IDOM

POWER PLANTS

IDOM Group

Power Plants - Thermal

- Owner‘s Engineer, Architect Engineer and EPC
- Relevant references
- IDOM presence

IDOM Group

IDOM

1957

Year founded

€350 m

contracted professional services

3,000

Professionals

125

Countries with projects

INNOVATION, EXCELLENCE & COMMITMENT

EMPLOYEE-OWNED / PARTNERSHIP

- IDOM is an Employee-Owned partnership firm.
- 100% of firm´s equity belongs to more than 800 employees-partners of the firm.
- Partnership is open to all the employees with some seniority requirements
- Long-term stability for personnel
- Demanding career with continuous professional improvement
- Commitment and client focus are a must

.

Offices

Canada
CALGARY

USA
MINNEAPOLIS

Mexico
MEXICO DF

Argentina
BUENOS AIRES

Colombia
BOGOTA
MEDELLIN

Peru
LIMA

Brazil
SAO PAULO

Chile
SANTIAGO

United Kingdom
LONDON
DERBYSHIRE
MANCHESTER
KENT
CARDIFF
STIRLINGSHIRE

Belgium
BRUSSELS

Poland
WARSAW
WROCLAW

Slovenia
LJUBLJNA

Spain
HQ + 12 Offices

Portugal
LISBON

Morocco
CASABLANCA

Algeria
ALGIERS

Libya
TRIPOLI

KSA
RIYADH

UAE
DUBAI

India
NEW DELHI

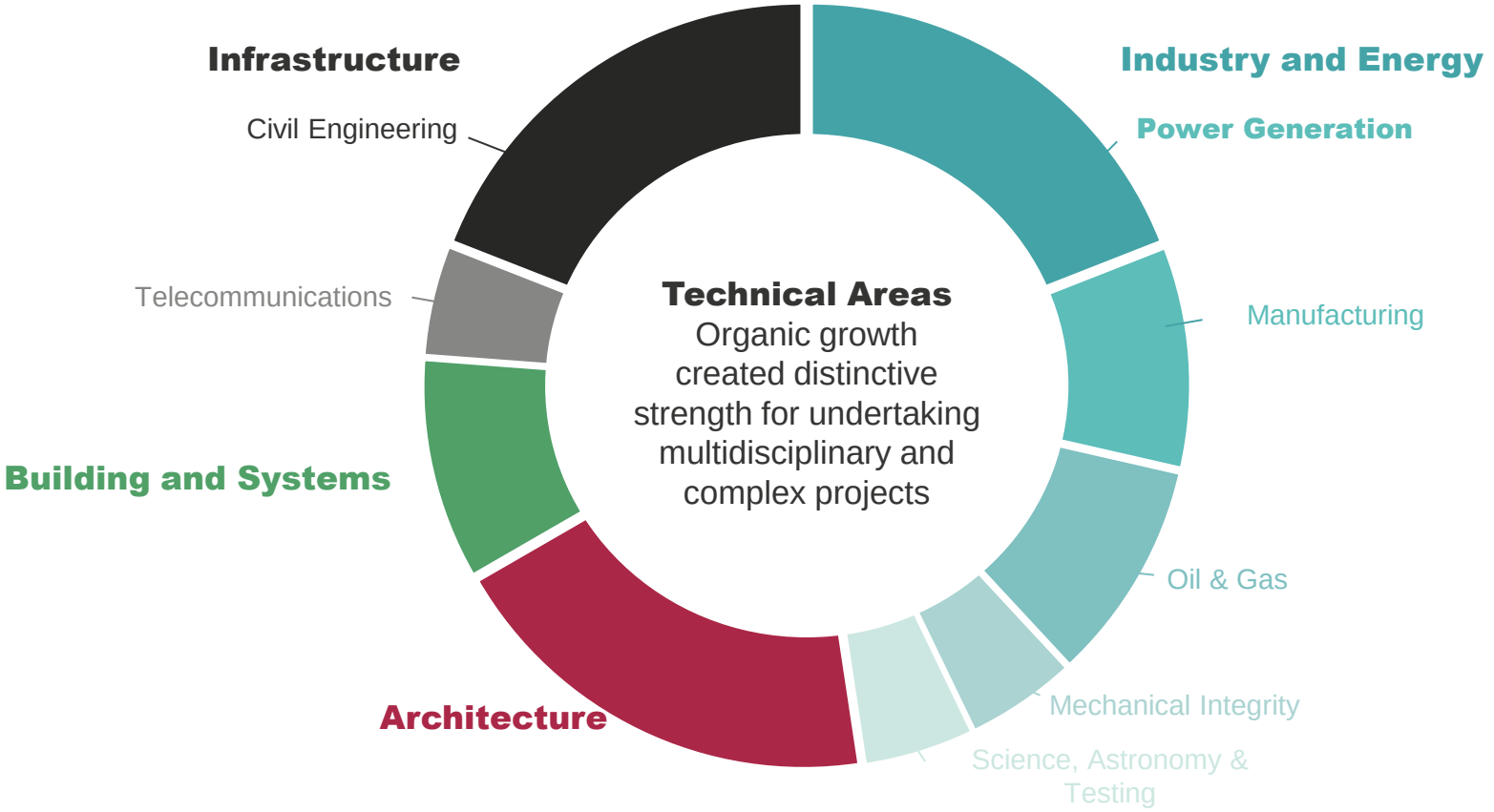
MALAYSIA
KUALA LUMPUR

41 OFFICES

SPREAD ALL OVER THE WORLD

13 Offices in Spain

Core Technical Areas



INDUSTRY & ENERGY

Main sectors of activity

INDUSTRY

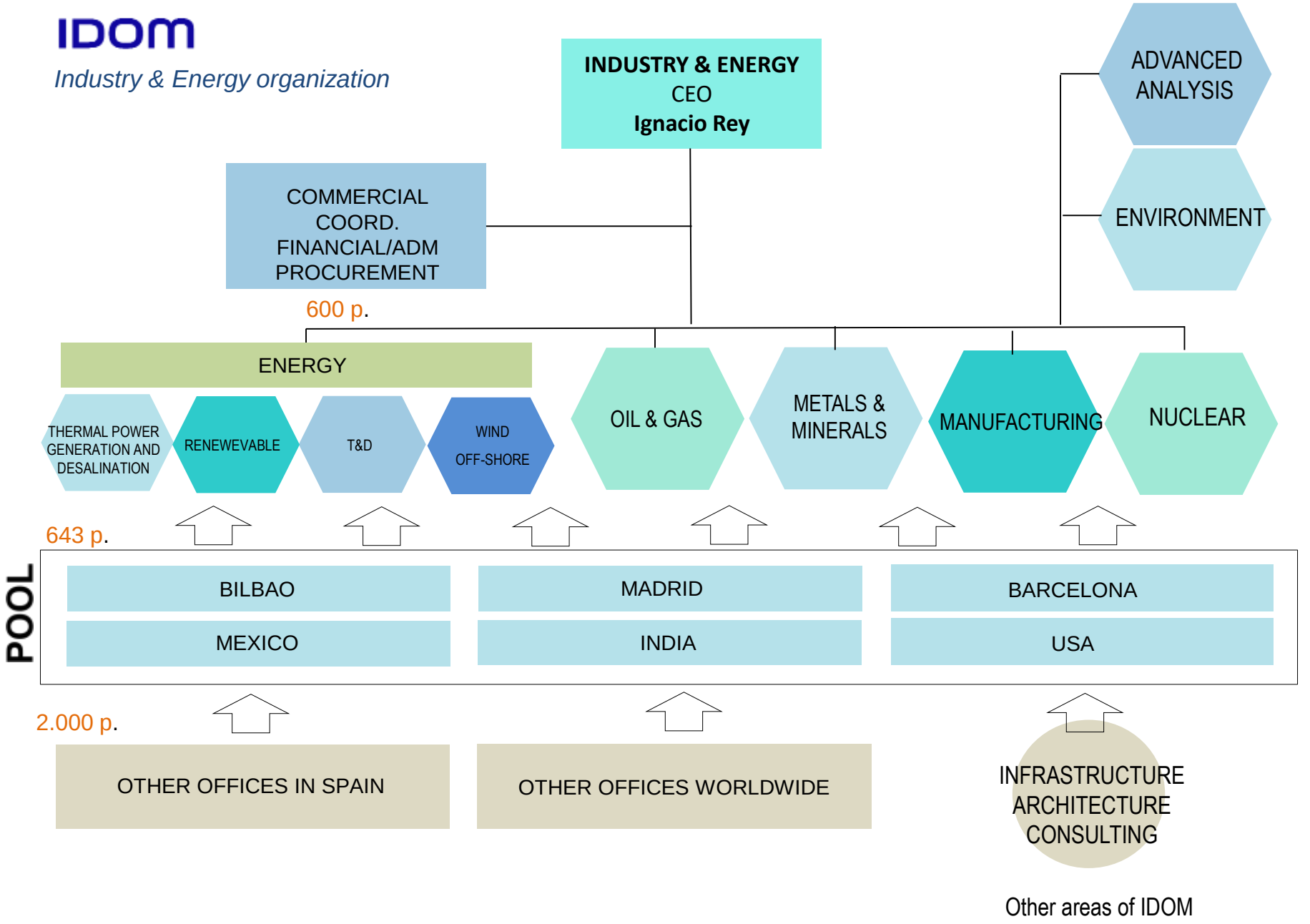
- IRON & STEEL
- REFINING & PETROCHEMICAL
- MINING
- GLASS
- PAPER
- CEMENT
- AUTOMOTIVE
- AIRCRAF
- TRAIN / TRAMP ASSEMBLY
- MANUFACTURING
- HANDLING & LOGISTICS
- FOOD & DRINK
- ENVIRONMENTAL
- WATER

ENERGY

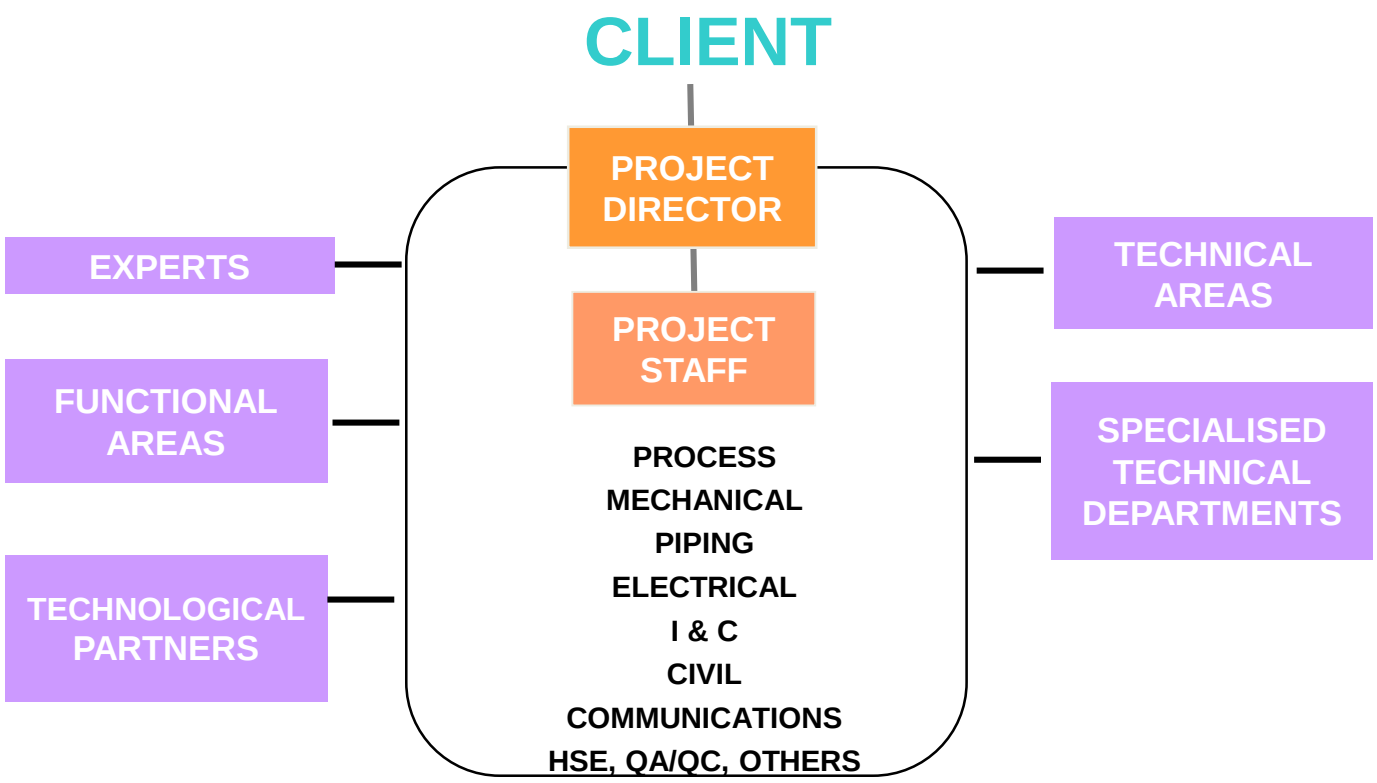
- POWER GENERATION:
  - **Fossil**
    - Simple & Combined Cycle PP
    - Cogeneration (CHP)
    - Coal fire PP
      - Flue gas desulphurization
    - Reciprocating engines
    - Desalination
  - **Renewable**
    - Integrated Solar Combined Cycle (ISCC)
    - Solar Thermal (CSP)
    - Biomass
    - Waste to energy
    - Geothermal
    - Hydroelectric
    - Wind farms
    - Photovoltaic
- POWER TRANSPORT & DISTRIBUTION
- NUCLEAR SERVICES
- PIPELINES

IDOM

Industry & Energy organization



INTEGRATED PROFESSIONAL SERVICES



The services offered by IDOM are adapted individually to each Customer.

IDOM's organisation is structured around the Project, in which each team is made up of specialists from different areas

Power Plants-Thermal

IDOM

Industry Recognition

ENR
Engineering News-Record

Engineering News Record (ENR) annually ranks engineering, architectural and contracting firms based upon sales in various sectors.

In 2019, **IDOM** is proud to have obtained the following positions based on 2018 IDOM's revenue.

Top International Design Firms

FOSSIL FUEL

RANK	FIRM	REVENUE ($ MIL.**)
1	CHINA ENERGY ENGINEERING CORP. LTD.	428.6
2	WORLEYPARSONS LTD.	177.9
3	BLACK & VEATCH	148.2
4	HYUNDAI ENGINEERING CO., LTD.	125.5
5	SNC-LAVALIN INC.	106.4
6	WS ATKINS PLC	95.0
7	TECNICAS REUNIDAS	62.9
8	FICHTNER GROUP	58.9
9	TRACTEBEL ENGINEERING SA	54.4
10	IDOM	45.8
11	MOTT MACDONALD	39.7
12	LOUIS BERGER	38.1

Top International Design Firms

POWER

RANK	FIRM	REVENUE ($ MIL.*)
1	POWER CONSTRUCTION CORP. OF CHINA	940.2
2	CHINA ENERGY ENGINEERING CORP. LTD.	644.8
3	SENER INGENIERÍA Y SISTEMAS SA	419.3
4	TRACTEBEL ENGINEERING SA	358.7
5	WS ATKINS PLC	311.1
6	WSP	286.6
7	WORLEYPARSONS	270.0
8	POYRY	197.0
9	STANTEC INC.	180.3
10	TETRA TECH INC.	171.0
11	FUGRO NV	169.0
12	BLACK & VEATCH	165.2
13	FICHTNER GROUP	162.8
14	MOTT MACDONALD	162.3
15	AMEC FOSTER WHEELER	153.0
16	HYUNDAI ENGINEERING CO. LTD.	138.8
17	AF GROUP	138.2
18	SNC-LAVALIN INC.	134.4
19	CHINA CHENGDA ENGINEERING CO. LTD.	132.4
20	AECOM	129.2
21	INTERTEK-PSI	118.8
22	KEPCO ENGINEERING & CONSTRUCTION CO. INC.	106.2
23	SWECO AB	106.0
24	JACOBS	87.2
25	ASSYSTEM	85.9
26	ARCADIS NV	81.0
27	TECNICAS REUNIDAS	78.6
28	CHINA NATIONAL MACHINERY INDUSTRY CORP.	77.4
29	RAMBOLL GRUPPEN A/S	72.3
30	DAR GROUP, DUBAI, UAE	70.4
31	SURBANA JURONG PRIVATE LTD.	66.0
32	CHINA COMMUNICATIONS CONSTRUCTION GROUP LTD.	61.5
33	SARGENT & LUNDY LLC	57.3
34	IDOM	56.9

IDOM
Industry & Energy

GLOBAL REFERENCE IN THERMAL POWER GENERATION

>45 GW

Engineered

10 to 15

Projects in a year

>600

Professionals with experience

5

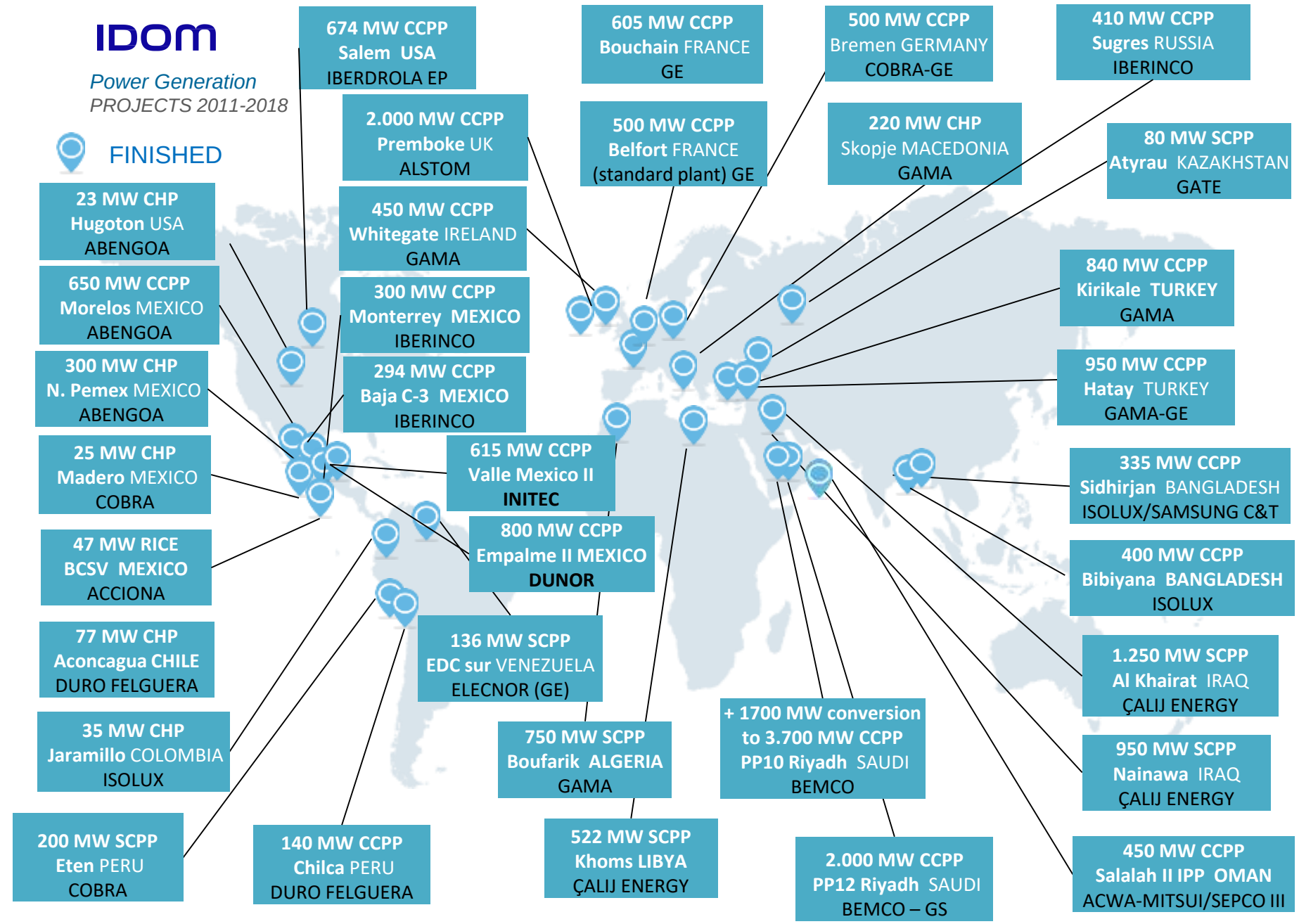
Continents with projects

IDOM

Power Generation

PROJECTS 2011-2018

FINISHED

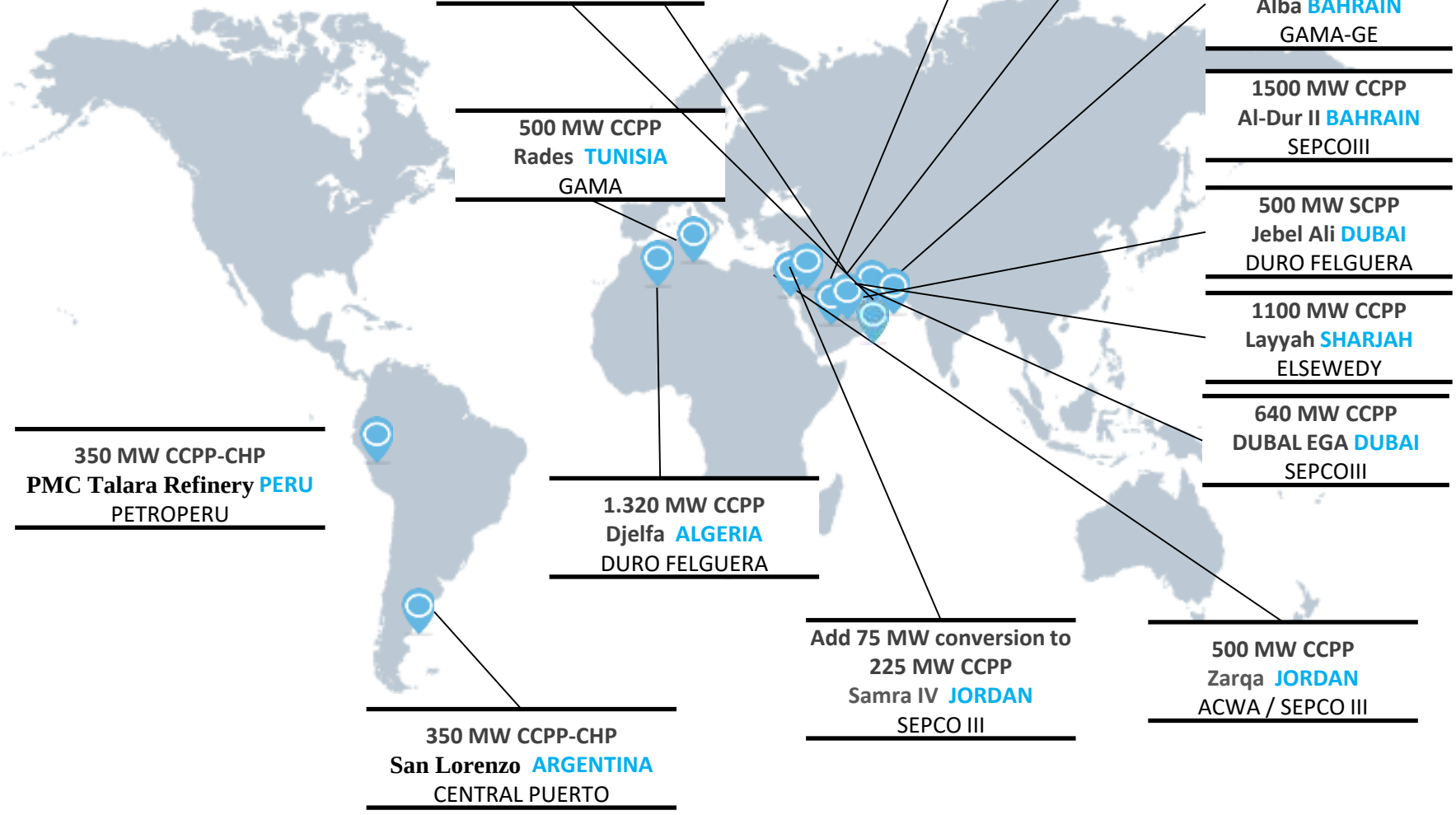


IDOM

Power Generation

PROJECTS 2018-2019

ONGOING



250 MW conversion to CCPP
Az Zour South 3 KUWAIT
SEPCOIII

SABIYA P54 & P55 Performance Tests
KUWAIT
ALGHANIM

Add 157 MW conversion to 441 MW CCPP
Hail SAUDI
AL-TOUKHI

80 MW RICE
Riyadh SAUDI
SSEM

1800 MW CCPP
Alba BAHRAIN
GAMA-GE

1500 MW CCPP
Al-Dur II BAHRAIN
SEPCOIII

500 MW CCPP
Rades TUNISIA
GAMA

500 MW SCPP
Jebel Ali DUBAI
DURO FELGUERA

1100 MW CCPP
Layyah SHARJAH
ELSEWEDY

640 MW CCPP
DUBAL EGA DUBAI
SEPCOIII

350 MW CCPP-CHP
PMC Talara Refinery PERU
PETROPERU

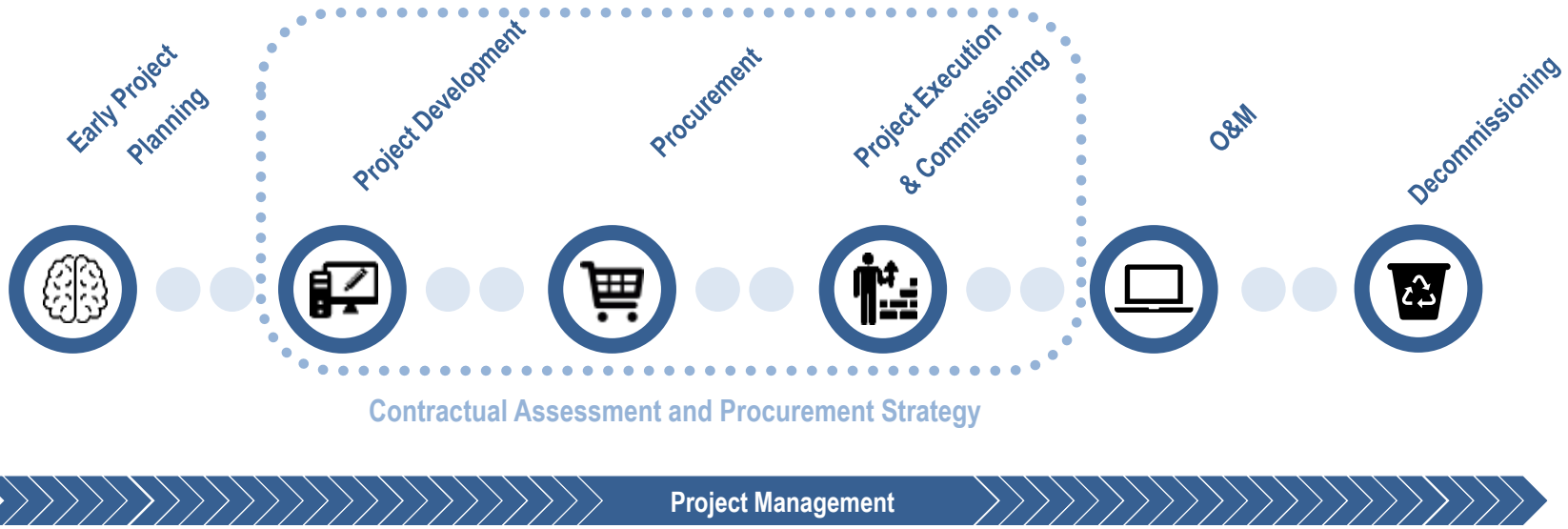
1.320 MW CCPP
Djelfa ALGERIA
DURO FELGUERA

Add 75 MW conversion to 225 MW CCPP
Samra IV JORDAN
SEPCO III

500 MW CCPP
Zarqa JORDAN
ACWA / SEPCO III

350 MW CCPP-CHP
San Lorenzo ARGENTINA
CENTRAL PUERTO

We want to be involved in the overall project life



We want to be involved in the overall project life

IDOM IS AN ENGINEERING COMPANY WITH MORE THAN 50 GW DESIGNED IN DIFFERENT TYPE OF POWER PLANTS.

- FULL RANGE OF SERVICES FROM E TO EPC. OWNER SIDE OR CONTRACTOR SIDE. (GOOD UNDERSTANDING OF THE BUSINESS AND CRITICAL ISSUES)
- MULDISCIPLINARY ENGINEERING CAPABILITIES INHOUSE
- PROJECT ENGINEERING RATHER THAN DISCIPLINE ENGINEERING. IDOM IN CHARGE OF DISCIPLINES INTEGRATION / COORDINATION
- FLEXIBLE COMPANY
- COMPANY KNOW HOW AND TALENT RETENTION

POWER PLANTS | PROJECT OVERALL LIFECYCLE

Targeted Markets Assessment

- Regulations
- System Operation & Capacity
- Gas/Power Prices
- Resource Assessment (sun, wind, hydro...)
- Country Risk Evaluation
- Networking (Authorities, Competitors, Partners, Off-Takers)

Opportunities Analysis

- Commercial and Financial Due Diligences
- Public Tender Req. Assess. / Origination
- Off-Takers Needs Audit (CHP)
- Alternatives Competitiveness Analysis
- Financial Modelling
- Assessment in the definition of partnership structures
- Project location assessment

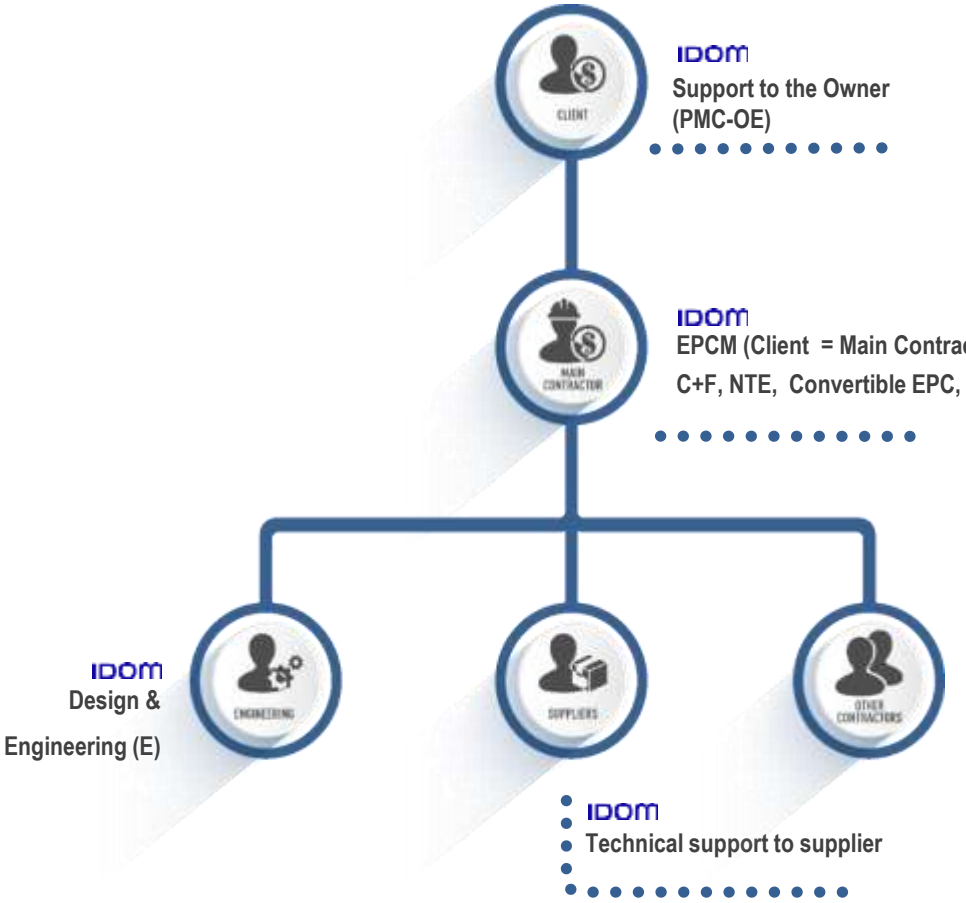
O&M Consultancy Services

- **Plant Dispatch management**
- **O&M Contractor**
  - Plant Operation Strategy
  - Plant Maintenance planning
  - CMMS

Decommissioning Services

- **Decommissioning planning**
- **Dismantling manuals**
- **Oversee final shutdown**
- **Design of restoration schemes**
- **Depending on country different requirements for:**
  - Proper disposal of materials
  - Safety standards
  - Mandated disposal timelines

POWER PLANTS | PROJECT EXECUTION



IDOM
Support to the Owner (PMC-OE)

IDOM
EPCM (Client = Main Contractor)
C+F, NTE, Convertible EPC, EPC

IDOM
Design &
Engineering (E)

IDOM
Technical support to supplier

ADDED VALUE

- EPCM: Engineering, Procurement and Construction management
- C+F= Cost + Fee
- NTE: Not To Exceed
- EPC: Engineering Procurement & Construction
- OBE = Overall Budget Estimation

POWER PLANTS | PROJECT EXECUTION

We want to be involved in the overall project life

Project Management

OWNER SIDE

EARLY PROJECT

- Targeted Markets Assessment
- Opportunities Analysis
  - Feasibility studies
  - Commercial and Financial Due Diligences
  - Alternatives Competitiveness Analysis
  - Project location assessment

PLANT DEFINITION

- Basic Design & Technology Selection
  - Planning & Scheduling
  - Financial Structure
  - Legal Framework (PPAs, GPAs,...)
  - Permitting & licensing

BIDDING PROCESS

- Contractual Model Retained Development
  - RFP preparation & Potential contractors list
  - Prequalification Criteria
  - Proposals Evaluation
- Bid/Origination Development & Management
  - Budget
  - Completion Risks Analysis - Performances / Schedule
  - Deliverables

PROJECT FOLLOW-UP

- Project follow-up and compliance with contract terms.
  - Engineering review
  - Review and monitoring of procurement
  - Construction & Commissioning Supervision

POWER PLANTS | PROJECT EXECUTION

We want to be involved in the overall project life

Project Management

CONTRACTOR SIDE

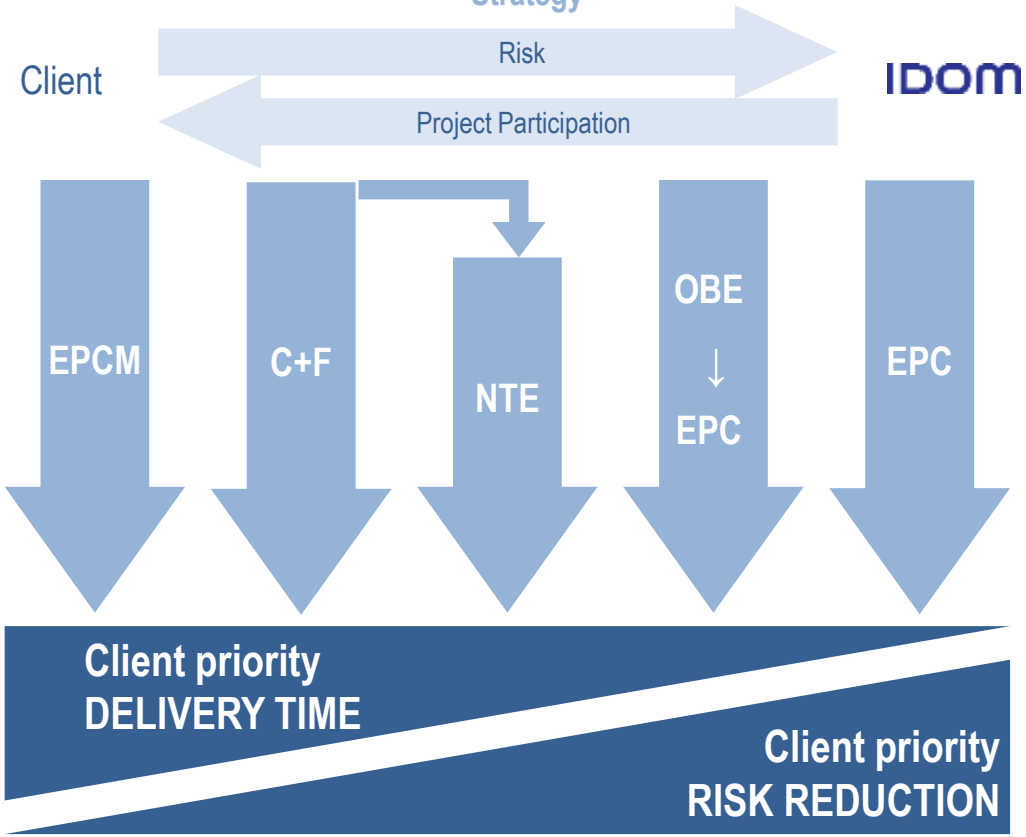
TENDERING PHASE

- ENGINEERING SERVICES FOR BID PREPARATION TO EPC CONTRACTORS
  - Technology Selection & Plant Configuration
  - HMB & WB / Overall PFD
  - Layout
  - Technical Docs: DS and RFQ´s for Main Equip, to get quotations
  - BOQ´S
  - Proposal Docs: PID´s, SLD´s, DS, Description, etc
  - Guarantee values
- Planning & Scheduling
- Permitting & licensing & Studies
  - Noise / Emissions

PROJECT EXECUTION

- FULL ENGINEERING SCOPE (OEM´s Consortium member of EPC or Not. Inputs are the Contract Doc´s
  - BASIC ENGINEERING
  - DETAIL ENGINEERING
  - PROCUREMENT SUPPORT
    - Bid´s evaluation, vendors expedite, vendors doc review and approval
  - LOGISTICS
  - QA´s
  - HSE
  - PERMITTING
  - TRAINING
  - CONSTRUCTION MANAGEMENT
  - COMMISSIONG

Contractual Assessment and Procurement Strategy



ADDED VALUE

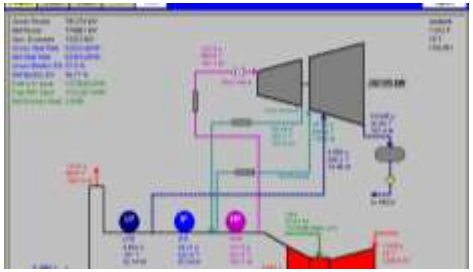
- Multidisciplinary and integrated approach
- Independent Consultancy
- Suitable, Qualified and Experienced People.
- Efficient design process for construction optimization
- Focus on client: customized solutions adapted to each client and project
- Client requirements compliance
- Client's needs and desires responsiveness
- International support
- In-house international expert advisors board
- Deep safety culture

Technical Resourses

THERMOFLOW

GT Pro-GT Master-ThermoFlex

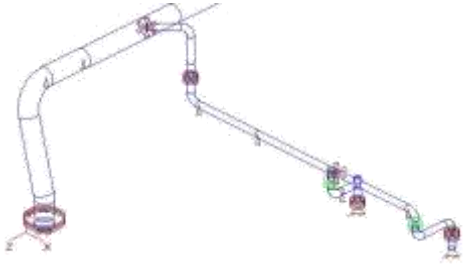
Combine Cycle Plants Simulation



CAESAR/ ROHR2

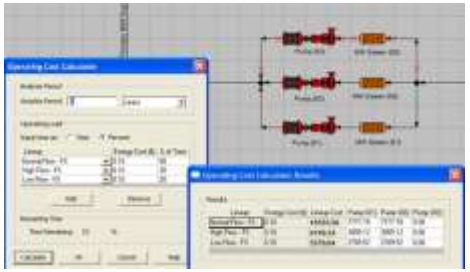
Stress Analysis Software

Stress & dynamic pipes



PIPE FLO/ FTS ARROW

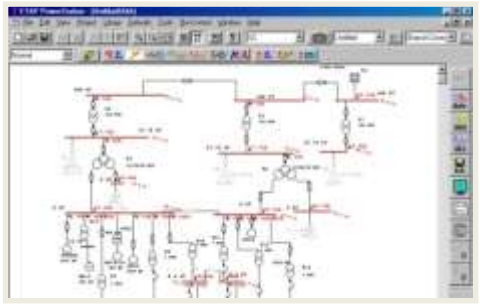
Pipe network design



ETAP

Electrical design

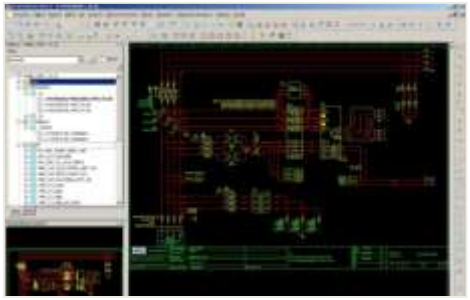
Electrical network calculation



EPLAN

Electrical diagrams

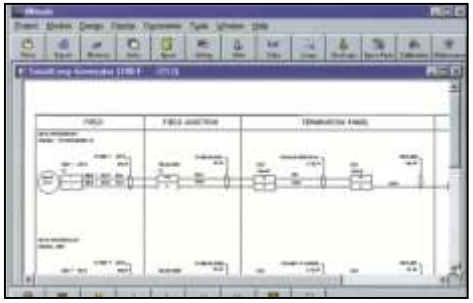
Electrical diagrams design



INTOOLS

I&C

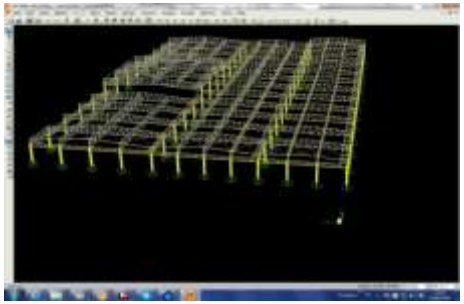
Instrumentation and design



SAP 2000/STAAD-PRO/ROBOT

3D structural design

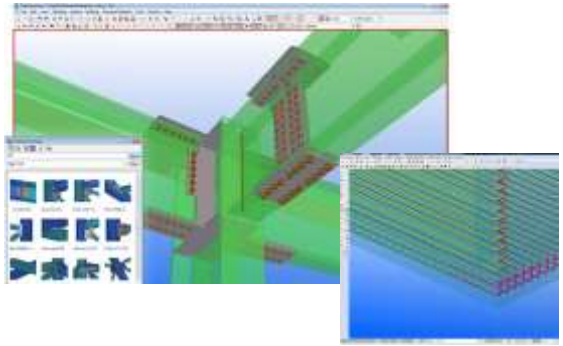
Steel & Concrete structures



TEKLA

Steel structure and concrete modelling

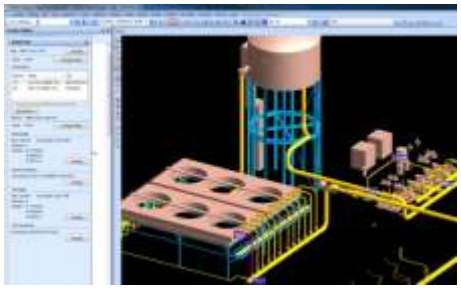
Steel and rebar detailing and fabrication



PDMS/E3D/PDS/SMARTPLANT

3D Industrial plant design

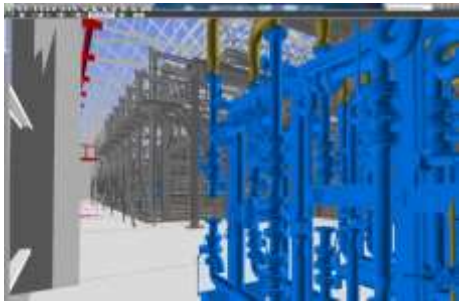
Piping, equipment, cable trays, modelling



NAVISWORKS

3D Integrated models

Integration, analysis tool



REVIT

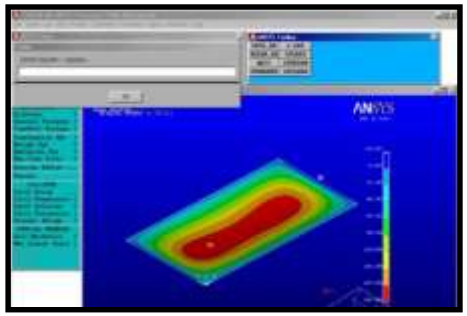
BIM

Building information modelling

ANSYS

Finite element software

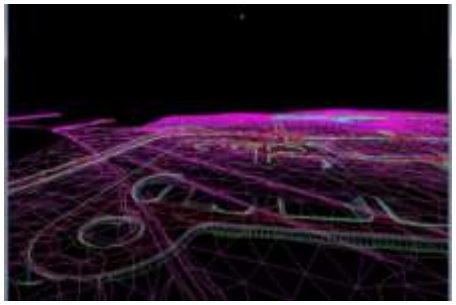
General purpose



ISTRAM

Civil works

Land and civil works design



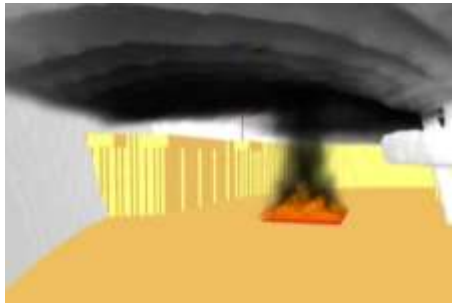
AUTORUN

Vehicle manoeuvre analysis

FDS

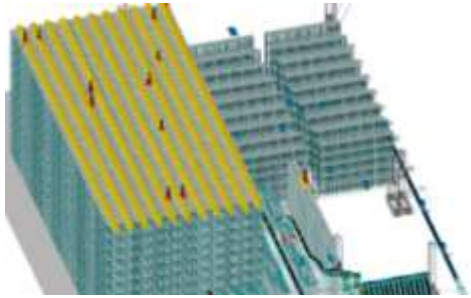
Fire dynamics simulator

CFD simulation & smoke



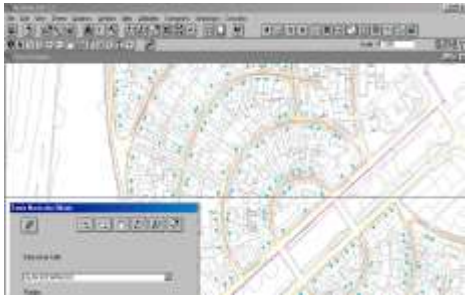
TAYLOR ED

Discrete dynamical systems



GIS

Geographic Information syst.

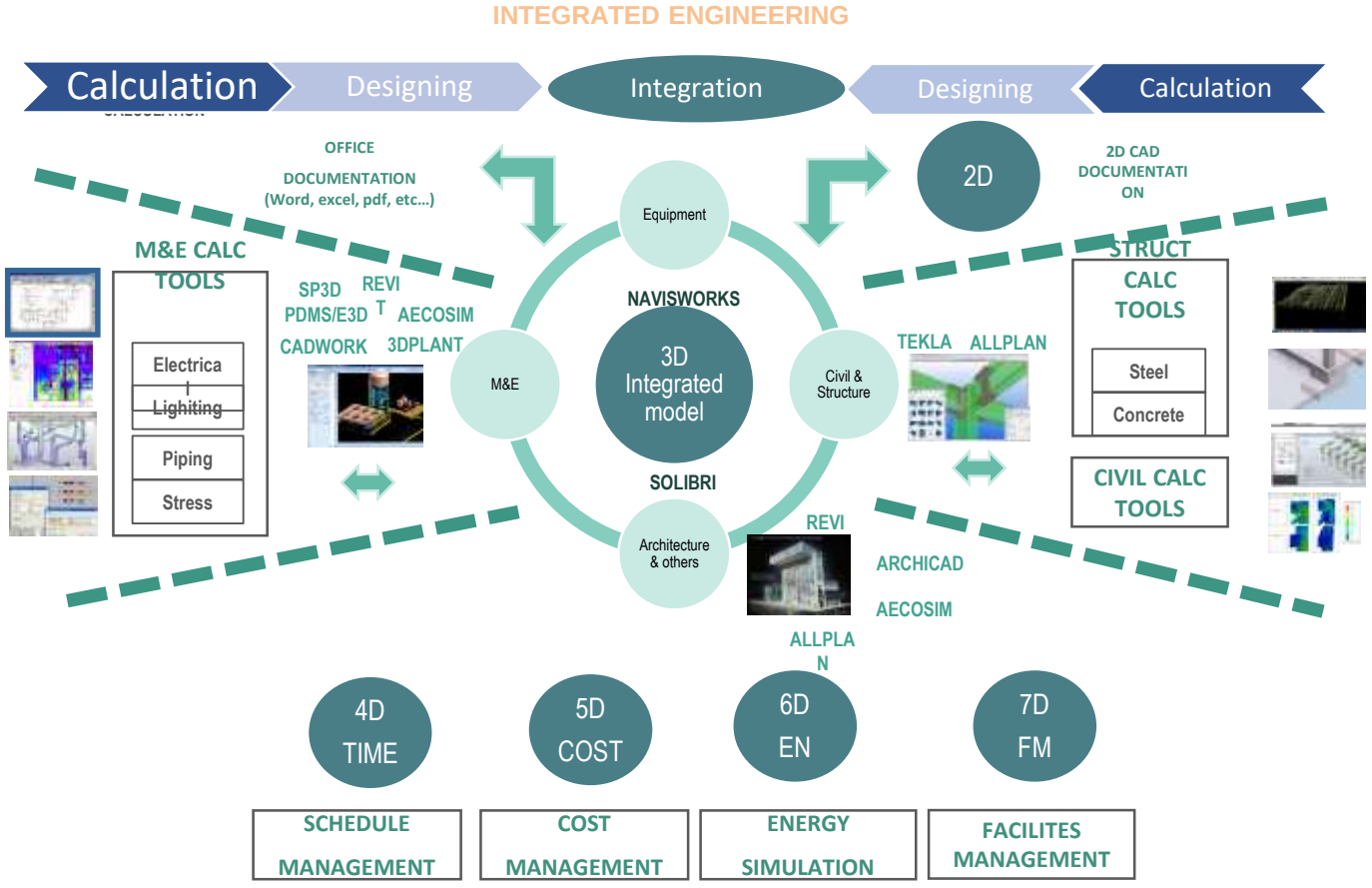


CARPATHE

Calculation of large gas network

Added value solutions
BIM (Building Information Modelling)

IDOM can design complete facilities under a BIM environment, from the usual 3D model up to a 7D level



IDOM

3D MODEL

AUTODESK REVIT
AECOsim
Bentley
GRAPHISOFT ARCHICAD
NEMETSCHEK Allplan
Tekla
AVEVA PDMS
INTERGRAPH
AVEVA EVERYTHING3D

MODELS MANAGER

AUTODESK NAVISWORKS
SOLIBRI
TEKLA BIMsight

ANALYSIS -CALCULATION

ANSYS FLUENT
SAP2000
TRICAD!
MagiCAD
DIALux
AUTODESK ROBOT
SOLIDWORKS
CANECO BIM
DesignBuilder SOFTWARE

MANAGEMENT TOOLS

4D TIME

SCHEDULE MANAGEMENT

Synchro
MS Project
Primavera P6
Asta Powerproject

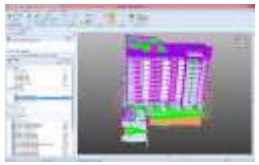
SYNCHRO SOFTWARE
Microsoft
ORACLE PRIMAVERA P6
Elecosoft

5D COST

COST MANAGEMENT

Arquimedes
Cost X
Cost It
Quantities Take Off

cype
exactal
Presto
AUTODESK



FACILITY MANAGEMENT

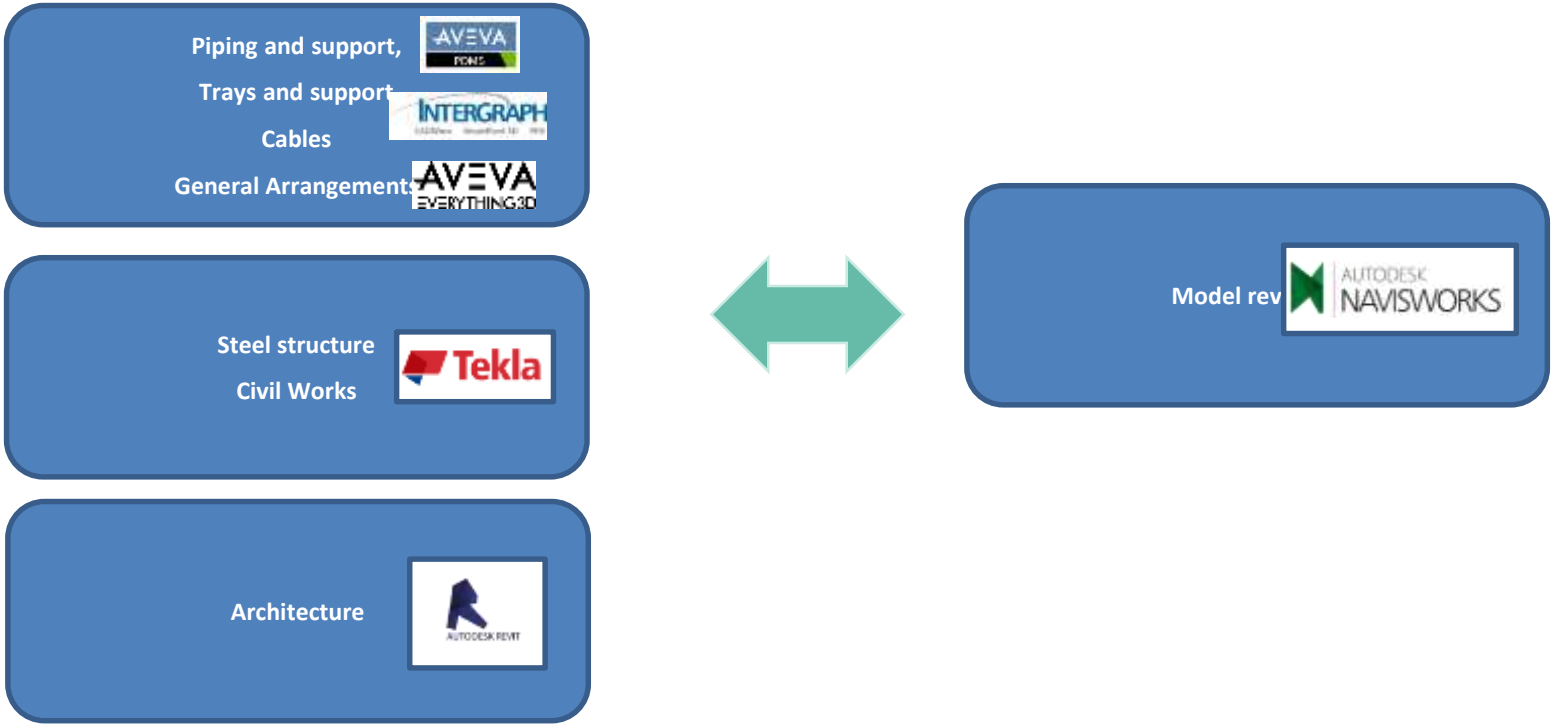
ARCHIBUS
FAMA SYSTEMS
IBM maximo
SAP PM
Prisma3®
rosmiman mms makes it simple

7D FM

POWER PLANTS

3D MODEL INTEGRATION

TEKLA (STEEL-CONCRETE)-PDMS/E3D/SP3D, NAVISWORKS

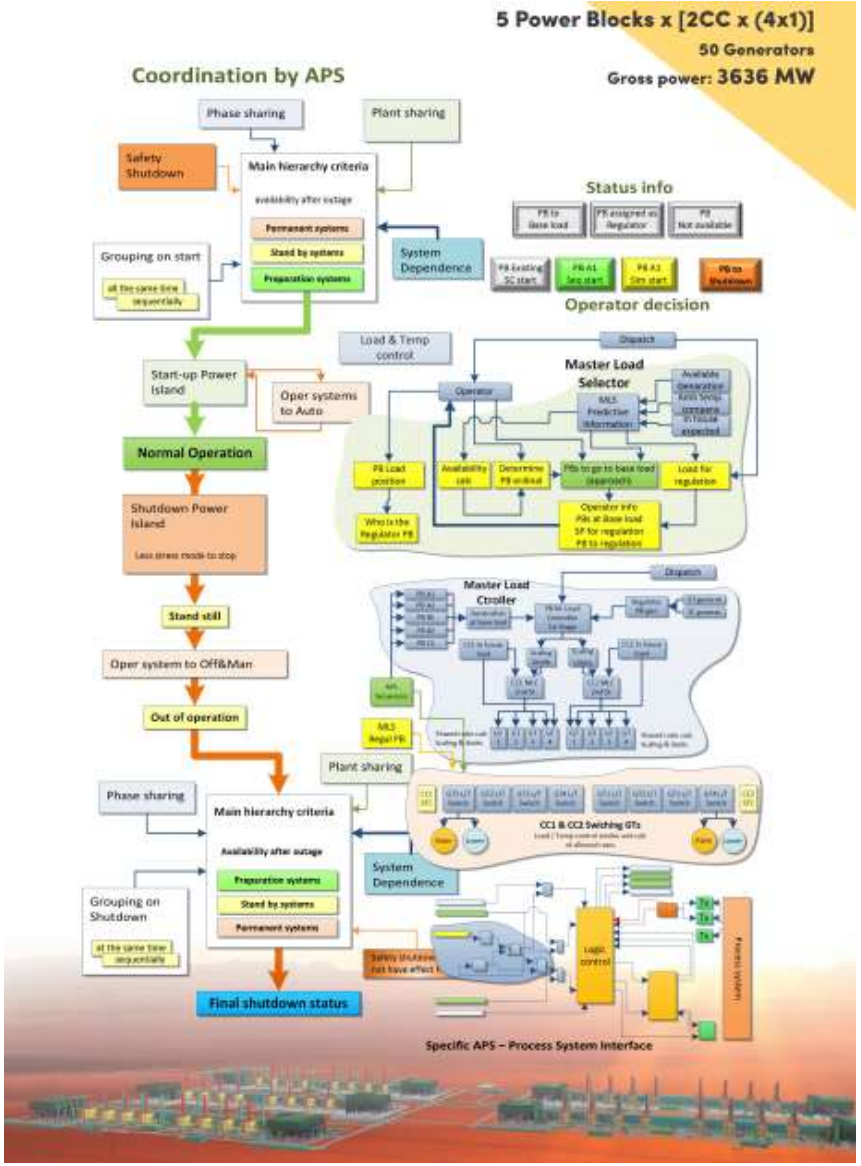


Thermal Power Plants. Operation Philosophy

CONTROL PHILOSOPHY FOR LARGE CCPP WITH SINGLE PUSH BUTTON

Project: PP10 CCPP (3636 MWe)
5 Power Blocks x [2CC x (4x1)] = 50 Generators
Year 2014

Controlling startup, loading and shutdown, the whole Plant is turned-up, and put into operation by nested sequence controllers, which place the plant in a state of minimum power generation, and by means of the automatic load control, is carried to the dispatch load set value. Nested sequence controllers also achieve automatically the complete shutdown.

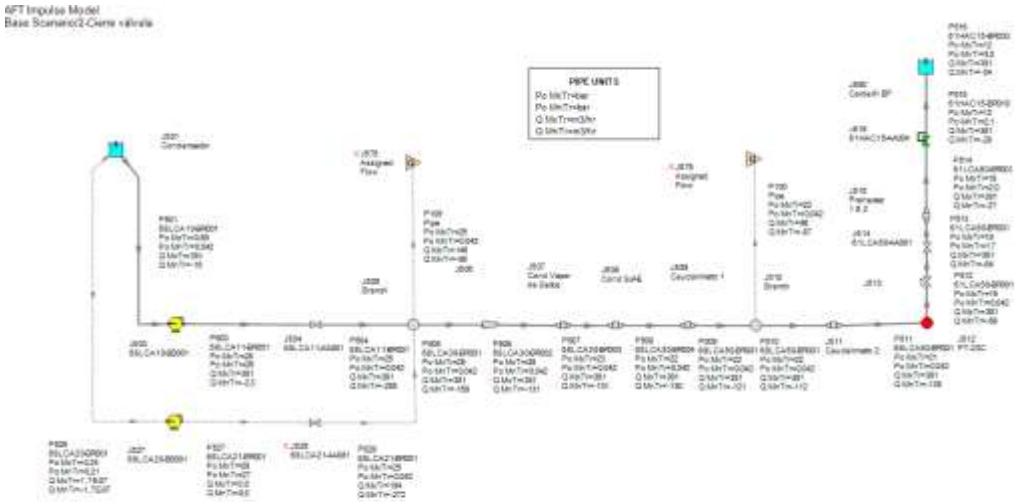


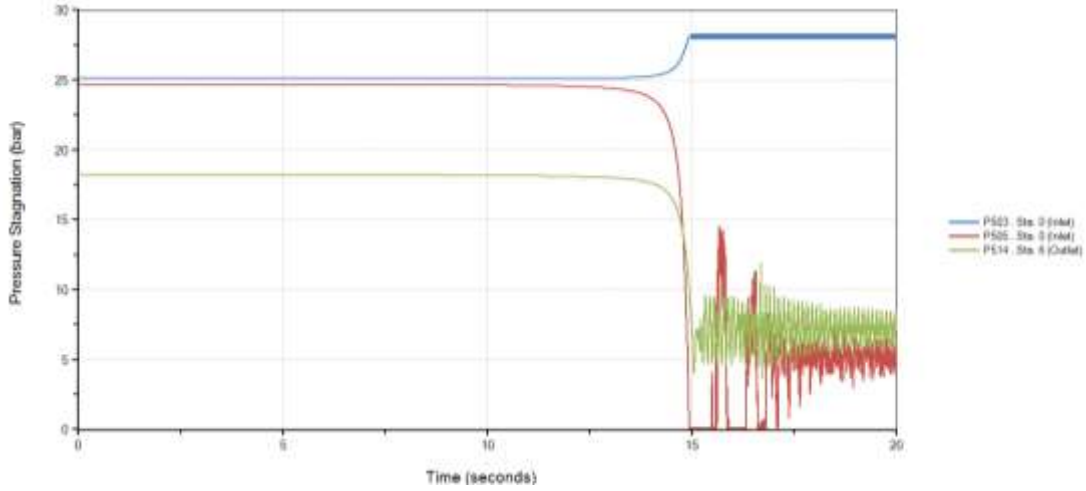
CONDENSATE SYSTEM TRANSIENT STUDY TOOL. AFT IMPULSE

Project: DULCES NOMBRES
Year 2011

Several issues studied:

- Forces definition at supports for condensate system
- Pump trip scenario
- Closed valve at pump discharge scenario
- Two pump simultaneous start-up
- Other scenarios studied for operative purposes





CIRCULATING WATER PUMP INTAKE DESIGN
TOOL. ANSYS FLUENT

Project: ANDASOL 3 SOLAR POWER PLANT (50 MWe)
Year 2011

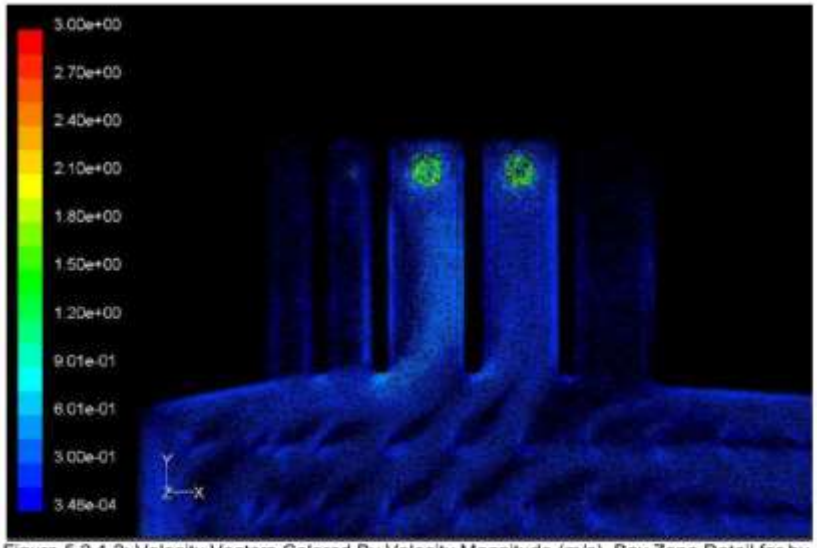


Figure 5.2.1.2: Velocity Vectors Colored By Velocity Magnitude (m/s). Bay Zone Detail for by-pass operation.

Validation with Computational Fluid Dynamics (CFD) simulation was performed for normal, by-pass operation and pump trip in the absence of physical model for circulating water intake system

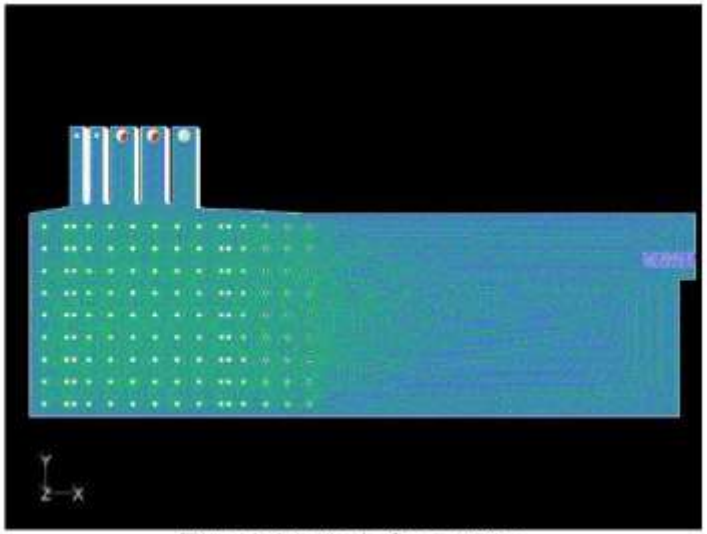


Figure 5.1.1: Mesh. General View

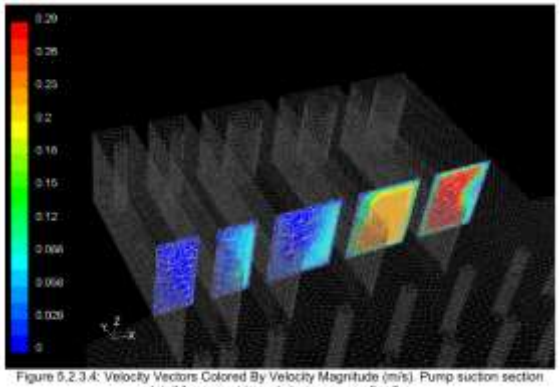
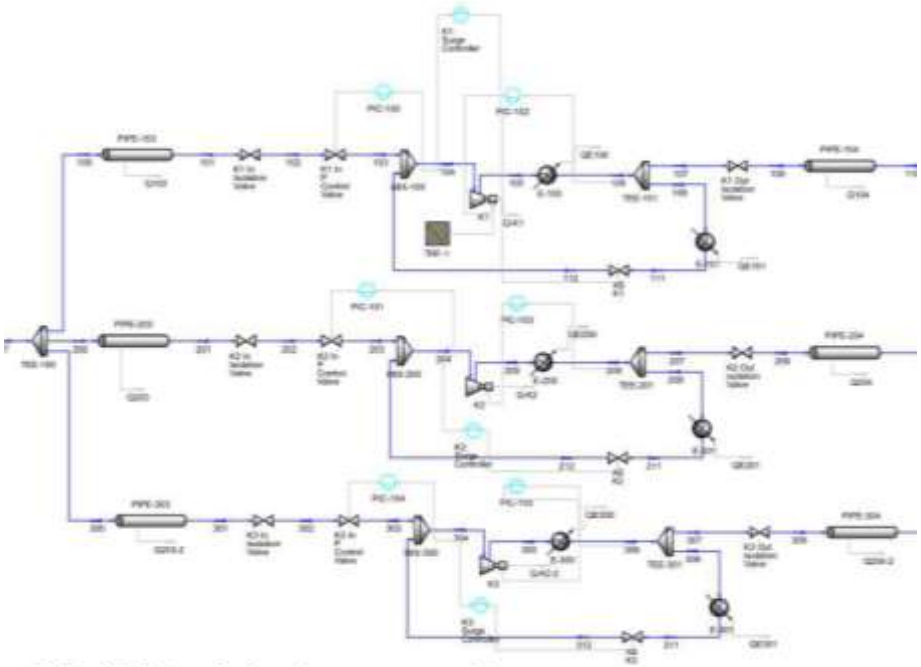


Figure 5.2.3.4: Velocity Vectors Colored By Velocity Magnitude (m/s). Pump suction section detail for pump trip and start-up case after 9 s.

FUEL GAS TRANSIENT (GAS COMPRESSOR) TOOL. HYSYS DYNAMICS

Project: BIBIYANA CCPP (340 MWe)
Year 2014

The expected outcome of the study is to provide enough information in order to take the decision to incorporate a fuel gas buffer capacity of a certain volume to avoid a potential GT turbine trip. A sensitivity analysis has been performed to calculate the required volume that should avoid turbine trip conditions.



re 4-1-3a. Model gas feed and compressor section.

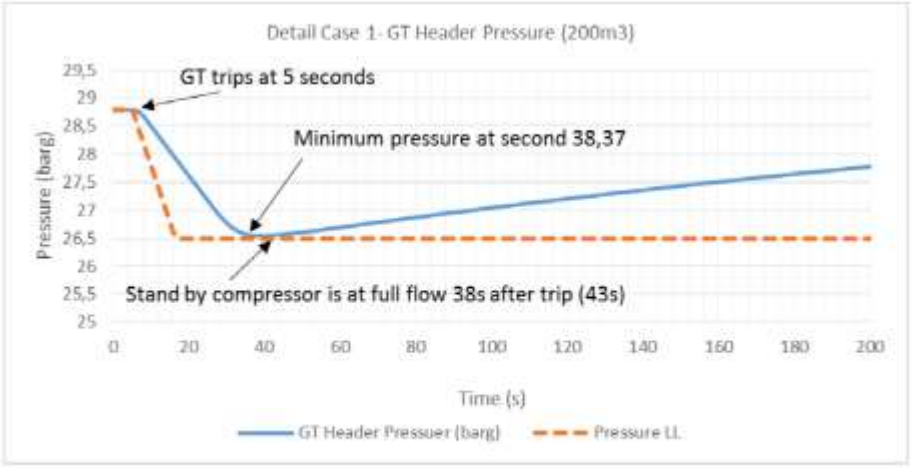
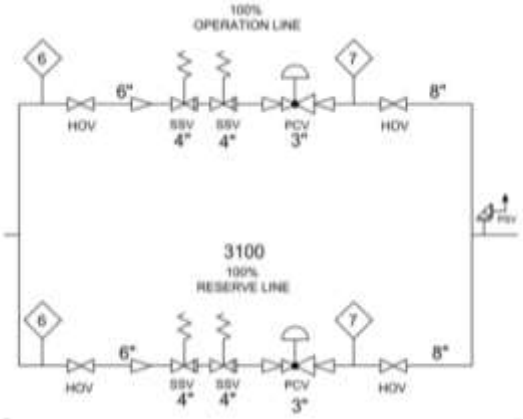


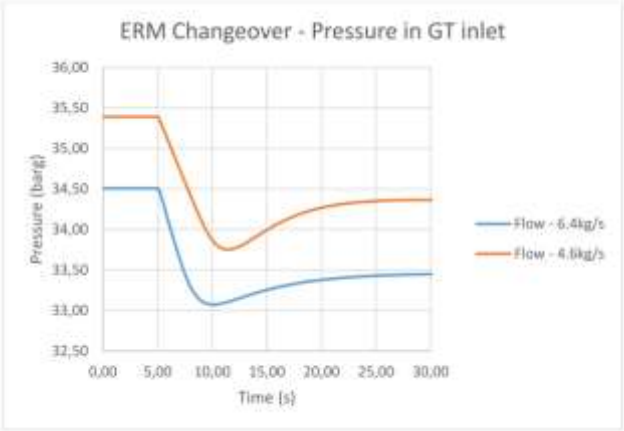
Figure 5.5.a. Gas Turbine Header Pressure for Case 1 - 200 seconds

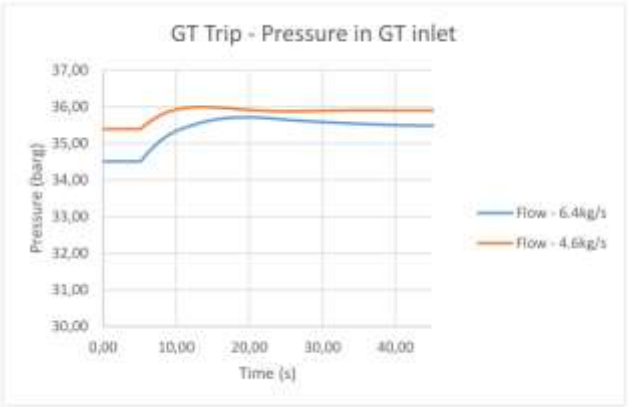
FUEL GAS TRANSIENT (GAS REGULATING AND METERING)
TOOL. HYSYS DYNAMICS

Project: HADERA COGENERATION (150 MWe)
Year 2017

Transition supply pressure operation applies to brief periods associated with pressure control mode transfers, PRMS changeovers, GT load rejections or trips.
There are three different transient scenarios that can cause overpressure or depression
in the fuel gas system.
Case 1: PRMS train changeover
Case 2: GT trip
Case 3: Sudden gas loss in the gas pipeline upstream PRMS



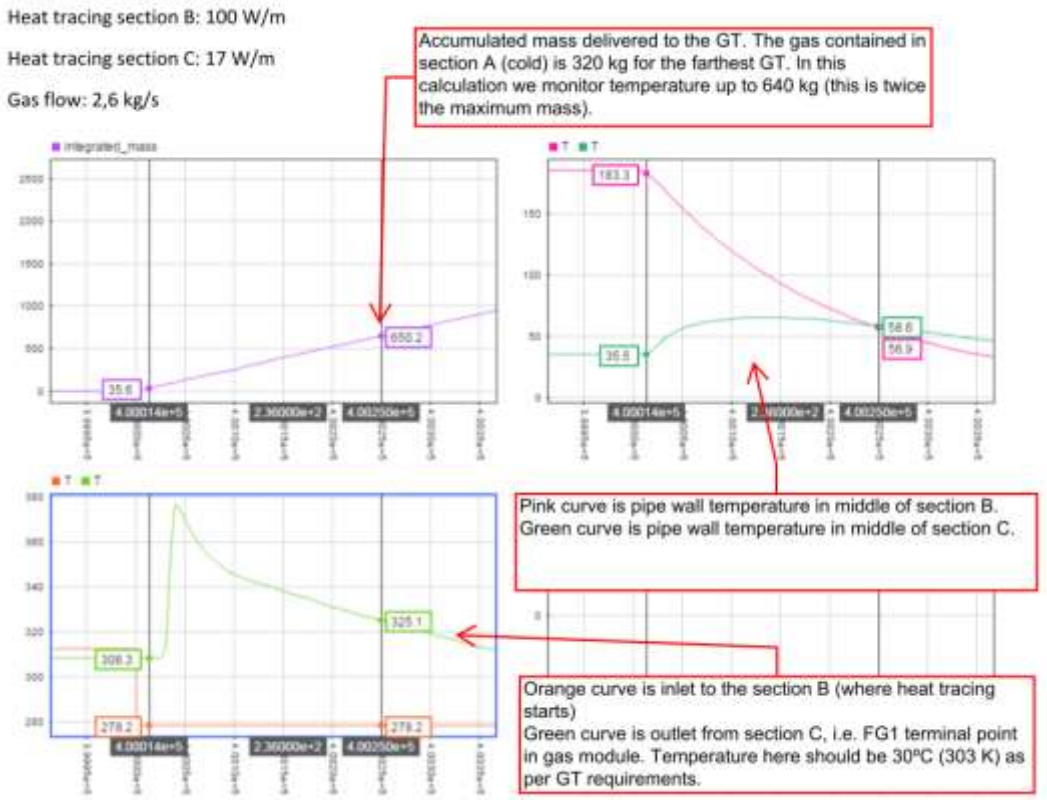




GAS HEAT UP DURING START-UP BY HEAT TRACING TOOL. SIMULINK / SIMSCAPE

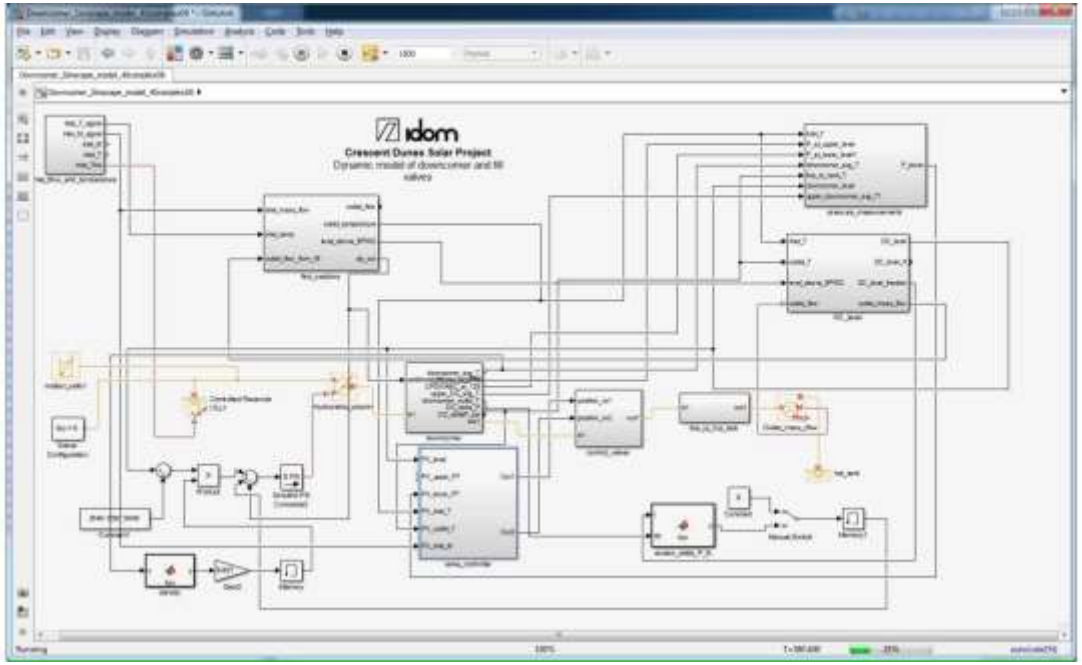
Project: SALALAH II IPP PROJECT (540 MWe)
Year 2017

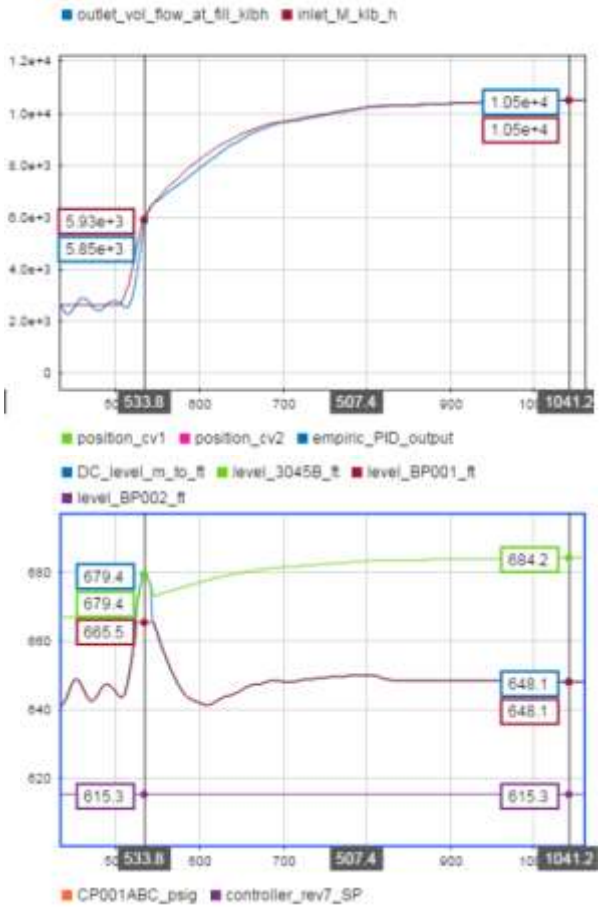
This study was requested in order to check incoming gas temperatura during GT start-ups, considering that a part of gas header was not heat traced. Mixing effects and decay/rise in gas temperature is obtained to be sufficent for GT operation.



DOWNCOMER FILL VALVES TRANSIENT STUDY TOOL. SIMULINK / SIMSCAPE

Project: Crescent Dunes Solar Energy Project (Solar Thermal Power Plant, 140 MWe)
Year 2017



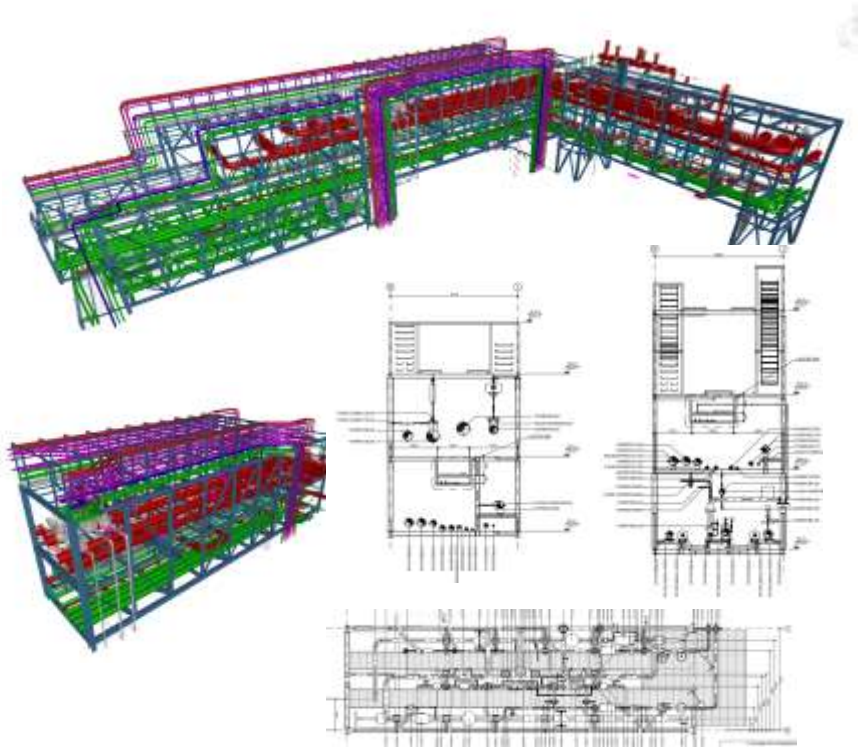


This study was requested in order to ensure the Downcomer Fill Control Valves are able to control, within reasonable limits, the level in the Downcomer in the worst flowrate transient from the Cold Salt Tank to the Receiver Assembly

MAIN RACK MODULAR SOLUCTION

Project: 1800 MW ALBA CCPP
Year 2017-2018

Main steam Pipe Rack designed in 5 modules
- Basic and Detailed Design of Steel structure, piping and cable trays
- Detail drawings.
- Integration of all elements inside the modules (equipment, pipelines, cable trays, flooring, railing, etc.)
-Specifications for on-site assembly. (Checking for every possible temporary state, including the handling)
- Calculation and plan of Modules transportation



5 modules
85 tn to 190 tn

- **Tight schedule/ customer will insist on « on time COD »**
- **Tight area**
- **High labor cost in Bahrein**
- **Site close to harbor facilities; large modules potential**
- **3 units (reduced cost through repeatability)**
- **Opportunity for future project with same configuration**

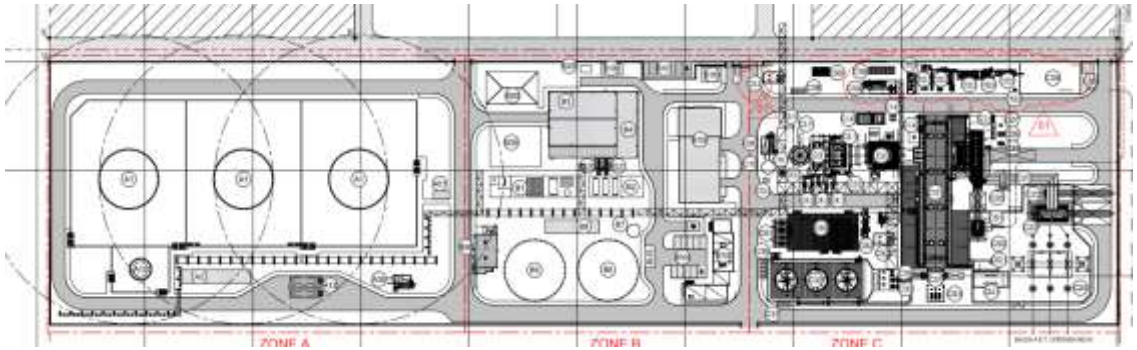
Thermal Power Plants : OE, Architect Engineer and EPC

350 MW CENTRAL PUERTO CCPP

COGENERACION CPSA SAN LORENZO

(Argentina)

(2017-2020)



DESCRIPTION

The Power Plant consists of one (1) Gas Turbine Generator sets (SIEMENS SGT5-4000F), one (1) Heat Recovery Steam Generators with one diverter damper, one (1) Steam Turbine (SIEMENS SST-600) and one (1) Hybrid Refrigeration Tower.

The Gas Turbine shall be provided with Dual Fuel firing capability:

The Power Plant shall provide basically electric power to the Argentine Interconnected System and steam to Terminal 6.

The electricity will be supplied through a new 500 kV line to the Transformer Station "Rio Coronda"

MAIN CHARACTERISTICS

- Total Nominal Power combined cycle operation: 350 MW.
- Steam export 260 tn/h (7 and 13 bar nominal pressure)
- Expected commercial operation in 2019 in open cycle mode.

WORK DONE

IDOM is the Owner's Engineer and Engineering technical assistance for CENTRAL PUERTO, specifically the services are the following ones:

- Conceptual design
- Basic engineering and main equipment integration engineering
- Technical specification for EPC bid process
- Evaluation of EPC proposals
- Contract support
- Review and monitoring of design of different EPC and main contractors
- Review and monitoring of procurement.
- Construction and Commissioning Supervision.

GHK

New Waste Management Centre of Gipuzkoa (CGRG)

(Spain)

(2016-2018)

DESCRIPTION

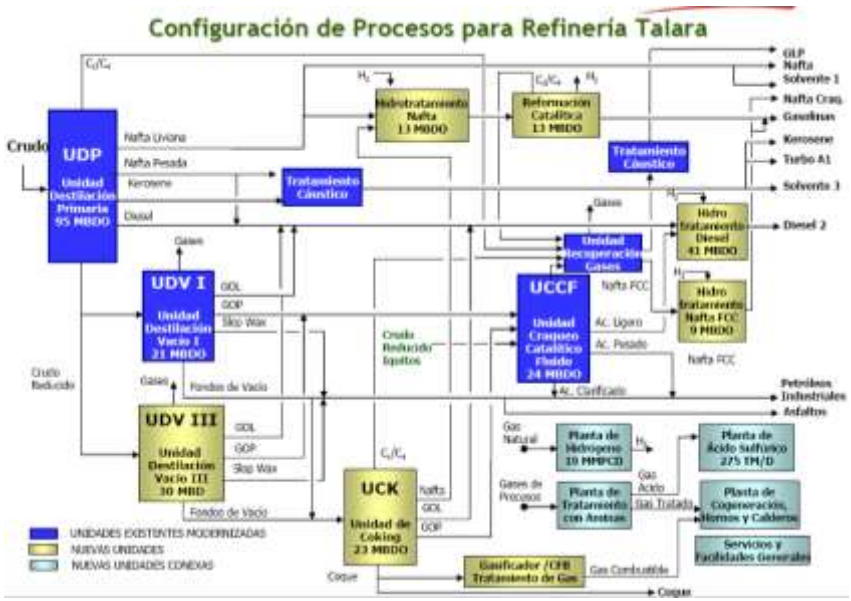
The CGRG is a MSW treatment plant. The treatment system consists of a Mechanical Biological Treatment (MBT) based on a biodrying process and a Waste to Energy (WTE) plant of 18 MWe.
The WTE plant includes an SCR flue gas treatment process, boiler ash collection and treatment system and bottom ash or slag treatment system.
The CGRG has also a packaging section, a leachate treatment plant and biodrying gas treatment system

MAIN CHARACTERISTICS

- Total Nominal Power: 18 MW.
- Expected commercial operation in 2018.

WORK DONE

IDOM is the Owner's Engineer and Engineering technical assistance for GHK, specifically the services are the following ones:
• Conceptual design
• Technical specification for EPC bid process
• Evaluation of EPC proposals
• Contract support
• Review and monitoring of design
• Review and monitoring of procurement.
• Construction and Commissioning Supervision.



PETROPERU

Modernization of the Talara Refinery
PETROPERU
Peru, 2010-on going

DESCRIPTION

PETROPERU is developing the Project TALARA REFINERY MODERNISATION in order to produce Diesel and Gasoline of low sulphur content and upgrade the Refinery for Heavy Crudes Processing and residuals reduction, increasing efficiency and improving environmental aspects.

The Talara Refinery includes a **Power Plant** that is configure as a Rankine – Hirn simple generation cycle with 3 High Pressure (HP) steam boilers fuelled by a mixture of refinery off gases (flexicoking extra low heat value flexigas and refinery fuel gases) enriched with external natural gas and 2 x 50 MW steam turbines with medium pressure steam extractions for the refinery MP requirements. **EPC contractor: COBRA-SINOHYDRO. Starting 2018, Expected operation December 2020**

MAIN FEATURES

- Production: 95.000 BPD
- Type: Cracking (FCC) Based Refinery with residuals conversion with FLEXICOKING and Gasification technology.
- Investment: USD 4 Billion.

IDOM RESPONSIBILITIES

- Project Manager Contractor (PMC) is developed by CONSORTIUM PMC TALARA configured by: INELECTRA, IDOM AND NIPPON KOEI.
- IDOM role in PMC TALARA Consortium is the Design review and follow up for:
  - Critical Equipment.
  - Mechanical Equipment.
  - Civil Specialty
  - Piping (as part of the PMC piping Team)
  - Utilities & Off Sites
    - Management and Process
    - Purchasing
    - Mechanical, civil, piping (as part of the PMC piping team

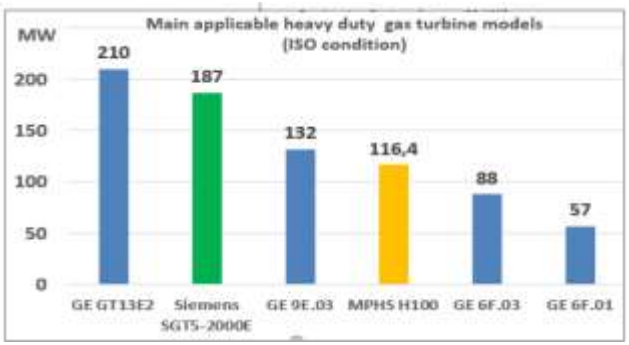
CHEC, Rapac, PMEC, and Mivtah Shamir TECHNICAL ADVISOR for

ALON TAVOR POWER PLANTS BIDDING (2019)

DESCRIPTION

Consortium is bidding for EXISTING Alon Tavor power plant. IDOM aided in the definition of CAPEX required to comply with required legislation, emissions, plant efficiency and others.

At the same time, one NEW peaker power plant of about 230 MWe study is developed. In order to feed financial models, IDOM developed a conceptual design and comparison of different options and technologies, comparing different OEM and plant alternatives.



WORK DONE

IDOM was the technical advisor for the consortium during the tendering process of Alon Tavor power plants

- CAPEX estimation reports for refurbishment and new elements as required for the Alon Tavor tendering/purchasing process
- Feasibility studies for new peaker plant (230MWe) in Alon Tavor site with costs estimations. Layout, preferred engines, production studies and project scheduling. IDOM developed also EPC project budget estimations for several alterbatives (GT for either Siemens/GE and motor engines based ion Wärtsila)

ence
ENERGÍA & CELULOSA

TECHNICAL DUE DILIGENCE FOR THREE BIOMASS POWER PLANTS IN SPAIN

WORK PERFORMED

Due diligence on the following assets:

- Biomass power plant located in Burgos area, Castilla y León, Spain. Electrical Power Output 16 MW. Wheat Straw, corn stover and Wood chips as main type of fuels.
- Biomass power plant located in Cáceres area, Extremadura, Spain. Electrical Power Output 16 MW. Wheat Straw, corn stover and Wood chips as main type of fuels.
- Biomass power plant located in Pamplona area, Navarra, Spain. Electrical Power Output 30 MW. Wheat Straw, corn stover and Wood chips as main type of fuels.

The work consisted on a technical assessment on the existing equipment: biomass boiler, biomass handling system, fuel crushers, steam turbine, electrical generator, cooling water systems, auxiliary fuel system, wáter treatment systems, fire fighting system, HVAC system, electrical systems I&C systems.

The work included also an economic analysis of the existing assets.

THESAN CAPITAL

TECHNICAL DUE DILIGENCE FOR THERMOAOLAR POWER PLANTS SOLABEN 1 AND SOLABEN 6

WORK PERFORMED

Hihg level technical assessment of the status of two thermosolar power plants of 50 MWe each so that the technical inputs of the financial model can be confirmed:

- Solar resource assessment
- Electrical yield production
- Performance assessment
- Operation expenses evaluation
- Utilities consumption: natural gas, nitrogen, parasitic loads, HTF refilling, Activated carbon, other chemical products, raw water consumption
- Reposition of Absorbers and mirrors
- Personnel expenses

Spain

Due diligence for the construction and operation waste infrastructures in Gipuzkoa, Basque Country

Client: Beneficiary: GUIPUZKOAKO HONDAKINEN KUADEAKETA
Financing Institutions: European Investment Bank, La Caixa, Banesto.

Date: 2010 - 2013

Functions carried out:

- Consulting Services

Technical Due Diligence for structuring the financing in relation to the construction and operation of new infrastructure for the management of municipal waste in Gipuzkoa. The infrastructures audited have been:

- Waste management complex including Biodrying + **Waste-to-Energy plant**,
- Slag maturation plant
- Photovoltaic plant
- Enlargement of the composting Plant of Lapatx,
- AD and composting plant
- Enlargement of 3 existing landfills (Sasieta, Urteta and Lapatx) and 7 new Transfer Stations.

The following documents have been prepared:

- Due diligence report including assessment of licenses and permissions, technical and economic feasibility of the construction and later operation of the new infrastructures
- Review of Contracts
- Review of Technical Specifications
- Monitoring of the works (Quarterly Report)
- Analysis of the environmental permissions and monitoring of the requested requirements

Jordan/China

Due diligence to Validate CNTY Company's Proposal and Technology in order to sign a Contract of Design-Finance-Build-Operate for a Waste to Energy Plant in Amman

Client: Greater Amman Municipality (GAM) - EBRD
Date: 12/2016 - Ongoing

Functions carried out:

- Preliminary assessment of existing technical information
- Visits
- Technical support to GAM during the Technical Tour
- Additional information collection during the Technical Tour
- Reporting about the Technical Tour
- Recommendations to improve the Technical content of the contract

Due Diligence to validate CNTY Company's proposal and technology in order to sign a contract of design-finance-build-operate to operate for 30 years a WtE plant in Amman.
The WtE plant's capacity is 547,000 tonnes per year.

Portugal

Due Diligence of waste infrastructures in Portugal

Client: FOMENTO DE CONSTRUCCIONESY CONTRATAS FCC, S.A.
Date: 06/2014 - 07/2014

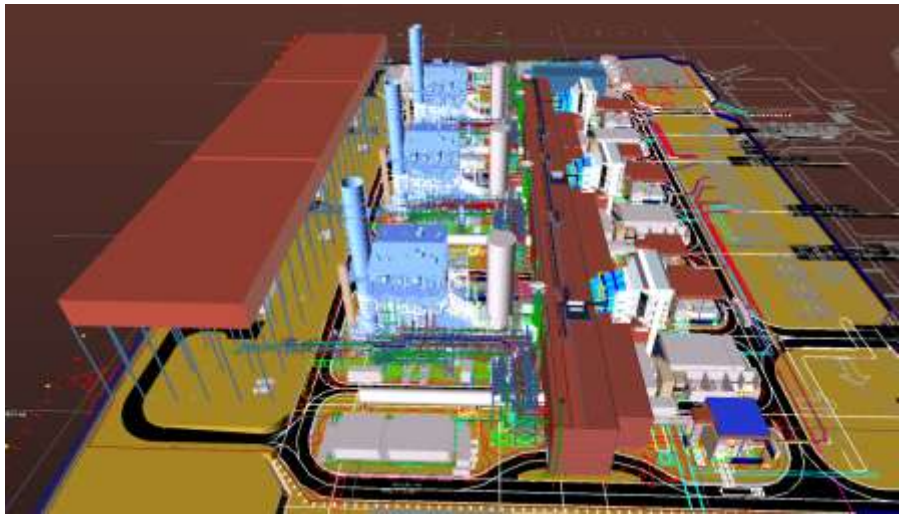
Functions carried out:

- Engineering Services
- Consulting Services

The main purpose of the present Technical and Environmental Due Diligence (TEDD) for the investment in Empresa Geral de Fomento (EGF), is to identify both the principal risks and the CAPEX and OPEX associated to the acquisition, for a total period of 20 years, of the exclusive rights for the management of wastes generated in 11 subsidiary companies in Portugal. These 11 companies generate approximately 60 % of the total amount of waste produced in the whole country.

The scope of works comprises:

- Technical review of 11 concession contracts and contracts between concessionaires and municipalities
- Detailed analysis of the availability and characteristics of the licenses of all infrastructures
- Estimation of potential penalties coming from the non-compliance with issued licenses
- Technical proposals to mitigate or reduce non-compliances including cost estimates
- Review of the Strategic Plan developed by FCC at the non-binding stage of the tender process
- Technical & Environmental Due Diligence of all infrastructures based on the documentation available in a dataroom (more than 8,000 documents) and site visits to two infrastructures: **Waste-to-Energy Plant** - VALORSUL and MBT & MRF Plant in Coimbra (ERSUC).



ALBA POWER STATION 5 - 1800 MW CCPP

PARTNERSHIP GE-GAMA (Bahrain)

2016- On Going

DESCRIPTION

Multi shaft Combined Cycle Power Plant consisting on a 3 x 1+1+1 configuration with three GE model 9HA.01 Gas Turbines, three HRSGs with 3 pressure levels and three Steam Turbine (Alstom Legacy).

Cooling system based on air cooled condenser.

MAIN FEATURES

- Net power (Base load): 1800 MW
- Execution time EPC: C.O.D. in 32 months
- Dates: Aug 2016 – Mar 2019

WORK PERFORMED

IDOM has been awarded the Basic and Detail Engineering of the plant including: **civil engineering** (pedestals , foundations and turbines hall), **electrical** (single line diagrams, calculations, equipment specifications, wiring diagrams, protections…), **mechanical and process** (P&ID's, equipment specifications, piping design in PDMS (3D modeling), supports…) **and I&C** (instruments and signal lists, equipment and instrument specifications, DCS data base and screens, logic diagrams and control loops, wiring diagrams…).

Idom is also developing the following tasks:

- Racks Modularization design
- Support to procurement activities and proposals technical evaluation
- Site technical assistance

62.22% efficiency rating. Guinness World Records™ for the world's most efficient combined-cycle power plant (achieved 28 April 2016)

BOUCHAIN - 605 MW CCPP
EDF / PARTNERSHIP EDF-GE
(France)
2012- 2015

DESCRIPTION

First application of new Class H Combined Cycle Power Plant. configuration with the new GE equipment (9HA.01 Gas Turbine, 109D-14 steam turbine and W28 generator), HRSGs with 3 pressure levels and cooling system based on existing natural draft cooling tower.

The plant is been jointly developed by GE and French state-controlled utility group Electricite de France SA (EDF.FR) on existing facilities of a coal fire power plant will be decommissioned at Bouchain (north of France).

The plant is equipped with Electrical Control System (ECS) similar to that used in large power distribution networks using IEC 61850 protocol and has been implemented Fieldbus Foundation Fieldbus and Profibus DP protocols in the process control of the plant.

MAIN CHARACTERISTICS

- Gross power: 605 MW
- Dates: 2012-2016

WORK DONE

IDOM has performed the Basic and Detail Engineering of the power island of the plant including: civil engineering (pedestal), electrical (single line diagrams, calculations, single-wires, equipment specifications, connection schemes, protections…), mechanical and process (P&ID's, equipment specifications, piping design in SP3D (3D modeling), supports…) and I&C (instruments and signal lists, equipment and instruments specifications, SCD data base and screens, logic diagrams and control loops, connection Schemes).

Idom has also developed support to procurement activities and proposals technical evaluation.

NEW STANDARD PLANT - 9FB GROWTH

GE Energy Power Plant Engineering
FRANCE
(2010 - 2011)

DESCRIPTION

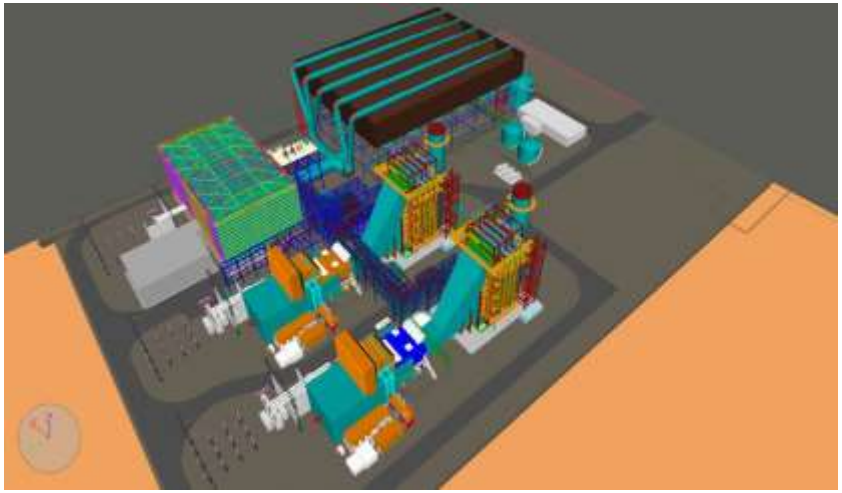
- New standard plant , 109FB GROWTH 500MW (class H), consist of the integration of new products and innovation into a single shaft configuration. The design includes the optimization of turbine hall, HRSG area, detailed arrangement of auxiliaries, definition of main cable and pipe routings resulting in a highly constructible and maintainable plant.
- The goal is to make sure that the shaft center-line equipment fits well together with the rest of the plant. Therefore, the plant design will be conducted in parallel with the product design
- The target market is primarily the broad European region, taking into account the upcoming challenges expected from the energy business evolution in this area. Other 50Hz market will also be investigated as the technology we offer is considered by the other customers.
- The plant shall be easily adaptable to specific site conditions therefore, the project will include the design for 3 main configurations based on different cooling systems (towers, once through or air cooled) and a set of selectable options.
- Seven countries are investigated to analyze the impact of local codes and regulations in the design: Belgium, France, Germany, Ireland, Spain, and Turkey.

MAIN CHARACTERISTICS

- Gross power: 500 MW
- Dates: 2010-2011

WORK DONE

- IDOM scope includes the basic design for the plant providing engineering information to GE. This includes the design work which is necessary to assess the power island arrangement feasibility and provide an accurate bill of quantities for cost estimating and scheduling purposes.
- Analyze and Comment phase which includes looking for further optimization (proposing new ideas, materials, technologies) that would reduce the plant total cost and schedule. The output will be a report stating the estimated improvements in equipment quantities, erection and commissioning man-hours, Schedule impact, and assessing impact on the plant operability (safety, flexibility, reliability, availability, maintainability).
- Preliminary Design Phase (base offer) and Detailed Design Phase (option). The output of the 2 phases are essentially identical, the Detailed Design being mainly an update when GE product development enters the detailed stage. Includes, civil, electrical, P&ID´s, piping, HVAC, I&C, 3D modelling in SP3D, BOQ´s, etc



615 MW VALLE DE MEXICO II CCPP

INITEC ENERGÍA

(MEXICO)
2016- 2017

DESCRIPTION

New Combined Cycle Power Plant places in the State of Mexico (Mexico).
The CTCC is based on a 2x1 configuration by means of two SGT6-8000H gas turbines, one SST6-5000 steam turbine (both manufactured by SIEMENS) and two HRSG manufactured by AMEC FOSTER WHEELER.
Cooling is done by means of an Air Cooled Condenser (ACC) and Fin Fan Coolers (FFC).

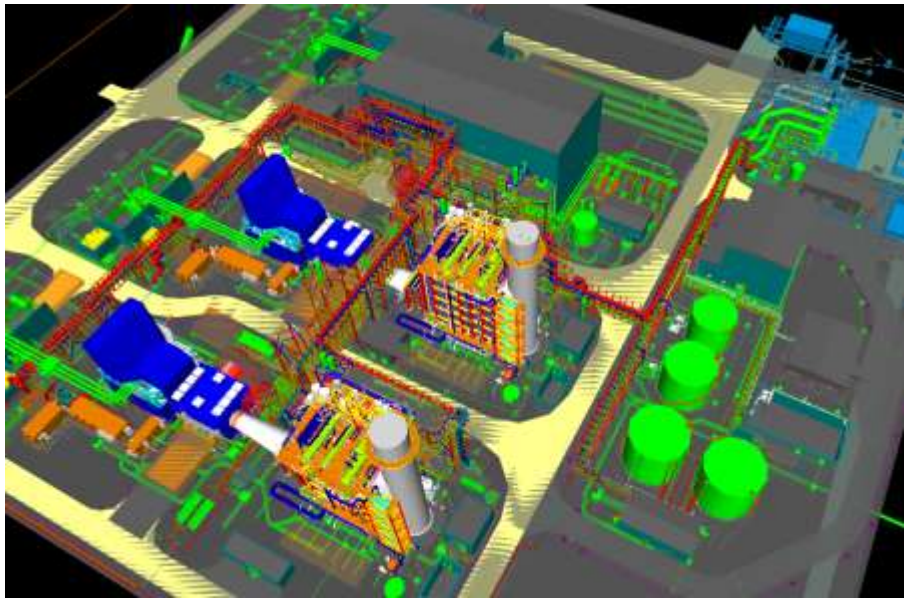
MAIN FEATURES

- Nominal power: 515 MW
- 2x1 power block configuration + ACC
- Planned delivery date: December 2017

WORK PERFORMED

IDOM is developing the detailed engineering, performing the following main works:

- Mechanical and Process Engineering: Equipment lay-out drawings, equipments and systems calculation, P&ID´s development with AVEVA Diagrams, hazard areas drawings...
- Piping Engineering: PDMS 3D model for all plant systems, plant drawings, isometrics and material take offs, supports design and drawings, stress calculations, piping specialties and valves lists and data sheets, line list...
- Electrical Engineering: One line diagrams, equipment and wiring calculations, materials take offs, cable trays modelling and drawings with PDMS, cable routing, interconnecting diagrams, protections settings,….
- Instrumentation and control Engineering: Instruments lists and data sheets, wiring diagrams, logic diagrams and control loops, DCS data base and screens design,...
- Civil & Structural Engineering: Steel and concrete structures calculations and drawings, foundations calculations and drawings, underground networks drawings, road and urbanization/finishing drawings, bill of quantities…
- Procurement Technical Support: Preparation of technical specifications for “Plant packages”, technical bid evaluations, activation of Vendor’s documentation, checking of Vendor’s documentation…



313 C.C. Empalme II - 791 MW CCPP

DUNOR (Partnership Duro Felguera – Elecnor)
Sonora (Mexico)

2015- Ongoing

DESCRIPTION

Multi shaft Combined Cycle Power Plant consisting on a 2+2+1 configuration with two **SIEMENS model SGT6-8000H Gas Turbines**, two CERREY HRSGs with 3 pressure levels and one DSPW Steam Turbine.

Cooling system once though type with sea water.

MAIN FEATURES

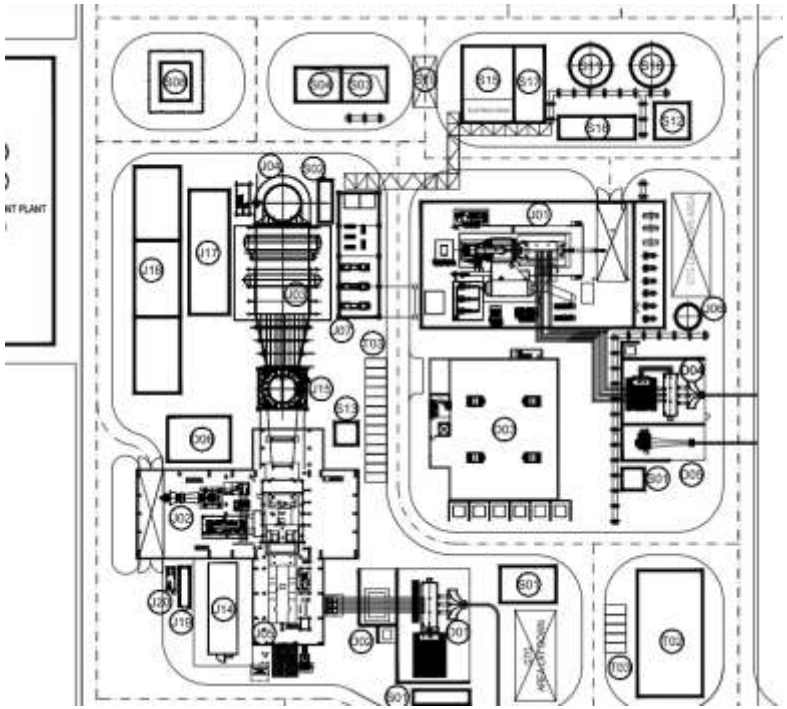
- Net power: 791 MWe
- Execution time EPC: C.O.D. in 31 months
- Dates: 2015- 2018

WORK PERFORMED

IDOM has been awarded the complete Basic and Detail Engineering of the plant: **civil engineering** (including pedestal and steam turbine hall), **electrical** (single line diagrams, calculations, equipment specifications, wiring diagrams, protections, cable trays - 3D modelling - , …), **mechanical and process** (P&ID's, equipment specifications, piping design in SP3D - 3D modeling -, supports…) **and I&C** (instruments and signal lists, equipment and instrument specifications, DCS data base and screens, logic diagrams and control loops, wiring diagrams…). Commissioning procedures and O&M manuals are also included.

Idom is also developing the following tasks:

- Support to procurement activities and proposals technical evaluation
- Review of suppliers documentation



640 MW DUBAL CCPP

Sepco III
Jebel Ali – (Dubai)

2015- 2018

DESCRIPTION

New Combined Cycle Power plant in multi-shaft arrangement, gross power 530MW (fuel oil) to 640MW (natural gas) – consisting on one (1) indoor Gas Turbine (Siemens SGT5-8000H) with evaporative cooler, one (1) triple pressure reheat type HRSG with by-pass stack and one (1) indoor Steam Turbine unit with sea water once through cooled condenser (by Siemens), complete with all associated balance of plant & equipment.

MAIN FEATURES

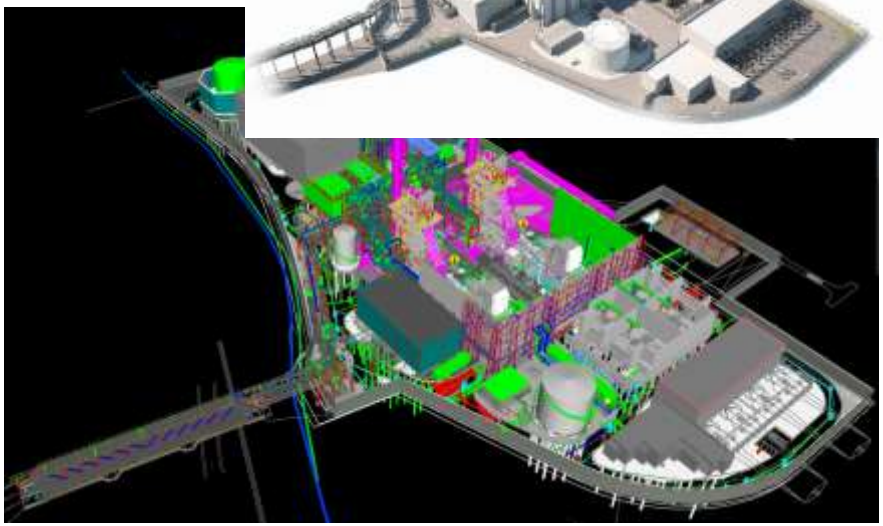
- Net power: 624 MWe
- Dates: Oct 2018- Feb 2021

WORK PERFORMED

IDOM has been awarded the complete Basic and Detail Engineering of the plant: **civil engineering** (including pedestal and steam turbine hall), **electrical** (single line diagrams, calculations, equipment specifications, wiring diagrams, protections, cable trays - 3D modelling - , …), **mechanical and process** (P&ID's, equipment specifications, piping design in SP3D - 3D modeling -, supports…) **and I&C** (instruments and signal lists, equipment and instrument specifications, DCS data base and screens, logic diagrams and control loops, wiring diagrams…). Commissioning procedures and O&M manuals are also included.

Idom is also developing the following tasks:

- Support to procurement activities and proposals technical evaluation
- Review of suppliers documentation



COGENERATION COMBINED CYCLE POWER PLANT 140-150 MW

IDOM EPC CONTRACT for IC POWER Ltd.

January 2016 - Ongoing

DESCRIPTION

The Power Plant consists of two (2) Gas Turbine Generator sets (GE 6F.01), two (2) Heat Recovery Steam Generators with two (2) pressure levels and Supplementary Firing, one (1) Steam Turbine (GE SAC2-15) and one (1) Air Cooled Condenser.

The Gas Turbines shall be provided with Dual Fuel firing capability (Natural Gas as the main fuel and Fuel Oil as back-up). Natural Gas will be supplied from a new PRMS, installed inside the Power Plant Area. Diesel Fuel Oil will be delivered by trucks and stored in two tanks (one is the main storage and the other for daily operation).

The Power Plant shall provide steam and electric power to a nearby Paper Mill Facility, satisfying their variable demand. Remaining electricity will be supplied to the 161 kV National Grid lines through a new Gas Insulated Switching Substation (GIS) located on site. The project also includes a bridge over a river with a pedestrian side (public) and an industrial side (restricted access) for pipes and trays connecting Paper mill facilities.

MAIN FEATURES

- Gross power generation: 140-150 MW
- Steam delivered to end consumer: 90 t/h (Normal operation scenario)
- Power to the grid: 80 MW
- Execution time EPC: 32 months: 5 months (LNTP) + 27 months (NTP)

WORK PERFORMED

IDOM has been awarded the construction of the Plant in an EPC format, including all the activities from conceptual design to start-up and operation:

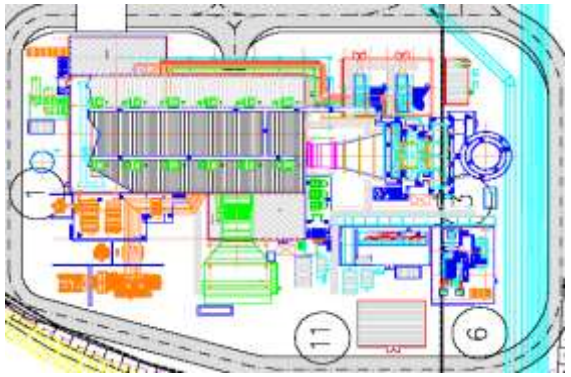
- Conceptual, Basic and Detail Engineering of the Plant (**layout definition**, **civil** (turbines pedestals, equipment foundations, industrial & public pedestrian bridge, pipe racks, undergrounds, etc), **electrical** (single line diagrams, calculations, equipment specifications, wiring diagrams, protections, etc), **mechanical and process** (Thermal Balances, Water Balance, P&ID's, equipment specifications, etc), **piping** (pipe specs, valve specs, stress analysis, etc), **3D modeling** in SP3D (equipment, foundations, structures, pipes, trays, supports, UG networks, etc…) and **I&C** (instruments and signal lists, equipment and instrument specifications, DCS data base and screens, logic diagrams and control loops, wiring diagrams, etc).
- Procurement of all required supplies
- Construction activities & management
- Commissioning of all the systems & Training courses for Plant operators
- Performance tests

POWER GENERATION
RELEVANT REFERENCES

Combined Cycle Power Plants References

800 MW BBE CCPP (SPAIN)
Client: BBE
2 x GE 9FA dual fuel with one through
EPC, Basic and detail design

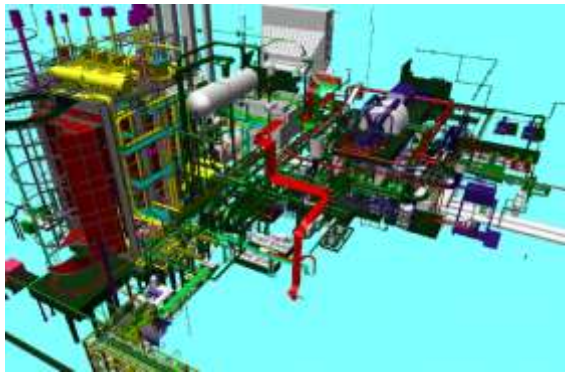
525 MW BOUCHAIN CCPP (FRANCE)
Client/Owner: GE /EDF
FlexEfficiency 50 GE single shaft natural gas
Basic and detail design power block



450 MW MITELSBUREN CCPP (GERMANY)
Client: ACS Cobra _GE
GE 9FB single shaft with cooling tower
Basic and detail design

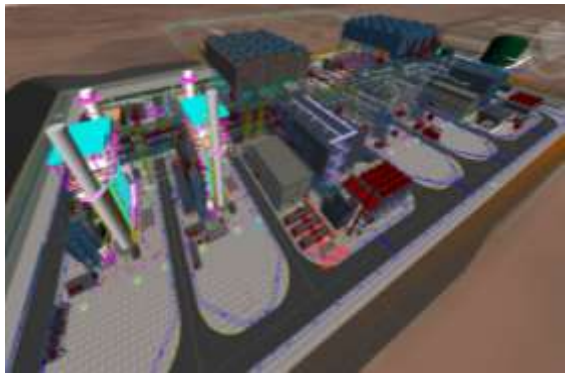
450 MW WHITEGATE IPP (IRELAND)
Client/Owner: GAMA_GE/Bord Gais
GE 9FB single shaft with ACC. Dual fuel
Basic and detail design

2000 MW PEMBROKE CCPP (UK)
Client: ALSTOM
4 ALSTOM single shaft (GT26B gas turbine)
Basic and detail design of civil work



400 MW RIGA CCPP + DH (LATVIA)
Client/Owner: IBERDROLA/ LATVENERGO
1x1 Multishaft GE9FB GT
Basic and detail design of civil work

Combined Cycle Power Plants References



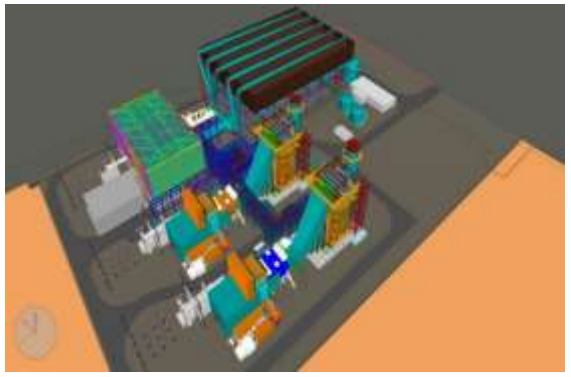
450 MW SALALAH II IPP – (OMAN)
Client/Owner: SEPCO III/AWCA-MITSUI
2x(2x1) configuration with four GE model 6F.03 dual fuel
Basic and detail design (on going)

500 MW ACWA POWER ZARQA CCGT (JORDAN)
Client/Owner: SEPCO III /ACWA
3x1 configuration with three GE model 9E
Basic and detail (on going)

440 MW HAIL CONVERSION TO CCPP (KSA)
Client/Owner: ALTOUKHI/SEC
Multishaft 4x1 with four SIMENS SGT6-2000E
Basic and detail design

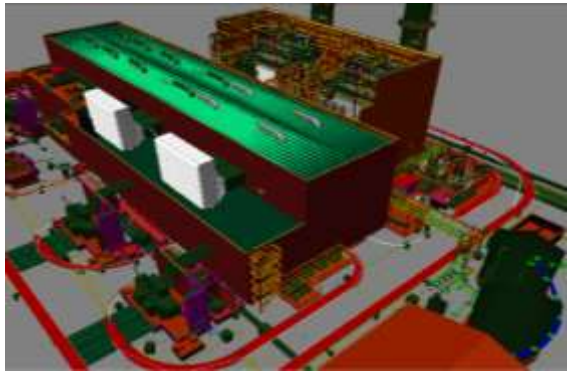
294 MW BAJA CALIFORNIA CCPP (MEXICO)
Client/Owner: IBERDROLA
Multishaft 1x1 configuration with one GE 7FA.04
Basic and detail design

300 MW DULCES NOMBRES CCPP (MEXICO)
Client/Owner: IBERDROLA
Multishaft 1x1 configuration with one ALSTOM GT24
Basic and detail design



615 MW VALLE DE MEXICO II CCPP (MEXICO)
Client: INITEC ENERGIA
2x1 Multishaft with two SGT6-8000H
Basic and detail design

Combined Cycle Power Plants References



800 MW CASTELLON 4 CCPP (SPAIN)
Client: IBERDROLA
2 x 1 GE 9FB with one through
Detail design

800 MW ESCATRON CCPP (SPAIN)
Client: ENEL POWER
2 x 1 GE PG9351FA
Basic and detail design

220 MW SKOPJE CCPP +DH (MACEDONIA)
Client: GAMA
Multishaft 1x1 ALSTOM GT with cooling tower
Basic and detail design

1650 MW STAYTHORPE CCPP (UK)
Client/Owner: ALSTOM/RWE
4 singleshafts ALSTOM GT26 natural gas with cooling tower
Basic and detail design of piping

210 MW B. DE TIRAJANA I CCPP (SPAIN)
Client/Owner: DURO FELGUERA/ENDESA
2x1 multishaft GE 6FA with one through. Diesel
Basic and detail design

210 MW SON REUS CCPP (SPAIN)
Client/Owner: DURO FELGUERA/ENDESA
2x1 multishaft GE 6FA ACC. Diesel
Basic and detail design

Combined Cycle Power Plants References

210 MW CÁS TRESORER I CCPP (SPAIN)
Client/Owner: DURO FELGUERA/ENDESA
2x1 multishaft GE 6FA with Hybrid cooling. Diesel
Basic and detail design

230 MW B. DE TIRAJANA II CCPP (SPAIN)
Client/Owner: DURO FELGUERA/ENDESA
2x1 multishaft GE 6FA with one through. Diesel
Basic and detail design

800 MW ARRUBAL CCPP (SPAIN)
Client: NATURAL GAS
2 singleshaft SMNS. SGT5-4000F with cooling tower.
Dual fuel
Owner engineering

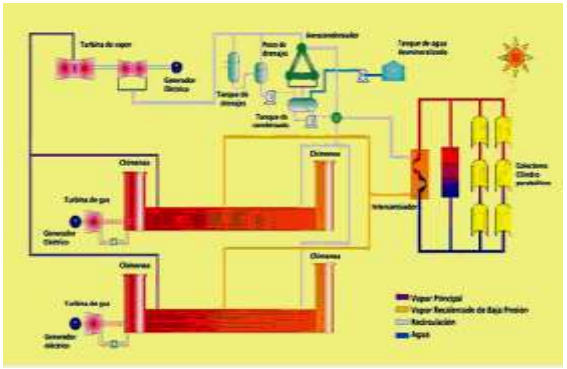
400 MW CASTEJÓN 2 CCPP (SPAIN)
Client/Owner: DURO FELGUERA/HIDROCANTABRICO
Singleshaft ALSTOM KA-26-1 with cooling tower
Basic and detail design of piping

229 MW CÁS TRESORER II CCPP (SPAIN)
Client/Owner: DURO FELGUERA/ENDESA
2x1 multishaft GE 6FA with Hybrid cooling. Diesel
Basic and detail design

300 MW ESCATRON PEAKER CCPP (SPAIN)
Client: GLOBAL 3 ENERGIA
4x1 multishaft LM6000PC-SPRINT with cooling tower
Basic and detail design

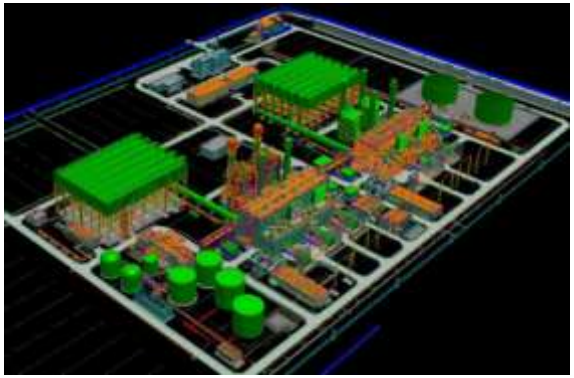
Combined Cycle Power Plants References

450 MW ISCC Ain Beni Mathar (MOROCCO)
Client: ABENER
2x1 CCPP with 20MW parabolic trough solar collectors field
Basic and detail design



150 MW ISCC HASSI R'MEL (ALGERIA)
Client: ABENER
2x1 CCPP with 25MW parabolic trough solar collectors field
Basic and detail design

385 MW CCPP in Tahaddart (MOROCCO)
Client: ONE – ENDESA - SIEMENS
SIEMENS single shaft with cooling towers
Owner engineering

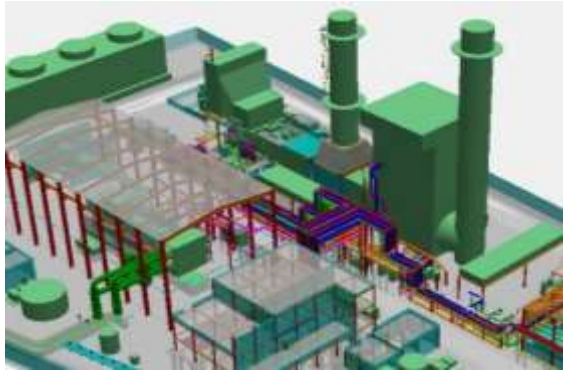


1600 MW DJELFA CCPP (ALGERIA)
Client/Owner: DURO FELGUERA/SONELGAZ
2x(2x1) GE 9FA dual fuel with ACC
Basic and detail design

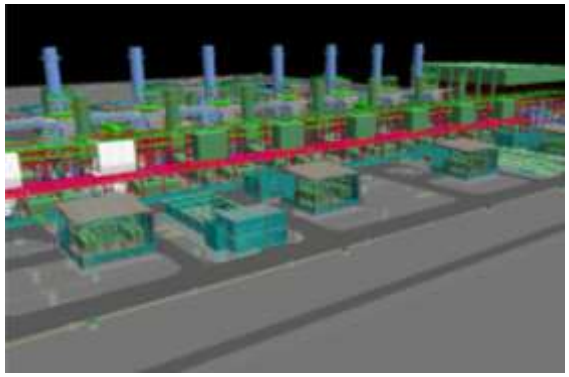
2000 MW FUJAIRAH 2 IWPP (UNITED EMIRATES)
Client: ALSTOM
2 Blocks multi-shaft Alstom's KA26-2 (GT26+STF30C)
1 Block KA26-1 multi-shaft (GT26+STF30C)
Desalinization Unit
Detail piping design

210 MW EXTENSION OF FUJAIRAH CCPP (UNITED EMIRATES)
Client: IBERDROLA
One General Electric 9FA gas turbine+ST
Basic and detail design

Combined Cycle Power Plants References



335 MW SIDDHIRGAN CCPP (BANGLADESH)
Client: ISOLUX_SAMSUNG C&T
1 x1 multishaft GE 9FA natural gas with Cooling tower
Basic and detail design



2000 MW PP12 CCPP (SAUDI ARABIA)
Client/Owner: BEMCO_GS/SEC
2 multishaft 4x1 GE7FA with ACC. Natural Gas, Distillate Oil and Arabian super-light crude Oil
Basic and detail design

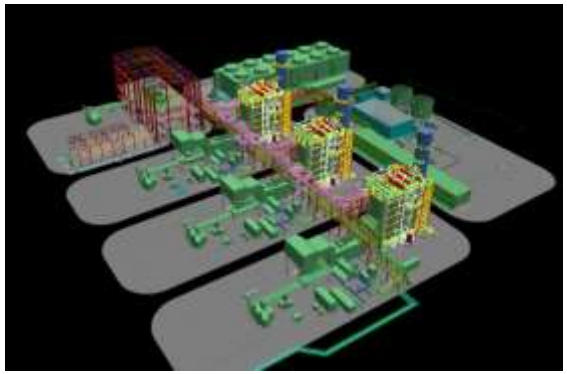
3700 MW PP10 CCPP (SAUDI ARABIA)
Client/Owner: BEMCO/SEC
10 multishaft 4x1 GE7FA with ACC.
Basic and detail design of CC Conversion

890 MW EUROSTAR IPP (TURKEY) (ON HOLD)
Client/Owner: GAMA_GE/METCAPs
2x1 multishaft GE PG9371(FB) with ACC. N. Gas
Basic and detail design

900 MW ERZIN CCPP (TURKEY)
Client/Owner: GAMA_GE/ AKANERJI
2x1 multishaft GEPG9371(FB) with Cooling tower. N. Gas
Basic and detail design

400 MW SUGRESS (RUSSIA)
Client/Owner: IBERDROLA/ OGK 5
1x1 Multishaft GE9FB GT one through cooling
Detail design

Combined Cycle Power Plants References



650 MW MORELOS CCPP (MEXICO)
Client/Owner: ABENER/
3x1 multishaft GE-7FA, natural gas, cooling tower
Basic and detail design

1135 MW TAMAZUNCHALE CCPP (MEXICO)
Client/Owner: IBERDROLA
2 multishaft 2X1 GE-7FA, natural gas, cooling tower
Detail design

450 MW VETANILLA CCPP (PERU)
Client/Owner: DFE/ENDESA
2x1 multishaft SMNS, natural gas, cooling tower
Basic and Detail design conversion into Combined Cycle

400 MW SABON CCPP (SPAIN)
Client/Owner: ACS COBRA_GE/UNION FENOSA
Singleshaft PG9351(FA) dual fuel, one through cooling
Basic and detail design

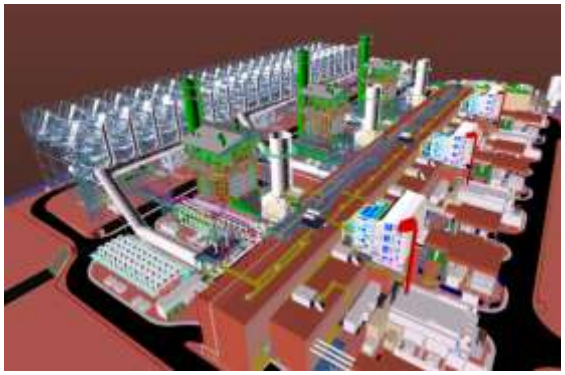
840 MW ANADOLU CCPP (TURKEY)
Client: GAMA_GE
2x1 multishaft GEPG9371(FB) with ACC. N. Gas
Basic and detail design

800 MW BIZKAIA ENERGIA CCPP (SPAIN)
Client: ESB
2x1 multishaft GE 9FA with ACC. N. Gas
Owner engineer

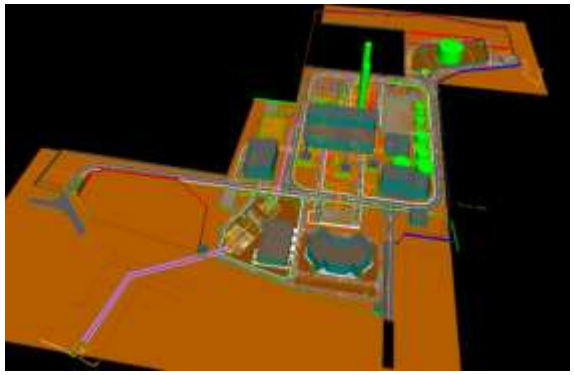
Combined Cycle Power Plants References

674 MW SALEM HARBOUR CCPP (USA)
Client/Owner: IBERDROLA/
Double 1x1 multishaft GE-7F.05, natural gas, ACC
Detail design

115 MW NEW CHILCA CCPP (PERU)
Client/Owner: DURO FELGUERA
1X1 multishaft GE-6F.03, natural gas, ACC
Basic and detail design



1800 MW ALBA POWER STATION 5 (BAHRAIN)
Client/Owner: GAMA
3 Multishaft 1x1 GT GE 9HA.01 natural gas, ACC
Basic and detail design

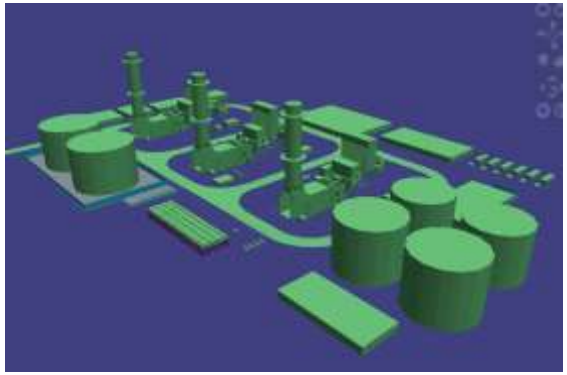


335 MW RADES-C CCPP (TUNISIA)
Client: GAMA
Double 1x1 multishaft Mitsubishi, dual fuel, OT
Basic and detail design

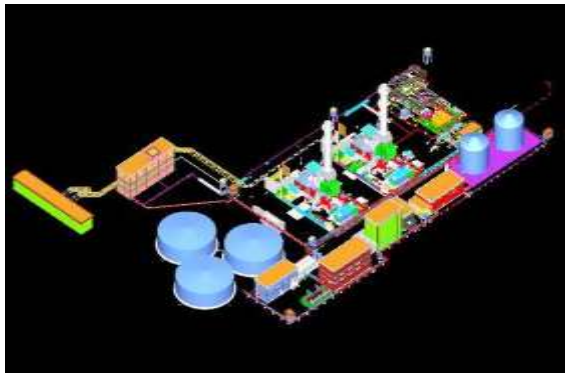
400 MW TARRAGONA POWER CHP (SPAIN)
Client/Owner: IBERDROLA/TARRAGONA POWER_BASF
Multishaft CCPP with ACC
Detail design

400 MW BIBIYANA CCPP (BANGLADESH)
Client: ISOLUX_SAMSUNG C&T
1 x1 singLe-shaft SIEMENS natural gas with Cooling tower
Basic design

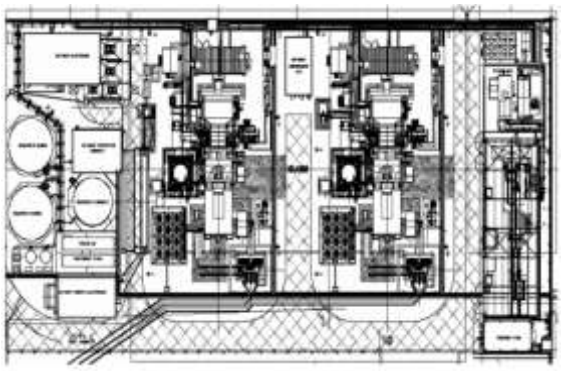
Single Cycle Gas Turbine Power Plants References



750 MW BOUFARIK SCGT (ALGERIA)
Client/Owner: GAMA /Sonelgaz
3 x GE 9FA dual fuel
Basic and detail design

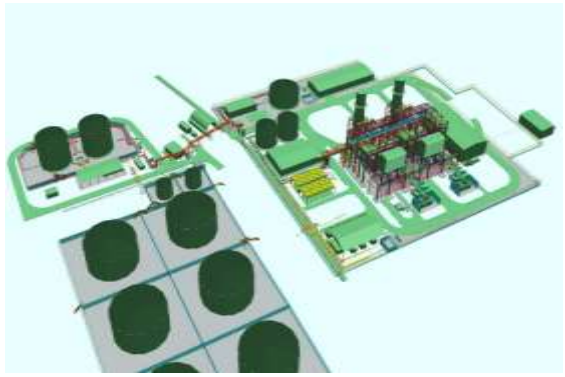


80 MW ANNABA SCGT (ALGERIA)
Client/Owner: GE /Sonelgaz
Two GE gas turbines 6000B dual fuel
Basic and detail design (civil & piping)

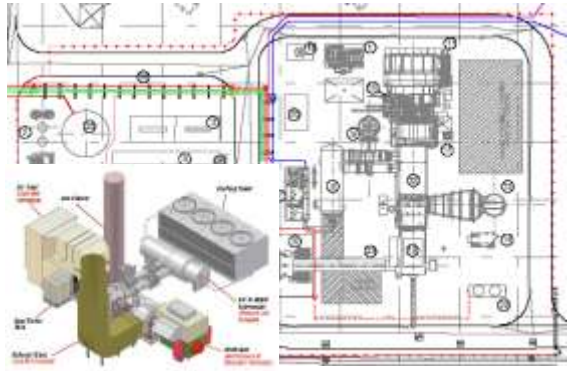


80 MW ALGER PORT SCGT (ALGERIA)
Client/Owner: GE /Sonelgaz
Two GE gas turbines 6000B dual fuel
Basic and detail design (civil & piping)

42 MW FLOATING POWER PLANT (ANGOLA)
Client: UTE CUETO-SOLUCIONES
Gas turbine GE 6B installed over a boat fuel oil
Basic and detail design



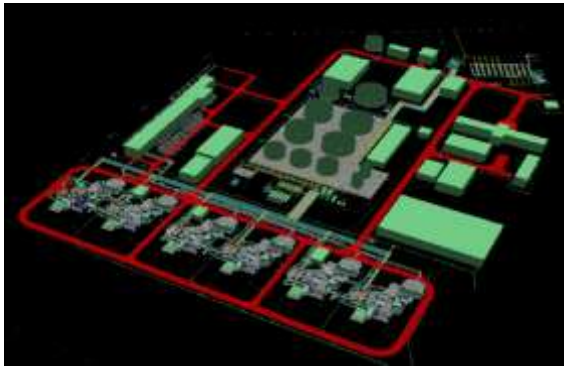
522 MW KHOMS SCGT (LiBYA)
Client: ÇALIK ENEJI
2 x GE 9FA.03 dual fuel
Basic and detail design



100 MW ARRUBAL PEAKER SCGT (SPAIN)
Client/Owner: ELECNOR/GAS NATURAL
GE LMS 100 gas turbine
Basic and detail design

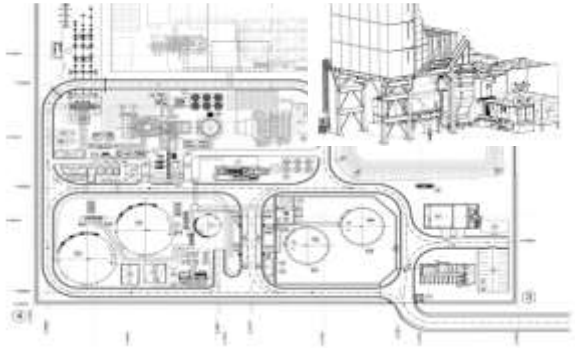
Single Cycle Gas Turbine Power Plants References

1250 MW AL-KHAIRAT SCGT (IRAQ)
Client/Owner: ÇALIK ENERJI/ MINISTRY OF ELEC. OF IRAQ
10 GE Frame 9E. Crude Oil, Light Distillate Oil and NG
Basic and detail design

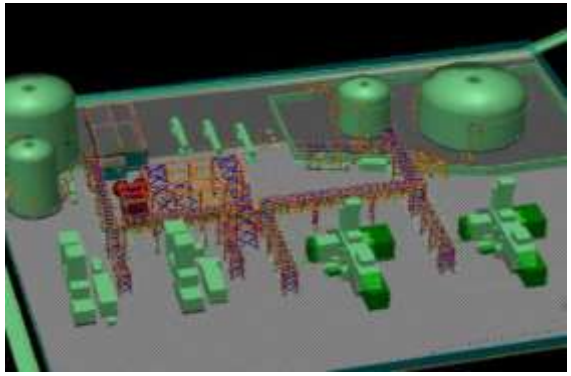


750 MW NAINAWA SCGT (IRAQ)
Client/Owner: ÇALIK ENERJI/ MINISTRY OF ELEC. OF IRAQ
6 GE Frame 9E. Crude Oil, Light Distillate Oil and NG
Basic and detail design

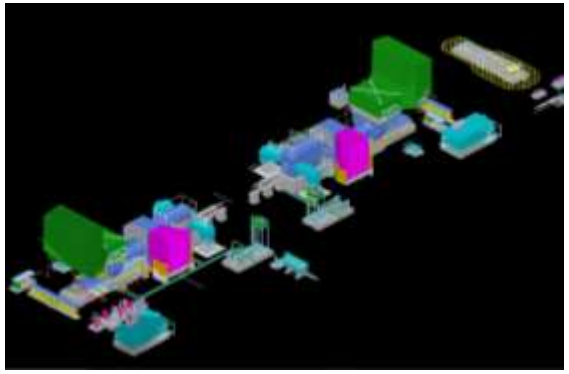
80 MW TRANCHE 3 SCGT (KAZAKHSTAN)
Client/Owner: GATE/AGIP
2 GE 6FB. Natural gas
Basic and detail design



200 MW ETEN SCGT (PERU)
Client ACS_COBRA
GE 7.05 gas turbine , natural gas
Basic and detail design



136 MW CHARALLAVE SCGT (VENEZUELA)
Client ELECNOR/ ELECTRICIDAD DE CARACAS
2 x FT49A (20 MW each), from P&W and 2 xGE LM6000 (48 MW each). Diesel
Basic and detail design



280 MW ZHUHAI SCGT (CHINA)
Client: GE
2 GE gas turbines 9E
Basic and detail design (civil & piping)

Cogeneration – CHP References

80 MW LA RABIDA II CHP (SPAIN)
Client/Owner: CEPSA
GE-PG6111F gas turbine
Detail design

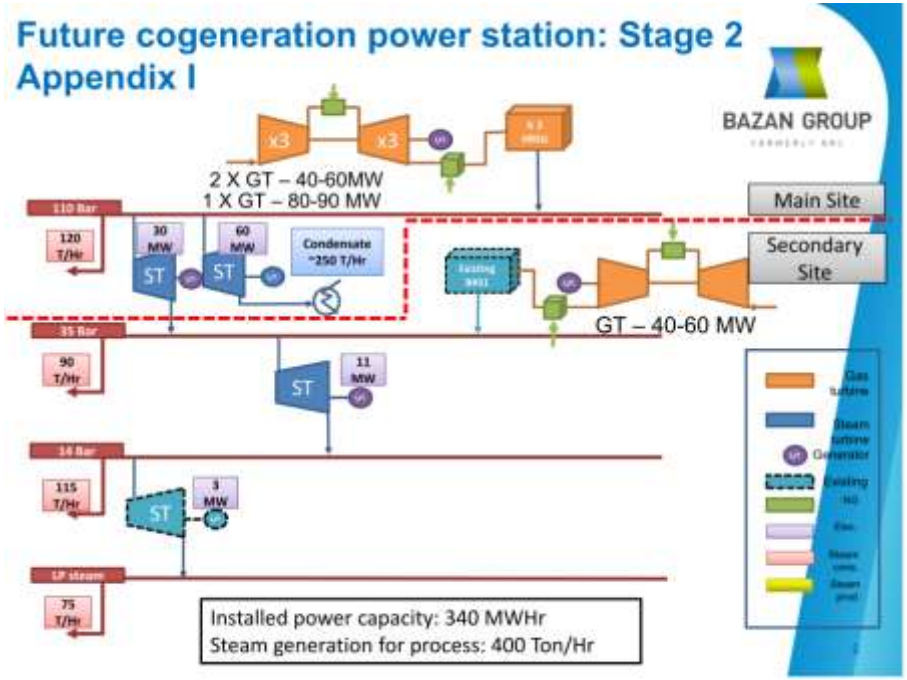
40 MW LUBRISUR CHP (SPAIN)
Client/Owner: CEPSA
GE-6581 B gas turbine
Detail design

40 MW PUERTOLLANO CHP (SPAIN)
Client/Owner: REPSOL
GT+HRSG
Basic design

30 MW HOLMEN CHP (SPAIN)
Client: HOLMEN PAPER MADRID
2x 1 GELM2500+G4 Dry low Emissions
Basic and detail design

400 MW TARRAGONA POWER CHP (SPAIN)
Client/Owner: IBERDROLA/TARRAGONA POWER_BASF
Multishaft CCPP with ACC
Finish detail design

40 MW PARTINGTON CHP (UK)
Client/Owner: SAICA
SIEMENS SGT 700 GT
Finish basic design and detail design



BAZAN REFINERY NEW CHP PLANT (HAIFA)

FEED DESIGN (2018-2019)

DESCRIPTION

The cogeneration power plant will produce power and steam for refinery. Project is divided in two steps:

Stage I. 135 Mwe + 400 tn/h of steam to be exported to refinery
Configuration:
2 GTs + 2HRSG with FAF and on the fly changeover capablity + 1 backpressure ST

Stage II. 340 Mwe + 400 tn/h of steam to be exported to refinery
Configuration:
2 GTs + 2HRSG with FAF and on the fly changeover capablity + 1 backpressure ST
1 GT + + 1HRSG with FAF and on the fly changeover capablity + 1 condensing ST + 1 ACC

WORK DONE

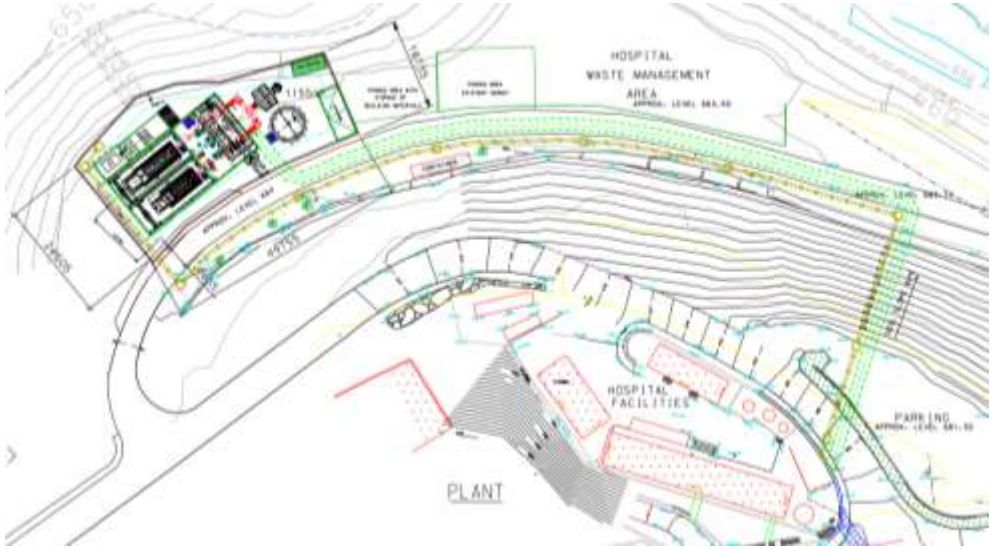
IDOM developed the full FEED studies for new cogeneration plant to be installed in Haifa refinery

- Conceptual design for all power plant disciplines (mechanical, process, civil, electrical and I&C) with different options and configurations
- Layouts, 3D model, foundations detailed design
- Full managenig of main equipment offers for plant Budget
- Masterplan preparation for permitting
- EPC technical specification preparatipon and Budgetary and schedule preparation for EPC bid process

Industry & Energy.

HADASSAH HOSPITAL (JERUSALEM)

CHP PLANT STUDY. CAPEX AND OPEX ESTIMATIONS (2018)



DESCRIPTION

CAPEX estimation report, show a feasible layout and present a project schedule for the project of the power plant (combined heat and power, CHP)

OPC is in the process of tendering to Hadassah Medical Organization

The plant under the analysis:

- Plant output 5 MW (one motor engine), electrical chiller or absorption chiller
- Plant output 7 MW (that can be obtained by motor 5 MW + Motor 2 MW or one motor 7MW), absorption chiller
- Plant output 12 MW (that can be obtained by motor 5 MW + Motor 5 MW or one motor 5MW + another one 7MW), absorption chiller

Hot water capacity: 30 MW thermal
Chilled wáter capacity: 8000 TR

WORK DONE

IDOM is the technical advisor for OPC during the tendering process for the CHP

- Conceptual design for electrical production profiles, hot water and chilled water consumptions in Mount Scopus and Ein Carem sites
- CAPEX and OPEX studies from different alternatives, begging with gas turbines and ending with combustión engines fueled by gas
- Coordination with financial model for OPC investment
- Layout
- Budgetary and schedule preparation for EPC bid process

Coal Fired Power Plants - Flue Gas Desulphurisation (FGD) References

1256 MW SINES FGD (PORTUGAL)
Client: ACS COBRA_HITACHI
Limestone-gypsum wet FGD 1333 Nm3/s
Basic and detail design

556MW ABOÑO FGD (SPAIN)
Client/Owner: ACS COBRA_HITACHI/HIDROCANTABRICO
Limestone-gypsum wet FGD 656 Nm3/s
Basic and detail design

350 MW SOTO FGD (SPAIN)
Client/Owner: ACS COBRA_HITACHI/HIDROCANTABRICO
Limestone-gypsum wet FGD 370 Nm3/s
Basic and detail design

323 MW PUENTE NUEVO FGD (SPAIN)
Client/Owner: ENEL
Desulphurization Efficiency: >95 %
Basic and detail design

565 MW LOS BARRIOS FGD (SPAIN)
Client/Owner: ENDESA
Gas Flow for Desulphurization: 1.916.000 Nm3/h
Owner engineering

575 MW LITORAL FGD (SPAIN)
Client/Owner: ENDESA
Gas Flow for Desulphurization: 1.916.000 Nm3/h
Owner engineering

Some references (Coal Fired PP Decommissioning)

ESCUCHA. Coal-Fired Power Plant (2012 and 2017 Teruel - Spain).

- Phases A-E (2012): Partial dismantling (design services and on site works)
- Phases A-C (2017): Total dismantling and demolition (design services).

PUENTE NUEVO. Coal-Fired Power Plant (2017. Córdoba - Spain).

- Phases A-C (2017): Total dismantling and demolition (valuation works).

CANDELARIA, JINAMAR AND PUNTA GRANDE. 3 Gas-Oil Power Plants (2017. Canary Islands - Spain).

- Phases A-C (2017): Total dismantling and demolition (design services).

ALCUDIA I. Coal-Fired Power Plant (2015-16. Mallorca - Spain).

- Phases A-C (2015-16): Total dismantling and demolition (design services), structural and legal reports

FOIX. Coal-Fired Power Plant (2015. Barcelona- Spain).

- Phases A-C (2015): Total dismantling and demolition (design services)

PUERTOLLANO. Coal-Fired Power Plant (2013 - 2017. C. Real - Spain).

- Phases A-F (2013-2017): Total dismantling and demolition (including tower cooling demolition).

PUERTOLLANO, ELCOGAS. Coal-Fired Power Plant (2014. C. Real - Spain).

- Phases A-C (2014): Total dismantling and demolition (design services).

CERCS. Coal-Fired Power Plant (2012. Barcelona - Spain).

- Phases A-E (2013-2017): Total dismantling and demolition

ESCATRÓN. Coal-Fired Power Plant (2010-11. Teruel - Spain).

- Phases A-F (2013-2017): Total dismantling and demolition

Some documents

Some works

Special blasting

Insulation for asbestos removal

Demolition robot

Reciprocating Engine Plants References

15.6 MW ESSENTIAL SERV. GENERATORS (KAZAKHSTAN)
Client/Owner GATE/AGIP
3 backup 5.2 MW diesel generators by CATERPILLAR
Basic and detail design

16.5 MW LINASA CHP PLANT(Murcia, SPAIN)
Client LINASA
3 motor generating sets WÄRTSILÄ 18V34SG, 5.5 MW
EPC

4x 6.6 MW EMERG.DIESEL FOR COOLING SYSTEM (SPAIN)
Client VANDELLOS II NUCLEAR POWER PLANT
4x6,6 MW emergency diesel for emergency cooling (KJ)
EPC

19.5 MW ROFEICA CHP PLANT(Barcelona, SPAIN)
Client ROFEICA
3 motor generating sets WÄRTSILÄ 18V32, 6.5 MW
EPC

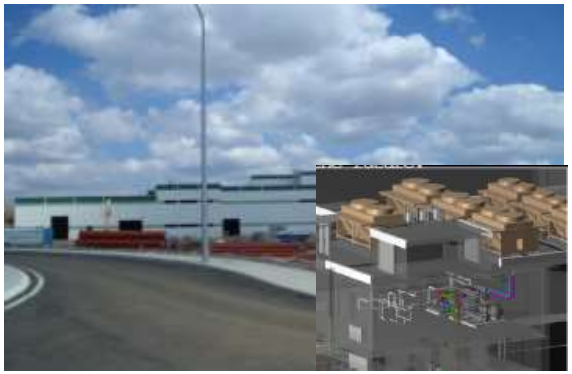
21 MW VILLARICOS CHP PLANT(Almeria, SPAIN)
Client COVISA
two fuel-oil engines of 10.5 MW of WÄRTSILÄ
EPC

21 MW OLCESA CHP PLANT(Cuenca, SPAIN)
Client OLCESA
Two motor generating sets WÄRTSILÄ 12V46, 10.5 MW
EPC

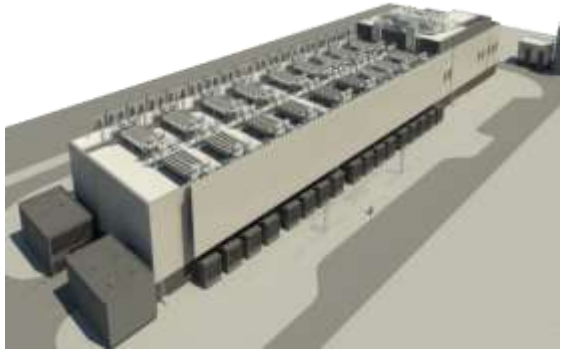
Reciprocating Engine Plants References

47 MW BAJA CALIFORNIA SUR V ICPP (MEXICO)
Client/Owner: ACCIONA/CFE
MAN B&W-DOOSAN 12K80MC-S9 Diesel engine with ACC and SCR. Heavy Fuel Oil
Basic and detail design

6.5 MW CHP PLANT(Barakaldo, SPAIN)
Client PROFUSA
12 Otto cycle engines fed by a mixture of coke gas and natural gas
Basic and detail design

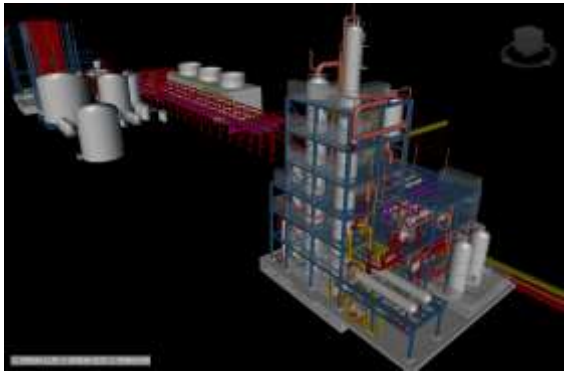


10 MW TRIGENERATION POWER PLANT (SPAIN)
Client SILICIO SOLAR
6 trains of NG fueled GE-Jenbacher JMS 612 GS-E11
Basic and detail design

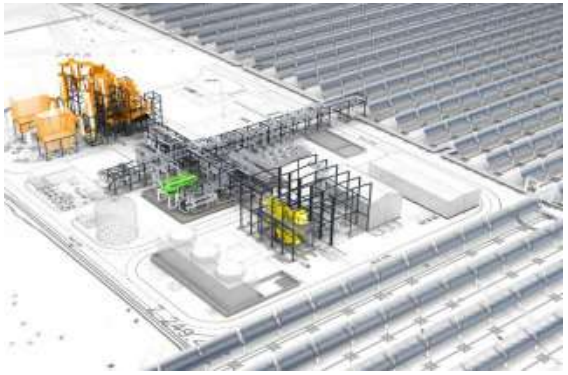


85 MW RIYADH Airport Electrical LOAD CENTRE 3 (KSA)
Client SSEM
34 sets 2.5 MW MTU 16V4000 DS 2800
Basic and detail design

40 MW BIOMASS FIRED POWER PLANTS (CANADA)
Client/Owner: IBERDROLA/DALKIA
Fuel: Sawmill, wood and bark residues, together with roadside debris
Basic and detail design



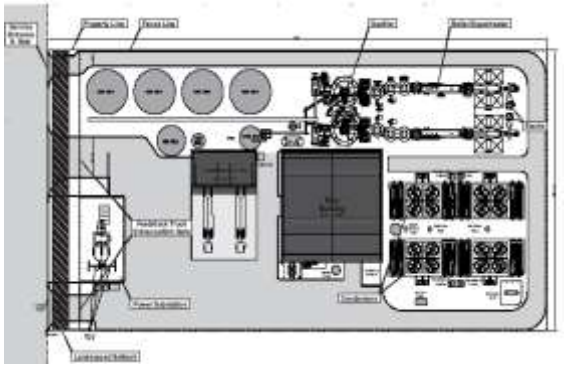
23 MW BIOMASS FIRED CHP (Kansas, USA)
Client/Owner: ABENER
25 MGY ligno-cellulosic bioethanol plant in Hugoton
Basic and detail design



25 MW CSP HYBRIDIZED WITH BIOMASS POWER PLANT (SPAIN)
Client: ABANTIA / COMSA EMTE
Fuel: Forest wood, energy crops and olive oil wastes
Basic and detail design

43 MW BIOMASS FIRED CHP (COLOMBIA)
Client/Owner: ISOLUX CORSAN /BIOENERGY
Fuel: Bagasse (100%)
Basic and detail design

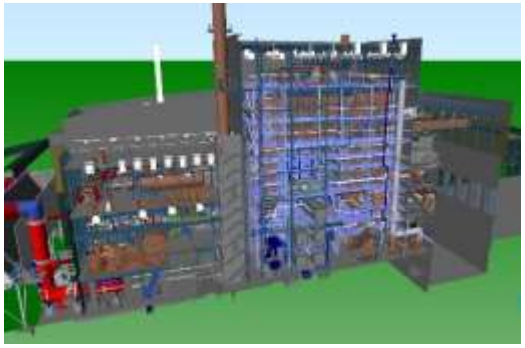
4 MW BIOMASS FIRED CHP (Lure, FRANCE)
Client/Owner: TAFISA
Fuel: Bark and sawdust. Boiler of 50MWth
Basic and detail design. Construction supervision.



8.5 MW BIOMASS GASIFICATION PP (Hawaii, USA)
Client/Owner: CAMPBELL INDUSTRIAL PARK
Fuel: Mostly C&D debris
Basic design

WASTE TO ENERGY References

28 MW WASTE-to-ENERGY PP (San Sebastián, SPAIN)
Client/Owner: FCC/GHK
Fuel: Municipal Solid Waste
Basic design



6 WASTE-to-ENERGY PP (UK, Ireland, Poland, Spain). Power Ranges: 15 – 40 MW.
Client/Owner: HZI
Fuel: Municipal Solid Waste
Detail design

23 MW WASTE-to-ENERGY PP (Barcelona, SPAIN)
Client: MUNICIPAL PUBLIC COMPANY TERSA
Fuel: Municipal Solid Waste
Basic design

20 MW WASTE-to-ENERGY PP (Valencia, SPAIN)
Client: TÉCNICAS Y TRATAMIENTOS ENERG. DE RESIDUOS, S.A.
Fuel: Municipal Solid Waste
Basic design. Owner Engineer.

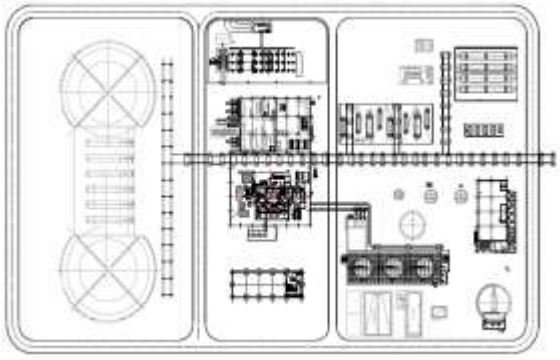
18 MW Landfill Gas to Energy PP (Madrid, SPAIN)
Client/Owner: CESPA SUFISA VERTRESA
Fuel: Landfill Gas
Detail design. Works supervision

8.5 MW BIOMASS GASIFICATION PP (Hawaii, USA)
Client/Owner: CAMPBELL INDUSTRIAL PARK
Fuel: Mostly C&D debris (wood)
Basic design

CSP PLANTS References

125 MW CSP Molten Salt Tower Plant (USA)
Client/Owner ACS_COBRA/SOLAR RESERVE
1,600 Acres area. 6-8 thermal storage hours
Basic and detail design

11 MW PS10 CSP PLANT(Seville, SPAIN)
Client/Owner ABENGOA
624 heliostats + 114 m tower in 75,216 m2
Detail design



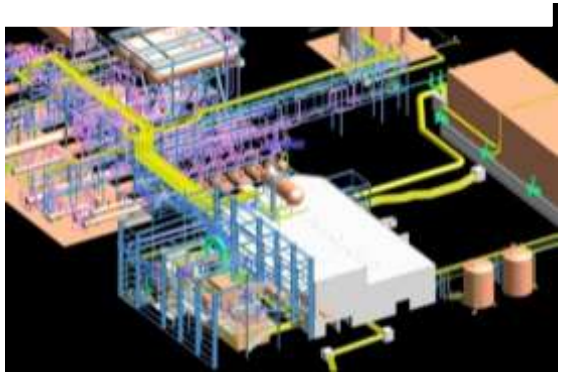
55 MW CSP PLANT(INDIA)
Client/Owner MEIL Green Power Limited
Parabolic trough technology with 118 loops
Basic and detail design (Power Block, Solar Field, HTF system and Thermal Energy Storage System)

50 MW LA RISCA CSP PLANT(SPAIN)
Client/Owner SERIDOM/ACCIONA ENERGIA
Parabolic trough technology with 96 loops
EPC Power Block

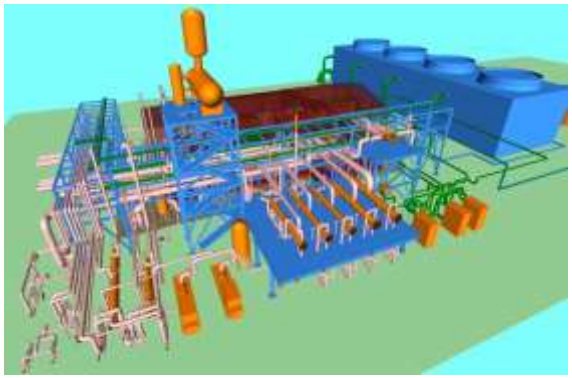
50 MW GUZMAN CSP PLANT(SPAIN)
Client/Owner FCC_Abantia _SERIDOM/GUZMAN
Parabolic trough technology with 96 loops
Basic and detail design power block & solar field

50 MW LA AFRICANA CSP PLANT(SPAIN)
Client/Owner TSK/ AFRICANA ENERGIA S.L
Parabolic trough technology
Detailed engineering for the power block + BOP + HTF

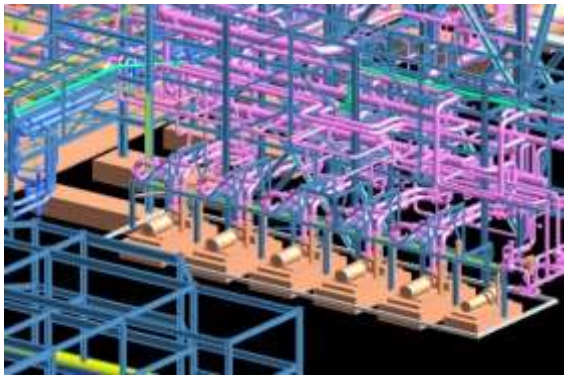
CSP PLANTS References



50 MW MAJADAS CSP (SPAIN)
Client/Owner SERIDOM/ACCIONA ENERGIA
Parabolic trough technology
EPC Power Block



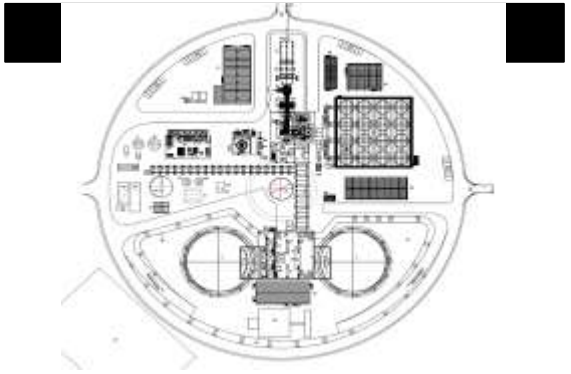
50 MW ANDASOL 3 CSP (SPAIN)
Client/Owner MAN SOLAR _DF/MARQUESADO SOLAR
Parabolic trough technology
Basic and detail design power block



50 MW OLIVENZA CSP PLANT(SPAIN)
Client/Owner ACCIONA_SERIDOM /IBEREOLICA
Parabolic trough technology with 123 loops
EPC Power Block

50 MW LA ARENALES CSP PLANT(SPAIN)
Client OHL - MAN SOLAR MILLENIUM
Parabolic trough technology
Basic and detail design power block and HTF

50 MW MORON CSP PLANT(SPAIN)
Client/Owner ACCIONA _SERIDOM/IBEREOLICA
Parabolic trough technology with 96 loops
EPC Power Block



115 MW CSP PLANTS (SOUTH AFRICA)
Redstone and Limestone
Client SOLAR RESERVE
Central tower technology with 9467 heliostats
Basic design for EPC RFQ package

PHOTOVOLTAIC PLANTS References

15,9 MW PV plant in La Alconera
Extremadura
SOLEX

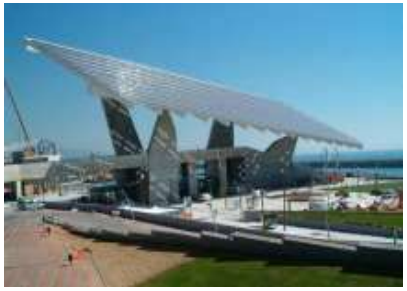
25 MW PV plant in Olmedilla de Alcorcon
Castilla - La Mancha
MORGAN STANLEY

30 MW PV plant in Badajoz
Extremadura
ECO-ENERGIAS DEL GUADIANA

12 MW photovoltaic plant in Tinajeros
Castilla - La Mancha
SUNPOWER

5 MW PV plant in Alvarado
Extremadura
TECNICA UNIVERSAL SOLAR (TUSSOL)

400 kW PV plant in Casino-Ciudad Real
Castilla - La Mancha
HARRAHS



443 kW photovoltaic rooftop in Barcelona
Cataluña
INFRAESTRUCTURES DEL LLEVANT

100 kW photovoltaic rooftop in Zaragoza
Aragón
TRANSPORTES OCHOA

WIND FARMS References

Wind farm 44 MW in Jerez
Andalucia
WIGEP ANDALUCIA

Hydro-Wind Farm in Gorona del Viento
Canarias
GORONA DEL VIENTO EL HIERRO

Wind Farms 59 MW (Mingorrubio and Alaiz
)
ELECNOR

Wind farm 32 MW in Tejonero
Andalucia
DESARROLLOS EÓLICOS S.A.U.

Wind Nacelles plant in Tiajin
CHINA
GAMESA EOLICA

Several wind farms 564 MW in Spain

VESTAS EÓLICA

Wind farms 74 MW in Alcornocales
Andalucia
SEASA

Foundation design for wind farms in Aragon
SPAIN
TAIM-NEG MICON EOLICA

WIND FARMS References

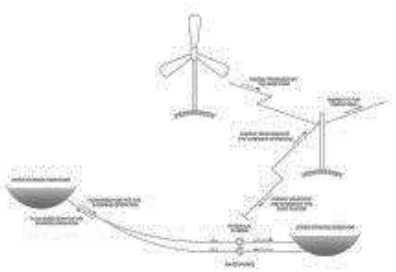
102 MW wind farm in Oaxaca
MEXICO
ENERGIA Y RECURSOS AMBIENTALES

Sierra de Arcas and El Pedroso wind farms (46MW) SPAIN
ENHOL

Wind farm 26 MW in Rymanow
POLAND
CJR WIND

More tha 664 MW in
BRAZIL
IBERDROLA + VESTAS ÍMPA

Several wind farms 240 MW in Polonia
POLAND
EDP RENEWABLES POLSKA



Wind/hydroelectric 400 MW in Alaska
U.S.A
AEC Engineering (IDOM USA)

More than 904 MW in
MEXICO
SEVERAL CLIENTS

More than 70 MW in
TURKEY
INSTITUT KAZSELENERGOPROEKT

IDOM

Thanks!