

## IEM Energy Consultants

Client Company Type	Company Location	Plant Type	Plant Location	Date (Year)	Scope of Service
US-IOU	US State-NE	Coal/gas Steam	Latin America	2017	Review and evaluation of warehouse operations for one (1) coal fired, internationally based power plant, to optimize process and minimize inventory
US-IOU	US State-NE	Combined cycle	Latin America	2017	Review and evaluation of warehouse operations for two (2) combined cycle internationally based power plants, to optimize process and minimize inventory
US-IOU	US State-NE	Various	Various	2016	Providing LTSA and maintenance strategy consulting to plants in the fleet, including RFP process and negotiation of subsequent agreements (2016 – ongoing).
US-IOU	US State-NE	Various	Various	2016	Providing combined cycle power plant training to corporate personnel (2016).
US-IOU	US State-NE	Coal/gas Steam	Latin America	2006	Performed technical due diligence for acquisition of an international coal generation asset (2006).
US-Muni	US State-Midwest	Coal/gas Steam	US State-Midwest	2016	Providing Owner's Engineer Services for thermal plant boiler upgrade (2016 – ongoing).
OUS Utility	Latin America	Light/Heavy Fuel Oil	Latin America	2018	Oversee warehouse optimization and enhancements to improve operational efficiency and decrease shrinkage and waste (Commencing March 2017).
OUS Utility	Latin America	Light/Heavy Fuel Oil	Latin America	2016	Providing maintenance management consulting and CMMS implementation services (2016).
OUS Utility	North America	Various	North America	2015	Provide due Diligence Support on the acquisition of several peaking and combined cycle power plants (2015-2016).
OUS Utility	North America	Simple cycle gas turbine	North America	2015	Provide training on LTSA type agreement for LMS100 power plant (2015)
OUS Utility	North America	Combined cycle	North America	2011	Performed reliability assessment on cogeneration asset (2011).
Engineer /EPC	US State-Midwest	Simple cycle gas turbine	Various	2011	Provide O&M estimating support on multiple projects including LM6000, LM2500, Wartsila and 7FA (2011 – ongoing).

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Engineer /EPC	US State-Midwest	Simple cycle gas turbine	Various	2012	Provide O&M and technical support as part of a team supporting acquisitions by their client (2012 – ongoing).
Industrial	US State-Midwest	Various	US State-Midwest	2005	Developed plant O&M assessment program, to aide in improving practices at insureds facilities, and oversee the implementation of the program at coal, combustion turbine, hydro and reciprocating engine based power plants (2005 – ongoing).
Industrial	US State-Midwest	Various	US State-Midwest	2005	Provide ongoing support as required for loss control and root cause analysis on claims (2005 – ongoing).
Industrial	US State-Midwest	Hydro	US State-Midwest	2014	Provided technical evaluation for underwriting support on run of the river hydro facility, (non-FERC evaluation) (2014).
Industrial	US State-Midwest	Coal/gas Steam	US State-Midwest	2014	Provided technical evaluation for underwriting support for coal fired power plant (2014).
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2017	Currently, developing RFP for an LTSA type agreement for legacy Tier 2 7FA.03 plants (2017 – ongoing).
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2017	Developing user guides for plant personnel for the agreements (2017).
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2013	Assisted with various engineering and upgrades studies (2013 – ongoing).
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2013	Assisted with negotiations of LTSA type agreements on 2x1 501F5ee+, and 2x1 7FA.05 based power plants (2013 – 2014).
Domestic IPP	US State-NE	Combined cycle	US State-Midwest	2016	Provided outage management & scheduling support for an outage at a Midwest cogeneration facility major inspections on 2 GE Frame 6B gas turbines and 70 MW GE steam turbine (2016).

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Domestic IPP	US State-NE	Combined cycle	US State-Midwest	2015	Provided site specific systems training to operations and maintenance personnel at a Midwest cogeneration facility (2015 – 2016).
Domestic IPP	US State-NE	Combined cycle	US State-Midwest	2011	Performed High Impact Low Probability reliability and risk assessment (2011).
Industrial	US State-NE	Various	Various	2013	Performing assessments and reports on maintenance strategies, risk mitigation and reliability (2013 – ongoing).
Industrial	US State-NE	Combined cycle	Various	2015	Wrote report, “Operational and Control Strategies for Reducing Steam Turbine Damage from Cycling Combined Cycle Plants, (2015)
Industrial	US State-NE	Combined cycle	Various	2007	Wrote report, “Gas Turbine Upgrades for Enhancing Operational Flexibility”, (2007 updated 2009)
Industrial	US State-NE	Combined cycle	Various	2001	Coauthored report, “Mitigation of Technical and Market Risks in Combustion Turbine-Based Projects – Long Term Maintenance Contracts, Insurance, Electricity and Natural Gas Contracts” (2001)
Engineer /EPC	US State-SE	Combined cycle	Africa	2013	Provided technical due diligence support for Nigerian asset acquisitions (2013 – 2014).
Engineer /EPC	US State-SE	Combined cycle	Africa	2013	Provided technical due diligence for company’s client on international asset (2013).
Industrial	Asia	Simple cycle gas turbine	Asia	2015	Expert Witness on a loss related to damage on a combustion turbine as a result of shipping (2015-2016)
OEM	US State-SW	Combined cycle	Various	2016	Provided condition assessment & inspection support on steam turbines in storage for new project installation opportunities (2016).
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2003	On-going CT fleet O&M support in terms of economic modeling and forecasting

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US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2003	CT Fleet support for LTSA negotiations and re-evaluations (2003 & on-going)
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2003	Training for CT facilities
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2003	Outage management services for CT plants (on-going)
US-IOU	US State-Midwest	Combined cycle	US State-Midwest	2003	Vendor surveillance for combustion turbine component repairs. (2003 & on-going)
Engineer/EPC	US State-NW	Simple cycle gas turbine	South America	2016	Provided expert witness support for a litigation in central America, relating to the refurbishment, installation and commissioning Siemens 501D5A (2016).
US-IOU	US State-Midwest	Various	US State-Midwest	2014	Provided expert witness testimony in plant generation, maintenance, availability and reliability (2014 – 2016).
US-IOU	US State-Midwest	Coal/gas Steam	US State-Midwest	2007	Provided Outage Management and Construction Supervision Oversight for coal plant planned maintenance outages (2007 – 2009).
US-IOU	US State-Midwest	Coal/gas Steam	US State-Midwest	2008	Provided control engineering support for a distributed control system replacement on a pulverized coal power plant in Illinois (2008).
US-IOU	US State-Midwest	Simple cycle gas turbine	US State-Midwest	1999	Provided project management services for the restoration and upgrade, and installation of three (3) GE Frame 7B as well as two (2) new Frame 6B combustion turbines in peaking application, (1999 - 2000)
International IPP	Asia	Combined cycle	Asia	2016	Developed and conducted a 3-day steam and gas turbine training course to operations and maintenance personnel in Kuala Lumpur, Malaysia (2016).
US-IOU	US State-NW	Combined cycle	US State-NW	2017	Developing site specific steam turbine training class to be presented (2017).
US-IOU	US State-NW	Combined cycle	US State-NW	2016	Developed and Conducted 3-day training program on gas turbine maintenance (2016).
US-IOU	US State-NW	Combined cycle	US State-NW	2016	Providing oversight for gas turbine major inspection and vendor surveillance for component repairs (2016).

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International IPP	North America	Biofuel	Various	2015	Providing O&M and feasibility consulting for anaerobic digester power plants (2015 – ongoing).
Engineer /EPC	US State-Midwest	Simple cycle gas turbine	US State-NE	2016	Provided critical spare parts review on Rolls Royce Trent 60 CC plant following plant ownership transfer, (2016).
Engineer /EPC	US State-Midwest	Coal/gas Steam	North America	2011	Provided outage management services for major outages in coal plant fleet, including responsibilities as outage manager, commissioning lead, scheduler, and area lead positions managing work scopes within the outage. Work scope included turbine generator uprates, balance of plant upgrades, distributed control system replacement, feedwater heater replacement, and routine outage maintenance. Planning occurred in 2011 and outage execution in 2012. Outages were completed ahead of schedule with effective performance improvement (2011 – 2012).
Engineer /EPC	US State-Midwest	Coal/gas Steam	Various	2009	Outage management consulting to various clients (2009 – 2011).
Engineer /EPC	US State-Midwest	Simple cycle gas turbine	US State-NW	2010	Performed combustion turbine retirement analysis to support western US based utility IRP (2010).
Engineer /EPC	US State-Midwest	Simple cycle gas turbine	US State-Midwest	2009	Performed combustion turbine retirement analysis to support a Midwest based utility IRP (2009).
Engineer /EPC	US State-Midwest	Various	Various	2006	Performed various technical due diligence assignments for the purchase of various technologies / assets (2006 – 2009).
Engineer /EPC	US State-SW	Light/Heavy Fuel Oil	US State-SW	2009	Provided maintenance practices training for oil-fired plants (2009).
Engineer /EPC	US State-Midwest	Coal/gas Steam	US State-SW	2006	Provided outage planning and scheduling support for coal plant planned outage at a southwest US based utility (2006).

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Engineer /EPC	US State-Midwest	Steam	US State-Midwest	2006	Developed operations procedures for a central power plant at a University in the US (2006 - 2007).
Engineer /EPC	US State-Midwest	Coal/gas Steam	US State-NE	2006	Supported a reliability assessment of two coal plants for large eastern US utility (2006).
Engineer /EPC	US State-Midwest	Coal/gas Steam	US State-SW	2007	Provided outage management support of a turbine-generator outage for large southwestern US utility (2007).
Domestic IPP	US State-SE	Landfill Gas	US State-SE	2015	Provided Operations Procedures at LFG Energy Plants (2015-2016).
Domestic IPP	US State-SE	Landfill Gas	US State-SE	2015	Implemented CMMS at LFG Energy Plants (2015-2016).
Domestic IPP	US State-Midwest	Coal/gas Steam	US State-Midwest	2015	Provided outage management support to planned outages (2015).
Domestic IPP	US State-SE	Biofuel /other renewable	US State-SE	2012	Providing feasibility for biogas renewable energy projects (2012 – 2019). New Plant Development.
Domestic IPP	US State-SE	Biofuel /other renewable	US State-SE	2012	Engineering, construction, commissioning services for biogas renewable energy projects (2012 – 2019). New Plant Development.
Domestic IPP	US State-SE	Biofuel /other renewable	US State-SE	2012	Development and implementation of operating and maintenance procedures support for biogas renewable energy projects (2012 – present).
OEM	Europe	Solar thermal	US State-SW	2013	Project Management, construction management and commissioning for solar thermal energy project.
OEM	Europe	Solar thermal	US State-SW	2013	On-going O&M program support for solar thermal energy project

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OEM	Europe	Solar thermal	US State-SW	2013	Development and implementation of O&M procedures for solar thermal energy project
OEM	Europe	Solar thermal	US State-SW	2013	Solar thermal energy project O&M staff training programs
Engineer /EPC	US State-NW	Combined cycle	US State-NW	2014	Provided subject matter expert advice on steam turbine generator removal, refurbishment and reinstallation (2014).
Industrial	Europe	Combined cycle	US State-Midwest	2011	Developed and presented training for asset management and combined cycle plant fundamentals courses (2011 – 2013).
US-Coop	US State-Midwest	Coal/gas Steam	US State-Midwest	2009	Provided outage management consulting at coal-fired plants (2009 – 2010).
US-Coop	US State-Midwest	Coal/gas Steam	US State-Midwest	2010	Provided outage planning and scheduling training utilizing Microsoft Project for plant and corporate personnel (2010).

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