

## Reference List – Power Plant Systems

Customer/End User	Project	Year
Veolia Environment UK	<b>Dry Cooling System – 19 MW</b> <ul style="list-style-type: none"> <li>• Technical due diligence</li> <li>• CFD analysis</li> <li>• Retrofit program and supervision</li> </ul>	2014
KVA Buchs Switzerland	<b>Thermal Power Cycle – 20 MW</b> <ul style="list-style-type: none"> <li>• New operation concept for parallel power block operation and new operating targets</li> <li>• Performance optimization</li> </ul>	2014
Utzenstorf Paper Switzerland	<b>Thermal Power Cycle – 5.8 MW</b> <ul style="list-style-type: none"> <li>• Feasibility study for a higher automation level of the thermal power cycle</li> <li>• HAZOP study</li> </ul>	2013
Veolia Environment Switzerland	<b>Thermal Power Cycle – 3.5 MW</b> <ul style="list-style-type: none"> <li>• Feasibility study for the thermal power cycle</li> <li>• Conceptual design</li> </ul>	2012
St. Galler Stadtwerke Switzerland	<b>Geothermal Power Plant – 3.0 MW</b> <ul style="list-style-type: none"> <li>• Feasibility study including performance calculation, operational concept and cost assessment</li> <li>• Feasibility study for the integration of other plants with the geothermal plant for cogeneration</li> <li>• Conceptual design</li> </ul>	2011
Hitachi Zosen Inova Ltd. Switzerland	<b>Waste to Energy Power Plant – 95 MW, Ince Marshes, UK</b> <ul style="list-style-type: none"> <li>• Conceptual design of cold end (indirect wet system)</li> <li>• Thermo-hydraulic system design and cold end optimization</li> <li>• Sizing of main components and specification of cooling tower</li> <li>• Evaluation of supplier proposals</li> <li>• Process diagrams</li> <li>• System layout</li> </ul>	2011
Airlight Energy SA Switzerland	<b>Concentrated Solar Power Plant – 3.5 MW, CSP Italcementi, Morocco</b> <ul style="list-style-type: none"> <li>• Conceptual design of power cycle</li> <li>• Thermo-hydraulic system design</li> <li>• Performance verification of steam turbine</li> <li>• Single line diagram</li> <li>• Sizing of main components</li> <li>• EPC tender specification of the power cycle</li> <li>• Plant layout</li> </ul>	2011
Entsorgung St. Gallen KHK Kehrichtheizkraftwerk Switzerland	<b>Waste to Energy Power Plant – 5.8 MW Steam Turbine Retrofit</b> <ul style="list-style-type: none"> <li>• Analysis of technical due diligence of installed Steam Turbine</li> <li>• Specification for steam turbine retrofit</li> <li>• Supply, erection, commissioning and testing support</li> </ul>	2011 - 12
MAPNA Group, I.R. Iran	<b>Ramin Steam Power Plant - 3 x 350 MW</b> <ul style="list-style-type: none"> <li>• Feasibility study for optimal main cooling system (dry, wet and indirect dry Heller)</li> <li>• Overall plant performance analysis and cold end optimization</li> <li>• Computational Fluid Dynamic (CFD) analysis of environmental impact on the direct dry air-cooled condenser system</li> <li>• Conceptual design</li> </ul>	2010

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Airlight Energy SA Switzerland	<b>Concentrated Solar Power Plant – 2.5 MW, CSP ASU, USA</b> <ul style="list-style-type: none"> <li>• Conceptual design of power cycle</li> <li>• Thermo-hydraulic system design</li> <li>• Process diagrams, single line diagram, control and protection diagram</li> <li>• Sizing of main components</li> <li>• EPC tender specification of the power cycle</li> <li>• Plant layout</li> </ul>	2011
Airlight Energy SA Switzerland	<b>Concentrated Solar Power Plant - 6.5 MW, CSP THAIS1, Italy</b> <ul style="list-style-type: none"> <li>• Conceptual design of power cycle</li> <li>• Thermo-hydraulic system design</li> <li>• Process diagrams, single line diagram, control and protection diagram</li> <li>• Performance verification of steam turbine</li> <li>• Sizing of main components</li> <li>• Plant layout</li> </ul>	2011
Entsorgung St.Gallen KHK Kehrichtheizkraftwerk Switzerland	<b>Waste to Energy Plant – 5.8 MW, KHK St.Gallen</b> <ul style="list-style-type: none"> <li>• Technical due diligence of feed water and condensate system</li> <li>• Retrofit design including performance, process, mechanical, electrical, instrumentation operation and controls</li> <li>• Supply, erection, commissioning and testing support</li> </ul>	2011 - 12
Airlight Energy SA Switzerland	<b>Concentrated Solar Power Plant – 50MW, CSP NER300, Italy</b> <ul style="list-style-type: none"> <li>• Conceptual design of power cycle</li> <li>• Thermo-hydraulic system design</li> <li>• Performance verification of steam turbine</li> <li>• Sizing of main components</li> <li>• System description and plant layout</li> <li>• Overall project time schedule</li> <li>• NER300 application documents</li> </ul>	2011
EGL Energiegesellschaft Laufenburg AG Switzerland	<b>Combined Cycle Power Plant - 400 MW</b> <ul style="list-style-type: none"> <li>• Technical due diligence of combined cycle (complete plant) regarding operation flexibility (from base load to peak cycling operation)</li> <li>• Technical due diligence and retrofit program for water supply and water treatment systems (zero discharge site)</li> <li>• Plant staff training program and training sessions</li> </ul>	2009 - 10
ALSTOM (Schweiz) AG Switzerland	<b>Steam Turbine - 300 MW, CCPP Llangefno, UK</b> <ul style="list-style-type: none"> <li>• Process hazard analysis (system safety analysis ISO 61508/61511)</li> <li>• Allocation of safety functions</li> <li>• Safety requirements specification</li> <li>• Implementation and documentation</li> <li>• End user review</li> </ul>	2008
RWE Germany	<b>Steam Power Plant - 800 MW</b> <ul style="list-style-type: none"> <li>• Feasibility study and conceptual design for a dry cooling systems (natural draft, enhanced natural draft and mechanical draft)</li> <li>• Evaluation and net present value analysis</li> </ul>	2008

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EGL Energiegesellschaft Laufenburg AG Switzerland	<b>Combined Cycle Power Plant - 400 MW</b> <ul style="list-style-type: none"> <li>Performance prediction for net present value calculation during project development phase</li> <li>Analysis of multi-year meteorological data</li> <li>Plant life time predictive performance calculation and analysis</li> <li>Calculation software to predict plant power generation performance on a multi-year basis</li> </ul>	2008 - 09
GE Energy Jenbacher Gas Engines Austria	<b>Gas Engines</b> <ul style="list-style-type: none"> <li>Variant analysis, modularization &amp; standardization</li> <li>Development plan including cost/benefit analysis</li> <li>Advisor for development and implementation</li> </ul>	2007
ALSTOM (Schweiz) AG Switzerland	<b>Combined Cycle Power Plants</b> <ul style="list-style-type: none"> <li>Support for cold end optimization modelling for CCGT</li> <li>Definition of algorithms to integrate ACC Module in CCGT performance calculation tool</li> <li>Definition of ACC total cost factors</li> </ul>	2007
Creative Power Solutions AG Switzerland	<b>Gas Turbine Power Plant – 250 MW, Doha, Kuwait</b> <ul style="list-style-type: none"> <li>Engineering, supply and installation of the entire plant balance systems</li> <li>Thermo-hydraulic system design</li> <li>Gas turbine auxiliary systems retrofit 60Hz to 50 Hz</li> <li>Local engineering support</li> <li>Operation and maintenance documentation for the entire plant</li> </ul>	2007 - 08
EGL Energiegesellschaft Laufenburg AG Switzerland	<b>Combined Cycle Power Plant - 400 MW</b> <ul style="list-style-type: none"> <li>EPC contract specification for heat recovery steam generator, water/steam cycle and balance of plant systems</li> </ul>	2007 - 08
EGL Energiegesellschaft Laufenburg AG Switzerland	<b>Combined Cycle Power Plant - 400 MW</b> <ul style="list-style-type: none"> <li>Feasibility study for main and auxiliary system (dry, wet and hybrid cooling)</li> <li>Optimization of specific cooling system</li> <li>Net present value assessment</li> </ul>	2007 - 08
ALSTOM (Schweiz) AG Switzerland	<b>Steam Turbine – 150 MW, CCGT Gissi, Italy</b> <ul style="list-style-type: none"> <li>Process hazard analysis (system safety analysis ISO 61508/61511)</li> <li>Allocation of safety functions</li> <li>Safety requirements specification</li> <li>Implementation and documentation</li> <li>End user review</li> </ul>	2007
AVAG AG Switzerland	<b>Waste to Energy Power Plant – 12 MW, KVA Thun</b> <ul style="list-style-type: none"> <li>Technical due diligence feedwater system</li> <li>Road map to solve the problems</li> <li>Design improvement</li> </ul>	2006
ALSTOM (Schweiz) AG Switzerland	<b>Combined Cycle Power Plants Aghada, Soto4, Malaga, Llangage, Tallawarra</b> <ul style="list-style-type: none"> <li>Technical project lead for balance of plant systems</li> </ul>	2005 - 07

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ERZ Entsorgung + Recycling Zürich Switzerland	<b>Waste to Energy Power Plant – 17 MW, KVA Hagenholz Zürich</b> Total process analysis: <ul style="list-style-type: none"> <li>• Technical due diligence of power and district heating system</li> <li>• Optimization for availability, thermal performance and operational reliability</li> <li>• Conceptual system design for optimizations</li> </ul>	2005 - 06
TURBOMACH SA Switzerland	<b>Combined Cycle District Heating Plant – 75 MW, Riga, Lithuania</b> <ul style="list-style-type: none"> <li>• Plant design and engineering consulting</li> <li>• Design and engineering reviews</li> </ul>	2004
Harbin Air Conditioning Co. Ltd. P.R.China	<b>Steam Power Plant Zuoquan - 2 x 50 MW</b> <ul style="list-style-type: none"> <li>• Technical due diligence retrofit wet to dry cooling</li> <li>• Plant process and system analysis</li> <li>• System re-design including performance calculation, process, mechanical, electrical, instrumentation operation and controls</li> <li>• Manufacturing, erection and commissioning supervision (site)</li> </ul>	2004 - 06
Transitgas AG Switzerland	<b>Combined Cycle District Heating Plant – 10 MW</b> <ul style="list-style-type: none"> <li>• Technical due diligence of water chemistry concept and systems of the power cycle</li> <li>• Retrofit concept and retrofit supervision</li> </ul>	2004
ALSTOM (Schweiz) AG Switzerland	<b>Technical Project Management for Plant Services and Retrofits</b> <ul style="list-style-type: none"> <li>• Outage management for water/steam cycles for various projects</li> <li>• Punch list management</li> <li>• Operation support</li> </ul>	2003 - 04
ALSTOM (Schweiz) AG Switzerland	<b>Closed Cooling Water Re-Coolers for Industrial Gas Turbines</b> <ul style="list-style-type: none"> <li>• Process calculation &amp; evaluation</li> <li>• Re-cooler performance calculation program</li> <li>• Variant analysis, standardization and modularization</li> <li>• Product documentation</li> </ul>	2002 - 03
ALSTOM (Schweiz) AG Switzerland	<b>Power Plant Operating Staff Training Documentation</b> <ul style="list-style-type: none"> <li>• Trainee and instructor documentation</li> <li>• Exercises</li> <li>• Computer based training modules</li> </ul>	2002
KABA GILGEN AG Switzerland	<b>MTRC Hong Kong</b> <ul style="list-style-type: none"> <li>• Subway platform automatic door system operation and maintenance documentation</li> <li>• System first line &amp; second line maintenance</li> <li>• Spare parts management</li> </ul>	2001
ALSTOM (Schweiz) AG Switzerland	<b>Technical Project Management for new CCGT plants</b> <ul style="list-style-type: none"> <li>• Water/steam cycle engineering for various projects</li> <li>• Complete from NTP to project hand-over to service</li> <li>• Claim management</li> <li>• Outage management</li> </ul>	2000 - 02
ALSTOM (Schweiz) AG Switzerland	<b>Process Instrumentation &amp; Controls</b> <ul style="list-style-type: none"> <li>• Standard logic diagrams for water/steam cycles</li> <li>• Process simulation support and analysis</li> <li>• Project implementation</li> </ul>	2000 - 02

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Alstom Power AG Switzerland	<b>Power Plant Operating Staff Training</b> <ul style="list-style-type: none"> <li>• Development of new generation customer training concept</li> <li>• Training principles</li> <li>• Training documentation system design</li> <li>• Trainee &amp; trainer documentation</li> <li>• Exercises</li> </ul>	2000
Alstom Power AG Switzerland	<b>Balance of Plant Systems</b> <ul style="list-style-type: none"> <li>• Fuel gas system analysis and costs reduction program</li> <li>• Performance, product and design analysis</li> <li>• Supplier data analysis</li> <li>• Process performance &amp; design definition</li> </ul>	2000
Sulzer Burckhardt AG Switzerland	<b>COMOS<sup>2</sup></b> <ul style="list-style-type: none"> <li>• Competitive modular oil supply system for reciprocating compressors</li> <li>• Product development, design &amp; specification</li> <li>• Variant analysis, modularization &amp; standardization</li> <li>• Design and specification</li> <li>• Documentation</li> </ul>	1999 - 00
PALL Switzerland AG Switzerland	<b>Industrial Filters</b> <ul style="list-style-type: none"> <li>• Lube oil filter analysis and evaluation</li> <li>• Market and application analysis</li> <li>• Design &amp; performance evaluation</li> <li>• Costs/price evaluation</li> </ul>	1999
ABB Power Generation AG Switzerland	<b>Balance of Plant Systems</b> <ul style="list-style-type: none"> <li>• Applicability of reciprocating compressors for gas boosting service to industrial gas turbines</li> <li>• Process, field and supplier data analysis</li> <li>• Process performance &amp; design definition</li> </ul>	1999
KELAG AG Switzerland	<b>Lube Oil and Cooling Oil Supply Systems</b> <ul style="list-style-type: none"> <li>• System design and engineering</li> <li>• Manufacturing supervision</li> <li>• O&amp;M documentation</li> <li>• Factory performance test</li> </ul>	1999
KELAG AG Switzerland	<b>Power Plant Piping Systems</b> <ul style="list-style-type: none"> <li>• Shop manufacturing calculation software</li> <li>• Assembly procedure evaluation</li> <li>• Software concept development</li> <li>• Programming</li> <li>• Test phase application and validation</li> <li>• Implementation and staff training</li> </ul>	1998 - 99