iresc

Integrated Risk, Environmental and Safety Consultants

FIRE & GAS MAPPING STUDY SERVICES USING figco





We at IRESC have expert knowledge in F&G Mapping Guidelines including SHELL Guidelines, BP Guidelines, PTS Standards, NFPA Standards, ISA-TR84.00.07, etc. More importantly, we apply engineering knowledge and experience to develop practical, fit-for-purpose solutions, which help our clients to maximize their facilities' fire and gas detector coverage.

How can IRESC support you?

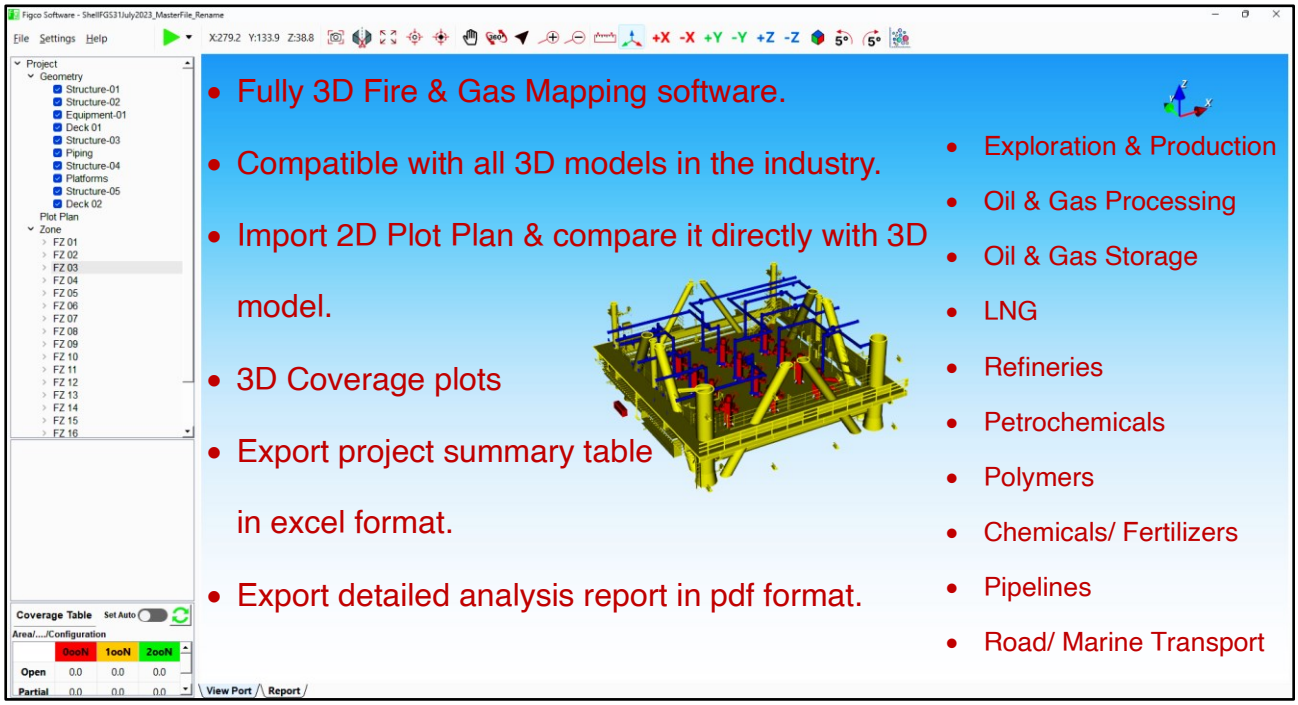
Perform full 3D mapping study for flame, flammable gas and toxic gas detectors to:

- Optimise the number of detectors
- Optimise layout of the detectors
- Achieve desired performance targets
- Locate detectors at accessible and maintainable areas
- Accurately identify areas with reduced or no coverage
- Achieve optimal & fit-for-purpose solutions that provide a balance between safety, required performance, availability and cost.





Software Overview



- Fully 3D Fire & Gas Mapping software.
- Compatible with all 3D models in the industry.
- Import 2D Plot Plan & compare it directly with 3D model.
- 3D Coverage plots
- Export project summary table in excel format.
- Export detailed analysis report in pdf format.

Industry Sectors

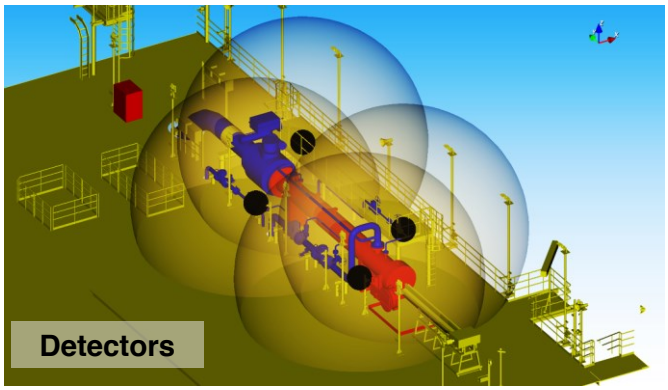
- Exploration & Production
- Oil & Gas Processing
- Oil & Gas Storage
- LNG
- Refineries
- Petrochemicals
- Polymers
- Chemicals/ Fertilizers
- Pipelines
- Road/ Marine Transport

3D Geometry Model Compatibility of figco

- CATIA v4 (*.model;*.session;*.exp;*.dlv3)
- CATIA v5 (*.CATPart;*.CATProduct;*.cgr)
- CIS/2 (*.stp)
- MicroStation Design (*.dgn;*.prp;*.prw)
- DWF (*.dwf; *.dwfx; *.w2d)
- Autodesk DWG/DXF (*.dwg;*.dxf)
- FBX (*.fbx)
- IFC (*.ifc)
- IGES (*.igs;*.iges;*.ige)
- Inventor (*.ipt;*.iam;*.ipj)
- JT (*.jt)
- NX (*.prt)
- OBJ (*.obj)
- Parasolid (*.x_b;*.x_t;*.xmt_txt)
- Pro/ENGINEER (*.prt*;*.asm*;*.g;*.neu*)
- Autodesk ReCap (*.rcs;*.rcp)
- Revit (*.rvt; *.rfa; *.rte)
- Rhino (*.3dm)
- RVM (*.rvm)
- SAT (*.sat;*.sab;*.smt;*.smb)
- SketchUp (*.skp)
- SolidWorks (*.prt;*.sldprt;*.asm;*.sldasm)
- STEP (*.stp;*.step;*.stpz;*.ste)
- STL (*.stl;*.stla;*.stlb)
- VRML (*.wrl;*.wrz)
- SmartPlant 3D (*.vue)
- All Navisworks Files (*.nwd;*.nwf;*.nwc)

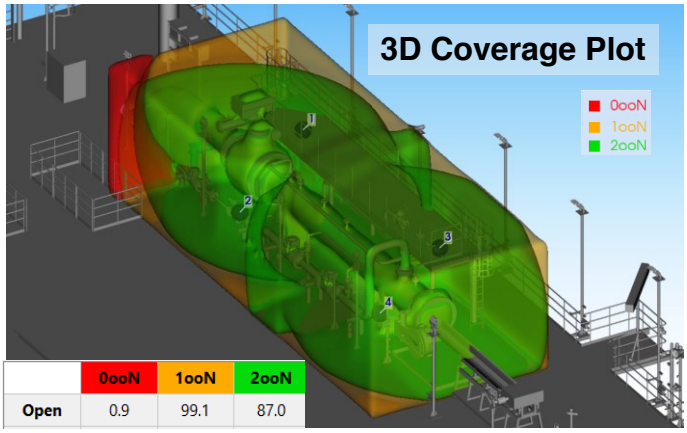
Wide variety of 3D models that can be imported to FIGCO

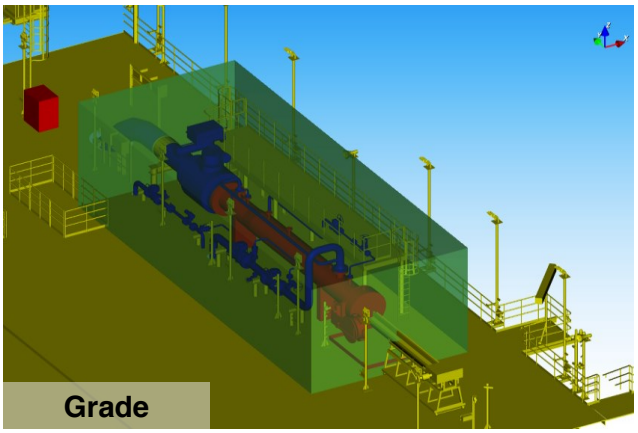
Navisworks Manage → Unreal Datasmith Plugin .udatasmith → FIGCO Geometry Converter → .glb → Figco



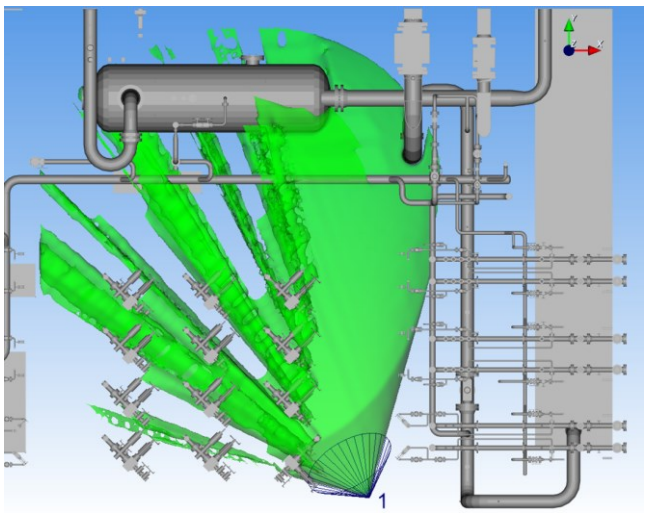
Special Features of figco

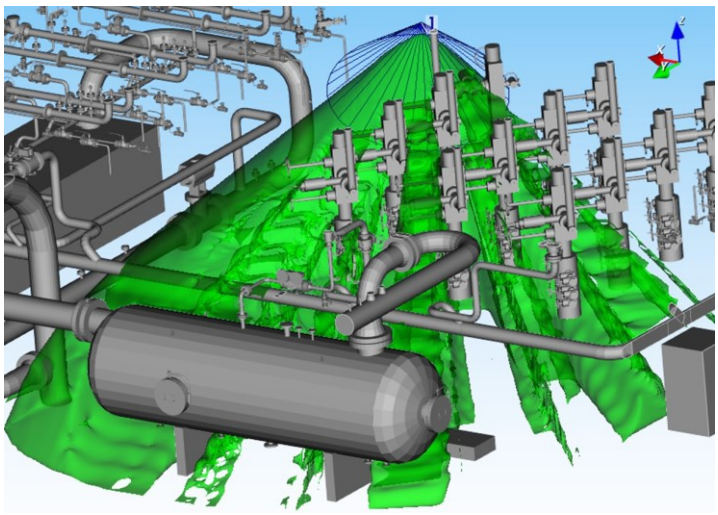
- Fully Flexible in terms of assessing different voting logics.
- Fully customizable to match detector parameters based on the data sheet and performance target based on standards.
- Generation of easy-to-interpret colour coded 3D coverage maps overlaid on equipment layouts for convenient visualisation and optimization.
- Tabulated coordinates for the recommended detector locations in terms of x, y and z coordinates and, for flame detectors, the horizontal rotation (yaw) angle and vertical tilt.
- Flame Mapping analysis is suitable for IR, UV, and CCTV type detectors.
- Gas Mapping analysis using point type, open path detectors or a combination of both.
- Easily account for cross credit from different types of detectors in the same zone.





Flame Mapping Assessment

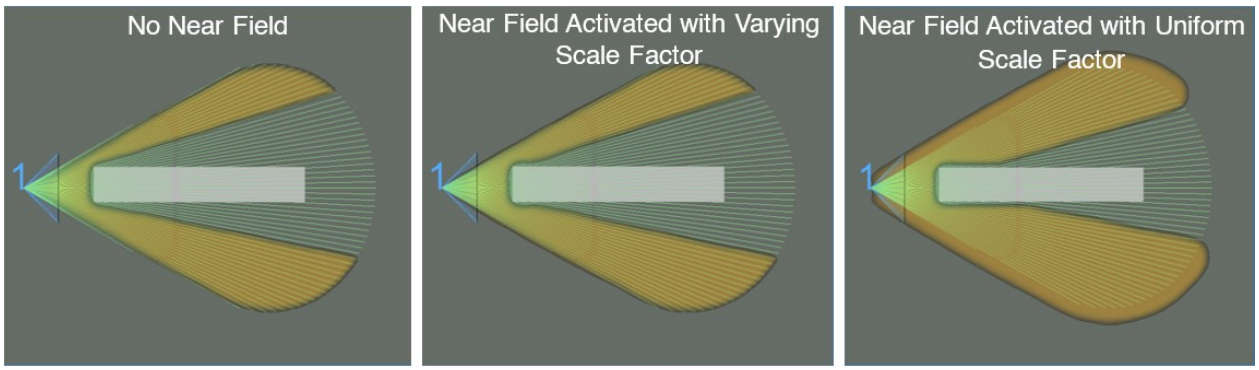




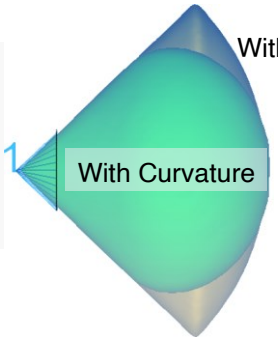
Obstructed Line-of-Sight of Fire Detector

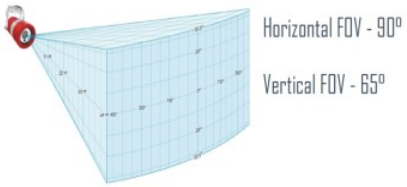
Flame Mapping Assessment (Continued)

Near-field coverage modelling helps determine accurate and realistic fire detector performance.



Roll-off (Curvature) at the periphery of the vision cone models realistic fire detector performance





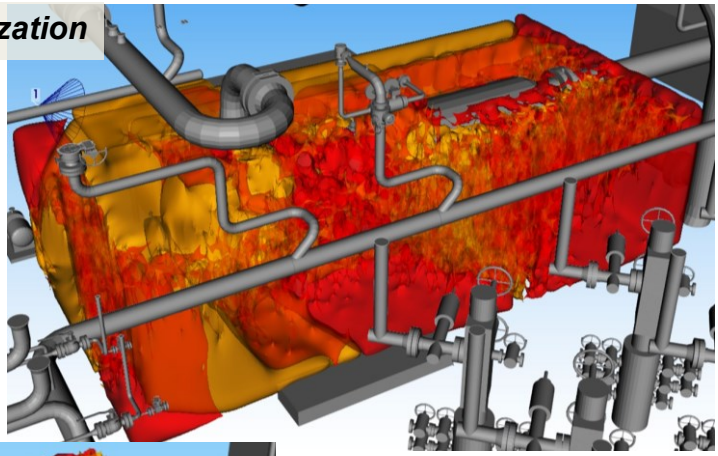
Independent Horizontal and Vertical angles in Flame Detector's field-of-view

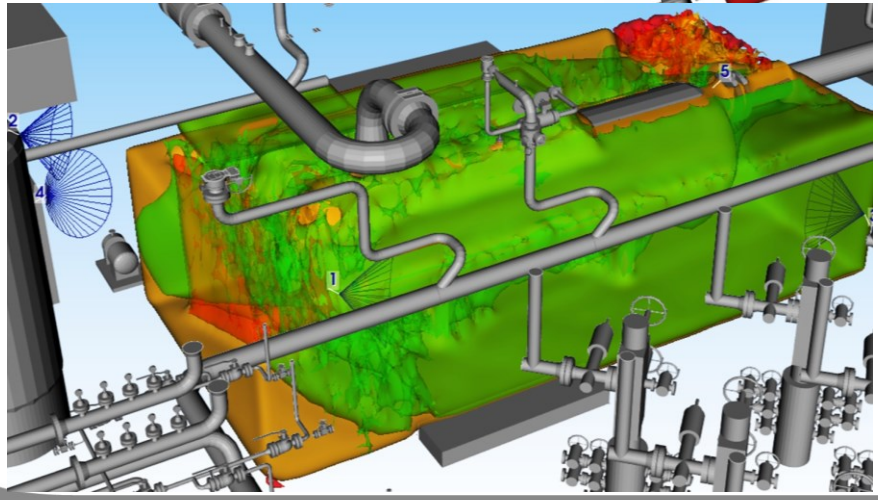
Before Optimization

Green 2ooN regions - *both alarms and control actions generated (if any)*

Orange 1ooN regions - *alarms generated but no control action initiated*

Red 0ooN regions - *No coverage*



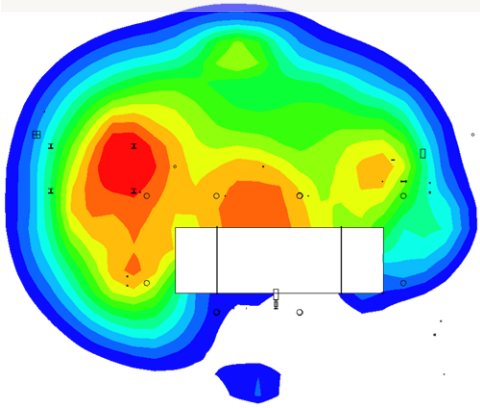


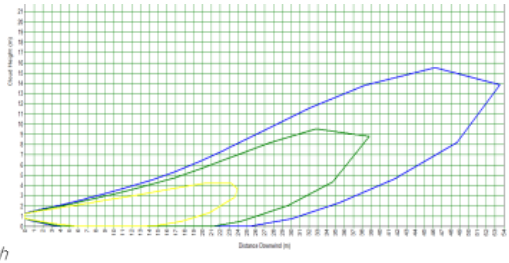
After Optimization

Gas Mapping Assessment

Selection of target gas cloud size based on:

CFD explosion modelling with FLACS or **Dispersion modelling with PHAST**





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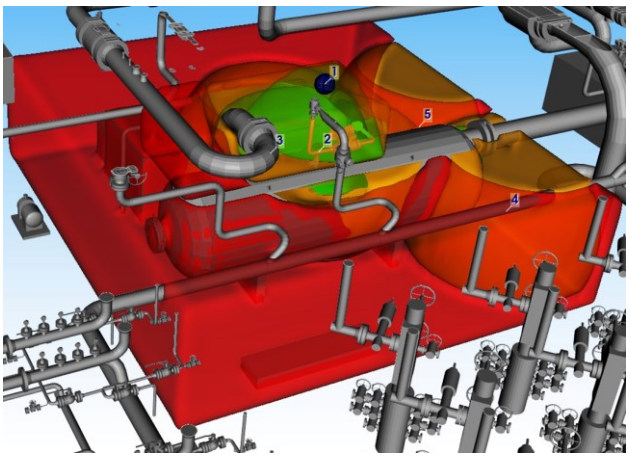
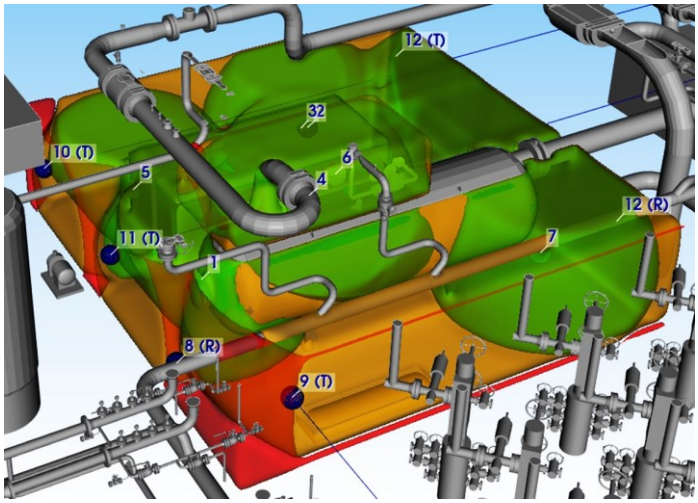
Before Optimization



After Optimization using combination of Point Type and Open Path Gas Detectors



IRESC Fire and Gas Mapping Publications

- ***Optimizing Fire & Gas Detection Coverage and Layout using 3D Mapping Tools,*** *2017 Mary Kay O'Connor Process Safety Center International Symposium, Texas, United States*
- **Establishing Minimum Requirements For Fire And Gas Detection For Process Facilities,** *Hazards Australasia 2013, Perth, Australia*

Key Project Experience:

- ***ENOC Jebel Ali Refinery Expansion Project***, Dubai for Technip Italy S.p.A. (TPIT). Units covered: CDU, Hydrotreaters (Naphtha, Kerosene and Diesel), LPG Fractionation, SRU, ARU, SRU.
- ***PVGAS Ca Mau Gas Processing Plant Project,*** Vietnam for POSCO Engineering.
- ***Petronet Dahej LNG Terminal Project,*** India. Development of 3D Model for existing facility through onsite laser scanning and performing 3D mapping using the model developed.
- ***Singapore LNG Terminal – Phase 3 Expansion Project,*** Singapore for Fluor Corporation.
- ***BP Tangguh Expansion Project***, Indonesia for PT. Saipem Indonesia. Study covered two Well Head Platforms (WHP).
- ***KNPC Clean Fuels Project Mina Al Ahmadi (MAA) Refinery***, Kuwait for JGC Corporation, GS E&C and SK E&C JV. Units covered: ARDS, SRU, CCR, VRU, FCC Naphtha Hydrotreater Unit, DCU.
- ***PETRONAS Yetagun Phase V Development Project,*** offshore Myanmar for Larsen & Toubro.
- ***Petrobras FPSO Cidade de Campos dos Goytacazes MV29 Project,*** offshore Brazil for MODEC. CFD based dispersion study was adopted to determine gas mapping requirements.
- ***PETRONAS LNG Train 9 EPCC Project***, Malaysia for JGC for LNG Liquefaction Train.
- ***Gazprom Badra CPF Phase 2 Project***, Iraq for Samsung Engineering. Units covered: gas treatment, fractionation & compression, SRU, LPG recovery, storage & truck loading etc.
- ***Groupement Timimoun Field Development Project,*** Algeria for Samsung Engineering.
- ***PETRONAS Gas Treatment Plant Onshore Gas Terminal (GTPOGT) Expansion Project***, Turkmenistan for Hyundai Engineering.
- ***PTT LNG Receiving Terminal Expansion Project Phase II***, Thailand for POSCO Engineering.
- ***PETRONAS Terengganu Gas Terminal (TGAST) Project Phase 2***, Malaysia for Samsung Engineering.
- ***GSPC Mundra LNG Terminal Project***, India. Two-stage assessment (i.e. preliminary review of F&G detectors layout and detailed review of 3D model).
- ***South West Gas Fields Development Project,*** Algeria for L&T Hydrocarbon Engineering (LTHE).
- ***Do Terminal Hejre Crude Stabilisation Project***, Dong Energy, Denmark for CB&I.
- ***Refrigerated Gaseous Tank Facility (RGTF) for Pengerang Deepwater Terminal 2 (PDT2) Project***, Pengerang Terminals (Two) Sdn. Bhd. (PT2SB), Malaysia for Chiyoda Malaysia Sdn. Bhd.
- ***EPCC-01 Package - CDU/VDU with Hot Well Off Gas Treatment Unit, Saturated LPG Treating Unit & Saturated Fuel Gas Treating Unit,*** HPCL Rajasthan Refinery Limited (HRRL), India for Tata Projects Limited (TPL).
- ***EPCC-10 Package - VGO HDT and ROGPSA Units***, HPCL Rajasthan Refinery Limited (HRRL), India for Tata Projects Limited (TPL).
- ***EPCC-04 Package – Delayed Coker Unit (DCU) with Unsaturated LPG Treating Unit***, HPCL Rajasthan Refinery Limited (HRRL), India for Tata Projects Limited (TPL).
- ***Mixed Feed Cracker (MFC) Project***, Korea for GS Caltex Corporation.
- ***KNPC Clean Fuels Project - Mina Al Ahmadi (MAA) Refinery,*** Kuwait for Daelim Industrial Co., Ltd.
- ***KNPC New Refinery Project (NRP), Kuwait.***
- ***ABS-Biodiesel Plant Project***, Hong Kong for ABS Biodiesel Plant (Hong Kong) Limited.
- ***SABIC UNITED EO/EG III Project***, Jubail Industrial City, Kingdom of Saudi Arabia for Samsung Engineering Co. LTD., (SECL).
- ***Do Terminal Hejre Crude Stabilisation Project***, Dong Energy, Denmark for Do Terminal Hejre Crude Stabilisation Project.

- ***HURL Ammonia Urea Fertilizer Project***, India for Toyo Engineering Corporation, Japan (TOYO) and Toyo Engineering India Private Ltd. (TEIPL) Consortium.
- ***Asset Development Plan 1 – PRU and O&U Unit Project*** (conducted using 2D mapping assessment), Nayara Energy Ltd (NAYARA), India for TEIPL.
- ***PTTGC Olefin Reconfiguration Project***, Thailand for Samsung Engineering Co. Ltd.
- ***PTTGC Olefin Reconfiguration Project - OSBL scope***, Thailand for TTCL Public Company Limited.
- ***PTTGC Propylene Oxide Project***, Thailand for Samsung Engineering Co. Ltd.
- ***SHWE Field Development Project***, Myanmar for POSCO International Corporation.
- ***BP Tangguh Expansion Project (offshore Gas Processing Facilities) – Well Slot Relocation***, Indonesia for PT Saipem Indonesia.
- ***Petrobras FPSO Campos Basin MV31 Project,*** Brazil for MODEC Offshore Production Systems (Singapore) Pte. Ltd.
- ***PV Gas Thi Vai LNG Receiving Terminal Project***, Samsung C&T, Vietnam for Petrovietnam Gas Corporation.
- ***HSEPL LNG Terminal- Regasification Facilities Project***, India for TOYO Engineering India Private Limited (TEIPL).
- ***DLTPL Dhamra LNG Terminal Project***, India for CTCI Corporation (CTIC).
- ***PTTLNG Nong Fab LNG Receiving Terminal Project***, Thailand for Saipem S.A.- CTCI Corporation Joint Venture (SPCC).
- ***PTT 2nd LNG Terminal Project***, Thailand for CTCI Corporation.
- ***Dahej Expansion Project (Phase IIIA)***, Petronet LNG Ltd. India for TEIL.

IRESC Office Locations (Email: info@irescglobal.com)

Houston *Hong Kong* *Brisbane* *Singapore* *India* *Abu Dhabi*

