MIKRA
ENGINEERING

ABOUT US

Managing Director
Dr.-Ing. Davor Bišćan

YOUR PARTNER FOR ADVANCED ENGINEERING SOLUTIONS

After 10 years of engagement at engineering of ALSTOM Power and MAN TURBO by the end of 2009. Dr.-Ing. Davor Bišćan founded Business division for engineering and consulting services within the family owned company MIKRA Ltd.

On this way we provide professional support to our customers for the purpose of:

- Energy consulting
- Concept engineering
- Basic engineering
- Detail engineering
- Software and training
- Supervision

In their daily work our proven experts utilize state-of-the-art computer programs such as EBSILON®Professional, Aveva E3D, Aveva PDMS, LICAD and AutoCAD Plant 3D.

Our services have been so far successfully implemented in the following Fields of application:

- Oil and Gas
- Water Supply
- Thermal Power Plants
- Process Plants
- Waste incineration
- Wastewater Treatment Plants

We are constantly performing research and development of new solutions, products and services. Thereby we closely collaborate with Faculty of Engineering Rijeka, Faculty of Mechanical Engineering and Naval Architecture Zagreb and Faculty of Chemical Engineering and Technology Zagreb.

In order to strengthen our identity, as of 1.6.2017. Dr.-Ing. Davor Bišćan as a Managing Director and Owner founded a new company MIKRA ENGINEERING Ltd. which is a legal successor of Business division for engineering and consulting services of company MIKRA Ltd.

In this form, owner and staff of MIKRA ENGINEERING Ltd. are willing to enthusiastically continue their professional approach in satisfying present and new customers.

Our strategy is to deeply understand the customer's needs and to build a long-term partnership with our customers.

Thank you for the confidence placed in us.

ENERGY CONSULTING

PERFORMANCE OPTIMIZATION AND ENERGY AUDITS

- Onsite assesment and conducting measurements
- Determination of energy savings
- Cost estimation and techno-economic analysis
- Feasibility studies
- Project management and project coordination
- Performance optimization by means of EBSILON®Professional
- Tendering and Procurement Management
- Local support in legislative conditions
- Preparation of documentation for issuing the Location and Building Permit

CONCEPT ENGINEERING

GAS-, STEAM-, AND COMBINED CYCLE PLANTS

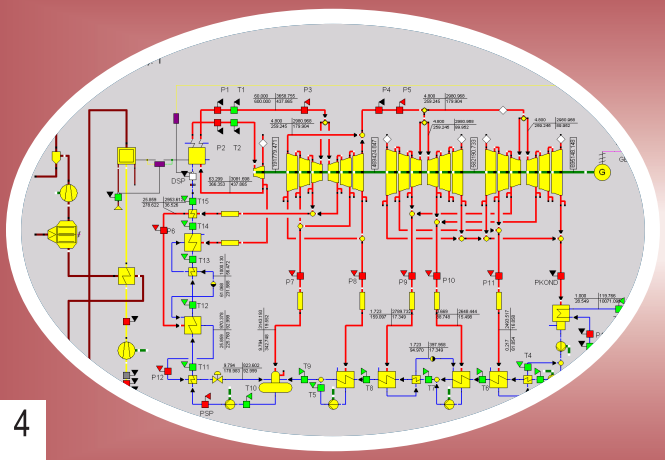
- Demand analysis
- Plant design simulation by means of EBSILON®Professional
- Concept development based on multi-criteria optimization
- Heat and mass balance calculation
- Off-design calculation
- Viability analysis

WASTE HEAT RECOVERY PLANTS

- Waste heat potential evaluation
- Concept development by means of EBSILON®Professional
- Determination of process parameters
- Equipment cost evaluation
- Development of different system layouts
- Payback analysis
- Integration of waste heat recovery module into existing industrial process

COGENERATION PLANTS AND BIOMASS PLANTS

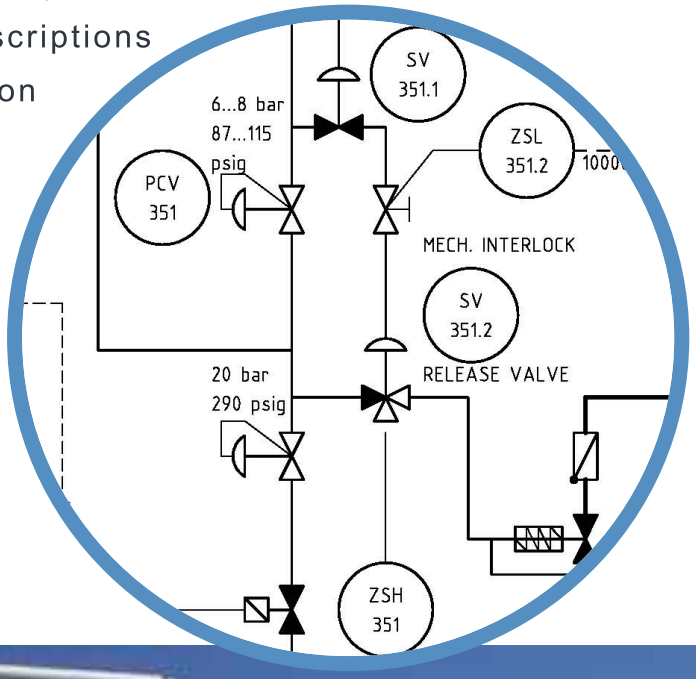
- Demand analysis
- Plant design simulation by means of EBSILON®Professional
- Concept development based on multi-criteria optimization
- Heat and mass balance calculation
- Off-design calculation
- Viability analysis



BASIC ENGINEERING

PREPARATION OF DOCUMENTATION

- Process flow diagrams (PFD)
- Hydraulic calculations
- Piping & Instrumentation Diagrams (P&ID)
- System descriptions and functional descriptions
- Checking of drawings and documentation
- Technical supplier specifications
- Hazard and operability studies
- PED equipment list
- Measuring points and alarm list

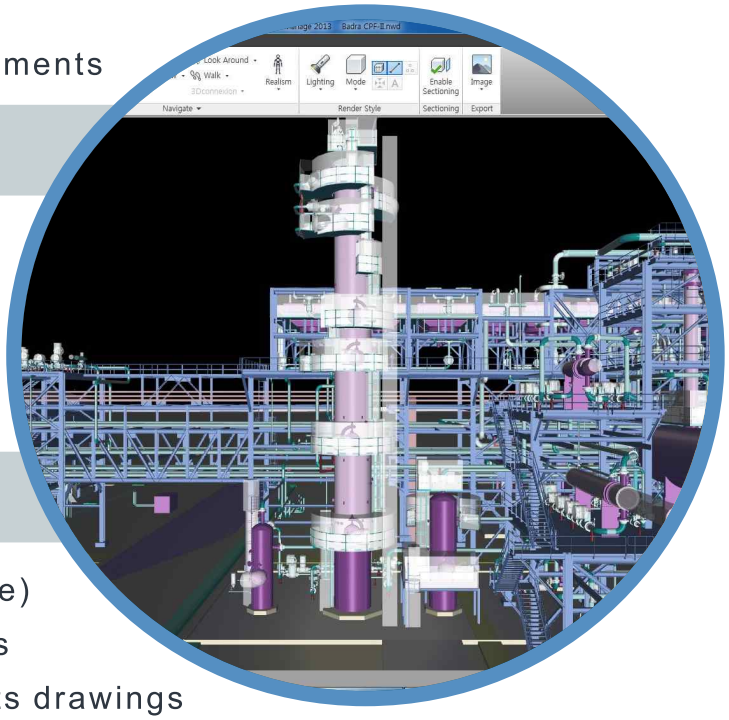


DETAIL ENGINEERING

3D ARRANGEMENT AND PIPING PLANNING

AVEVA PLANT

- Large scale plants
- Industrial plants
- On-shore and off-shore plants
- Solutions for project specific requirements



CLIENT DRAWINGS

- General arrangement drawing
- Foundation plan
- Take over point drawing

DRAWINGS AND MANUFACTURING DOCUMENTATION

- Equipment drawings (e.g. base frame)
- Piping system arrangement drawings
- Piping isometrics and piping supports drawings
- Parts lists and structure of documentation

DETAIL DESIGN OF OVERALL PLANT

- 3D piping design
- Selection and design of piping supports, hangers and secondary steel
- Piping stress analysis
- 3D design of equipment according to vendor drawings
- 3D design of civil infrastructure to accommodate facility
- 3D design of instrumentation, control and telecommunication equipment
- 3D design of electrical equipment
- 3D HVAC design

AUTOCAD PLANT 3D

ONSITE SUPERVISION

PROFESSIONAL SUPPORT DURING ERECTION, PRE-COMMISSIONING AND COMMISSIONING

- Supervision of local vendor's workshop mechanical works
- Preparing documentation for PED category equipment and piping subject to approval of authorized institution
- Checking the implementation of the mechanical Construction Quality Control
- Plan and execution of all mechanical works in accordance with good engineering and construction practice and with required quality level
- Mechanical Completion, Pre-Commissioning and Commissioning Procedures
- Method Statements for commissioning of main equipment and process systems
- Overall procedures for Trail Operation, Initial Operation & Acceptance Tests
- Plant Operation & Maintenance Manuals
- Personnel Training documentation and manuals
- Commissioning of main components, systems and process control systems
- Specification of the Tests on Completion (Performance and reliability Tests)
- Providing substantial technical support to the mechanical Subcontractors with the aim of facilitating the rapid and economic execution of the works

OIL AND GAS

PLANNING OF PUMPING STATIONS AND INDIVIDUAL PIPELINE STATIONS, TAP-OFF STATIONS AND RECEIVING STATIONS

- 3D planing of Pumping Stations, Compressor Stations, individual pipeline stations, LPG system, Fire Water system, Fire Foam System, Potable Water system, Plant Air, Instrument Air, Nitrogen System and others (arrangement & piping planning, supports design, stress analysis)
- Preparation of Detail Design documentation
- Preparation of FEED documentation, Cross-check of FEED documentation
- Preparation of Commissioning Breakdown Structure
- Pre-commissioning documentation: pre-commissioning check lists, Procedures for Filling and Flushing of plant facilities and pipelines
- Commissioning documentation: commissioning check-lists, Method Statements for commissioning of main equipment and process systems, Overall procedures for Trail Operation, Initial Operation & Acceptance Tests
- Specification of the Tests on Completion (Performance and reliability Tests)
- Plant Operation Manual and Plant Maintenance Manual
- Onsite support in pre-commisioning and commisioning activities

WATER SUPPLY

PLANNING, PRE-COMMISIONING AND COMMISIONING

SYSTEMS FOR DRINKING WATER, WATER FOR DOMESTIC AND COMMERCIAL USE, WATER FOR FIRE-FIGHTING

- 3D planing of Pipeline Systems, Tank Farms, Pumping Stations and Pipeline Stations (arrangement & piping planning, supports design, stress analysis)
- Preparation of Detail Design documentation
- Preparation of FEED documentation, Cross-check of FEED documentation
- Preparation of Commissioning Breakdown Structure
- Pre-commissioning documentation: pre-commissioning check lists, Procedures for Filling, Flushing and Disinfection of plant facilities and pipelines
- Commissioning documentation: commissioning check-lists, Method Statements for commissioning of main equipment and process systems, Overall procedures for Trail Operation, Initial Operation & Acceptance Tests
- Specification of the Tests on Completion (Performance and reliability Tests)
- Plant Operation Manual
- Plant Maintenance Manual
- Onsite support in pre-commisioning and commisioning activities

WASTE WATER TREATMENT

PLANNING OF WASTE WATER TREATMENT SYSTEMS, PUMPING STATIONS AND ASSOCIATED PIPING

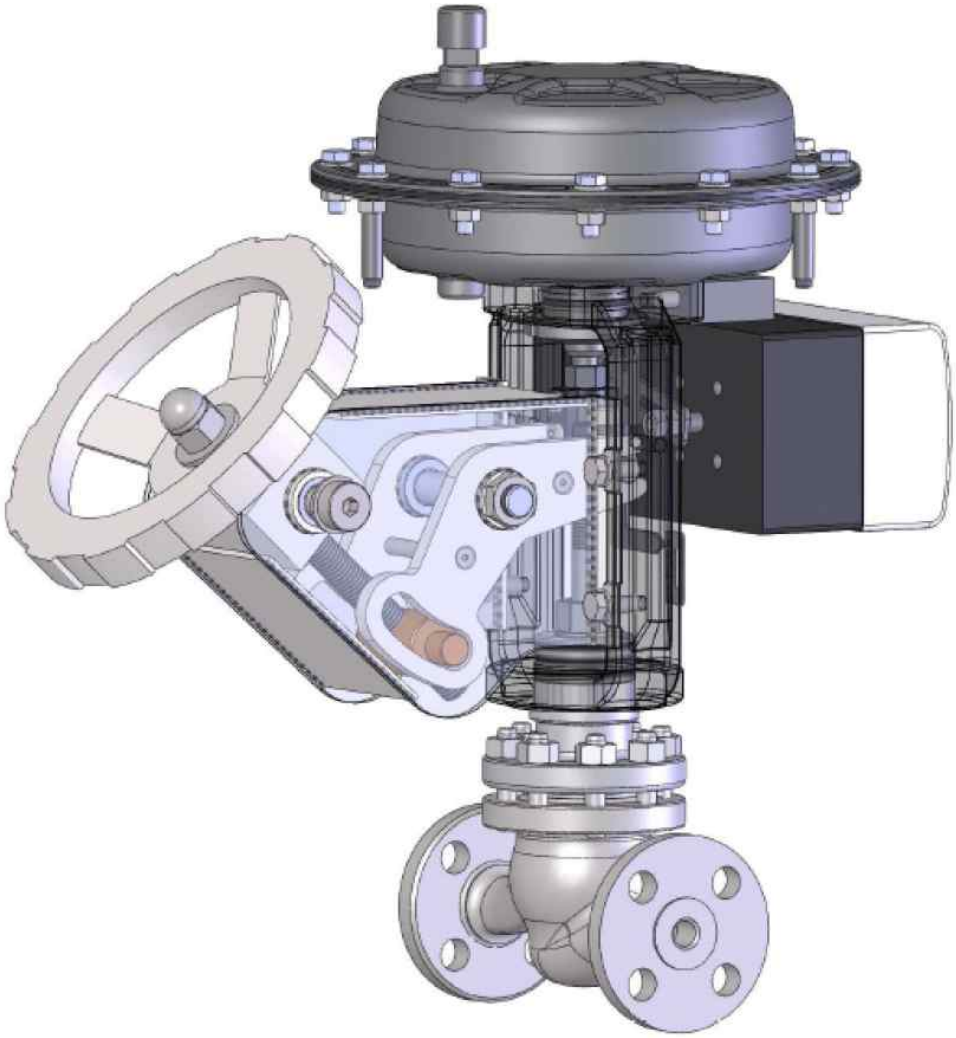
EQUIPMENT SELECTION, COMMISSIONING AND SUPERVISION OF SITE WORKS

- Preparation of P&I diagrams
- Preparation of tender documentation and detailed technical documentation
- Technical consulting, planning and implementation of optimization concepts for complete wastewater treatment plants or functional parts of the plant
- Research works, studies, analysis, expertise
- Reconstruction and modernization
- Technical instructions for operation and maintenance
- Start-up of the plant and associated documentation
- Personnel training

EQUIPMENT DESIGN

3D DESIGN OF PROCESS EQUIPMENT AS VALVES, VALVE ACTUATORS, STEAM DESUPERHEATERS AND OTHERS

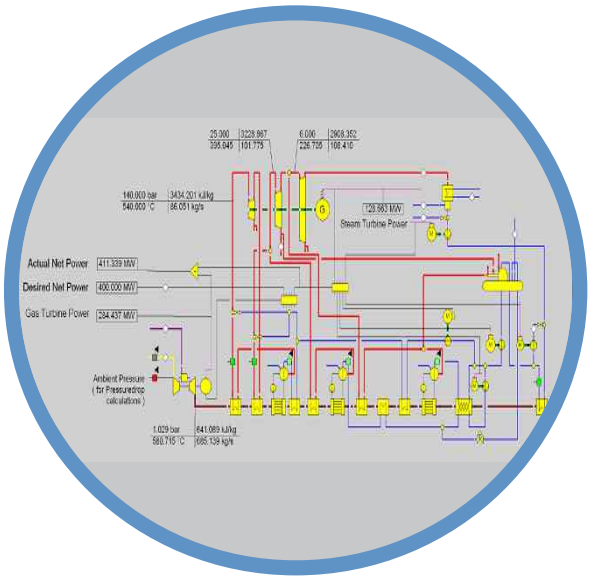
- Development of 3D design concept
- Detailed 3D design according relevant standards
- Static strength calculation and sizing of components
- Preparation of assembly drawings
- Preparation of manufacturing and welding drawings
- Preparation of parts lists
- Preparation of disassembly and reassembly manuals



SOFTWARE AND TRAINING

MIKRA D.O.O. IS AUTHORIZED PARTNER FOR DISTRIBUTION, LEASE, TRAINING AND MAINTENANCE OF EBSILON®PROFESSIONAL, PROGRAM SUITE FOR ENGINEERING AND DESIGNING ENERGY AND POWER PLANT SYSTEMS

EBSILON®Professional is a system that simulates thermodynamic cycle processes and is used for engineering, designing, and optimizing plants.



Precise planning is a key factor for successful design or modification of energy and power plant systems. At an early stage in the project, it is necessary to determine whether and how the performance requirements can be achieved.

EBSILON®Professional supports engineering processes from feasibility studies to detailed dimensioning of the plant.

Because of the broad flexibility of the system and the universality of the approach to solutions, it is possible to simulate virtually any thermodynamic cycle process.

- Maximize the benefits of repowering and retrofitting actions by letting the EBSILON®Professional model do the simulation
- Design a performance-optimized plant for your application scenario by introducing the specific parameters into the model
- Calculate the effects of component contamination, various load cases, and changes in environmental conditions
- Simulate the operation of newly developed components in a cycle

REFERENCE PROJECTS

AERATION EQUIPMENT FOR WASTEWATER TREATMENT PLANTS

3D design of aeration equipment and related accessories for domestic and industrial sewage wastewater treatment, including establishment of a database library and typical drawings.

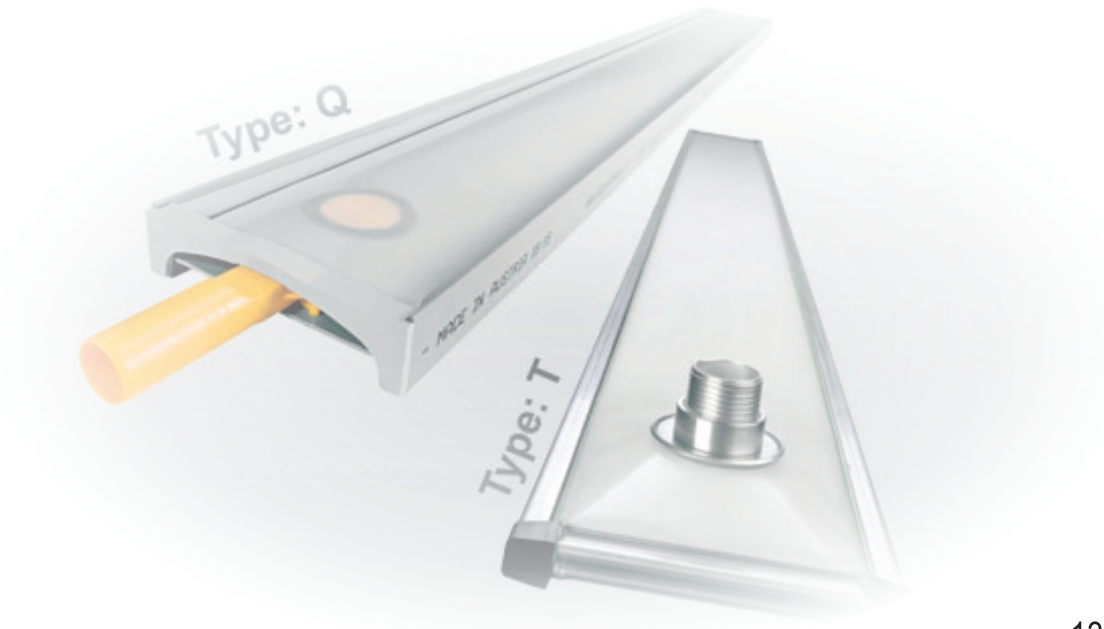
Services provided:

- Establishment of a database library and typical drawings for AEROSTRIP applications
- Preparation of 3D drawings for individual components

Key data:

- AEROSTRIP diffuser type T, length: 1,0 - 4,0 m in 0,5 m steps
- AEROSTRIP diffuser type Q, length: 1,0 - 4,0 m in 0,5 m steps
- AEROSTRIP Accessories
- AEROSTRIP Snap fasteners
- Oxygen transfer efficiency up to 60%
- Aeration efficiency from 3 up to 5 kg O_2/kWh
- 0 to 100% control of air flow range
- Non-clogging diffuser membrane
- Capable of intermittent operation

Time period: ongoing, from 2018 onwards



WWTP KNIN

Water Supply and Sewerage Improvements and Construction of Waste Water Treatment Plant in the Municipality of Knin (supply of Operational and Maintenance Equipment). The final capacity of the WWTP for the city of Knin is 25000 PE with primary, secondary and tertiary treatment. For stage I the WWTP capacity is 20000 PE.

Services provided:

- Preparation and systematization of as-built documentation
- Translation of Trial Operation Plan
- Translation of Process Control and Optimization Philosophy
- Translation of Training brochure (Health & Safety)
- Translation of Training brochure (Process Training)

Key data:

- 2 identical processing water lines, each line is sized to hydraulic load of waste water treated of 44 l/s, and organic load of 10.000 population equivalent
- 1 common sludge line with simultaneous aerobic stabilization, mechanical thickening, mechanical dewatering and sludge disposal
- Plant components: Influent pumping station with screw pumps, Structure with fine screens, Septic sludge reception station, Aerated grit chamber, Sand classifier, Open channel for flow Measurement, Chemical dosing, Anaerobic Bio-P removal reactor, Bioreactors, Distribution chamber, Secondary clarifiers, Sludge return pumping station, Outlet structure and flow measurement, Supernatant tank and pumping station, Excess sludge pumping station, Sludge thickening and dewatering unit, Sludge storage

Time period: ongoing, from 2018 onwards

HIA JET A1 SUPPLY PROJECT

The HIA Jet A1 Supply Project shall provide an additional supply of Jet A1 fuel from Ras Laffan Industrial City (RLIC) to Hamad International Airport (HIA). The Project consists mainly of tie-ins, 28" Import pipeline, tank farm and pumping facilities at new Jet Fuel Tank Farm (JFTF) Area within RLIC, approximately 132 km 24" pipeline, metering and tie-in station at HIA.

Services provided:

- Preparation of Pre-Commissioning and Commissioning Plan
- Preparation of General Sequence of Commissioning
- Preparation of Schedule of Pre-Commissioning and Commissioning Documents
- Preparation of list of Engineering/Vendor documents required for Operation Manual

Key data:

- Demand for Jet A-1 fuel is projected to increase from its current 30,000 barrels/day, potentially rising to more than 190,000 barrels/day by 2030
- Tie-in to upstream facilities at LRTF, length 2.5 km
- Tie-in to upstream facilities at PGTL, length 1.3 km
- New Jet A1 Manifold Station (JA1MS)
- 28" Import Pipeline to JFTF, length 8.3 km
- New Jet fuel Tank Farm (JFTF)
- 24" Export Pipeline to C2 Station, length 132 km
- 4 Sectional Block Valve Stations
- New Station C2

Time period: 2017-2018

REFERENCE PROJECTS

GKA WERNDORF

Construction of a district heating gas boiler plant in Neudorf ob Wildon, Austria. Purpose of the plant is to secure the district heat supply in the southern grid area of the city of Graz. The plant with three boilers will have a fuel heat output of 97.5 MWt at full load. The thermal efficiency of the state of the art plant will be within the range of 95% over the entire load range. Thus, the plant will have a thermal useful power of at least 92.6 MWt.

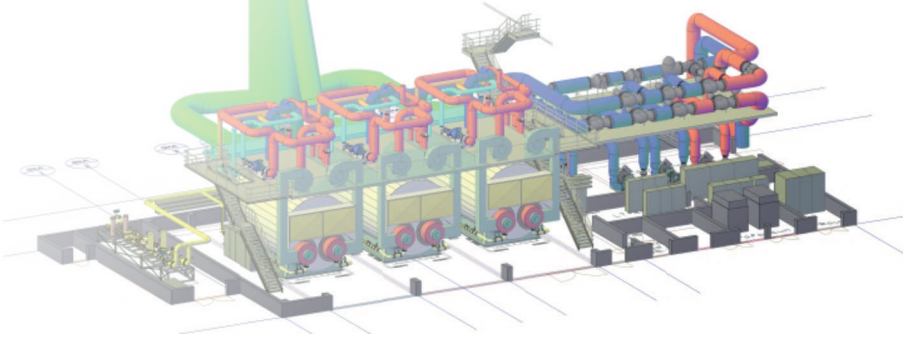
Services provided:

- Basic 3D design (Aveva E3D) of hot water piping, exhaust gas lines, recirculation lines
- Equipment modelling and optimizing positions of boiler, district heating pumps, filters, heat exchanger incl. foundation
- Basic electrical design (Aveva E3D): positioning racks in LV main distribution room and control room, positioning transformers and I&C equipment, positioning racks of firing in boiler house
- Checking of vendor drawings and recommending required modifications

Key data:

- Three (3) boilers with a nominal heat power per boiler of approx. 30.8 MW and fuel heat output per boiler of approx. 32.5 MW
- Total plant fuel heat output : 97.5 MW
- Plant overall efficiency: ≥ 95%
- District heating pumps (supply and return), mixing pumps, economizer pumps
- Fresh air blower dry transformers, medium voltage switchgear, low voltage switchgear, uninterruptible power supply, frequency converters, measuring instruments, boiler control, process control system

Time period: 2017



CHUQUICAMATA (CHILE)

The Codelco copper mine Mina Ministro Hales in Chuquicamata is expanded by a new roasting plant and a sulfuric acid plant. For this purpose a new turnkey construction of a two-lined gas washing and cooling system is required.

Services provided:

- Checking of P&ID's and recommending required modifications
- Checking of vendor drawings and recommending required modifications
- 3D modelling of equipment according to vendor drawings (pumps and other associated equipment)
- 3D planning of piping, piping supports and secondary steel (PDMS)
- Preparation of general arrangement drawings (PDMS)
- Preparation of piping isometrics (PDMS)
- Preparation of Material take off (MTO)
- Preparation of piping supports drawings (PDMS/AutoCAD)

Key data:

- 2 (two) lines, each containing 1 (one) Quench tower with 1 (one) 2nd stage WESP
- 2 (two) flushing pumps for WESP, 1 (one) for each line
- 6 (six) circulation pumps, 3 (three) for each line
- Filter-flushing system, Fogging system and Air scavenging system
- Associated Piping for recirculation pumps and flushing pumps

Time period: 2017

TRANS ADRIATIC PIPELINE (TAP)

Trans Adriatic Pipeline (TAP) will transport gas via Greece and Albania and across the Adriatic Sea to Italy's southern Puglia region and further to Western Europe. The project is aimed at enhancing security of supply as well as diversification of gas supplies for the European markets.

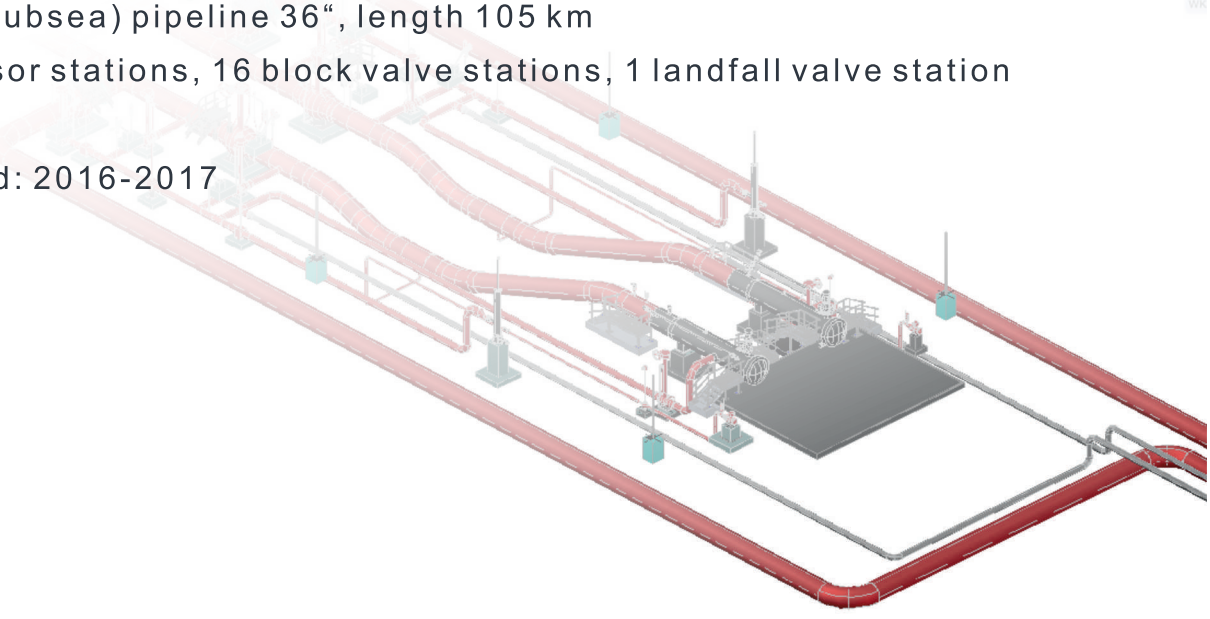
Services provided:

- 3D planning of individual compressor stations, block valve stations and landfall valve station
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- 3D modelling of equipment according to vendor drawings (pumps, various tanks, valve shafts and other associated equipment)
- Piping design
- Design of instrumentation, control and telecommunication equipment
- Design of electrical equipment
- Preparation of general arrangement drawings
- Preparation of piping arrangement drawings
- Preparation of piping isometrics

Key data:

- Design capacity of 10 bcm/y, possibility of expansion up to max. of 20 bcm/y
- Onshore pipeline 48“, length 727 km
- Onshore pipeline 36“, length 51 km
- Offshore (subsea) pipeline 36“, length 105 km
- 3 compressor stations, 16 block valve stations, 1 landfall valve station

Time period: 2016-2017



BASIN 3 LIQUID BULK TERMINAL AT SOKHNA PORT (EGYPT)

Construction of a world-scale petrochemical and liquefied gas tank terminal in harbor area of Ain-Aokhna (Egypt). This terminal will serve as the main supply to the Egyptian network for gasoil & LPG.

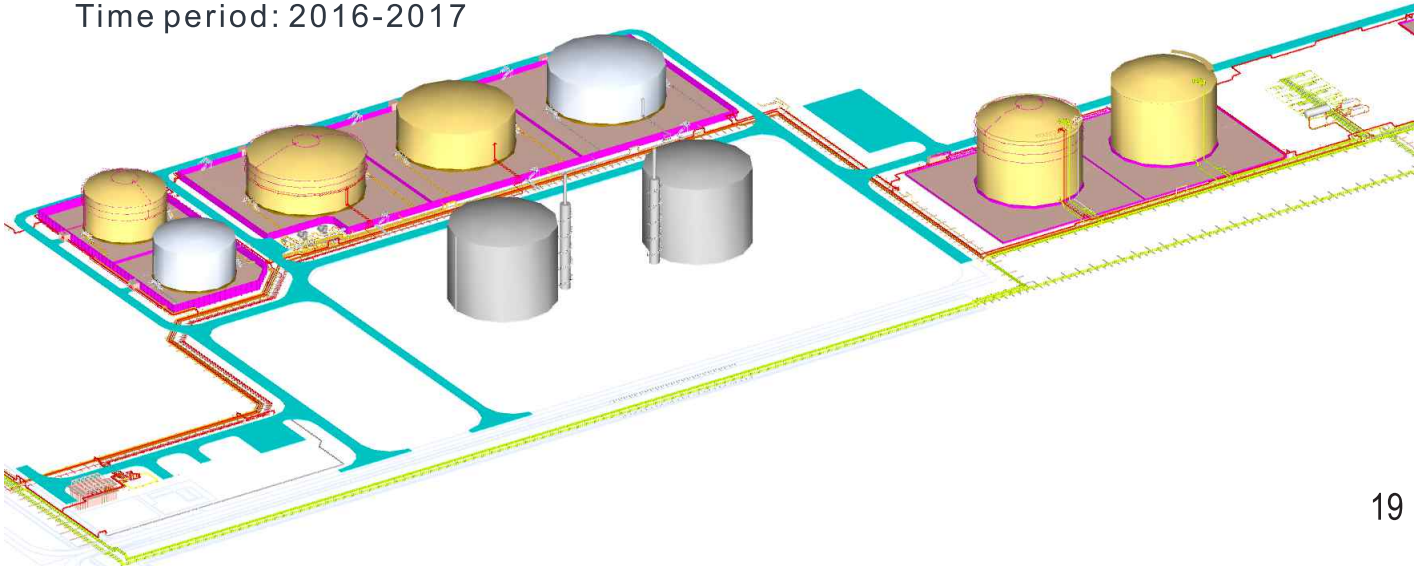
Services provided:

- 3D planning of LPG system (AutoCAD Plant 3D)
- 3D planning of Sea Water Supply system (AutoCAD Plant 3D)
- 3D planning of Fire Foam system (AutoCAD Plant 3D)
- 3D planning of Fire Water system (AutoCAD Plant 3D)
- 3D planning of Potable Water system (AutoCAD Plant 3D)
- 3D planning of Plant Air, Instrument Air and Nitrogen System (AutoCAD Plant 3D)
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- Modelling of equipment according to vendor drawings (pumps, various tanks and other equipment on the project)

Key data:

- Three (3) oil tanks, with a total capacity of 100 000 m^3
- Three (3) liquefied petroleum gas (LPG) tanks, with a total capacity of 150 000 m^3
- 4.3 km LPG pipeline
- 37.5 km gas oil pipeline connecting to the national grid through Mina Sadat
- Floating storage and regasification unit, with a storage capacity of 170 000 m^3
- Related infrastructure

Time period: 2016-2017



THE CIRCLE AT ZÜRICH AIRPORT

Construction of an energy channel as a constitutive part of The Circle at Zürich Airport. The Circle complex is developed as fully energetically sustainable and meets LEED Platinum® and MINERGIE® sustainability levels.

Services provided:

- Cross-check of 3D model of heat distribution system and geothermal probes distribution system
- Establishment of a model for conducting pipe stress calculations
- Definition of load cases
- Definition of proper supporting concept for piping systems
- Performing piping stress calculations
- Elaboration of report with calculation results and recommendation of optimal design

Key data:

- Heat pumps and chillers for the purpose of sustainable supply of heating and cooling energy
- Ground probes field for the purpose of seasonal heat storage
- Interface to existing district heating system of Zürich Airport power plant
- Heating capacity 4800 kW at supply/return temperature of 36/26°C
- Cooling capacity 6330 kW at supply/return temperature of 13/21°C
- Ground sourced heat pumps capacity 1500 kW at supply/return temperature 8/4°C

Time period: 2016

COMMON SEAWATER SUPPLY PROJECT (CSSP)

Safe and reliable supply of seawater to the oil fields in the southern Iraq. The seawater is injected into the reservoirs as a secondary recovery method to maintain the reservoir pressure and to increase the percentage of oil extraction.

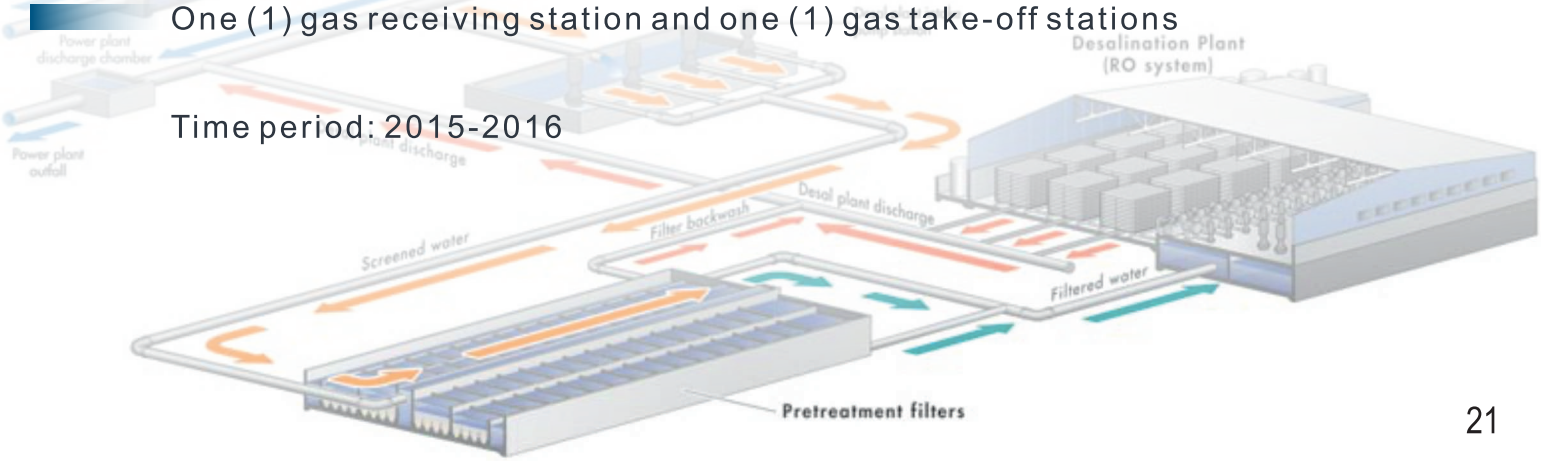
Services provided:

- 3D planning of individual interconnecting and delivery stations
- 3D planning of gas receiving stations and gas take-off stations
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- PDMS modelling of equipment according to vendor drawings (pumps, various tanks, valve shafts and other equipment on the project)
- PDMS piping design
- PDMS design of civil structures at individual stations
- PDMS design of instrumentation, control and telecommunication equipment
- PDMS design of electrical equipment
- Preparation of general arrangement drawings
- Preparation of piping arrangement drawings

Key data:

- Supplied seawater capacity 12.5 mil. barrels/day (24 m^3/s)
- One (1) Seawater Treatment Facility (STF)
- One Shipping Pump Station (SPS) with a discharge pressure of 45 bar
- Two pipeline corridors with five (5) steel pipelines of 270 km length
- Eight (8) interconnecting stations , eight (10) delivery stations, twelve (11) block valve stations
- One (1) gas receiving station and one (1) gas take-off stations

Time period: 2015-2016



STRATEGIC WATER STORAGE / RECOVERY

The major purpose of the "Strategic Water Storage / Recovery Facility in Liwa" (SWSR) project is the infiltration (recharge) and storage of desalinated water in an aquifer in the Western Region of the Emirate of Abu Dhabi and the subsequent recovery of the infiltrated water for emergency supply of Abu Dhabi City. The infiltrated desalinated water shall form a strategic water reserve, which shall be recovered and used during emergency conditions.

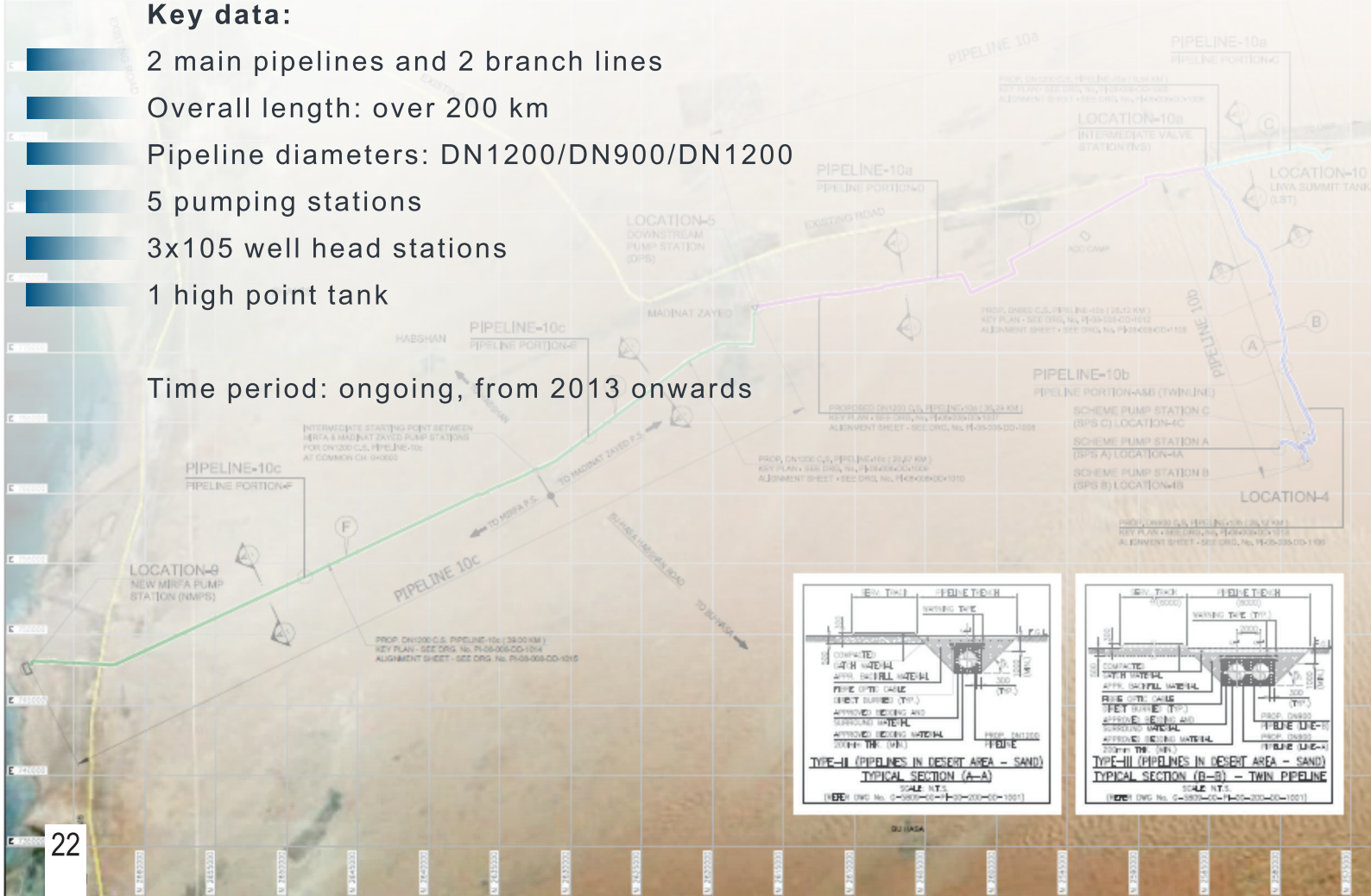
Services provided:

- Preparation of Commissioning Breakdown Structure
- Elaboration of Procedures for Filling of Pipeline and station piping including Start-up of the system
- Preparation of Procedure for early infiltration of the system
- Elaboration of operation manuals and detailed operating instructions for the entire pipeline system

Key data:

- 2 main pipelines and 2 branch lines
- Overall length: over 200 km
- Pipeline diameters: DN1200/DN900/DN1200
- 5 pumping stations
- 3x105 well head stations
- 1 high point tank

Time period: ongoing, from 2013 onwards



FUJAIRAH PHASE 2 WATER TRANSMISSION SYSTEM

Extension of the existing transport system for drinking water, from the Fujairah desalination plant in the United Arab Emirates, for supply of the individual regions and consumers in the interior of the country.

Services provided:

- Elaboration of operating and maintenance manuals for the entire system with:
- Analyzes of component characteristics and main system parameters
- Calculation and selection of required filling flow and filling pressure of the downstream system pipeline branches
- Analysis, cross-checking and commenting of a large number of documents received from sub-suppliers of different subsystems and components

Key data:

- 3 parallel main pipelines in total
- Overall length: over 170 km
- Diameter: up to 64"
- Capacity: more than 1 million m^3/d
- 1 pumping station
- 15 receiving stations are planned
- 1 high point tank

Time period: 2010-2011

WASTE HEAT RECOVERY PLANT KRONOSPAN

Utilisation of waste heat from gas engine for the purpose of safe and reliable supply of technological steam and heat for district heating network.

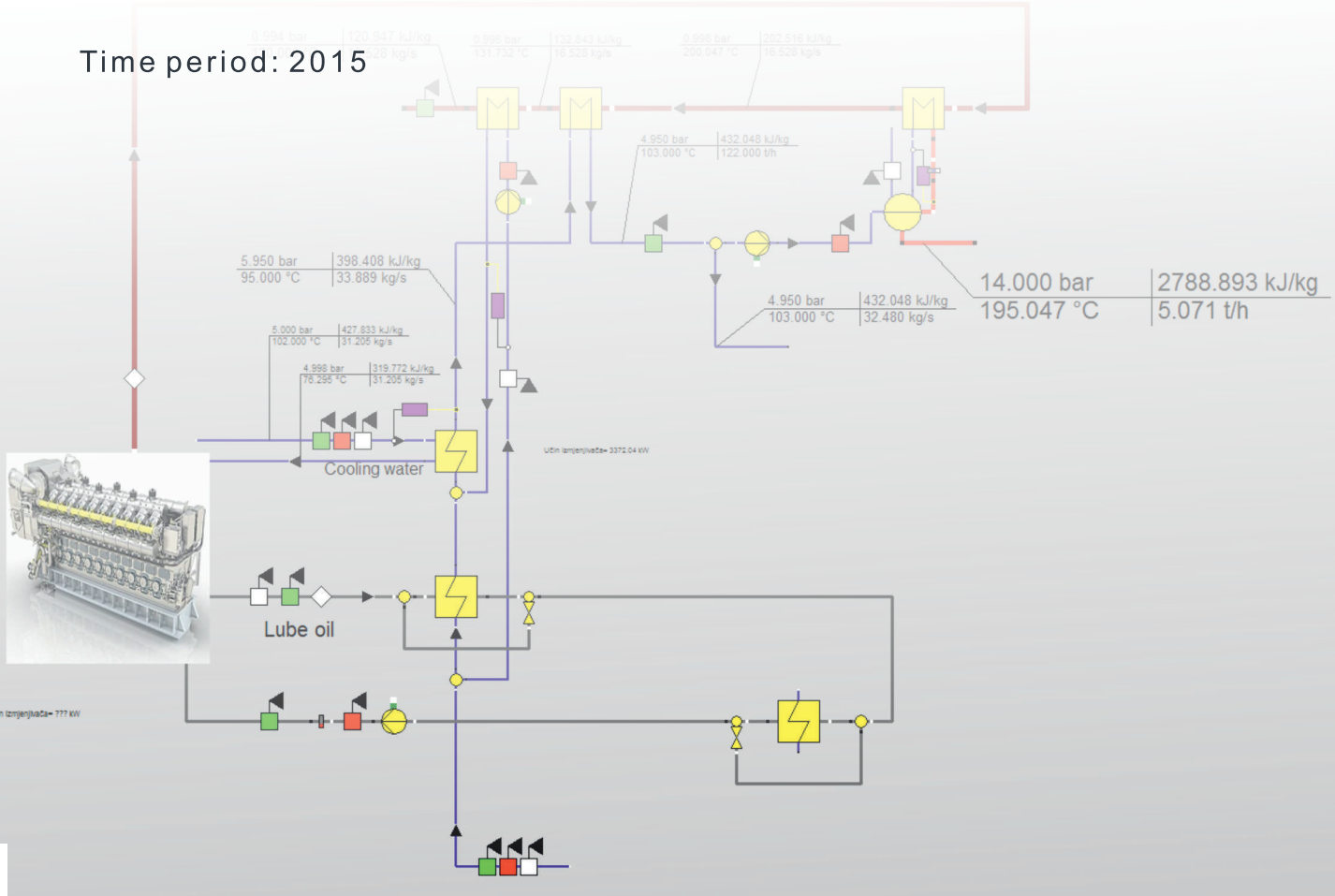
Services provided:

- Establishment of Ebsilon@Professional model
- Establishment of Excel interface for plant performance calculations
- Heat and mass balance calculations
- Plant performance calculations

Key data:

- MAN 20V35/44G four-stroke medium-speed gas engine, rated power 10 MWe
- Exhaust gas temperature: 395°C
- Exhaust gas mass flow: 59,5 t/h
- Technological steam: 14 bar, 195°C
- Heat for district heating network, 5 bar, 103°C

Time period: 2015



CCCGT BLOCK AT POWER PLANT EL-TO ZAGREB

Purpose of the new CCCGT Block is extension of power plant EL-TO to ensure safe and reliable supply of district heat, technological steam and electricity upon decommissioning of several existing units.

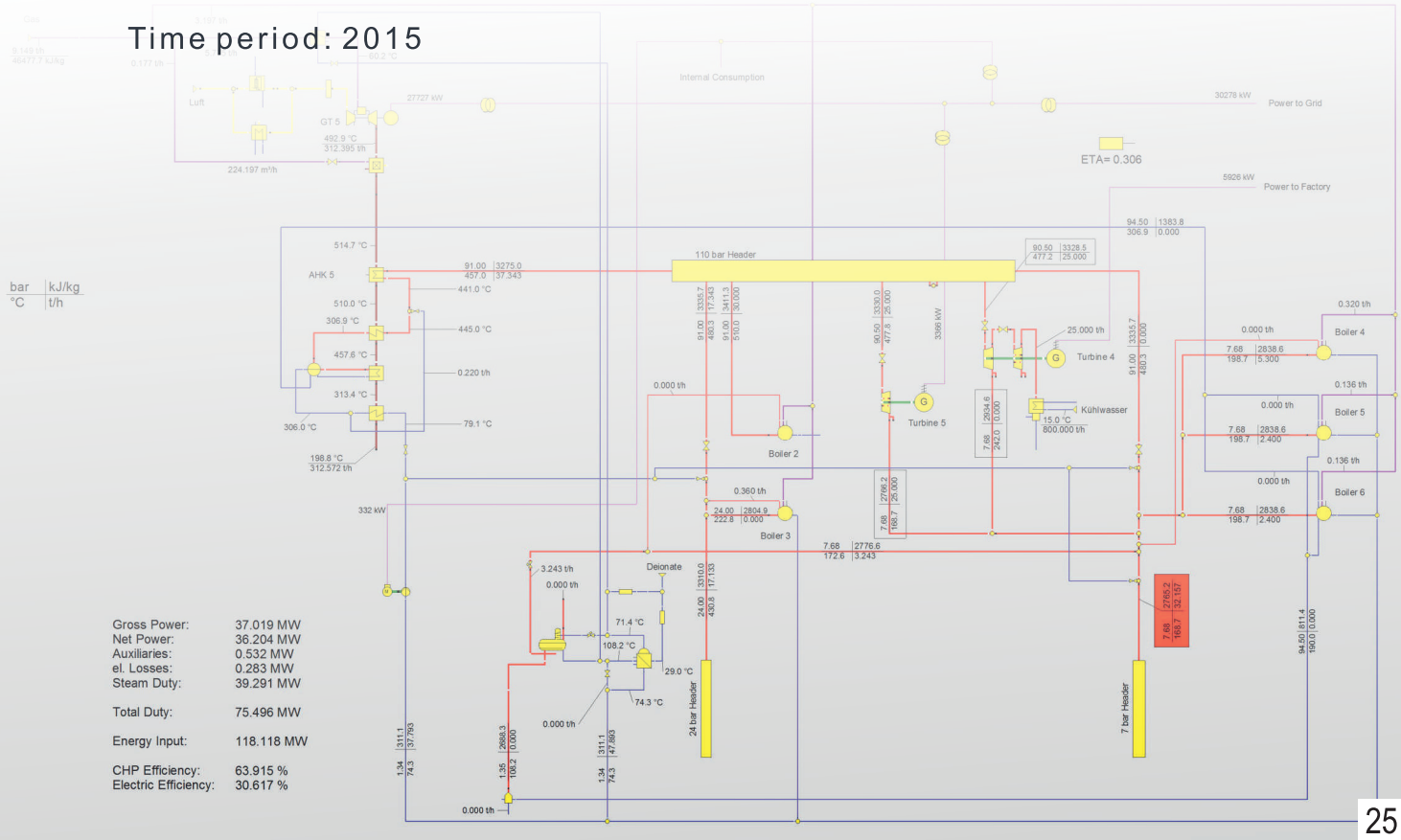
Services provided:

- Establishment of Ebsilon@Professional model
- Establishment of Excel interface for plant performance calculations
- Heat and mass balance calculations
- Plant performance calculations

Key data:

- Two (2) gas turbines (Siemens SGT-800 Gas, rated power 47 MW)
- Double pressure HRSG with supplementary firing
- One (1) condensing steam turbine, rated power 55 MW
- Fresh steam temperature: 520°C
- Fresh steam pressure: 90 bar
- One (1) water cooled condenser, cooling output 130 MW

Time period: 2015



BIOMASS POWER PLANTS BE-TO SISAK AND OSIJEK

Purpose of the Biomass Cogeneration Power Plants BE-TO SISAK and BE-TO OSIJEK is safe and reliable supply of district heat, technological steam (BE-TO OSIJEK only) and electricity.

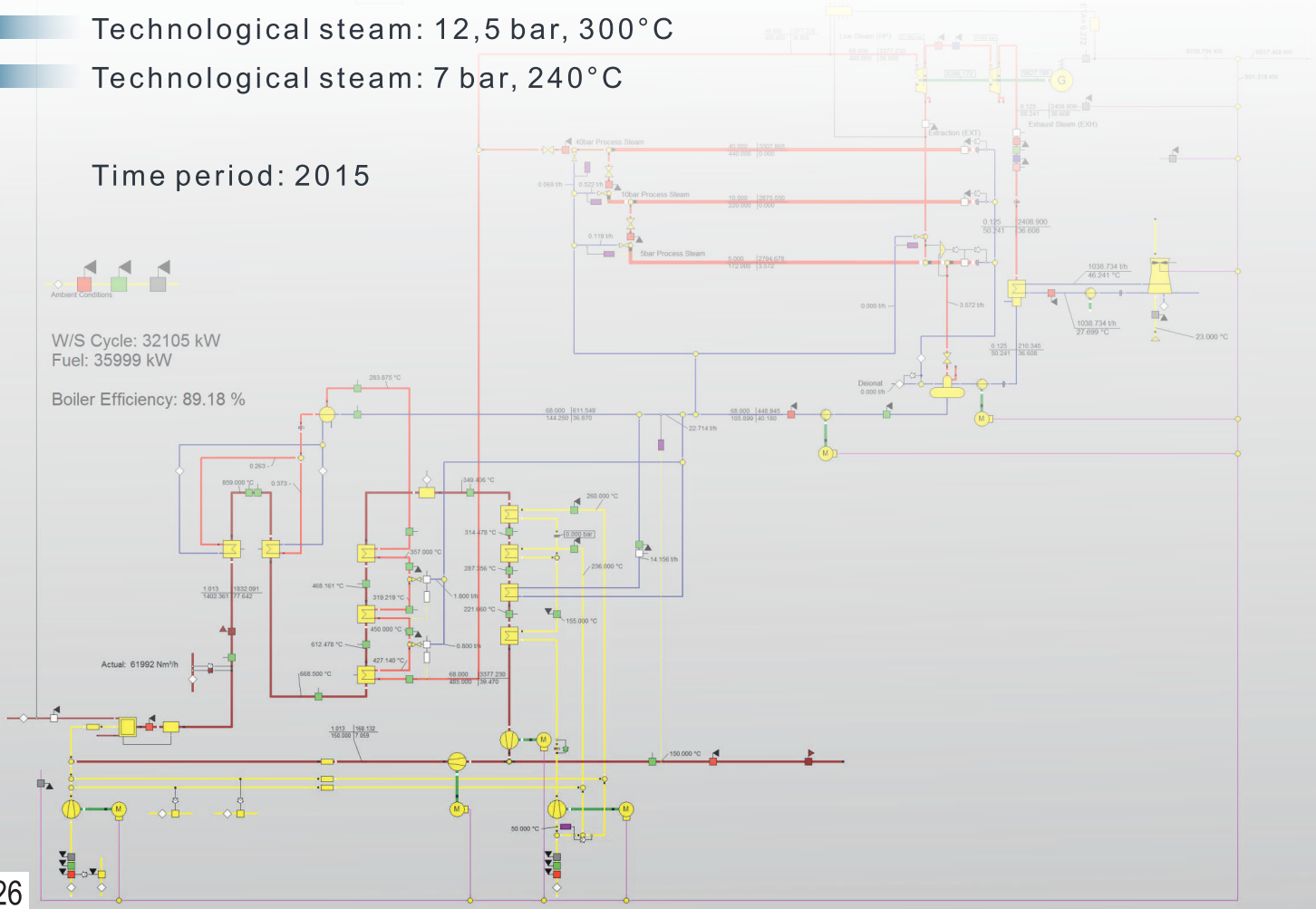
Services provided:

- Establishment of Ebsilon@Professional model
- Establishment of Excel interface for plant performance calculations
- Heat and mass balance calculations
- Plant performance calculations

Key data:

- Biomass fired steam boiler, steam flow 41,4 t/h
- Fresh steam temperature: 500°C
- Fresh steam pressure: 50 bar
- One (1) extraction condensing steam turbine, rated power 5,6 MW
- One (1) air cooled condenser, cooling output 4,4 MW
- Technological steam: 12,5 bar, 300°C
- Technological steam: 7 bar, 240°C

Time period: 2015



COGENERATION POWER PLANT EL-TO ZAGREB

Purpose of the Cogeneration Power Plant EL-TO is safe and reliable supply of heat for the district heating network, technological steam and electricity.

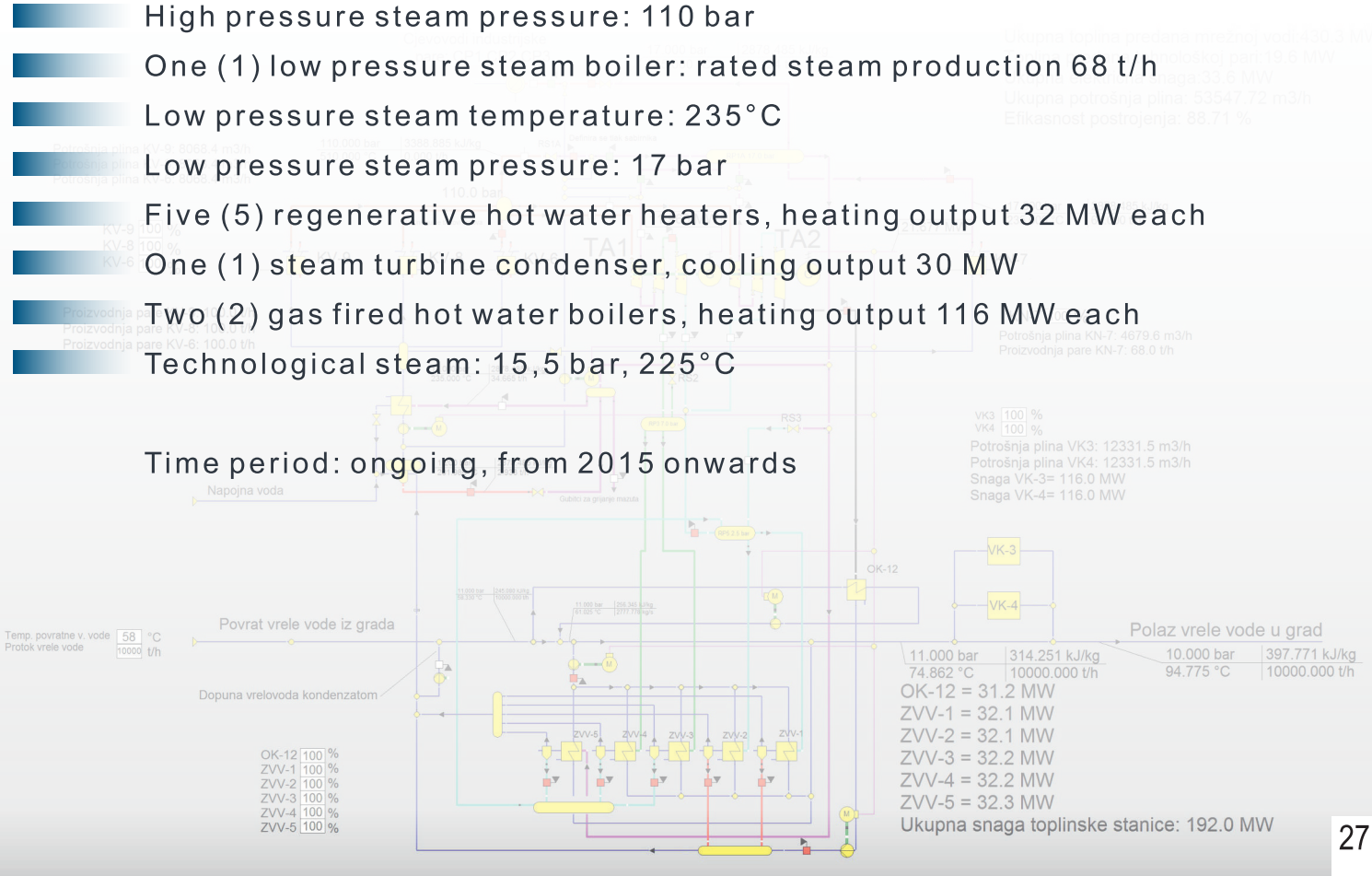
Services provided:

- Establishment of Ebsilon@Professional model
- Establishment of Excel interface for hourly off-design calculations
- Heat and mass balance calculations
- Calculation of plant performance (on hourly basis)
- Calculation of plant revenues and costs (on hourly basis)

Key data:

- One (1) extraction back-pressure steam turbine, rated power 12 MW
- One (1) extraction condensing steam turbine, rated power 20 MW
- Three (3) high pressure steam boilers, rated steam production 98 t/h each
- High pressure steam temperature: 510°C
- High pressure steam pressure: 110 bar
- One (1) low pressure steam boiler: rated steam production 68 t/h
- Low pressure steam temperature: 235°C
- Low pressure steam pressure: 17 bar
- Five (5) regenerative hot water heaters, heating output 32 MW each
- One (1) steam turbine condenser, cooling output 30 MW
- Two (2) gas fired hot water boilers, heating output 116 MW each
- Technological steam: 15,5 bar, 225°C

Time period: ongoing, from 2015 onwards



ANALYSIS AND OPTIMIZATION OF CHP PLANT INOWROCLAW

Conducting energy audit at CHP plant in Soda Production facility Inowroclaw and recommendation of appropriate measures for achieving energy savings.

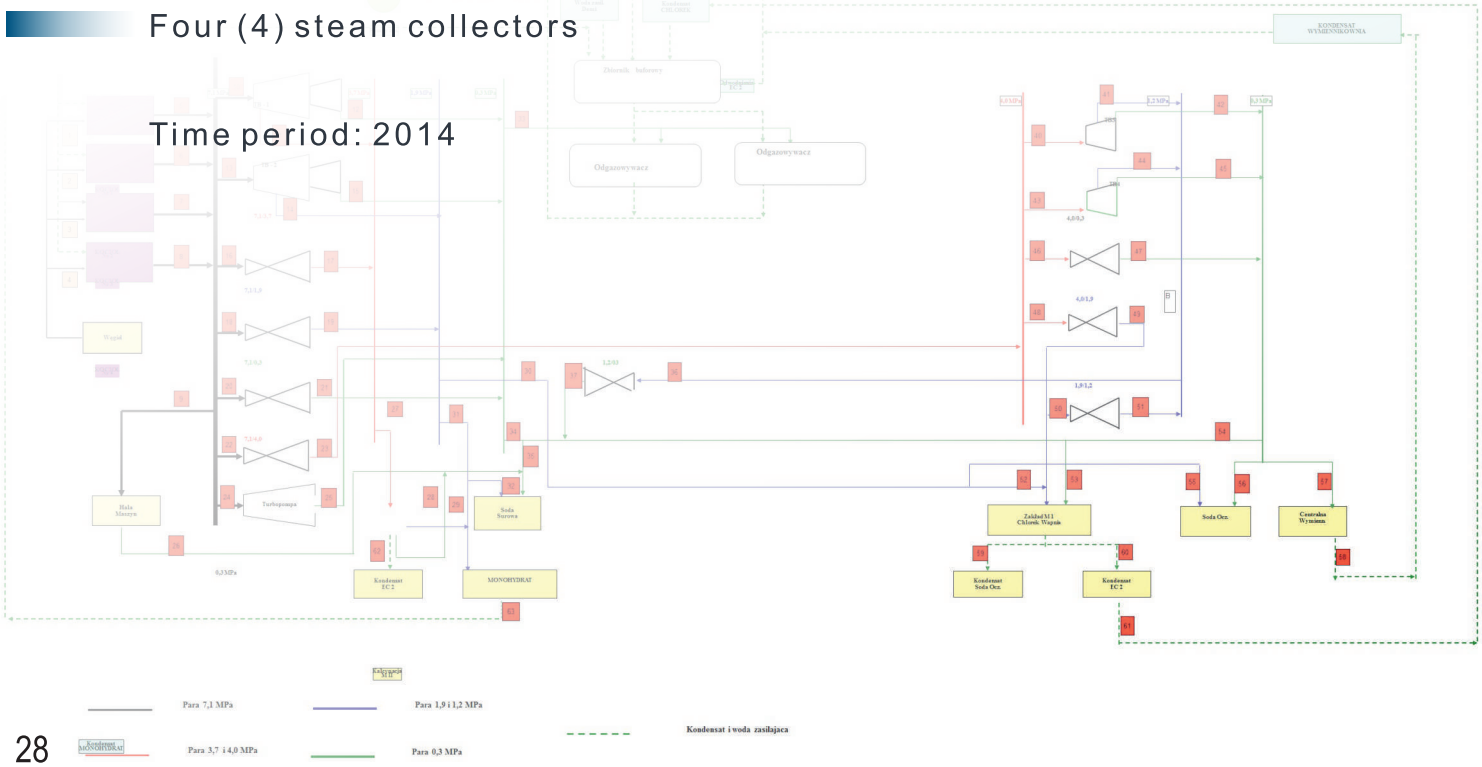
Services provided:

- Energy audit at CHP plant in Soda Production facility Inowroclaw
- Collecting relevant technical data
- Conducting thermodynamic and techno-economic calculations of CHP plant
- Identification of appropriate measures for achieving energy savings
- Preparation and elaboration of a report with technical and ecomonic aspects of selected measures for achieving energy savings

Key data:

- Four (4) coal fired steam boilers OP110 (110 t/h)
- Fresh steam pressure: 85 bar
- Fresh steam temperature: 465°C
- Two (2) back-pressure extraction steam turbines, rated power 17,5 MW
- Two (2) back-pressure extraction steam turbines, rated power 4,75 MW
- Eight (8) pressure reducing station
- Four (4) steam collectors

Time period: 2014



ANALYSIS AND OPTIMIZATION OF CHP PLANT JANIKOWO

Conducting energy audit at CHP plant in Soda Production facility Janikowo and recommendation of appropriate measures for achieving energy savings.

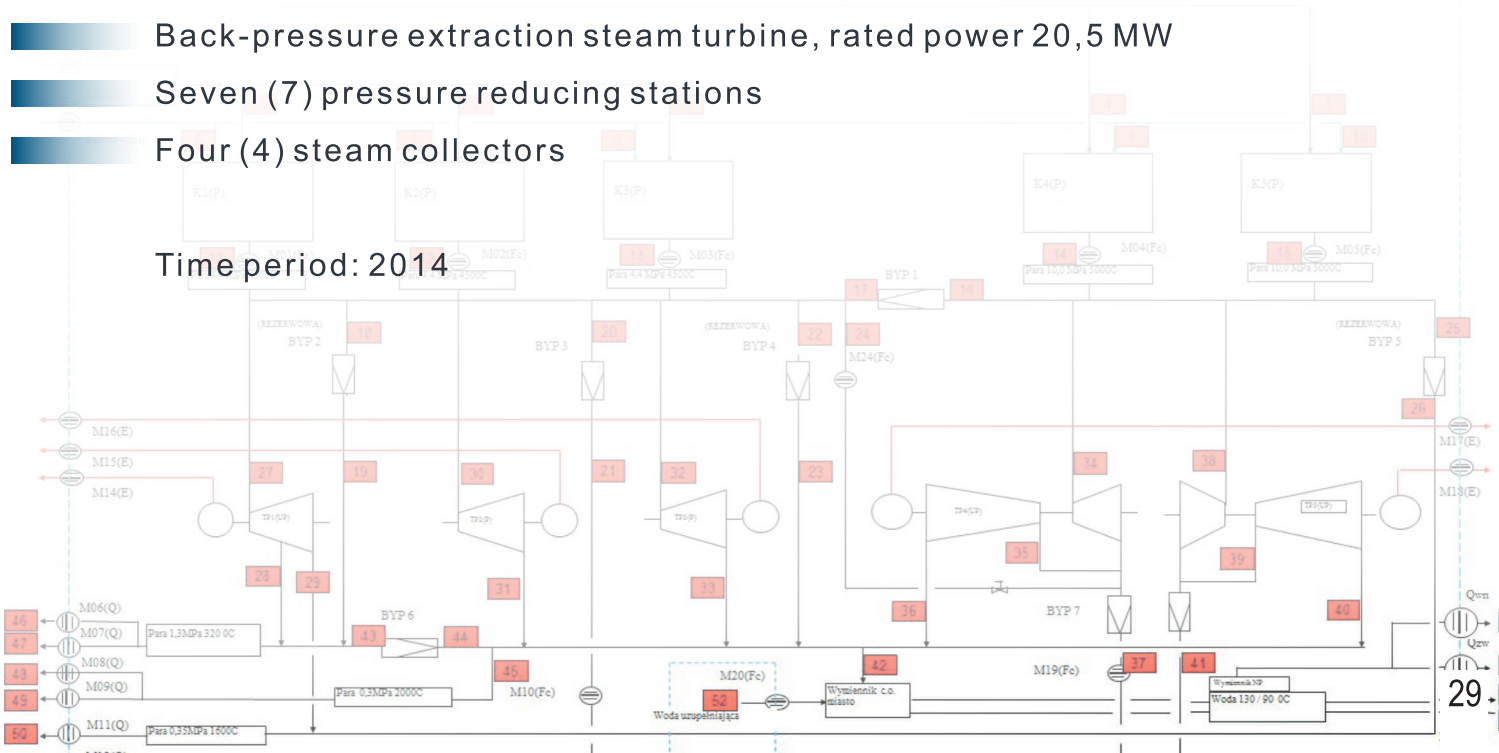
Services provided:

- Energy audit at CHP plant in Soda Production facility Janikowo
- Collecting relevant technical data
- Conducting thermodynamic and techno-economic calculations of CHP plant
- Identification of appropriate measures for achieving energy savings
- Preparation and elaboration of a report with technical and economic aspects of selected measures for achieving energy savings

Key data:

- Three (3) coal fired steam boilers CKTI-85 (85 t/h, 420˚C, 38 bar)
- Two (2) coal fired steam boilers OP-140 (140 t/h, 500˚C, 96 bar)
- Back-pressure extraction steam turbine, rated power 7,5 MW
- Back-pressure extraction steam turbine, rated power 4 MW
- Back-pressure extraction steam turbine, rated power 7,8 MW
- Back-pressure extraction steam turbine, rated power 16,2 MW
- Back-pressure extraction steam turbine, rated power 20,5 MW
- Seven (7) pressure reducing stations
- Four (4) steam collectors

Time period: 2014



ANALYSIS AND OPTIMIZATION OF CHP PLANT PLOCK

Conducting energy audit at CHP plant in Plock refinery and recommendation of appropriate measures for achieving energy savings.

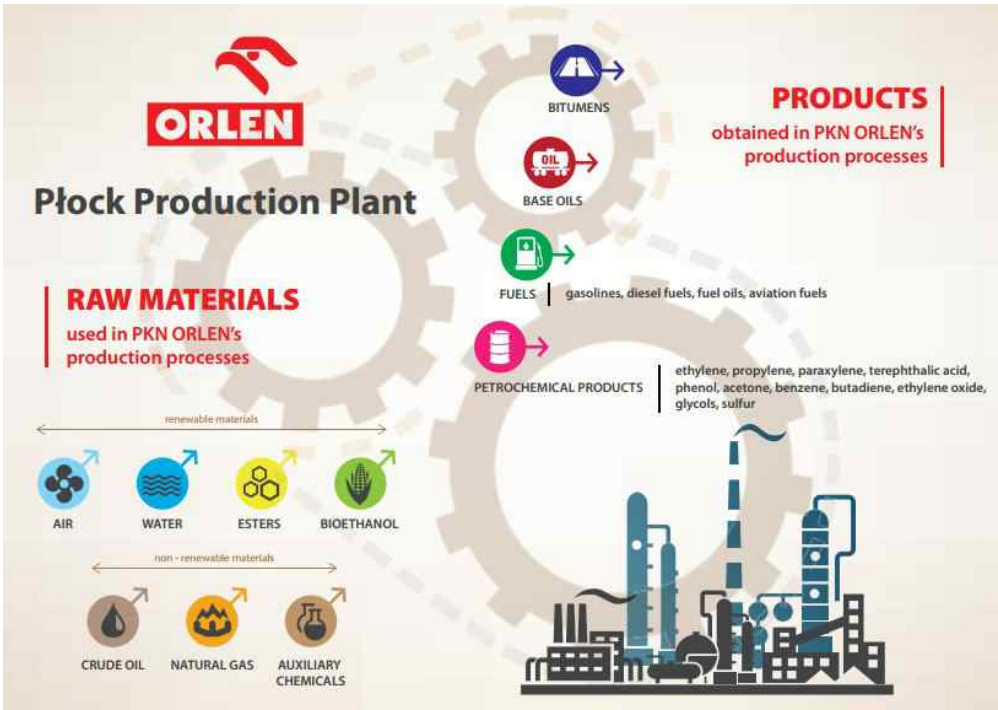
Services provided:

- Energy audit at CHP plant in Plock refinery
- Collecting relevant technical data
- Conducting thermodynamic and hydrodynamic process calculations of CHP plant
- Identification of appropriate measures for achieving energy savings
- Preparation and elaboration of a report with technical and economic aspects of selected measures for achieving energy savings

Key data:

- Seven conventional steam boilers (170-290 MW)
- Fresh steam pressure: 137 bar
- Fresh steam temperature: 550°C
- Six back-pressure steam turbines, rated power 55 MW
- One condensing steam turbine, rated power 70 MW
- Seven steam collectors
- Two steam stations
- Steam distribution network length 240 km

Time period: 2012



BIOLYS PRODUCTION PLANT IN VOLGODONSK

Contruction of a new Biolys production plant in Volgodonsk. Biolys is a highly efficient source of the amino acid L-lysine, produced via modern fermentation technology, and is used as a feed additive in modern animal nutrition. Wheat from the Rostov region will be used as a raw material.

Services provided:

- PDMS modelling of equipment according to vendor drawings (pumps, heat exchangers, various tanks, mixer, silos and other equipment on the project)
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- PDMS piping design (up to DN100)
- PDMS design of civil infrastructure to accommodate facility (building walls, steel structures and others as required)
- Preparation of general arrangement drawings
- Preparation of piping arrangement drawings
- Preparation of piping isometrics

Key data:

- Annual production capacity of around 100,000 metric tons starting from early 2015
- Steam flow 39500 kg/h
- Water flow (Potable + Industrial) 270 m^3/h
- Compressed air flow (process + instrumental) 52000 Nm^3/h
- Natural gas flow 1200 Nm^3/h
- Installed electrical power 20 MW

Time period: 2013 – 2014

CARBON BLACK & DELAYED COKER PROJECT (CBDC)

Construction of a Coke Calcination Unit to produce UV carbon black coke, semi-conductive black coke, calcined coke, using slurry oil and vacuum residue from Ruwais refinery as feed stock.

Services provided:

- PDMS modelling of equipment according to vendor drawings (pumps, heat exchangers, various tanks, mixer, Gillotin damper, various fans and other equipment on the project),
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- PDMS piping and HVAC design
- PDMS design of civil infrastructure to accommodate facility (building walls, steel structures and others as required)
- Preparation of General Arrangement drawings,
- Preparation of Piping Arrangement drawings,
- Preparation of HVAC isometrics

Key data:

- Green Coke Receiving, Sizing, Storage and Handling
- Calcination by means of two Calciner Lines with a feed capacity of 2 x 350.000 tpy at 347 dpy
- Calcined Coke Handling, Dedusting, Storage, Handling and Ship Loading
- Steam generation for refinery network
- Flue Gas Treatment
- Utility Systems

Time period: 2014

ALCOHOL PLANT IN BARBY

Construction of an Alcohol Plant comprising fermentation unit and distillation and rectification unit.

Services provided:

- PDMS modelling of equipment according to vendor drawings (pumps, heat exchangers, various tanks, mixers, distillation columns and other equipment on the project)
- Checking of vendor drawings and recommending required modifications
- Checking of P&ID's and recommending required modifications
- PDMS piping design
- Communication with pipe stress calculation department for required piping routing modifications
- PDMS design of civil infrastructure to accommodate facility (building walls, steel structures and others as required)
- Preparation of general arrangement drawings
- Preparation of piping arrangement drawings
- Preparation of piping isometrics

Key data:

- Design capacity of about 143 m^3/24 hrs.

Time period: 2014

SCR SPITTELAU VIENNA

Renovation and construction of the flue-gas denitrification plant for 2-lines waste-to-energy plant. From 2011-2015 Spittelau plant is being completely technically renewed and economically optimized. This includes also a new SCR-DeNOx system as low-temperature process including a heat transfer system.

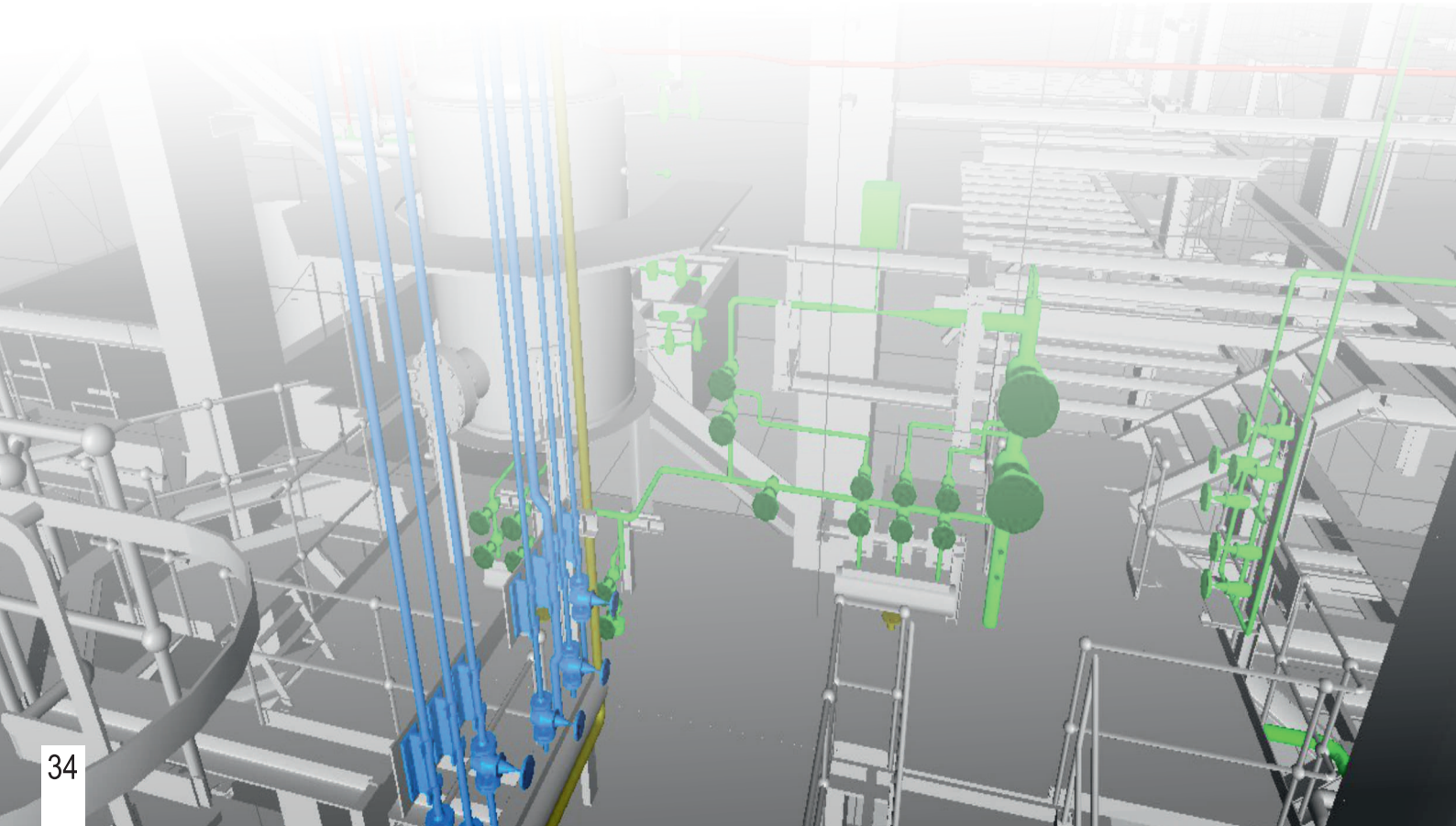
Services provided:

- Evaluation of existing PDMS model for the flue-gas denitrification plant
- Preparation of sectional drawings (PDMS/AutoCAD)

Key data:

- Flue gas flow rate (m_n^3/h): 220.000 (2x110.000)
- NOx reduction (mg/m_n^3): dry 11% O_2<70
- Nh_3 Slip (mg/m_n^3): 11% O_2<4

Time period: 2013



TA 341-TA-004 IN THE INA REFINERY RIJEKA POWER PLANT

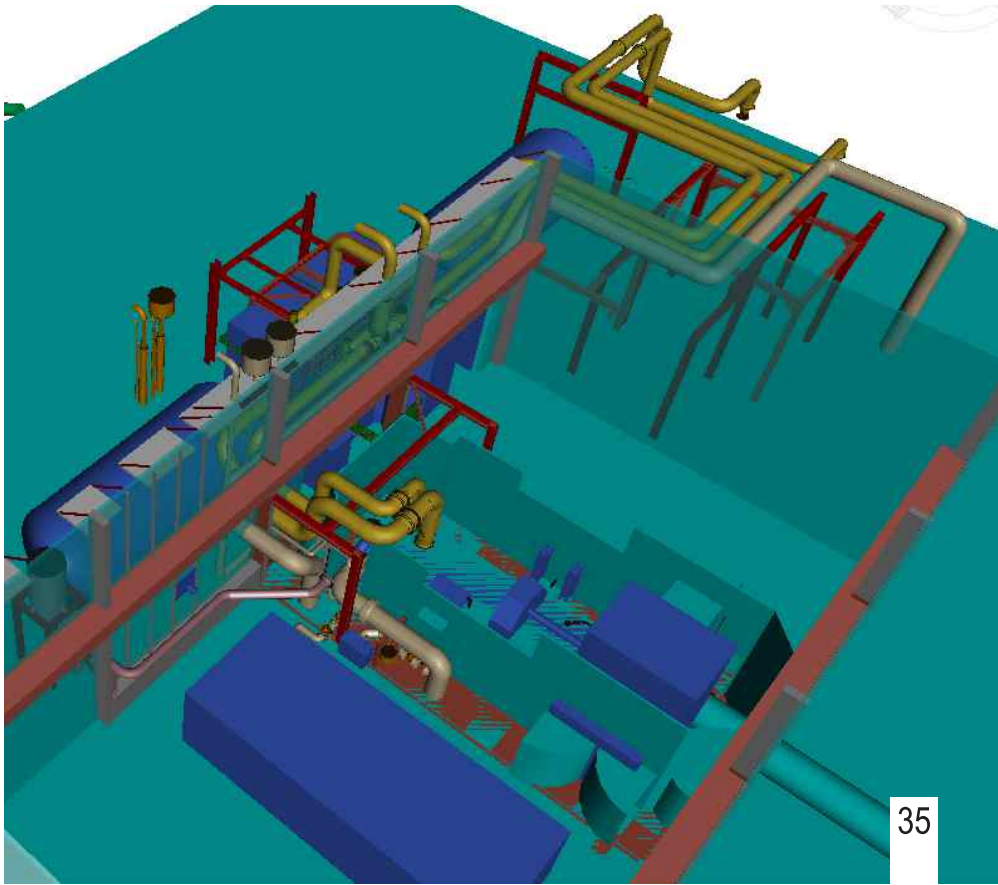
Services provided:

- Checking of a Steam Turbine Plant 3D PDMS model
- Providing substantial technical support to the mechanical Subcontractors with the aim of facilitating the rapid and economic execution of the installation works (erection)
- Preparation of as built documentation

Key data:

- Rated power 21 MW
- Rotational speed 6044/1500 min^{-1}
- Fresh steam pressure: 36 ÷ 38 bar
- Fresh steam temperature: 420 ÷ 450°C
- Fresh steam mass flow: 153 t/h
- First regulated extraction: 13 ÷ 15 bar, max. 50 t/h
- Second regulated extraction: 6 ÷ 7 bar, max. 50 t/h
- Exhaust steam pressure: 0.05 ÷ 0.12 bar
- Steam mass flow at inlet into condenser: 14.5 ÷ 51.7 t/h

Time period: 2011



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