activities

During project preparation CAPEX / OPEX and Site assessment collaboration with **CRB from USA**.

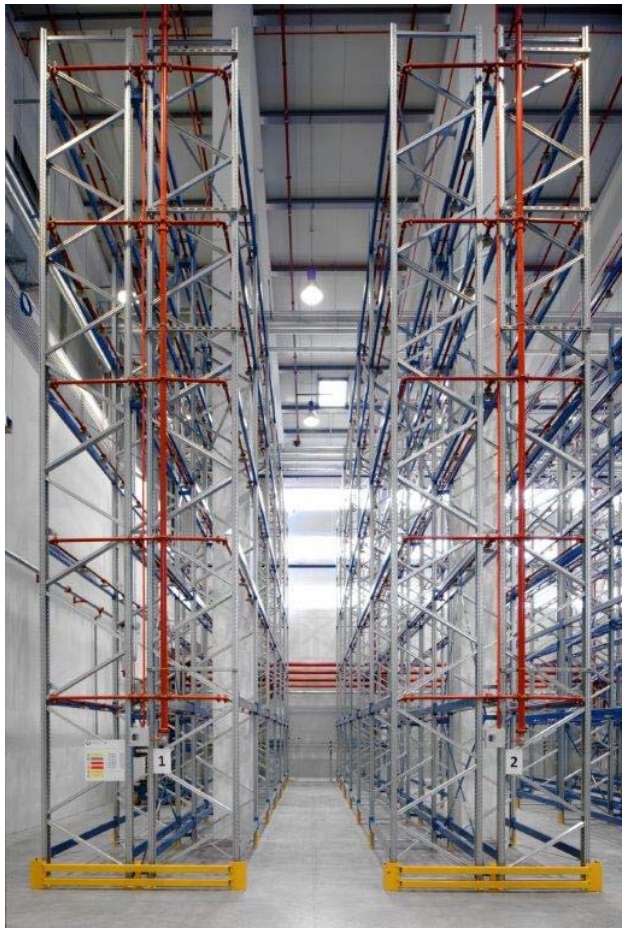
FM Global requirements implemented.

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

HOSPIRA Zagreb - Green field new pharmaceuticals warehouse building and new office building



EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

PLIVA/TEVA New green field" multi-purpose plant for API production - Synthesis SM2, Croatia

PLIVA Croatian Pharmaceutical industry owned by TEVA (Israel) decided to construct new multi-purpose plant for the production of active pharmaceutical ingredients (API) - Synthesis SM2. Basic and Main design services Pliva contracted with consortium JACOBS-EKONERG which includes: process, mechanical, architectural, civil, electrical and I&C design, fire fighting design, safety design at the level of the main design requested for obtaining construction permit for the new API facility - Synthesis SM2.

SM2 facility consists of following objects.

- Main production building – Object A
- Tank Area – Object B
- Utility building – Object C
- Firewater waste basin – Object D1
- Technological water waste basin – Object D2
- Fire fighting pump station – Object D3
- Temporary waste collection – Object D4
- Firewater basin supply – Object D5
- External pipe rack – Object E
- Service and communication roads and paved area

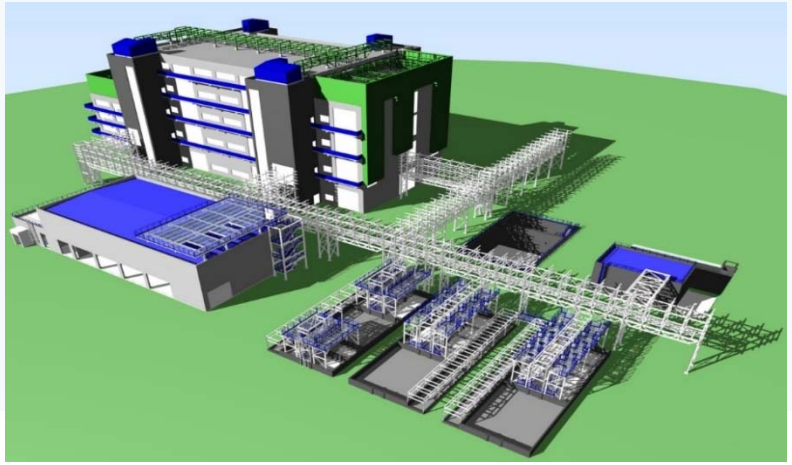
EKONERG Scope

- Conceptual and Basic / Main design
- Environmental impact assessment study
- Location permit obtaining
- Construction permit obtaining
- Designer's supervision during construction

Collaboration with JACOBS (office from Milan, Italy).

Main process equipment that will be used in Synthesis SM2, organised in 5 production trains:

- 42 reactors with a total capacity of ~ 120 m3 (the biggest reactor is 6.3 m3)
- 15 filtration units: 8 centrifuges and 7 filter dryers
- 8 paddle dryer
- Other processing equipment:
  - Head tanks
  - Mother liquor thanks
  - Central Vacuum System
  - Vacuum pumps
  - Filters
  - Auxiliary tanks
- Clean rooms, class D, for final and intermediaries API
- System of Process Control



EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

PLIVA/TEVA New green field" multi-purpose plant for API production - Synthesis SM2, Croatia

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

BELUPO - Green field new production plant for Semi-solid and Liquid Production (SSD) and Oral Solid Dosage Production (OSD), Koprivnica, Croatia

Construction of new production plant for SS and OSD production as green field project located in Koprivnica for Client Belupo d.d that is currently in construction

Project key data:

- Two factories (OSD nad SS) organized in common facilities with include office area and two communication / connection bridges to existing production building
- New high storage warehouse for 3.500 pallets, compact shuttle, sampling booths, cold chamber from 2-8°C
- Completely new independent utility sources (6,5 MW cooling energy, 4x 1600kVA transformer, 10 t/h stem boiler, PW and CS production system etc.)
- Around 10.000 m2 of clean rooms

EKONERG Scope

- EIA – Environmental impact assessment elaborate
- Conceptual, Basic, Detailed and Workshop design
- Preparation of tender documentation
- Location permit obtaining
- Construction permit obtaining
- Operating permit obtaining
- Designer's supervision during construction
- Consultancy activities

EKONERG

PHARMA & PROCESS INDUSTRY

PHARMACEUTICAL INDUSTRY

BELUPO - Green field new production plant for Semi-solid and Liquid Production (SSD) and Oral Solid Dosage Production (OSD), Koprivnica, Croatia

EKONERG

PHARMA & PROCESS INDUSTRY

FIRESAFE INSULATION FACTORY

Rockwool® IST1 225,000 t/year, Istra, Croatia

In Istria, ROCKWOOL ADRIATIC Ltd, part of Rockwool International A/S, Denmark, built a new firesafe insulation factory with one production line. In the 2nd stage of construction, another production line will be built. Planned capacity of the first production line is 125,000 t/year and final capacity will be 225,000 t/year of the finished product. Factory is built with Rockwool inovative technology and state-of-the-art equipment with high level of process automation.

Environmentalprotection was one of the main project issues.

EKONERG Scope

- Preparation of conceptual design of the factory
- Preparation of Environmental Impact Assessment Study (EIAS) and related activities
- Locations permit obtaining
- Preparation of main design
- Construction permit obtaining
- Preparation of the detailed design
- Nostrification of the foreign design
- Preparation of tender documentation
- Preparation of invitations for bids and bid evaluation
- Negotiating and contracting with main Contractor
- Organization of the construction site
- Supervision of construction
- Designer's supervision during construction
- Preparation of As-built documentation
- Organization and coordination of functional testing
- Preparation, organization and coordination of technical inspection of the plant
- Takeover of the plant
- Operating permit obtaining
- Other consultancy activities

Project overview:

Project duration:	3 years
Building area:	500.000 m²
All floors area:	26.500 m²
Asphalt area:	90.000 m²
Excavated soil:	78.000 m³
Backfilling:	92.000 m³
Structural steel:	3.000 t
Concrete:	26.000 m³

EKONERG

PHARMA & PROCESS INDUSTRY

FIRESAFE INSULATION FACTORY

Rockwool® IST1 225,000 t/year, Istra, Croatia

EKONERG

PHARMA & PROCESS INDUSTRY

CEMENT PLANT

Grinding plant, NAŠICECEMENT, Croatia

The construction of new plant includes:

- building steel structure with dimensions H=34 m, AxB=24x66 m, platforms and stairs, steel supports for equipment,
- total weight of steel structure Gtot.= 13000 kN
- ball mill for cement grinding, capacity of cement producing Q = 100 t/h
- four steel bunkers for clinker, gypsum, slag and limestone with related transport system, delivery system of the aforementioned components to the bunker, dosing system of components into the mill and solid particles air cleaning system
- installation of new cement mill with related solid particles air cleaning system
- installation of new separator with transport system for delivery of milled cement from mill to the separator, transport system for delivery of fine and coarse fraction and solid particles air cleaning system
- stell bridge for installation of cement transport system into the cement silo
- new steel tower with dimensions H=46 m, AxB=4,2x3,25 m with bucket elevator for cement transport into the existing silo, platforms and stairs
- installation of electrical equipment and process control and visualization system.

EKONERG SCOPE

- Main and detailed design
- Workshop design documentation
- Construction permit obtaining
- Designer's supervision during construction
- Preparation of As-built documentation

EKONERG

PROCESS AND PHARMACEUTICAL INDUSTRY

LIME PLANT

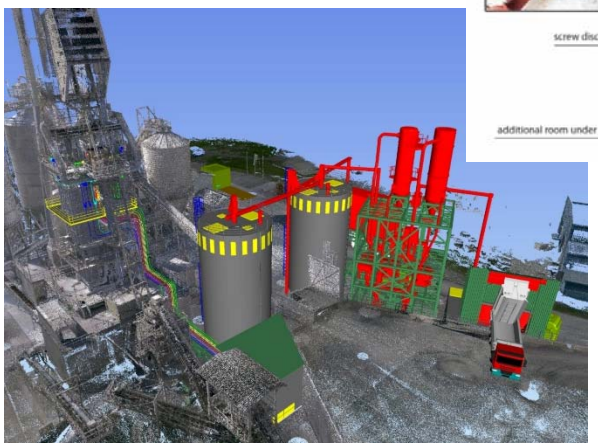
Reducing greenhouse gas emissions by introducing "wood dust" as an alternative fuel in the lime factory, InterCal Sirač, Croatia

New plant design includes a facility for unloading, processing, transportation and storage of wood dust and ground sunflower seed shells, wood pellets and wood chips to the burners of the two-shaft kiln for lime production.

- Unloading bunker: reinforced concrete structure with upper steel structure, H=7,7m, AxB=3,8x7m
- Processing plant: steel structure with platforms and stairs, steel supports for equipment, H=16,5m, AxB=9,4x10,3m
- Design of biomass and dust wood transportation system (screw conveyers)
- 2x Concrete storage silo, 500m3, H=14,5m, D=7,5m
- Truck loading station: steel structure with platforms and stairs, steel supports for equipment, H=6,9m, AxB=8,7x13,8m
- Dosing unit building: steel structure with sandwich panel cladding, H=5m, AxB=7x7m
- Design of pneumatic wood dust transport system from dosing unit to kiln

Ekonerg Scope

- Preliminary design
- Preparation of conceptual design of the plant
- Preparation of Environmental Impact Assessment Study (EIAS) and related activities
- Obtaining of Special Conditions
- Main design
- Construction permit obtaining
- Coordinating activities
- 3D scanning



EKONERG

PROCESS AND PHARMACEUTICAL INDUSTRY

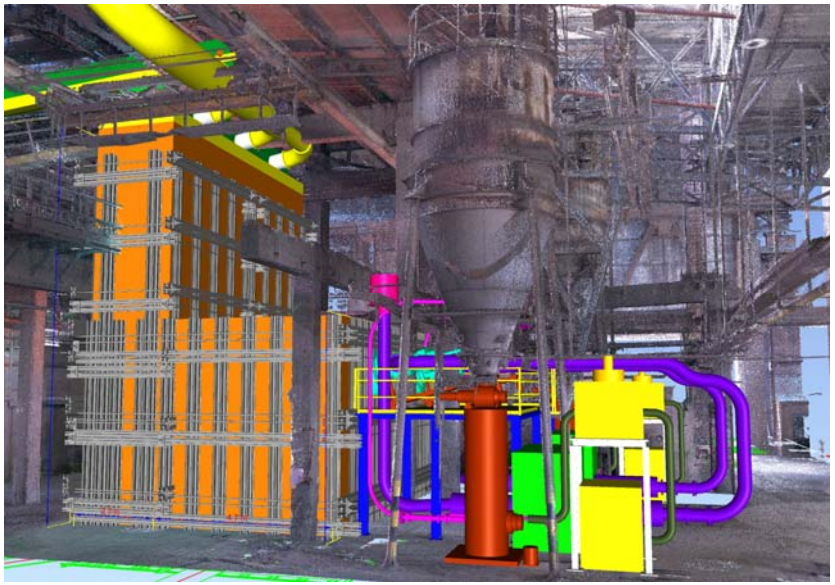
CEMENT PLANT

Calcium aluminate cement kiln 9 t/h, Calucem Pula, Croatia

Calucem produces a wide array of different calcium aluminate cement in Pula. Products within the product group additionally differ in mineral composition and fineness of grinding. The alumina content gives our calcium aluminate cement exceptional properties of resistance to high temperatures, acids, as well as the rapid achievement of high strength.

The investor has seven shaft kilns for the production of cement at the location, with a nominal capacity of 4 t/h each, and one with a capacity of 9 t/h.

This project foresees the design of a new kiln with a capacity of 9 t/h and demolition of two existing furnaces with a capacity of 4 t/h.



Ekonerg Scope

- Preliminary design
- Preparation of conceptual design
- Preparation of Environmental Impact Assessment Study (EIAS) and related activities
- Obtaining of Special Conditions
- 3D scanning

EKONERG

Contact

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CROATIA

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