

We perform technical analyses



IRESC is a multinational team of highly qualified, multi-disciplinary process safety and risk practitioners with several years of global experience. We provide independent services for clients in the Offshore and Onshore Oil & Gas Processing, Liquefied Natural Gas (LNG), Refineries, Chemical and Petrochemical sectors.

We have undertaken numerous process safety, environmental, risk and reliability studies during all phases of project lifecycle, including concept/basic design (FEED), detailed engineering (EPC) and operational phase. We strive to provide cost-effective, practical solutions while adhering to high standards of Health, Safety and Environment (HSE).



leading to practical solutions

Our Services

Process Safety Studies

- Hazard Identification (HAZID)
- Hazard and Operability (HAZOP)
- Functional Safety: Safety Integrity Level (SIL) / Instrumented Protective Function (IPF) Classification / Layer of Protection Analysis (LOPA) / SIL Verification / SIL Validation (FAT and SAT) / Safety Requirement Specification (SRS) / Functional Safety Assessment (FSA)
- Alarm Management Studies (AMS)
- Bow-Tie and Performance Standards for Safety Critical Equipment (SCEPS)
- Human Factors Ergonomics Studies
- Inherently Safer Design (ISD) Review
- Simultaneous Operations (SIMOPS)

Quantitative Risk Assessment Studies

- Consequence Analysis and Quantitative Risk Assessment (QRA)
- Fire & Explosion Risk Assessment (FERA) and Building Risk Assessment (BRA)
- Explosion Overpressure Analysis, including full probabilistic analysis with FLACS
- Evacuation Escape and Rescue Analysis (EERA)
- Essential Systems Survivability Analysis (ESSA)
- Gas Dispersion and Smoke Ingress (GDSI)/ Flare Radiation Studies

- Dropped Object Studies
- Ship Collision Studies
- Helicopter Crash Studies
- 3D Fire and Gas Mapping (F&G) Study

Reliability Studies

- Reliability, Availability and Maintainability (RAM)
- Failure Modes and Effects Analysis (FMEA)

Process Environmental Studies

- Environmental Impact Identification (ENVID)
- Air Quality Modelling/Noise Modelling
- Exhaust and Vent Dispersion Studies, including use of Computational Fluid Dynamics (CFD) modelling
- Health, Safety and Environmental Impact Assessment (HSEIA)

Industry Sectors

- Exploration & Production (Onshore/ Offshore)
- Oil & Gas Processing and storage
- LNG
- LNG Terminals
- Refineries
- Petrochemicals/Polymers
- Chemicals/Fertilisers
- Pipelines
- Power Plant
- Road/Marine Transport

Owners/Operators

IRESC has conducted Safety & Risk Studies for the following Owners/Operators facilities:

- Eni
- Shell
- BP
- TOTAL
- PETRONAS
- Saudi Arabian Oil Company (Saudi Aramco)
- Kuwait National Petroleum Company (KNPC)
- ADNOC
- Formosa Plastics Corporation, U.S.A
- Petrobras
- Shintech
- Saudi Basic Industries Corporation (SABIC)
- Qatargas
- Qatar Petrochemical Company (QAPCO)
- INPEX
- Huntsman
- PTT Public Company
- PTT LNG Company Limited
- PTT Global Chemical
- Thai Oil Public Company Limited
- Star Petroleum Refining Co., Ltd (SPRC)
- PetroVietnam
- PT Asahimas Chemicals
- Saudi Arabian Mining Company (Ma'aden)
- Singapore Refining Company
- Saudi Butanol Company
- Rabigh Refining and Petrochemical Company (Petro Rabigh)
- Petronet LNG Limited (PLL)
- PT Pertamina
- PT Chandra Asri Perkasa (CAP)
- Singapore LNG Corporation Pte. Ltd. (SLNG)
- Petrochina Halfaya
- Hong Kong Electric Co. Ltd
- POSCO International Corporation
- Sarawak Petchem Sdn. Bhd
- HPCL Rajasthan Refinery Ltd. (HRRL)
- Sonatrach
- Yanbu National Petrochemical Company (YANSAB)
- Reliance Industries Limited
- Neste
- Bahrain Petroleum Company (BAPCO)

FEED/EPC Consultants/Contractors

IRESC has supported the following Consultants/Contractors during FEED and Detailed Design of projects on Safety & Risk Studies:

- Technip Energies
- Saipem
- MODEC Offshore Production Systems
- Samsung Engineering Company Ltd. (SECL)
- Samsung C&T
- Tokyo Gas Engineering Solutions Corporation
- CTCI Corporation
- Bechtel
- Fluor
- Hitachi Ltd.
- Toyo Engineering Corporation
- POSCO Engineering
- Hyundai Heavy Industries (HHI)
- Daelim Industrial Co. Ltd.
- Larsen & Toubro Ltd.
- Daewoo Engineering & Construction Co. Ltd
- JGC Corporation
- Surbana Jurong Infrastructure Pte Ltd.
- Petrofac
- Chiyoda Corporation
- Tecnicas Reunidas (TR)
- SK Engineering & Construction
- Engineers India Limited (EIL)
- Bumi Armada Berhad
- GS Engineering & Construction Corp.
- McDermott (CB&I)
- PT Rekayasa Industri
- PetroVietnam Engineering
- Wison Engineering
- China Petroleum Engineering Co. Ltd (CPE)
- Wood PLC (Amec Foster Wheeler)
- Sinopec Luoyang Engineering Co. Ltd.
- TATA Projects Limited
- Kinetics Technology
- Maire Tecnimont
- Excelerate Energy
- PIELDS-Engineering

Offshore & FPSO Project Experience

- **PETRONAS ZLNG Project, nearshore Malaysia**, in support of Saipem (FEED). Safety studies included FERA, QRA, HSE Safety Case, EERA, ESSA, TRIA, CRA, SGIA, DOS, SCEPS, Ship Collision, DOS, PVSA, and Human Factor Engineering for the floating LNG Liquefaction facility.
- **SHWE Phase 3 Offshore Platform Project, offshore Myanmar**, in support of Hyundai Heavy Industries (EPC). Safety studies included HAZID, HAZOP, SIL Classification, FRA, Blast Overpressure Analysis, QRA, Operational HSE Case, EERA, ESSA, DOS, SCEPS, Ship Collision, DOS, RAM, F&G Mapping, Exhaust and Vent Dispersion for the new SHWE LP Compression Platform and modification on existing production platforms.
IRESA also supported McDermott for phase 2 Expansion involving subsea facilities including subsea wellhead and pipelines.
- **Petrobras FPSO MV29/ MV31 Project, offshore Brazil**, in support of MODEC (EPC). Safety Studies included HAZID, HAZOP, SIL Classification, FERA, QRA, CFD Thermal Dispersion & Exhaust, Noise, Gas Mapping, RAM, ETRERA, DOS, ESSA, SCS, Predictive Noise Study and Design HSE Case.
- **Eni Angola Block 15/06 East Hub FPSO Project**, in support of Bumi Armada (EPC). Safety Studies included HAZID, ENVID, HAZOP, SIL Classification, NFHA, EERA, ESSA, DOS, FERA, Fire Response Analysis of Pressurised Systems, Smoke and Gas Dispersion Analysis, QRA, Thermal Dispersion & Exhaust, Flare Dispersion and Radiation, HER, SCE&PS, Emission Study, Design Safety Case, Operational Safety Case and RAM.
- **ADNOC NASR Full Field Development Project, offshore Abu Dhabi**, in support of Hyundai Heavy Industries (EPC). Scope included HAZOP, SIL Classification, SIL Verification, SIL Validation (FAT and SAT) for NASR Super Complex facility.
- **Reliance KG-D6 Field Development Project, Krishna Godavari Basin, offshore India**, in support of McDermott (EPC). Safety studies included HAZID, ENVID, SIL Classification, SAFOP, SIL Verification, DOS, FERA for new subsea wells, pipelines, umbilical and modifications to control/ riser platform. Plume Modelling was also performed for subsea water discharge.

LNG/Onshore Oil & Gas Project Experience

- **BP Tangguh Expansion Project, Indonesia**, in support of Chiyoda, Saipem, Tripatra JV (FFED). Safety Studies included FEA, Occupied Building Design Report, NPHA, DORA, EERA and ESSA study for the new LNG Liquefaction Train 3.
- **Singapore LNG (SLNG) Receiving Terminal**. IRESA has been supporting various contractors like Fluor, Surbana Jurong (SJ), JGC, Wood for the various expansion projects of this terminal.
- **Qatargas North Field South (NFS) Project, Ras Laffan, Qatar**, in support of Worley-Samsung C&T (FEED). Safety Studies included HAZOP, SIL Classification and Verification, HAC, FERA, QRA, BRA, HFE, ALARP, Fire Safety Review, Flare Radiation Study, PFP review and EERA for the new LNG storage and loading facility from the NFS train.
- **NLNG Train 7 Project, Bonny Island, Nigeria**, in support of Saipem/Chiyoda/Daewoo JV (EPC). The facility is owned by Nigeria LNG Limited (JV between NNPC, Shell, Total, and ENI). Safety Studies included HAZOP and Alarm Rationalization for the new liquefaction train.
- **Sonatrach South West Gas Fields Development Project, Algeria**, in support of EPC for Larsen & Toubro. The safety studies included QRA, FEHA, EERA, ESSA, Flare Radiation, Atmospheric Modelling, ALARP, Bowtie and SCEPS for three Central Processing Facilities.
- **Petrochina Halfaya Oilfield Project, Iraq**, in support of China Petroleum Engineering. The safety studies included QRA, FERA, Toxic Assessment, BRA, EERA, ESSA, F&G Mapping, SIMOPS, and RAM studies for CPF3 upgrade project.
- **Saudi Aramco Zuluf Onshore Facilities Project, Saudi Arabia**, in support of JGC (EPC). Safety studies included HAZOP and SIL Classification for the grassroot Zuluf Central Processing Facilities.
- **PETRONAS Onshore Gas Treatment Plant Project, Turkmenistan**, in support of Hyundai Engineering (EPC). Safety studies included HAZID, HAZOP, IPF Classification & Verification, SRS, QRA, Human Factors, HSE Case, HSE & PS, RAM, ESSA, and F&G Mapping for the gas treatment facilities.

Refineries Project Experience

- **Kuwait National Petroleum Company (KNPC) Clean Fuels Project for the Mina Abdullah (MAB) Refinery, in Kuwait**, in support of Petrofac / Samsung / CB&I JV (EPC). Safety Studies included HAZOP, SIL Classification and Verification, SRS and Alarm Rationalisation for CDU, CCR, HOC, KHT, DHT, VRU, HCR and DHTU units. IRESC also supported JGC/GS/SK JV (EPC) in F&G and AMS Studies for **Mina Al Ahmadi (MAA) Refinery**.
- **Saudi Aramco & Total Raffinage Chimie Amiral Project, Kingdom of Saudi Arabia**, in support of Technip (FEED). HAZID, ENVID, HAZOP and SIL Classification were performed for the new petrochemical complex, consisting of mixed feed cracker, OEU, HD2 BTEU, SHU, HDPE, pipelines, and U&O facilities.
- **HPCL Rajasthan Refinery Limited (HRRL), Barmer, Rajasthan, India** in support of Tata Projects Limited (EPC). The safety studies included HAZID, HAZOP, SIL Classification and Verification, Risk Assessment and EERA for CDU/VDU, DCU and VGO-HDT Units.
- **Star Petroleum Refining Public Company (SPRC) – Capacity Expansion Project, Thailand**, in support of Technip (EPC). HAZOP-LOPA was performed for modifications in CDU, DHTU, WCN, RFCCU, NHTU, PLF, HVGO, and VDU, as per Chevron PHA-SOA procedure.
- **PETRONAS Refinery and Petrochemical Integrated Development (RAPID) Project, Malaysia**, in support of CTCI and MIEI Consortium, Tecnicas Reunidas, Toyo Engineering, and Samsung Engineering for various packages such as Package 5 development (Steam Cracker Complex– BDU, PGH, BZU, MTBE, etc.), Package 1 (RFCC, LTU, PRU), Package 3 (Refinery Units – SGP, DHT, KHT, CNHT, NHT, CCR, HPU, RPSA, etc.), Package 6A (LLDPE Plant) and Package 11 (EOEG Plant).
- **NESTE Singapore and Rotterdam Refinery Expansion Project**, in support of Technip (FEED and EPC). Safety Studies included HAZOP, SIL Classification (LOPA), Layout Risk Analysis and Fire Hazard Analysis for refinery units to produce diesel, naphtha, jet fuel, propane based on pre-treated vegetable oils/animal fats/fatty acid distillate feedstock.

Petrochemical/Polymer Project Experience

- **Shintech Ethane Cracker Plant Project, Plaquemine USA**, in support of Toyo Engineering (EPC). Safety Studies included BRA, CA, HAZOP, SIL Classification & Verification, and HIPS.
- **Borouge 4 Ethane Cracker Project, Abu Dhabi**, in support Technip Energies (EPC). HAZOP and SIL Classification (LOPA) studies were performed for the Ethane Cracker Unit and associated interfaces.
- **PTTGC Olefins Reconfiguration Project (ORP) and Oxirane Propylene Oxide (PO) Project, Thailand**. Safety Studies performed in support of Samsung Engineering (EPC) included HAZID, ENVID, HAZOP, SIL Classification, SRS, QRA, BRA, Layout Assessment, FSA, F&G Mapping and SIL Verification.
- **SABIC-YANSAB Butadiene Project, Saudi Arabia** of Yanbu National Petrochemical Company (YANSAB). Safety Studies performed in support of CTCI (FEED) included HAZOP, SIL, Inherent Safety Design Review, Sustainability Review, QRA and Layout study for the new butadiene plant, revamp of existing butene-1 plant, and various U&O facilities.
- **Olefin Plant Project, Indonesia**, owned by PT Chandra Asri Perkasa (CAP). Safety Studies performed in support of SECL and TOYO (FEED) included HAZOP, SIL Classification, MHA, CA, BRA, QRA, and radiation and dispersion for the olefins unit, BDU, ARU, tank farm, HDPE, PP, and LDPE plants.
- **Phu My Polypropylene Production Plant Project, Cai Mep, Vietnam**, owned by Phu My Plastics Production (PMP). Safety Studies performed in support of Technimont (FEED) included HAZID-ENVID, HAZOP and SIL Classification for Polypropylene (PP) Plant based on *Basell Spheripol Technology* and Propane Dehydrogenation (PDH) Plant based on *UOP Oleflex technology*.
- **Pertamina Olefin Complex Project, Indonesia**, in support of SECL-Technip-Tripatra consortium (FEED). HAZOP and SIL Classification studies were performed for the new Ethylene Cracker, HDPE/ LLDPE/ LDPE/ PP units, and offsites// utilities.