



List of References

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APPA Consult GmbH

The idea of working together, sharing the same attitude towards customers, technology and environment, created our company. A team of experienced engineers, all working their whole business life in power plant, came together to give their best to the benefit of our customers.

In times when our customers invest in refurbishing their existing power plants, upgrade or built new plants, the permanent staff does not always match their demand.

APPA Consult can take over the entire development works or compensate the clients' lack of experts.

We provide project development from the idea to the realization of an investment, together with our customers to their benefit. We know changes or up-rates on existing products or when new players are entering the market. We keep eyes and ears open to watch what the market offers and the market requests to the success of our clients.



The following reference list is a compilation of APPA company orders but also representative projects our key personal has substantially been involved through out there business live in power plants. We cover selected projects only. Emphasize is given to more recent projects.

Abbreviations:

ACC	Air Cooled Condenser
BOP	Balancing of Plant
CAPEX	CAPital EXpenditures
CCGT	Combined Cycle Gas Turbine
CCHP	Combined Cycle Heat & Power
CCPP	Combined Cycle Power Plant
CFB	Circulating Fluidized Bed
CT	Cooling Tower
EIA	Environmental Impact Assessment
FGD	Flue Gas Desulphurization
CHP	Combined Heat & Power (Plant)
DOR	Division of Responsibility
FEED	Front End Engineering Design
EPC	Engineering Procurement & Construction
EPC(M)	Engineering Procurement & Construction Management
FBC	Fluidized Bed Combustion
FGD	Flue Gas Desulphurization
FSA	Fuel Supply Agreement
GT	Gas Turbine
HRSG	Heat Recovery Steam Generator
HSE (HS&E)	Health Safety & Environment
IPSE	Heat Balance Calculation Program
ISO	International Standard Organization
IWPP	Integrated Water and Power Plant
LHV	Low Heating Value (or Lower Heating Value)
LTSA (CSA)	Product Service Agreements (gas turbines, power trains only or total plants)
LNG	Liquefied Natural Gas
MFS	Minimum Functional Specification
OCGT	Open Cycle Gas Turbine (Plant)
OCPPP	Open Cycle Power Plant
OEM	Original Equipment Manufacturer
OPEX	OPerating EXpenditures
PPA	Power Purchase Agreement
RFQ/RFP	Tender Preparation (Request for Quotation or Request for Proposal)
ST	Steam Turbine
WHIP	Waste to Heat Incineration Plant
WTG	Wind Turbine Generator

Project Name: GINGER

Task (2018/2019): EPC Adviser for Andritz

Client	Country	Project Basics	Involvement
Andritz Küster GmbH	Germany	<p>Andritz Küsters GMBH (AKK) was bidding for a wetlaid project for production of glasfibre matts in the United States of America</p> <p>The scope AKK was bidding for comprised stock preparation, NexFormer and binder wire including transfer roll.</p>	<ul style="list-style-type: none"> Review of scope of supply to be offered Holding regular internal weekly meetings in order for all parties involved to be kept up to date and to coordinate necessary tasks and work packages Define the scope of supply of all parties (AKK and its affiliated companies as well as the client) involved and reflect the scope in an over scope split; this made sure that no part has been missed out elaborating and fine tuning various documents for the binding offer, such as Technical specification, Commercial conditions, Definition of conditions for Final Acceptance Certificate (FAC), Definition of conditions for Mechanical Completion Certificate (MCC) Define the scope of supply for a possible pre-engineering contract Coordinate with parent company (i.e. Andritz AG) scope of supply and way forward for a fast start-up of the project

Project Name: WOLFSBURG CHP

Task (2018): Owners Adviser for MHPS

Client	Country	Project Basics	Involvement
MHPS - Mitsubishi Hitachi Power Systems GmbH	Germany	<p>MHPS was bidding for a CHP Plant in Wolfsburg.</p> <p>The scheduled power plant consisted of one H-100 Gas Turbine, one Heat Recovery Steam Generator (HRSG) and one Steam Turbine</p> <p>Power electric scheduled: 136 MW_{el} Power thermal: 115 MW_{th}</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Discussion and optimization of the water steam cycle to find the best solution and efficiency. Together with MHPS team members finding the best technical solution for enquiry of the HRSG and Steam Turbine. Screening the market and contacting potential suppliers for supply of HRSG and ST. Study and review of the client's documents in order to pinpoint all necessary technical details relevant for enquiry of HRSG and ST Participating in client's meeting to discuss and finalize technical solutions to ensure best solution for the owner. Compiling all technical information and details available for enquiry of HRSG and ST Technical enquires of HSRG and ST, receive, evaluate all offers, hold technical discussions with potential suppliers Compile all technical documents forming the contract with the suppliers of HRSG and ST

<u>Project Name:</u> TAFILHA 2 – WIND POWER Task (2018/2019): Owners Engineer			
Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Tafilha, Jordan	<p>MGH is the Owner of a 100MW (28 WTGs) wind farm. Project execution started June 2018. APPA was contracted for Owners Engineer services. EPC Contractor is a consortium GE and Elecnor Project to be completed end of 2019.</p> <p>(Status: Project ongoing)</p>	<ul style="list-style-type: none"> • Time schedule Control • Management and supervising basic engineer, document review on behalf and in the name of MGH, monthly review meetings, audit meetings of engineering provider • Factory acceptance test witness on selected equipment • Quality Audits on selected suppliers • Reporting to MGH Project Management • Establishing improvement opportunities in the technological decision process • Supervising site installation works, works progress for erection, commissioning, punch list items and guarantee period • Quality assurance and control • Follow up reporting, with EPC Contractor • Claim Management

<u>Project Name:</u> KORNEUBURG – BYPASS CHIMNEY Task (2017/18): Owners Adviser-Planer /Feasibility Study			
Client	Country	Project Basics	Involvement
EVN	Austria	<p>EVN AG operates a combined cycle power plant in Korneuburg fired with natural gas with an electrical output of 160MW.</p> <p>For faster start-up of the plant it was intended to construct a bypass chimney in order to have the possibility to operate the GT in opencycle mode. The feasibility study carried out by APPA investigated the possibility to retrofit the plant with a bypass chimney including 2 dampers and compensators.</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Checking of existing documents & drawings in respect to change of static pressure and changed of flue gas velocities after the GT • Definition of relevant operating points – also for future planned upgrades of the Alstom GT 13DM • Basic Heat Balance calculation incl. worst case scenario; Calculation of heat input to the HRSG because of leakages in the damper • Computerized Fluid Dynamics (CFD) Analysis of operating points in order to define changes in pressure losses • Basic static calculation of the new chimney – defining weights and forces onto the fundament • Comparing feasibility of inside and outside insulation of fluegas duct • Establish time schedule level 1 for the project • Get and compare budgetary proposals for damper with and without sealing air technology. Compare both damper types for this project

Project Name: Besmaya2 CCPP

Task (2015/19): Owners Engineer for Engineering & Site

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Kurdistan / Iraq	<p>Subject: Phase 2, additional 1600 MW Combined cycle gas turbine power plant on a greenfield location close to Bagdad. The plant is based on 4 (four) "F" class gas turbine units every 2 GT units in 2:2:1 configuration. It is the extension of further 1600 MW</p> <p>This second investment is based on additional natural gas allocation to the project.</p> <p>EPC: J&P Greece</p> <p>(Status: Project ongoing)</p>	<ul style="list-style-type: none"> • Contract negotiation with 2 EPC bidders and OEM suppliers. Question & Answering process • Management and supervising basic engineer, document review on behalf and in the name of MGH, monthly review meetings, audit meetings of engineering provider. • Mechanical, electric and plant related switchyard, automation, plant Process engineering • BOP basic and detailed engineering supervision review of enquiry documentation check, • time schedule control • Project initiating support for mech. BOP • FEED (document and engineering review and approval of all EPC engineering works on civil work, mechanical, electric and automation • Factory acceptance test witness on selected mechanical, electrical and automation equipment. • Reporting to MGH Project Management • Establishing improvement opportunities in the technological decision process • Supervising site installation works, works progress for erection, commissioning, trial run, punch list items and guarantee period. • Performance test supervision • Quality assurance and control • Follow up reporting, with EPC Contractor • Claim Management

Project Name: SULAYMANIYAH HIGH VOLTAGE ELECTRIC

Task (2016): Owners Advisor, Owners Engineer

Client	Country	Project Basics	Involvement
Mass Global Holding	Jordan for Iraq / Kurdistan region	<p>Subject: Additional HV electric from 400 kV to 132 kV. The 400 kV line has not been completed in time, therefore the power from the steam turbine had to be transferred from 400 kV to 132 kV</p>	<ul style="list-style-type: none"> • Review of Feasibility study • Plant configuration • Steam cycle reference calculation • Cost evaluation • Basic Layout recommendation

<u>Project Name:</u> CHP / LOVOSICE			
Task (2016): Documents for Authority Approval of CHP			
Client	Country	Project Basics	Involvement
Glanzstoff CZ	Czech Rep. for Czech Republic	<p>Subject: Combined heat and power plant based on small gas turbines of about 5 MW</p> <p>The task has been to establish relevant project documents for start of Authority approval process</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Establishing submission documents for start of Authorities procedures Plant configuration for all options available in the market Steam cycle reference calculation on different equipment suppliers Cost re-evaluation Layout implementation into existing plant area Plant description, emissions, energy balance

<u>Project Name:</u> CHP / LOVOSICE			
Task (2016): Feasibility Review			
Client	Country	Project Basics	Involvement
Glanzstoff CZ	Czech Rep. for Czech Republic	<p>Subject: Combined heat and power plant based on small gas turbines of about 5 MW</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Review of Feasibility study Plant configuration Steam cycle reference calculation Cost evaluation Basic Layout recommendation

<u>Project Name:</u> BESMAYA CCPP PHASE 2			
Task (2015/16): Owners Advisory Services Bidding Stage			
Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Besmaya / Iraq	<p>Subject: Combined cycle gas turbine power plant extension of additional 1600 MW, adjacent to Besmaya No. 1.</p> <p>The plant is based on 4 (four) "F" class gas turbine units in 2:2:1 configuration.</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Review Tender documents Besmaya 1 and update to Phase 2 MoE Iraq grid connection negotiation Decision process for CT or ACC. Layout, plant arrangement guidance. Initial negotiations with 2 potential overall EPC bidders Question & answering in bidding process Evaluation and comparison of Bids Tender negotiation with 2 potential bidders. Substitute to the Client's team in commercial negotiations for guarantees and warranties and other tech/comm. contract conditions. EPC Contract negotiations with shortlisted Bidders. Implementation of clarifications and deviations into the Tender

<u>Project Name:</u> CCPP / BURSA			
Task (2016): Audit and Lifetime Evaluation			
Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Turkey for Jordan	<p>Subject: Combined cycle power station based on four (4) Mitsubishi 701F gas turbines in multi-shaft arrangement.</p> <p>APPA had been approached carrying out an Audit on the existing 1460 MW CCPP</p>	<ul style="list-style-type: none"> • Site Audit • Data collection from data room for investigation of the plant history on plant shutdowns, reliability etc. • Evaluate the service quality on CI, HGPI and Major Inspection • Steam cycle reference calculation for comparison reason.

<u>Project Name:</u> CCPP / TIMELKAM			
Task (2016): Plant Optimization Engineering			
Client	Country	Project Basics	Involvement
Energie AG	Austria for Austria	<p>Subject: Combined cycle power station based on one (1) Siemens SGT5-4000F single shaft.</p> <p>APPA had been approached for adaptation of the existing CCPP to a new operation regime based on Austrian Power Grid Control request. (Status: Project completed)</p>	<ul style="list-style-type: none"> • Update of the On-Line Monitoring software with regard to part-load operation • Ascertain optimization potential in the original parameter settings • Data collection, steam cycle reference calculation for optimization of plant • Data coordination with Siemens, • Support in the first HGPI after 16.000 equ. fired hours • bidders, support in bidders selection

<u>Project Name:</u> KONIN CCPP / POLAND			
Task (2015): Bid Preparation Engineering			
Client	Country	Project Basics	Involvement
Siemens	Austria for Poland	<p>Subject: Support in bid preparation for CHP plant Konin in Poland based on Siemens gas turbine SGT5-800 for several BOP components, mainly from the cold end of the steam turbine, e.g. condenser tube cleaning system and others</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Data collection/coordination with Siemens • Product survey for equipment. • Enquiry specification for BOP equipment • Evaluation of bids from suppliers, Technical comparison for Project Management

<u>Project Name:</u>	BANDIRMA 2 - CCPP / TURKEY
Task (2014/15):	Equipment Engineering

Client	Country	Project Basics	Involvement
Siemens SAGOE	Austria for Turkey	<p>Subject: Project execution support for combined cycle power station based on 1 (one) Siemens SGT5-8000H</p> <p>APPA had been provided with the execution of the gas fuel system design, engineering, preparation of purchase documents, technical negotiation with bidders and execution, site coordination and commissioning.</p>	<ul style="list-style-type: none"> • Data collection from Siemens execution team and from local sources • Basic design • Product survey for gas station supplier • Enquiry specification for the gas plant equipment, and gas compressor station • Bid evaluation, • Negotiation for optimization of equipment with equipment suppliers

<u>Project Name:</u>	BESMAYA1 CCPP
Task (2014-18):	Owners Engineer in Execution

Client	Country	Project Basics	APPA Involvement
Mass Global Holding (MGH)	Jordan for Iraq	<p>Subject: 1600 MW Combined cycle gas turbine power plant on a greenfield location close to Bagdad.</p> <p>The plant is currently based on 4 (four) "F" class gas turbine units every 2 GT units in 2:2:1 configuration. An extension of further 1600 MW shall be considered in design already. Second investment is based on natural gas allocation to the project.</p> <p>(Status: Project ongoing)</p>	<ul style="list-style-type: none"> • Phase II: Execution, starting from kick-off meeting, • Management and supervision on behalf and in the name of the Owner MGH. • Mechanical Plant Process engineering review for site support. • Basic and detailed engineering, enquiry document review and approval for mechanical, electrical (400 kV) and switchyard, C&I and automation. • Time schedule control / follow up. • Reporting to MGH Project Management, attending monthly progress meetings • Finding improvement opportunities for equipment purchasing and in the technological decision process • Project initiating support for mech. BOP • FEED (document control and engineering review of all EPC engineering works • Quality assurance and control Follow up reporting, monthly progress meetings with EPC Contractor • Supervising site installation works, works progress for erection, commissioning, trial run, punch list items and guarantee period. • Quality assurance and control Follow up reporting, progress meetings with EPC Contractor • Claim Management

Project Name: JORDAN 100 MW WIND POWER

Task (2014/15): Project Development / EPC BIDDING PROCESS
TECHNICAL SUPPORT

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan / Jordan	Subject: Consultancy support for the Client in preparation of bidding documents for 100 MW wind-power in Jordan. Selection of EPC contractor, preparation of wind analysis, cost/profit calculation	<ul style="list-style-type: none"> • Coordination of bid documents, scope diversification, • Power generator bid evaluation, reporting • Bid compilation • Follow up process on wind power measuring, (Status: Project completed)

Project Name: BESMAYA CCGP PHASE 1

Task (2014): Owners Advisory Services Bidding Stage

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Besmaya / Iraq	Subject: Combined cycle gas turbine power plant on a greenfield location close to Bagdad. The plant is based on 8 (eight) "F" class gas turbine units in 2:2:1 configuration. Due to gas allocation the execution has to be split in Phase 1 and Phase 2. (Status: Project completed)	<ul style="list-style-type: none"> • "Fit for purpose –plant configuration and gas turbine selection. • Featuring of the power plant in line with PPA and FSA (grid code and grid requirements, fuel used, cold end, black-start etc.), • Decision process 132 or 400 kV Switchyards • Decision process for CT or ACC. • Layout, plant arrangement guidance. • Preparation of Tender documents (Minimum Design Criteria) • Auditing of potential EPC contractors and reporting • Initial negotiations with 3 potential overall EPC bidders and with main equipment suppliers for gas turbines and steam turbines • Question & answering in bidding process • Evaluation and comparison of all Bids • Tender negotiation with 3 potential bidders. • Financial viability • Substitute to the Client's team in commercial negotiations for guarantees and warranties, compliance to PPA and FSA and other tech/comm contract conditions. • EPC Contract negotiations with shortlisted Bidders. Implementation of clarifications and deviations into the Tender

Project Name: ERBIL / SULAYMANIYAH / DUHOUK			
Task (2014): Implementation Case Study			
Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Kurdistan / Iraq	<p>Subject: Installation of equipment for supplement power production. Based on a power augmentation study from 2013 the case study shall secure the limits of power production for each location and each individual gas turbine train. Due to different date of purchasing and manufacturing (of gas turbine, generator, generator leads, transformer) the equipment data had to be evaluated individual.</p> <p>The study brought out the best possible combination of power augmentation investment based on 8 (eight) existing GT units of General Electric Frame 9E on each of the three site.</p>	<ul style="list-style-type: none"> Information collection from equipment suppliers Data collection from equipment at site Weakest link calculation from gas turbine, generator, bus bar and transformer Reporting to Project Management Compiling the report, directors summary defining best possible combination of power augmentation. Design review and supervision, of chosen augmentation equipment for one location <p>(Status: Project completed)</p>

Project Name: EREN-CORLU CCPP / TURKEY			
Task (2014): Bid Preparation Support			
Client	Country	Project Basics	Involvement
Mitsubishi - MHIE	Austria for Turkey	<p>Subject: Proposal support for CHP plant. Configuration support, cycle calculation for steam cycle based on large steam extraction from the turbine, best fitting steam turbine.</p> <p>Based on 1 (one) GT unit of Mitsubishi, one HRSG and 1 new Extraction-Condensing steam turbine</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Data collection, steam process cycle calculation, Product survey for steam turbines with steam extraction. Enquiry specification for steam turbine, Steam turbine bid evaluation, Negotiation for optimization of equipment with steam turbine bidders <p>Cycle calculation with improved steam turbine data</p> <p>Additional for the entire project a list of deviations and clarifications to the client's tender specification had been prepared.</p>

Project Name: DUHOUK OC TO CCPP CONVERSION

Task (2013/15): Owners Engineer for Design Review & Site

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Kurdistan / Iraq	<p>Subject: Conversion of OCPP into CCPP Supplement output: 500 MWeI on combined cycle Based on 8 (eight) existing GT units of General Electric Frame 9E, 8 new HRSG's from CMI and 2 new General Electric condensing steam turbine units as well as ACC (Air Cooled Condenser) and ancillary equipment</p> <p>EPC: Enka / Bechtel with GE as nominated subcontractor for Steam turbine</p> <p>(Status: Project on hold)</p>	<ul style="list-style-type: none"> • Management and supervising basic engineer on behalf and in the name of MGH, monthly review meetings, audit meetings of engineering provider. • Mechanical, electric (132 kV & 400 kV), switchyard, automation plant Process engineering • BOP mechanic, electric (132 kV and 400 kV and C&I, automation) and switchyard - basic and detailed engineering review of enquiry documentation, • time schedule control • Factory acceptance test witness on selected mechanical, electrical and automation equipment. • Reporting to MGH Project Management in the Middle East • Establishing improvement opportunities in technological decision process • Supervising site installation works, works progress for erection, commissioning, trial run, punch list items and guarantee period. • Performance test supervision (TUEV SUED) Document review as site support. • Quality assurance and control Follow up reporting, progress meetings with EPC Contractor

Project Name: PLOCK CCPP (CHP)

Task (2013/14): Owners Advisory Support on LTSA

Client	Country	Project Basics	Involvement
PKN Orlen Polska	Poland	<p>Subject: Advisory support for PKN Plock 500+ MW CCPP power plant. Support in tender review for the LTSA (Long Term Service Agreement), the guarantee performance and negotiations with all EPC candidates. Remaining Bidders: Siemens and General Electric.</p>	<ul style="list-style-type: none"> • Tender document review and update • Bidders Question & answering process • LTSA Tender preparation, Bid evaluation and negotiation with bidders • LTSA Contract completion with shortlisted Bidders. Contract negotiations for service contract (LTSA or CSA or equal)

Project Name: ERBIL (ARBEEL) OC TO CCPP CONVERSION

Task (2013/14): Owners Engineer for Design Review & Site

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Kurdistan / Iraq	<p>Subject: Conversion of OCPP into CCPP Supplement output: 500 MWel on combined cycle Based on 8 (eight) existing GT units of General Electric Frame 9E, 8 new HRSG's from CMI and 2 new General Electric condensing steam turbine units as well as ACC (Air Cooled Condenser) and ancillary equipment</p> <p>EPC: Enka / Bechtel with GE as nominated subcontractor for Steam turbine</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Supervising basic engineering on behalf and in the name of MGH, leading monthly review meetings, audit meetings at location of engineering provider. Document control, management and review Mechanical, electric (132 kV & 400 kV) and switchyard, automation plant Process engineering BOP basic and detailed engineering, review of enquiry documentation check and release time schedule review Factory acceptance test (FAT) witness on main mechanical, electrical and DCS equipment. Reporting to MGH Project Management Establishing improvement opportunities in technological decision process Supervising site installation works, works progress for erection, commissioning, trial run, punch list items and guarantee period. Performance test witness (TUEV SUED) Quality assurance and control Follow up reporting with EPC Contractor

Project Name: SULAYMANIYAH GT POWER AUGMENTATION

Task (2013): Feasibility & Invest Study

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan	<p>Subject: Power augmentation opportunities for 9E gas turbines with / without water requirements</p> <p>Development of augmentation opportunities on either gas turbines in operation but also on gas turbines under constructions</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> Add on optimization study for Duhouk, later extended also for the Erbil & Sulaymaniyah gas turbine power stations as well Comparison of all power augmentation options available in the market Power output, water requirements, installation of equipment into existing plants or equipment already under manufacturing Cost impact, ROI evaluation Negotiation with equipment bidders Influence of power augmentation into conversion equipment (steam turbine, HRSG, ACC) Plant configuration and Conceptual engineering, equipment location (in filter

			house) for gas turbines already in operation. <ul style="list-style-type: none"> • Emission and impact analysis • Cooling water requirement study • Conceptual plant and system layout
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<u>Project Name:</u> SULAYMANIYAH CONVERSION OC TO CAPP Task (2013/16): Owners Engineer for Design Review & Site

Client	Country	Project Basics	Involvement
Mass Global Holding (MGH)	Jordan for Kurdistan / Iraq	Subject: Conversion of OCPP into CAPP Additional output: 500 MWeI on combined cycle Based on 8 (eight) existing GT units of General Electric Frame 9E, add on of 8 new HRSG's and 2 new condensing steam turbine units and ACC (Air Cooled Condenser), and related BOP equipment, the add on electric and automation, switchyard connection to 132 kV (temporary) and 400 kV grid EPC: Enka Turkey (Status: Project completed)	<ul style="list-style-type: none"> • Establishing MDC (Minimum Design Criteria), negotiate with EPC bidders and OEM suppliers. Question & Answering process • Management and supervising basic engineer on behalf and in the name of MGH, monthly review meetings, audit meetings of engineering provider. • Mechanical, electric (132 kV & 400 kV) and switchyard, automation plant Process engineering • BOP basic and detailed engineering supervision review of enquiry documentation check, • time schedule control • Project initiating support for mech. BOP • FEED (document and engineering review and approval of all EPC engineering works on civil work, mechanical, electric and automation • Factory acceptance test witness on selected mechanical, electrical and automation equipment. • Reporting to MGH Project Management • Establishing improvement opportunities in the technological decision process • Supervising site installation works, works progress for erection, commissioning, trial run, punch list items and guarantee period. • Performance test supervision (TUEV SUED) • Document review as site support. • Quality assurance and control Follow up reporting, with EPC Contractor

Project Name: PAPELERA CHP PLANT			
Task (2013): Feasibility Study			
Client	Country	Project Basics	Involvement
Allplan for Fabrica de Papel Islas California	Mexico	Subject: CHP Combined Heat and Power Plant for paper factory. Design configuration for 10 MW CHP plant in a paper factory, CAPEX & OPEX estimate, technical design criteria Status: Project completed	<ul style="list-style-type: none"> • Project coordination for the proposed works • Configuration • Performance estimate • Scope definition • Cost evaluation (CAPEX) • Layout support • OPEX expenses • Reporting

Project Name: PLOCK CCPP			
Task (2013): Feasibility Report			
Client	Country	Project Basics	Involvement
PKN Orlen	Poland	Subject: Consultancy support for new investment at PKN Plock refinery. CCPP power plant with power production of 500 MW nominal and thermal energy delivery to the petrochemical plant Plock Status: Project completed	<ul style="list-style-type: none"> • Preparing a status report for heavy duty gas turbines in the range of 450+ MWel • current technology levels of all OEM's • future up-rates or upgrades of gas turbines on the range, worldwide • Time frame of machine up-rates, introduction, reference situation • Advantages of new machines (flexibility, emissions, minimum load, modes of operation philosophy.

Project Name: TAHRIR CHP AND SC BACKUP			
Task (2012): Owners Advisor – Tender Preparation			
Client	Country	Project Basics	Involvement
Financial Arranger and EPC INVAR Intl	Egypt	Subject: CHP Combined Heat and Power Plant for petrochemical plant Ain Sokhna. Bidding process for a combined heat and power plant lot in the configuration with 2 gas turbine units Frame 9E (General Electric), 2 HRSG's and auxiliary equipment Additional 1 Unit GE Frame 6B for backup	<ul style="list-style-type: none"> • Proposal management for the proposed works • Division of Works between all partners • Performance guarantees • Bid coordination, evaluation and clarification • Cost evaluation (CAPEX) • Layout support • Preparation of Proposal for mechanic, civil, electric and instrumentation • Contract negotiation

<u>Project Name:</u> BADRA SIMPLE CYCLE			
Task (2012): Owners Advisor – Tender Preparation			
Client	Country	Project Basics	Involvement
Financial Arranger and EPC INVAR Intl	Iraq	<p>Subject: Open Cycle power plant Badra Oilfields.</p> <p>Bidding process for an open cycle power plant in the configuration 3 + 1 gas turbine units based on Frame 6B gas turbines (General Electric), auxiliary equipment</p>	<ul style="list-style-type: none"> • Project management and coordination for the proposed works • Division of Works between all partners • Performance guarantees • Bid coordination, evaluation and clarification • Cost evaluation (CAPEX) • Layout support • Tender Compilation

<u>Project Name:</u> OSIJEK CCPP (CHP)			
Task (2012/13): Environmental Impact Assessment (EIA)			
Client	Country	Project Basics	Involvement
IGH Zagreb for HEPP Municipality Osijek	Croatia	<p>Subject: District Heating Power Plant nominal 450 to 500 MWel “F” class heavy duty gas turbines of all known worldwide bidders</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Environmental impact assessment – Preparation of technical report • Plant configuration and Conceptual engineering • Coordination with local partner for Authority approval process • Presentation of project to municipality and residents • Emission and impact analysis • Cooling water requirement study • Conceptual plant and system layout • Design review and layout planning

<u>Project Name:</u> OSIJEK CCPP (CHP)			
Task (2012/13): Conceptual Study and Feasibility Study			
Client	Country	Project Basics	Involvement
IGH Zagreb for HEP Municipality Osijek	Croatia	<p>Subject: District Heating Power Plant nominal 250 to 500 MWel Configuration and Feasibility Study for heavy duty “E” or “F” class based gas turbines plant</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Plant configuration and Conceptual engineering • Configuration of power plant fitting to existing district heating power plant. Investment Study, long term ROI • Coordination with local partner for local requirements, analyses, standards • Emission and impact analysis • Minimum water requirement in alternatives cooling tower or river-water design • Conceptual plant and system layout • Design review and layout planning • Presentation of project to municipality and HEP

Project Name: YANBU3 – IWPP

Task (2012): Owners Advisor – Bid Extension

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting (Saudi Arabia) and CCC – Contracting & Engineering Contract Services (Greece)	Saudi Arabia	<p>Subject: grass root power and desalination plant 2708 MWel / 550.000 m3 / day</p> <p>Bid extension work for the conventional steam power plant based on B&W Boilers and Alstom steam turbines.</p> <p>EPC: ACC/ /CCC Athens. B&W and Alstom as nominated sub-contractors</p>	<ul style="list-style-type: none"> • Project management and coordination for the bid extension works • Total equipment responsibility for electric, mechanic and C&I • Developing concept alternatives with B&W and Alstom on thermal cycle. • Heat balance optimization • Alternative concept of supercritical boiler design • Revised price calculation • Bid extension compilation work.

Project Name: PP-10 RIYADH OC TO CAPP CONVERSION

**Task (2012-13): Owners Engineer
Engineering Supervision for EPC Contractor**

Client	Country	Project Basics	Involvement
BEMCO as EPC Contractor Lebanon / Saudi Arabia	Saudi Arabia	<p>Subject: Conversion of OCPP into CAPP Additional output: 1350 MWel in combined cycle Based on 40 (forty) existing GT units of General Electric Frame 7EA, 40 new HRSG's from NEM and 10 new General Electric condensing steam turbine units as well as ACC (Air Cooled Condenser)</p> <p>EPC: BEMCO with GE as nominated subcontractor for ST</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Advising a Spanish basic engineer on behalf and in the name of BEMCO. • Mechanical Plant Process engineering advice and optimization. • BOP basic and detailed engineering , enquiry documentation check, time schedule control • Reporting to BEMCO Project Management in the Middle East • Establishing improvement opportunities for equipment purchasing and in technological decision process • Project initiating support for mech. BOP, FEED of engineering works • Quality assurance and control Follow up reporting, monthly progress meetings with EPC Contractor in the engineering phase

<u>Project Name:</u> LAZISKA & RNEST			
Task (2011-12): Engineering and QA/QC Support			

Client	Country	Project Basics	Involvement
STRABAG Austria	for Poland and Brasil	Subject: Revamping of DeNOx plants for petrochemical industry in Poland (PKN ORLEN) and For petrochemical plant in Brazil (Petrobras) APPA: Personal support to enrich the STRABAG project execution team on FEED, document controlling, QA/QC, Auditing and documentation	<ul style="list-style-type: none"> • FEED (Front End Engineering Design) • Equipment Supplier Audits • QA/QC at manufacturers and subcontractors manufacturing facilities

<u>Project Name:</u> TE-TOL LUBLJANA CHP			
Task (2011-12): Owners Advisor – Tender Preparation			

Client	Country	Project Basics	Involvement
EPC Contractor RUDIS d. d. Trbovlje (Slovenia)	Slovenia	Subject: CHP Combined Heat and Power Plant for district heating Ljubljana Bidding process for a combined heat and power plant lot in the configuration with either 2 gas turbine units SGT5-800 (Siemens), 2 HRSG's and auxiliary equipment (steam turbine is in a separate lot).	<ul style="list-style-type: none"> • Project coordination for the proposed works • Division of Works between all partners • Developing concept Rudis and partner • Heat balance optimization • Performance guarantees • Bid coordination, evaluation and clarification • Layout support • Tender Compilation

<u>Project Name:</u> TIMELKAM CCHP			
Task (2011): ON LINE MONITORING			

Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	Combined cycle power plant nominal 400 MWeI main contractor to the client: Siemens On Line monitoring based on IPSE simulation and configuration	<ul style="list-style-type: none"> • Restart of implementation of Online Monitoring System after bugfixing of OPC server in DCS by OEM • Implementation of Graphical User Interface

Project Name: RAS AL KHAIR (OLD: RAS AZ ZAWR) – IWPP

**Task (2011): EPC Execution Phase 2 (extension to Phase 1):
Basic Engineering EPC(M) support**

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting / Saudi Arabia and SEPOCO3 / China	Saudi Arabia	<p>Subject: grass root power and desalination plant 2400 MWel / 1.000.000 m3 / day Based on 12 units Siemens GT and 5 units ST, HRSG's from Doosan.</p> <p>Configuration 2:2:1 and 2 GT units in OCPP</p> <p>EPC: ACC/SEPCO3, Siemens as nominated subcontractor</p> <p>(Status: Phase 2 start 01. April 2011 completed 14. July 2011)</p>	<ul style="list-style-type: none"> • EPC Contractors Engineer for basic engineering of mech. BOP, • Management of power train (gas turbine, HRSG, steam turbine) • BOP engineering, enquiry documentation, contract negotiation for gas system, distillate system, water treatment, steam condensers, steam piping. • Coordination for Q&A and HSE • Planning and engineering support for electric BOP (order to Siemens EFIE) • Follow up meetings, coordination meetings with Siemens, monthly progress meetings with the Ministry, SWCC and Owners Engineer (Pöyry Elektrowatt) in the engineering phase 2

Project Name: YANBU3 – IWPP

Task (2011): Owners Advisor – Tender Preparation

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting (Saudi Arabia) and CCC – Contracting & Engineering Contract Services (Greece)	Saudi Arabia	<p>Subject: grass root power and desalination plant 2708 MWel / 550.000 m3 / day</p> <p>APPA support for the power station only. Bidding process for a conventional steam power plant based on B&W Boilers and Alstom steam turbines.</p> <p>APPA: Owners Advisor for the power plant offer preparation.</p> <p>EPC: ACC/ /CCC Athens. B&W and Alstom as nominated sub-contractors</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Project management and coordination for the proposal works • Responsible for mechanic, electric (400 kV) and automation. • Division of Works between all partners • Developing concept alternatives with B&W and Alstom • Heat balance optimization • Performance guarantees • Bid coordination, evaluation and clarification • Equipment configuration, coordination of B&W and Alstom, piping arrangement, FGD (de-sulphurization) & DENOX, equipment • Civil work / 2D Layout configuration and CAPEX calculation for civil and piping. • Complete price calculation • Tender Compilation • Contract negotiation and coordination of all major partners in the project. • Cost calculation in preparation for contract execution

<u>Project Name:</u> WLOCLAWEK (CCPP)			
Task (2011): OWNERS CONSULTANT – (EPC BIDDING PROCESS)			
Client	Country	Project Basics	Involvement
PKN Orlen Polska	Poland	<p>Subject: Consultancy support for PKN Wloclawek 450+ MW CCPP power plant and thermal extraction. Revision of Tender (RFQ) prepared previously by others, Support in negotiations with Bidders for the major components gas turbine, HRSG, steam turbine, layout, time scheduling and project setup. Apparent winner: Siemens</p>	<ul style="list-style-type: none"> • Main equipment negotiations with 5 Bidders (6 different gas turbines) • Question & answering process • LTSA Tender preparation, Bid evaluation and contract negotiations • Negotiation of clarifications and deviations for Orlen. • Layout, plant arrangement guidance. • Technical Bid evaluation Phase 1 (preliminary) and Phase 2 (final). • EPC Contract negotiations with shortlisted Bidders. Contract negotiations of service contract (LTSA or CSA or equal)

<u>Project Name:</u> OBROVAC (CCPP)			
Task (2011): MINIMUM FUNCTIONAL SPECIFICATION – RFP (RFQ)			
Client	Country	Project Basics	Involvement
IGH Zagreb	Croatia	<p>Subject: grass root power plant nominal 400 to 500 MW Environmental Impact Study for heavy duty “F” class gas turbines in single shaft configuration (Status: Project completed)</p>	<ul style="list-style-type: none"> • Review and update of Feasibility Study • Invitation for Bid, Instructions to Bidders, • Equipment enquiry documents, • Concept Engineering, Heat Balances • Layout, Plot plan, Arrangement drawings, Schematics • Preparation of Minimum Function Specification • Mechanical components • Electric and I&C • Civil work coordination • QA/QC, Health & Safety

<u>Project Name:</u> OBROVAC CCPP			
Task (2011): Configuration and Environmental Impact Assessment (EIA)			
Client	Country	Project Basics	Involvement
IGH Zagreb	Croatia	<p>Subject: grass root power plant nominal 400 to 500 MW Environmental Impact Study for heavy duty "F" class gas turbines in single shaft configuration and Air Cooled Condenser</p> <p>(Status: Project completed)</p>	<ul style="list-style-type: none"> • Environmental impact assessment – Preparation of technical report • Establishing related information and drawings for Authority approval • Plant configuration and Conceptual engineering • Coordination with local partner for Authority approval process • Plant implementation into HEPP grid and gas connection • Presentation of project to municipality and residents • Emission and impact analysis • Minimum water requirement study • Conceptual plant and system layout • Design review and layout planning

<u>Project Name:</u> SITE EXECUTION PROCEDURE FOR CCPP			
Task (2010): QA STANDARD SITE DOCUMENTATION			
Client	Country	Project Basics	Involvement
Austrian Energy & Environment (AE&E)	General	<p>Development of the structural basics for Site Standard Documentation for Bandirma I and as tool for all future CCPP projects.</p> <p>(Status: Project Completed)</p>	<ul style="list-style-type: none"> • QA Activity & Coordination Plan • Definition of Functions • Standard Master QA Plan • Standard QA Inspection & Test Plan • Site Coordination: Delivery of Material, Erection, Training, Commissioning, Tests, Trial Run, Transfer to Client, Closing Site

<u>Project Name:</u> TABOUK OCPP (SIMPLE CYCLE GT)			
Task: 2010 Site Managing			
Client	Country	Project Basics	Involvement
ACC – Al Arrab Contracting Co. for Saudi Arabian Electricity Company (SEC)	Saudi Arabia	<p>Open cycle power plant with Siemens SGT6-3000 gas turbines fired with distillate oil only Outdoor design / compound and individual plant operation</p> <p>Total output 312 MWeI</p>	<ul style="list-style-type: none"> • Plant Site Management from mid of erection time, cold tests and hot tests • Boundary limits coordination, • Contract with SEC, Siemens • Electric support • Sub-supplier coordination • Time scheduling

Project Name: RAZ Az ZAWR – IWPP

**Task (2010/2011): EPC Execution Phase 1:
Basic Engineering (EPC(M)) support**

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting and SEPOCO3	Saudi Arabia / China	<p>Subject: grass root power and desalination plant 2400 MWel / 1.000.000 m3 / day Based on 12 units Siemens GT and 5 units ST, Doosan HRSG's</p> <p>EPC: ACC/SEPCO3, Siemens as nominated subcontractor for the power train</p> <p>(Status: Project completed 31. March 2011)</p>	<ul style="list-style-type: none"> EPC Contractors execution engineering for basic design of mech. and electrical BOP, 400 kV switchyard establishing of project management process tools (Primavera 6 and Document management system based on Sharepoint) Time scheduling of total plant (MS-Project and Primavera level 3 and 4) Overall layout basic planning Coordination of power train (gas turbine generators, HRSG, steam turbine generator sets) Plant Process engineering 400 kV Switchyard: Grid study of HV balance between Ma'aden and the SEC grid, consequences for the net, the steam process, bypass alternative development. BOP engineering, enquiry documentation, RFQ for gas system, distillate system, water treatment, steam condensers, steam piping. Coordination for Q&A and HSE Developing structures for the PMO (Proj. Mgmt. Office). Project Startup support for electric BOP, FEED of engineering works (Lahmeyer India scope) Follow up meetings, monthly progress meetings with Owners Engineer (Pöyry Elektrowatt) in the engineering phase

Project Name: RAZ Az ZAWR – IWPP

Task (2010): Owners Advisor – Evaluation Process

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting and SEPOCO3	Saudi Arabia	<p>Subject: grass root power and desalination plant 2400 MWel / 1.000.000 m3 / day Based on Siemens GT and ST. EPC: ACC/Siemens/SEPCO3, (Status: Concluded)</p>	<ul style="list-style-type: none"> Owners Consulting for Evaluation Process Coordination for Q&A Developing / structuring a PMO (Proj. Mgmt. Office) Organisation Chart, Manpower Schedule for Execution.

Project Name: HASKOVO TPP (CCPP)

Task (2009/2010): EU CONFORMITY OF TENDER SPECIFICATION

Client	Country	Project Basics	Involvement
LGE / Finance Engineering	Bulgaria	Revise Functional Specification to fit into EU requirements for open tendering process. Subject are two x 130MW CCPP South East of Bulgaria (completed)	Establishing: <ul style="list-style-type: none"> • Invitation to Bid • Instructions for Tenderer • Long Term Service Contract conditions • Question & answering process • Coordination with EPC Bidder Contract extension: <ul style="list-style-type: none"> • Support in Bidding stage, question & answering, • Deviation & Clarification negotiation of full technical part (mechanical, electrical, C&I as well as civil work • PPA / FSA support Site connections and tie in points for electricity, gas and water

Project Name: RAZ Az ZAWR – IWPP

Task (2010): Owners Advisor – Tender Preparation

Client	Country	Project Basics	Involvement
EPC Contractor Al Arrab Contracting / Saudi Arabia and SEPOCO3 / China	Saudi Arabia	Subject: grass root power and desalination plant 2400 MWel / 1.000.000 m3 / day Based on Siemens GT and ST. APPA: Owners Advisor for the power plant offer. EPC: ACC/Siemens/SEPCO3, (Status: SWCC provided the contract to ACC + SEPCO III) (Project completed, order to ACC)	<ul style="list-style-type: none"> • Project management and coordination for the proposal works • Division of Works between all partners • Developing concept alternatives with Siemens • Heat balance optimization • Bid coordination, evaluation and clarification • Performance guarantees, Emission guarantees, Auxiliary consumption of total power plant and individual CCPP units • CAPEX & OPEX cost estimation for the CCPP units as well as for the open cycle gas turbines units • Tender Compilation • Question & Answering process with SWCC • Supporting ACC in contract negotiation with nominated subcontractor Siemens for GT, HRSH, ST, Generators and DCS system

Project Name: BIOMASS POWER PLANT HEB BAERNBACH			
Task (2010): Preparation of Tender Documents (RFQ)			
Client	Country	Project Basics	Involvement
E-Steiermark	Austria	10 MW steam turbine plant for a biomass power plant. Nominal 10 MWeI and optional district heating	<ul style="list-style-type: none"> • Preparation of enquiry documents for steam turbine, related electric, C&I and condensing plant. • Heat balance evaluation and optimization • Offer evaluation and comparison • Contract negotiation with sub suppliers

Project Name: QESHM CCPP			
Task (2009): PHASE 1 – OWNERS CONSULTANT			
Client	Country	Project Basics	Involvement
Vado-Engineering	Iran	Preparation of technical contract documents, scope of work, basic configuration of a 540 MW Combined Cycle Power Plant in 2:2:1 configuration using two GT13-E2 gas turbines from Alstom, two HRSG's (SF) and one steam turbine	<ul style="list-style-type: none"> • Feasibility Study, plant configuration, investment- and operation expenses, Plant Break Even evaluation. • Main equipment selection, based on decided gas turbine supplier • Preparation of technical contract documents for all systems, e.g. mechanical equipment, mechanical BOP, electric BOP, Instrumentation and automatization, civil work • Preparation of Scope of Works • Concept Engineering, Heat Balances • Layout, Arrangement drawings, Schematics • Mechanical component enquiries • Electric and I&C basic design • Preparation of Tender for Long Term Service Contract • Negotiations with subcontractors

<u>Project Name:</u> HASKOVO TPP (CCPP)			
Task (2009): MINIMUM FUNCTIONAL SPECIFICATION – (RFQ)			
Client	Country	Project Basics	Involvement
Leveraged Green Energy US / Finance Engineering Bulgaria	Bulgaria	Preparation of a minimum functional specification including Tender for Long Term Service Contract for two blocks of 130 MW CCPP each in the South East of Bulgaria. OEM: Siemens, GE or Rolls Royce	<ul style="list-style-type: none"> • Main equipment enquiry documents, comparison of suppliers proposals • Question & answering process • Preparation of clarifications and deviations • Concept Engineering, Heat Balances • Layout, Arrangement, Schematics • Mechanical Electric and I&C • Preparation of Minimum Function Spec. • Contract negotiations

<u>Project Name:</u> HASKOVO TPP (CCPP)			
Task (2009): CONCEPTUAL STUDY AND PLANT CONFIGURATION			
Client	Country	Project Basics	Involvement
LGE US and Finance Engineering	Bulgaria	Evaluation of three different Gas Turbine types (Heavy Duty and Aero-derivatives) for suitability in a 260 MW Combined Cycle Power Plant for an independent power producer (IPP project) (completed)	<ul style="list-style-type: none"> • Concept Engineering, Heat Balances • Configuration opportunities • CAPEX / calculation • OPEX calculation over different durations • Market reference study • Economical evaluation and comparison • Executive Summary

<u>Project Name:</u> TIMELKAM CCHP			
Task (2009/10): ENGINEERING/DESIGN DISTRICT HEATING STORAGE			
Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	Combined cycle power plant 400 MWel and biomass power plant Equipment: Siemens SGT5-4000F, Existing fuel storage tank to be converted into district heating storage	<ul style="list-style-type: none"> • Timelkam Power Plant (EnergieAG), Operating Case Studies for district heating storage tank, • Design and design optimization of one District Heating Storage Tank which had to be converted from fuel storage. Thermal calculation / design of interior DH water distribution system

<u>Project Name:</u>	TIMELKAM CCHP
Task (2009/10):	PERFORMANCE TEST EVALUATION GAS TURBINE (3)

Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	LTSA for Turboset of Combined cycle power plant 400 MWel. Main contractor to the client: Siemens. Equipment: Siemens SGT5-4000F, Performance Test evaluation for the Client based on IPSE simulation tools (completed)	<ul style="list-style-type: none"> • Technical Advisor for Performance Test Procedure and evaluation of the results of the GT-only test after first inspection (measured by DCS) • Support to the client in negotiations with Siemens (LTSA)

<u>Project Name:</u>	DEVELOPMENT PROJECT APPA
Task (2009):	ISO 9001 Certification

Client	Country	Project Basics	Involvement
APPA Internal	Austria	Integrated management system and ISO 9001 certification (completed)	<ul style="list-style-type: none"> • Project Management, Organization and working structures • Working procedures and company policy documents

<u>Project Name:</u>	BUCHAREST SOUTH CHP
Task (2009):	OFFER PREPARATION, COST EVALUATION

Client	Country	Project Basics	Involvement
Efacec	Portugal	Preparation of proposal documents (General Part and Mechanical Equipment Part) for one 112 MWel and 116 MWth CCHP for Bucharest South / Romania based on GE 6FA+e gas turbine (Project Completed)	<ul style="list-style-type: none"> • Analysis of tender and site visit • Main equipment enquiry documents, comparison of suppliers proposals • Preparation of clarifications and deviations • Concept Engineering, Heat Balances • Time Schedule • Layout, Arrangement, Schematics • Mechanical, Electric and I&C • Preparation/Compilation of Bid • Contract negotiations

<u>Project Name:</u>	BANDIRMA CAPP
Task (2009):	SITE STATUS REVIEW

Client	Country	Project Basics	Involvement
A-TEC PPS	Turkey	Review of site status and project management implementation on site (completed)	<ul style="list-style-type: none"> • Interview with site key personnel • Review of schedules against status • Review of quality reports

<u>Project Name:</u>	BIOMASS CHP ALT-WEITRA
Task(2008/11):	Design & Engineering and Plant Operation

Client	Country	Project Basics	Involvement
WP Biostrom-anlagen GmbH	Austria	For NAWARO Energiebetriebe CHP Altweitra, Austria, 5,0 MWel CHP biomass power plant: Fuel Handling, Boiler, Steam Turbine, BOP equipment, cooling system. WP was taking responsibility prior first plant start-up.	<ul style="list-style-type: none"> • plant improvement • trouble shooting • solve punch list items on fuel handling • Plant reconstruction • eliminating of defects • Plant operation management • reorganize documentation

<u>Project Name:</u>	BANDIRMA CAPP
Task (2009):	SITE STATUS REVIEW

Client	Country	Project Basics	Involvement
A-TEC PPS	Turkey	Review of site status and project management implementation on site (completed)	<ul style="list-style-type: none"> • Interview with site key personnel • Review of schedules against status • Review of quality reports

<u>Project Name:</u>	(STANDARDIZATION CAPP PROJECTS)
Task (2009):	PROJECT STATUS REVIEW

Client	Country	Project Basics	Involvement
A-TEC PPS	Austria	Project Management Review of a project for an Austrian EPC Contractor (completed)	<ul style="list-style-type: none"> • Interviews with the core project management team members • Review of schedules • Review of project management execution implementation • Periodical review and Audit

<u>Project Name:</u>	BIOMASS CHP GOEPFRITZ
Task(2008/10):	Design & Engineering and Plant Operation

Client	Country	Project Basics	Involvement
WP Biostrom-anlagen GmbH	Austria	For NAWARO Energiebetriebe CHP Göpfritz, Austria, 5,5 MWel CHP biomass power plant: Fuel Handling, Boiler, steam turbine, BOP equipment, cooling system. WP was taking responsibility at plant start-up. APPA support to WP (cooperation with our partnering company) on all technical subjects and expert support	<ul style="list-style-type: none"> • plant improvement • trouble shooting • solve punch list items on fuel handling • Plant operation manager • Plant reconstruction • eliminating of defects • reorganize documentation • Plant Operation

<u>Project Name:</u> BIOMASS CHP RASTENFELD			
Task(2008/10): Design & Engineering and Plant Operation			
Client	Country	Project Basics	Involvement
WP Biostrom-anlagen GmbH	Austria	For NAWARO Energiebetriebe CHP Rastendorf, Upper Austria, 5,0 MWel CHP biomass power plant: Fuel Handling, Boiler, steam turbine, BOP equipment, cooling system. WP was taking responsibility at plant start-up. APPA support to WP (cooperation with our partnering company) on all technical subjects and expert support	<ul style="list-style-type: none"> • plant improvement • trouble shooting • solve punch list items on fuel handling • Plant operation manager • Plant reconstruction • eliminating of defects • reorganize documentation • Coordination support for proposal works and customer negotiation

<u>Project Name:</u> BIOMASS CHP ALTWEITRA/GOEPFRITZ/RASTENFELD			
Task(2008/09): Maintenance Requirements for Biomass Power Plant			
Client	Country	Project Basics	Involvement
WP Biostrom-anlagen GmbH	Austria	For NAWARO Energiebetriebe * CHP Göpfritz, * Altweittra and * Rastendorf, Austria, 5,0 MWth and 5,5 MWel CHP biomass power plant: Maintenance plan, preventive maintenance, regular inspection programs, inspection plan APPA support to WP (cooperation with our partnering company) on all technical subjects and expert support	<ul style="list-style-type: none"> • Periodical Inspection plans daily, weekly, monthly and according OEM requirement • Lubrication chart • Boiler and boiler parts • Steam turbine • Cooling system • eliminating of defects • fuel handling

<u>Project Name:</u> (STANDARDIZATION CCPP PROJECTS)			
Task (2008/09): PROJECT MANAGEMENT PROCESSES			
Client	Country	Project Basics	Involvement
A-TEC PPS	Austria	Improvement of the Project Management System of an Austrian EPC Contractor	<ul style="list-style-type: none"> • Review of implementation of existing system • Tuning of workflows, • Controlling • Auditing concept • Detailing procedures • Training

<u>Project Name:</u> WEISWEILER & WEIHE			
Task (2009): OFFER PREPARATION			
Client	Country	Project Basics	Involvement
A-TEC PPS	Austria	Preparation of proposal documents (General Part and Mechanical Equipment Part) for two 860 MW CCGT power plants for RWE Power AG / Germany	<ul style="list-style-type: none"> • Analysis of tender documents • Prepare questionnaire on the project • Preparation of clarifications and deviations • Concept Engineering and optimization • Selection of BOP equipment • Preparation of Bid Documents

<u>Project Name:</u> TIMELKAM CCHP			
Task (2008/09): ON LINE MONITORING			
Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	Combined cycle power plant nominal 400 MWeI main contractor to the client: Siemens On Line monitoring based on IPSE simulation tools	<ul style="list-style-type: none"> • Interface definition and location for signaling of the entire process • On-Line Monitoring System configuration, measuring device list, implementation based on IPSE

<u>Project Name:</u> SPE NAVAGNE			
Task (2009): OFFER PREPARATION			
Client	Country	Project Basics	Involvement
A-TEC PPS	Austria	Preparation of proposal documents (General Part and Mechanical Equipment Part) for one 900 MW CCGT power plant for SPE Navagne / Belgium	<ul style="list-style-type: none"> • Analysis of tender • Preparation of clarifications and deviations • Concept Engineering • Preparation of Bid Documents

<u>Project Name:</u> TIMELKAM CCHP			
Task (2008/09): PERFORMANCE TEST EVALUATION (1)			
Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	Combined cycle power plant nominal 400 MWeI. Main contractor Siemens Equipment: Siemens SGT5-4000F, HRSG 3 pressure reheat and steam turbine. Performance Test evaluation for the Client based on IPSE simulation tools	<ul style="list-style-type: none"> • Technical Advisor for Performance Test • evaluation of the results (measured and processed according to VDI 2048 by Arsenal Research / AIT), for 100 %, 80 % and extreme part load condition 25% during reliability test run and after first improvement • Support to the client in negotiations with Siemens (EPC)

Project Name: TIMELKAM CCHP			
Task (2008/09): PERFORMANCE TEST EVALUATION GASTURBINE (2)			
Client	Country	Project Basics	Involvement
Energie AG Upper Austria	Austria	LTSA for Turboset of Combined cycle power plant 400 MWel. Main contractor to the client: Siemens Equipment: Siemens gas turbine SGT5-4000F, Performance Test evaluation for the Client based on IPSE tools	<ul style="list-style-type: none"> • Technical Advisor for Performance Test Procedure and evaluation of the results of the GT-only Baseline (measured by Arsenal Research / AIT) • Support to the client in negotiations with Siemens (LTSA)

Project Name: EDELWEISS			
Task (2008/09): Feasibility Study and Conceptual Study			
Client	Country	Project Basics	Involvement
Voest Alpine Stahl (VAS)	4 different l	Concept definition for utilization of low grade process gases from steelworks in a thermal power plant Nominal 370 MWel Study of several thermodynamic concepts either in combined cycle design or in conventional power plant configuration	<ul style="list-style-type: none"> • Technical evaluation of the concepts regarding fuel aspects, lifetime, operation ability, phasing possibilities, gas turbine experience and capability • Gas turbine evaluation 'fit for purpose' on special fuel composition (Coke oven gas and other low grade process gases, • CAPEX & OPEX evaluation • Emission estimation • Location study • Executive Summary

Project Name: CZEŃSTOCHOWA CHP ON COAL, BIOMASS			
Task(2008/09): Basic Design and Engineering in Project EPC Execution			
Client	Country	Project Basics	Involvement
Fortum Heat Polska SP.Z.O.O	Poland	The new CHP plant will utilize coal and wood residue as fuels in a FBC boiler 64 MWel / 120 MWth Main equipment supplier: Alstom, Foster Wheeler	<ul style="list-style-type: none"> • Coordination support for proposal works and customer negotiation • Project management, basic design and coordination support with regard to FBC boiler and steam turbine • ST and equipment: basic & detail design, coordination with Alstom • Heat balance checks and revisions • Cost estimation • Developing and preparing the overall contract time schedule based on Primavera

Project Name: UNDISCLOSED			
Task (2008): Owners Consultant to Search for Location			
Client	Country	Project Basics	Involvement
Undisclosed	Germany	Power plant location search Conceptual design of a plant on single shaft or on dual shaft basis Technical input for operation contract 800 MWel All possible options based on 'F' technology gas turbines	<ul style="list-style-type: none"> • Evaluation of possible site locations fitting best possible with regard to power off-take, fuel supply, water availability and public acceptance • Evaluation comparison for single shaft or dual shaft configuration (delivery time, cost estimates for direct and indirect costs, space requirements) • Evaluation of main cooling water, network connection and natural gas supply options at different locations • Environmental impact evaluation • Pre project management • CAPEX OPEX prior to decision to build

Project Name: RAS LAFFAN C – IWPP			
Task (2008): Owners Consultant – Proposal Coordination			
Client	Country	Project Basics	Involvement
International Developer AES-Dubai	Qatar	Development of grass root power and desalination plant 2600 MWel / 250000 m3 per day EPC: General Electric US, Tecnicas Reunidas Spain, Fisia Italimpianti Italy	<ul style="list-style-type: none"> • Project management and coordination for the proposal stage • Preparation of inquiry documents (MFS – Minimum Functional Specification) • Developing concept alternatives with GE • Heat balance calculations, optimization • Bid evaluation and clarification • CAPEX & OPEX estimation • Environmental study

<u>Project Name:</u> KHARAFI NATIONAL – SABIYA OPEN CYCLE PLANT			
Task (2007): Offer Preparation OCPP			
Client	Country	Project Basics	Involvement
Kharafinational for Ministry of Energy (Electricity & Water) Kuwait	Kuwait	Open cycle gas turbine power plant on an emergency plan to provide power to city of Kuwait before summer 2008 2500 MWel based on ISO conditions Comparison of GT suppliers for new equipment as well as for used gas turbines Final selection: General Electric	<ul style="list-style-type: none"> • Owners engineer for proposal works and negotiations with the Ministry of Energy • Determination of plant configuration and layout • Technology and equipment selection • Conceptual design • CAPEX & OPEX estimation (with Fortum) • Health safety and environment concept • Proposal work support

<u>Project Name:</u> KHARAFI NATIONAL - AZ ZOUR OPEN CYCLE PLANT			
Task (2007): Offer Preparation			
Client	Country	Project Basics	Involvement
Kharafinational for Ministry of Power & Water Kuwait	Kuwait	Open cycle gas turbine power plant on an emergency plan to provide power to city before summer 2008 750 MWel GT supplier comparison, searching for used gas turbines Final selection: Siemens GT	<ul style="list-style-type: none"> • Owners engineer for proposal works and questionnaire from the Ministry of Energy • Determination of plant configuration and layout • Technology and equipment selection • Conceptual design • CAPEX & OPEX estimation (together with Fortum and Enprima) • Health safety and environment concept • Proposal work support

<u>Project Name:</u> PETROBRAZI CCHP			
Task (2008): RFQ (Inquiry Documents) Revision			
Client	Country	Project Basics	Involvement
OMV / Petrom SA	Romania	Combined cycle power project with option for later steam extraction 800 MWel	<ul style="list-style-type: none"> • Tender evaluation invitation to bid and instructions for bidders • Tender revisions based on individual equipment specifications for mechanical equipment, BOP, electric, C&I, civil work • Revision of schedules for objectives of quality, equipment selection, HSE, standards & codes, company norms etc.

<u>Project Name:</u> LINGEN / EMSLAND TOPPING-GT BLOCK C			
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Task (2008):		Revamping Basic Engineering	
Client	Country	Project Basics	Involvement
Owner RWE Germany Support: Babcock Hitachi Graz / Austria	Germany	Simple cycle (open cycle) gas turbine TOPPING power plant. The units are dedicated for efficiency improvement of the existing Emsland coal power plant in the City of Lingen. 2 aeroderivative gas turbines of the GE LM 6000 type from MTU Friedrichshafen, Germany 2 on one configuration with combined exhaust gas duct to the Benson coal boiler.	<ul style="list-style-type: none"> • Conceptual design, layout in existing plant, gas ducting & gas bypass • Electrical equipment • Heat balancing and optimization • CAPEX & OPEX estimation • Basic engineering for plant execution. <ul style="list-style-type: none"> • Project had been postponed due to the energy policy of RWE – project on hold.

<u>Project Name:</u>		GERSTEINWERK TOPPING-GT BLOCK 1	
Task (2008):		Basic Engineering for Plant Refurbishment	
Client	Country	Project Basics	Involvement
Owner: RWE Germany Support: Babcock Hitachi Graz / Austria	Germany	Simple cycle (open cycle) gas turbine TOPPING power plant (replacement of existing V92.2 gas turbine). The units are dedicated for efficiency improvement of the existing Gersteinwerk coal power plant in City of Lingen. 2 Aeroderivative gas turbines of the GE LM 6000 type from MTU Friedrichshafen, Germany 2 on one configuration with combined exhaust gas duct to the Benson coal boiler.	<ul style="list-style-type: none"> • Conceptual design, layout in existing plant, gas ducting & gas bypass • Electrical equipment • Heat balancing and optimization • CAPEX & OPEX estimation • Basic engineering for plant execution. • Technical feasibility study of exhaust gas ducting in combination with existing boilers • Project had been postponed due to the energy policy of RWE – project cancelled.

<u>Project Name:</u>		TIMELKAM CCHP	
Task:		Owners Consultancy Services	
Client	Country	Project Basics	Involvement
Energie AG	Austria	Combined cycle power plant nominal 400 MWeI EPC contractor to the client: Siemens, GT type SGT-5 4000F in single shaft configuration.	<ul style="list-style-type: none"> • Heat balance evaluation, revision of Siemens heat balances • Performance Guarantee test and evaluation of test results, improvement of complete power plant

Project Name: WEITENDORF HEAT RECOVERY OF GAS COMPRESSOR

Task (2008/09): Environmental Impact Assessment (EIA)

Task (2009/11): Owners Engineer (OE)

Client	Country	Project Basics	Involvement
OMV Power	Austria	<p>EIA: Utilization of exhaust heat of a pipeline compressor station, equipped with three gas turbines (GE/Nuovo Pignone PGT 25).</p> <p>Add on steam cycle process with HRSG, steam turbine and condensing tail with cooling tower</p> <p>Owners Engineer Supervising the EPC contractor in engineering, planning and execution.</p>	<ul style="list-style-type: none"> • Project Management for: • Environmental impact assessment – Preparation of technical report • Authority approval procedures • Presentation of project to municipality and residents (public hearing) • Emission and impact analysis • Conceptual plant and system layout • Design review and layout planning • Preparation of Tender documents • Evaluation of EPC proposals • Lead technical negotiations until signing of EPC contract • Project Management for: Owners engineer activities, FEED, time schedule, design release, sub-suppliers procedures and selection, conformity with OMV contract

Project Name: GRASSI CCPP

Task (2007): Feasibility Study CCPP for LNG Plant

Client	Country	Project Basics	Involvement
Newfoundland LNG Ltd.	Newfoundland and Labrador, Canada	<p>Combined cycle power plant supplied by three delivery jetties for LNG tankers up to 265.000 m3 capacity and storage facilities to supply the GT power plant on LNG gas fuel</p> <p>Establishing alternative solutions for CCGT nominal 160 MWeI based on 2:2:1 configuration and add-on simple cycle gas turbine plant</p> <p>Configuration study based on GE LM 6000 Aeroderivative gas turbines and Siemens SGT6-800 or SGT6-700 GT technological alternatives</p>	<ul style="list-style-type: none"> • Conceptual design, layout and plant configuration • Main equipment evaluation • Heat balancing and optimization • CAPEX & OPEX estimation • Invest study preparation for power plant island.

<u>Project Name:</u> ASSALUYEH CHP			
TASK: FEASIBILITY STUDY			
Client	Country	Project Basics	Involvement
Quest International Ltd. Dubai	IRAN	<p>Combined heat and power plant of 900 MW in n+1 configuration for the chemical complex Assaluyeh, in Bushehr province.</p> <p>Study has to evaluate all gas turbines in the size between 125 MW and 190 MW. Configuration study has been based on GE, Alstom, Mitsubishi and Siemens GT technology.</p> <p>Client intends to implement GT power plant based on IPP/FSA PPA and steam supply contract (SSC) contract</p>	<ul style="list-style-type: none"> • Conceptual design, layout based on different number of GT's • Main equipment evaluation • Thermal cycle calculation and optimization • CAPEX & OPEX estimation over 25 years • Invest study preparation for power plant island.

<u>Project Name:</u> TIMELKAM CCHP			
Task: Owners Consultancy Services			
Client	Country	Project Basics	Involvement
Energie AG	Austria	<p>Combined cycle power plant nominal 400 MWeI</p> <p>EPC contractor to the client: Siemens, GT type SGT-5 4000F in single shaft configuration.</p>	<ul style="list-style-type: none"> • Heat balance evaluation, revision of Siemens heat balances • Performance Guarantee test and evaluation of test results, improvement of complete power plant

<u>Project Name:</u> TABOUK OCPP (SIMPLE CYCLE GT)			
Task: Offer Preparation			
Client	Country	Project Basics	Involvement
ACC – Al Arrab Contracting for Saudi Arabian Electricity Company (SEC)	Saudi Arabia	<p>Open cycle power plant with four Siemens SGT5-800 gas turbines fired with distillate only</p> <p>Outdoor design / compound and individual operation</p> <p>Total output 312 MWeI</p>	<ul style="list-style-type: none"> • Tender preparation • Scope split definition with Siemens • Contract negotiation with SEC • Electric and C&I support

<u>Project Name:</u>	SALALAH (SIMPLE CYCLE GT)
Task:	Preparation of Tender

Client	Country	Project Basics	Involvement
Saudi Oger for Oman Power & Water Procurement Company S.A.O.C.	Oman	370 to 430 MW OCGT plant with later extension to CCGT Plant Nominal 400 MWeI / 15 MIGD desalination plant	<ul style="list-style-type: none"> • Technical evaluations • Comparison between GE Frame 6FA and GE Frame 9E for plant concept • CAPEX & OPEX estimation for OCGT and CCGT in different configurations • Heat balance calculation for fuel demand estimations based on annual load profile

<u>Project Name:</u>	WINTERTHUR CCPP
Task:	Feasibility Study

Client	Country	Project Basics	Involvement
Winterthur Municipality	Swiss	Refurbishment of District Heating Plant, renew of steam cycle	<ul style="list-style-type: none"> • Conceptual design, layout • HRSG equipment evaluation • Heat balancing and optimization • CAPEX & OPEX estimation • Investment study preparation.

<u>Project Name:</u>	BUCHAREST VEST CHP
Task:	Offer Preparation and EPC Engineering

Client	Country	Project Basics	Involvement
Electro Centrale Bucharest (ELCEN)	Romania	Refurbishment project for brown field plant Bucharest Vest (CET Vest) replacing conventional power plant by CHP to produce electric power and heat for the Bucharest network 190 MWeI / 174 MWth General Contractor based on GE Frame 9E gas turbine, Skoda steam turbine and Alstom Brno HRSG (now AE&E)	<ul style="list-style-type: none"> • Project management from project development up to contract award • Project development study in line with Owners requirements • Feasibility study in cooperation with ISPE • EIA (Environmental Impact Assessment) support for the client, revision of EIA • Basic and detail study for special gas compressor based on Romanian law and local gas supply restrictions together with Distrigaz Sud SA • Site investigation, layout study • Owners consultant for functional specification, dimensioning, pre-engineering, approval procedure and permitting work • Preparation of proposal based on turnkey contract conditions • Cost & price evaluation • Contract negotiation • Selection of main equipment • Transfer to EPC contract execution • Plant engineering during execution

<u>Project Name:</u> ANKARA CAPP			
Task: Offer Preparation and EPC Contractor (VA Tech)			
Client	Country	Project Basics	Involvement
Tractebel Energy Engineering and SPC Baymina	Turkey	<p>Combined cycle power plant based on two GE frame 9FA gas turbines, two HRSGs and one steam turbine</p> <p>763 MWeI (nominal)</p>	<ul style="list-style-type: none"> Project development work for 800 MW project for Innogy/UK (change from Alstom GT 26 gas turbine to GE Frame 9FA) Project transfer process from Innogy to Tractebel Preparation of proposal based on EPC contract conditions for Tractebel Consortium (GE and VA Tech) contract negotiation Cost & price evaluation Selection of main equipment Transfer to EPC contract execution

<u>Project Name:</u> PLOMIN ANTHRACITE COAL			
Task: EPC Contractor (AE&E)			
Client	Country	Project Basics	Involvement
HEP Croatia	Croatia	<p>Coal power plant 180 MW Benson boiler, HP steam 180 bar 545 °C, 670 t/h</p>	<ul style="list-style-type: none"> Project development work for AE&E Project transfer to execution Responsibility for the boiler design, construction and commissioning at site Plomin, Croatia Fuel handling and preparation Selection of main equipment

<u>Project Name:</u> COOLKEERAGH CAPP			
Task: Offer Preparation and EPC Contractor (VA Tech)			
Client	Country	Project Basics	Involvement
ESBI International Investments Rep. Ireland	Northern Ireland	<p>Plant configuration based on one GE Frame 9FA gas turbine, HRSG (Standardkessel) and one Alstom steam turbine on a turnkey basis</p> <p>398 MWeI</p>	<ul style="list-style-type: none"> Preparation of bid based on EPC contract conditions Consortium contract negotiation (GE lead and VA Tech as consortium partner) Cost & price evaluation Selection of main equipment Transfer to EPC contract execution E/C&I systems (including automation and protection) engineering and commissioning

<u>Project Name:</u> THESSALONIKI CCPP			
Task: Offer Preparation and EPC Contractor (VA Tech)			
Client	Country	Project Basics	Involvement
HPC Hellenic Petroleum Corporation	Greece	Plant configuration based on one GE 9FB gas turbine, HRSG and one Franco Tosi steam turbine (full condensing) with seawater intake system and seawater cooling tower 390 MWel	<ul style="list-style-type: none"> • Concept studies • Preparation of proposal based on EPC contract conditions • Consortium contract negotiation • Cost & price evaluation • Selection of main equipment • Transfer to EPC contract execution • Preparation of FGD- bidding documents, • Preparation of Technical Specifications • E/C&I systems (including automation and protection) engineering and commissioning

<u>Project Name:</u> TERMOLI CCPP			
Task: Contract Negotiation and EPC Contract Execution (VA Tech)			
Client	Country	Project Basics	Involvement
Energia SPA	Italy	Plant configuration based on one gas turbine, HRSG and one steam turbine full condensing with cooling tower Nominal 800 MWel	<ul style="list-style-type: none"> • Concept studies • Preparation of proposal based on EPC contract conditions • Consortium contract negotiation • Cost & price evaluation • Selection of main equipment • Transfer to EPC contract execution • E/C&I systems (including automation and protection) engineering and commissioning

<u>Project Name:</u> FLÖTZERSTEIG WHIP			
Task: Owners Consultant, Project Management			
Client	Country	Project Basics	Involvement
Vienna Municipality	Austria	Reconstruction of 3 waste burning lines and renewing of water treatment station for district heating supply, reconstruction of 3 electrostatic precipitators 60 MWth	<ul style="list-style-type: none"> • Concept studies • Preparation of proposal based on EPC contract conditions • CAPEX evaluation • Selection of main equipment • Execution Project Manager • Delivery of the entire supply •

<u>Project Name:</u> LAUTA WHIP			
Task: Owners Consultant, Project Management			
Client	Country	Project Basics	Involvement
Dresden Municipality	Germany	2 Lines waste incineration and flue gas purification, 1 backpressure turbine, generator and piping 16 MWel / 75 MWth	<ul style="list-style-type: none"> • Preparation of proposal based on EPC contract conditions • CAPEX & OPEX evaluation • Selection of main equipment • Preparation of offer and sale • Project Manager for execution

<u>Project Name:</u> ARNOLDSTEIN WHIP			
Task: Owners Consultant, Project Management			
Client	Country	Project Basics	Involvement
TRV Arnoldstein	Austria	Waste incineration plant for 80.000 t/a household waste, preparation of the general contract 6 MWel / 28 MWth	<ul style="list-style-type: none"> • Concept studies • Basic design • Preparation of proposal based on EPC contract conditions • CAPEX evaluation • Selection of main equipment WHR Boiler • Project Manager plant execution

<u>Project Name:</u> SIMMERING BIO MASS			
Task: Owners Consultant, Project Management			
Client	Country	Project Basics	Involvement
Municipality Vienna	Austria	General contract for turnkey biomass incineration plant 24 MWel / 65 MWth	<ul style="list-style-type: none"> • Support for the basic study for the municipality • Preparation of proposal • Consortium negotiations / subcontractor negotiations • CAPEX evaluation • Selection of main equipment supplier Biomass Boiler etc. • Project managing for plant execution

<u>Project Name:</u> KELENFÖLD CCHP			
Task: Turnkey Contract Supervisor & Consultant			
Client	Country	Project Basics	Involvement
MVM Rt.	Hungary	Refurbishment - implementation of one GE Frame 9E gas turbine with HRSG to feed existing steam turbines and Budapest district heating on turnkey basis 136 MWel / 196 MWth	<ul style="list-style-type: none"> • Turnkey contract • Engineering, Procurement and Commissioning of systems • Take over measurements of turbine vibrations and acoustic measurements

<u>Project Name:</u> GROZAVESTI CCHP			
Task: Offer Preparation & Negotiation, Transfer to Execution			
Client	Country	Project Basics	Involvement
Eisenberg Group for Municipality Bucharest	Romania	Refurbishment of combined heat and power plant by implementing of two GE frame 6B and two waste heat hot water boilers 80 MWeI / 154 MWth	<ul style="list-style-type: none"> • Turnkey contract negotiation up to 'preferred bidder' status • Project development on downtown Bucharest conditions, special noise requirements, special requests on gas pressure conditions in downtown area, dismantling work investigation on existing equipment • Thermodynamic concept • Contact negotiations • Engineering

<u>Project Name:</u> KULIM CCPP			
Task: Offer Preparation & Negotiation, EPC Execution			
Client	Country	Project Basics	Involvement
Northern Utility Resources SPC	Malaysia	Four blocks each consisting of two GE Frame 6B gas turbines, two HRSGs, one steam turbine with air cooled condenser 456 MWeI	<ul style="list-style-type: none"> • Turnkey contract • Engineering for authority, bank and investor approval • Thermodynamic concept • Contract negotiations • Engineering, Procurement and implementation on site • Team leading, project management engineering and commissioning of E/C&I systems

<u>Project Name:</u> HARIHAR CCPP			
Task: Offer Preparation & Negotiation			
Client	Country	Project Basics	Involvement
Atria SPC	India	Combined cycle power plant with two GE Frame 6B gas turbines, two HRSG and one steam turbine with wet cooling towers 120 MWeI	<ul style="list-style-type: none"> • Bid preparation, Negotiation • Bid calculation • Turnkey contract • Thermodynamic concept • Condensate cooling concept • Contract negotiations • Project Financing • Logistic concept (Bangalore County) • Implementation of VA Tech India Engineering - Subsidiary in Chennai

<u>Project Name:</u> SABAH CCPP			
Task: Offer Preparation & Negotiation			
Client	Country	Project Basics	Involvement
Undisclosed	Malaysia	Combined cycle power plant with two GE Frame 6B gas turbines, two HRSG and one steam turbine with air cooled condenser 120 MWeI	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic concept • Bid compilation and calculation • Contract negotiations

<u>Project Name:</u> EL AMERIYA CCPP			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Egyptian Petro-chemical Co.	Egypt	Extension of combined cycle power plant with one additional Alstom GT8C gas turbine, one HRSG and integration into existing plant	<ul style="list-style-type: none"> • Commissioning of gas turbine and water steam cycle

<u>Project Name:</u> BRESTANICA OCPP			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Termoelektrarna	Slovenia	Indoor open cycle power plant with two Alstom GT11N2 fired with natural gas, distillate and on mix operation (240 MWeI)	<ul style="list-style-type: none"> • Commissioning of gas turbine and auxiliary systems

<u>Project Name:</u> SON REUS CCPP			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Endesa	Spain	Combined cycle power plant with three Alstom GT8C fired with distillate, three HRSG and one steam turbine 225 MWeI	<ul style="list-style-type: none"> • Commissioning of gas turbine and auxiliaries

<u>Project Name:</u> VALLE DE MEXICO CCPP			
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Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Comision Federal de Electricidad	Mexico	Refurbishment of existing plant by installation of three Alstom GT11N2, three HRSG and steam fed to the existing plant steam header on 200m sea level 270 MWel	<ul style="list-style-type: none"> Commissioning of gas turbine and water steam cycle

<u>Project Name:</u> BESOS CCPP			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Endesa / Gas Natural	Spain	Two units, each with one Alstom GT26 in single shaft configuration with generator and steam turbine 400 MWel	<ul style="list-style-type: none"> Commissioning of gas turbine and water steam cycle Supervision of planned outages and restart

<u>Project Name:</u> DUNKERQUE			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Gas de France	France	Utilization of steelworks process gases in two hybrid boilers using Alstom GT13E2 exhaust as air supply to boilers plus two steam turbines - 640MWel	<ul style="list-style-type: none"> Commissioning of gas turbine and water steam cycle

<u>Project Name:</u> CARTAGENA CCPP			
Task: Gas Turbine Commissioning			
Client	Country	Project Basics	Involvement
Gas Natural	Spain	Three units, each with one Alstom GT26 in single shaft configuration with generator and steam turbine 400 MWel	<ul style="list-style-type: none"> Commissioning of gas turbine and water steam cycle

<u>Project Name:</u> GENERATOR DEVELOPMENT			
Task: Generator Design			
Client	Country	Project Basics	Involvement
VA Tech / ELIN	Austria	KW Ybbs - Persenbeug 7 (Austria) KW Staning (Austria) KW Jing Nan (China) KW Belleville (USA) KW Kotapanjang (Indonesia) KW Auhof (Austria) KW Freudenau (Austria)	<ul style="list-style-type: none"> • Radial and torsion resonance frequency analysis and system answer calculation in reference operation frequencies • Shaft bending analysis • Dynamic short circuit analysis • Assembly stress and deformation calculations • Static and dynamic foundation forces calculation • Assembly thermal stress analysis • Distortion analysis

<u>Project Name:</u> LINZ MITTE CHP			
Task: Bid Preparation & Negotiation, Execution			
Client	Country	Project Basics	Involvement
Municipality City of Linz	Austria	Combined cycle heat and power plant, turn key, based on one GE Frame 6FA gas turbine, HRSG from Alstom Brno (now Austrian Energy & Environment) and Siemens steam turbine 117 MWeI / 44 MWth for district heating	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design and heat balance • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management • E/C&I systems (including automation and protection) engineering and commissioning

<u>Project Name:</u> MUNICIPALITY MUNICH CHPP			
Client	Country	Project Basics	Involvement
SWM (Stadtwerke München)	Germany	Combined cycle heat and power plant, based on one GE Frame 6FA, one HRSG and one steam turbine with district heating taps on a turnkey basis 110 MWeI / 78 MWth	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management

Project Name: LINZ MITTE UNIT EXTENSION OCPP

Task: Bid Preparation, Negotiation and Implementation

Client	Country	Project Basics	Involvement
Municipality City of Linz	Austria	<p>One combined heat and power plant with one GE Frame 6FA gas turbine, HRSG and Siemens steam turbine</p> <p>115 MWeI, district heating and DH Storage capability</p>	<ul style="list-style-type: none"> • Turnkey contract • CHP Thermodynamic design • Design of district heating system implementation • Design of District Heating Storage Tank (system Hedbaek Denmark) • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over

Project Name: ERDEMIR – EREGLI IRON & STEEL CHP

Task: Bid Preparation, Negotiation and Implementation

Client	Country	Project Basics	Involvement
Eregli Iron & Steelworks	Turkey	<p>Two GE Frame 6B and two HRSGs with four different supplementary firing sources for process steam production</p> <p>Consortium Partner Babcox Wilcox Gama (Turkey)</p> <p>80 MWeI / 120 MWth</p>	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Equipment Procurement • Site management • Erection, commissioning and hand over management

Project Name: LINZ SÜD PHASE I CHP

Task: Bid Preparation, Negotiation and EPC Execution

Client	Country	Project Basics	Involvement
Municipality Linz	Austria	<p>Combined cycle heat and power plant, based on two GE Frame 6B, two HRSG and one steam turbine including tap off for district heating on turnkey basis</p> <p>117 MWeI / 105 MWth</p>	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management

<u>Project Name:</u> MERKENICH CCHP			
Task: Turn Key Project Turn Key Implementation			
Client	Country	Project Basics	Involvement
Cologne	Germany	<p>Combined cycle heat and power plant, based on one GE Frame 6FA, one HRSG and one extraction condensing steam turbine with district heating extraction</p> <p>110 MWeI / 78 MWth</p>	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management

<u>Project Name:</u> CSEPEL 400 MW CCPP (CHP ADDER)			
Task: First IPP in Hungary: Contract Negotiation and Execution			
Client	Country	Project Basics	Involvement
Powergen UK	Hungary	<p>Combined cycle block in 2:2:1 configuration, consisting of two GE Frame 9E gas turbines, two HRSG and one steam turbine on turnkey basis (later on so called EPC – Engineering Procurement & Construction)</p> <p>389 MWeI / 153 MWth</p>	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management

<u>Project Name:</u> EISENHÜTTENSTADT			
Task: Bid Negotiation and Contract Execution			
Client	Country	Project Basics	Involvement
Vulkan Energie-wirtschaft	Germany	<p>Integration of one GE Frame 6B, one HRSG and one steam turbine into an existing power plant of a steelworks</p> <p>79 MWeI / 76 MWth</p>	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management

<u>Project Name:</u> JENA CCPP			
Task: Bid Negotiation, Engineering BOPmech, Implementation			
Client	Country	Project Basics	Involvement
Thüringer Energie AG	Germany	Combined cycle and heat plant consisting of three GE Frame 6B, three HRSG with duct burners and two steam turbines with district heating taps on turnkey basis 190 MWeI / 225 MWth	<ul style="list-style-type: none"> • Turnkey contract • Thermodynamic design • Bid compilation and contract negotiations • Complete Engineering • Project management • Procurement • Site management • Erection, commissioning and hand over management •

<u>Project Name:</u> DIFFERENT POWER PLANTS			
Task: Electric BOP execution			
Client	Country	Project Basics	Involvement
Austrian Utilities	Austria	HV/MV substations T&D protection systems Substation automation	<ul style="list-style-type: none"> • Grid consulting services • Sales support, offer preparation • Team leading and project management • Engineering and programming of protection & control and automation systems during project execution • Commissioning and testing of protection & control and automation systems • After sales services for protection & control and automation systems •

<u>Project Name:</u> DIFFERENT POWER PLANTS			
Task: Hydro Generators and HV Equipment			
Client	Country	Project Basics	Involvement
Utilities	Several in Europe and SE Asia	Large Hydro Power Plants Electrical Systems	<ul style="list-style-type: none"> • Feasibility Studies • Project management • Engineering during project execution