



**Total Recovery Solutions International**

**2012 Sustainable Management of Municipal Solid Waste  
For The  
HONG KONG  
Special Administrative Region**



**Renewable Energy Proposal for the treatment of  
3000 tpd (rising to 9000 tpd) MSW using  
GASPLASMA<sup>®</sup> technology**



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## Summary

This document serves as an outline proposal to the Hong Kong Panel on Environmental Affairs and Legislative Council of the Hong Kong Special Administrative Region.

TRSI in partnership with a world class consortium propose to design and build a state-of-the-art waste to energy and resource recovery facility located in Hong Kong, China. This complex, hereinafter called the “Hong Kong Total Recovery Facility”, is proposed to be located on minimal acreage. The overall process footprint coupled with no ash to landfill will dramatically reduce the land call and reclamation costs when compared to MBI.

The consortia comprises of TRSI, Advanced Plasma Power and Technip. The facility will employ the latest, proven Gasplasma® technology to process an initial requirement of 3000 tonnes per day, rising to 9000 tonnes per day whilst employing zero landfill technology and class leading emissions serving to minimize environmental impact.

The facility will serve to employ proven advanced recycling technology coupled with high net electrical efficiency both electrically and thermally with no ash to landfill. In its place will be an inert aggregate -Plasmarok® approved as a product by the European Environment Agency. The output of the plant will enable Hong Kong to future-proof their investment due to the Hydrogen richness of the syngas produced. This can be fed cleanly and efficiently into engines of turbines for power generation or as a feedstock in the production of synthetic fuels.

APP and embedded partners have over 120 reference plants and over 5m+ operating hours (excluding Technip references).

**The proposed plant will have a performance bond wrap from Technip.**

*The Total Recovery Plasma Facility*



***Proposed visible level of the Hong Kong Total Recovery Facility horticulture plant  
-Co2 to fresh vegetables.***



The conceptual design of this “Hong Kong Total Recovery Facility”, as presented in this document, meets the People’s Republic of China goals for transitioning the country away from land filling waste materials and towards a zero-waste economy; in the process creating up to 200 sustainable jobs. The TRSI conceptual approach is for a development plan that addresses the safe treatment of **all** the waste materials arising in Hong Kong.

The conversion technologies selected will be seamlessly integrated thereby maximizing the revenue-generating potential of the Hong Kong Total Recovery Facility. The technologies are well-established and scalable for future expansion of the facility. The complex will be equipped with Best Available Control Technologies (BACT) for cleaning the Syngas, Biogas, LFG, and exhaust gases to meet the latest Peoples Republic of China environmental standards (EPD).

At the heart of this study is the processing equipment and Advanced Plasma Power’s Advanced Thermal Treatment technology.

## **SUMMARY OF BENEFITS**

The TRSI team is capable of delivering a sustainable waste management solution to the People’s Republic municipalities. The single business focus of the TRSI team is in delivering a financially sound and environmentally friendly waste management complex for China.

### **Economic Benefits**

The long term economic viability of the Total Recovery Facility depends largely on the status of the current waste management program, and on both the current and future markets for the various products generated by the facility along with revenue streams. Revenue streams identified are: (1) sale of renewable energy solely generated by this facility (2) recyclable steam (3) thermal off take (4) Plasmarok®

The TRSI team expects that all of the saleable power generated by the Total Recovery Facility will be consumed by the National Grid. The future of the power market in The People’s Republic is of critical importance to TRSI along with the profitability of the proposed complex.

## **Zero Waste Economy**

A primary objective of the TRSI team is to maximize the recovery and utilization of waste materials in order to provide sustainable solutions to many of today's environmental and energy related challenges. The most abundant global resource is waste which the proposed state-of-the-art TRSI complex will utilize providing urgently needed support to the long term growth of global economies, contributing to the health and prosperity of our own and future generations. This is achieved by the Total Recovery Facilities capability of safely, cleanly, and efficiently translating waste into clean, renewable energy. With increasing environmental regulations, the implementation of complexes such as the Total Recovery Facility will greatly decrease the need for landfills by recycling local solid waste into a source of renewable energy. The proposed complex and program addresses the need for more renewable resources and energy while domestic supplies are either decreasing or becoming too expensive.

Implementing a solution, such as the one proposed herein, would reduce Hong Kong's emissions problems, their reliance on coal, foreign oil supplies and markets. The People's Republic of China would establish itself as a global leader in waste management solutions, environmental initiatives and energy independence. Consequently, a local zero waste economy can be achieved by utilizing this innovative program to help preserve the environment and societal health.

# Technology Providers

Technology Providers

## **Advanced Plasma Power**

### **Advantages of GasPlasma®**

- Fuel Flexibility
- Process heterogeneous feedstock with minimal feed preparation
- Blend MSW, RDF, tyres, industrial waste, C&D waste, ASR, liquids and slurries
- Reduce dependence on single feedstock, optimize revenue based on available feed stocks
- Virtually 100% carbon conversion
- Plasmarok®- inert/non-leaching and does not contaminate soil or drinking water
- Hydrogen rich syngas
- Future-proof investment-syngas can be tailored to meet downstream requirements - transport fuels-gtl –sng/lng etc...
- High residence times within the convertor ensures tars and chars are 'cracked' minimizing particulate carry over into syngas stream
- Augments the three R's-Reduce, Reuse and Recycle



## **Hong Kong EPD Objectives**

The Hong Kong EPD is contemplating an Integrated Waste Management Facilities (IWMF) project to address Municipal Solid Waste (MSW) issues. The project contemplates sorting/recycling and incineration with energy recovery as key components. The goal is to eliminate MSW accumulations in existing landfills.

### **Current Preferred Solution: Incineration**

Incineration of MSW has been used since the late 1800's burning MSW with oxygen in a 540 to 820 degrees Celsius range.

### **Environmental Issues with Incineration**

Since the late 1970's the scientific and environmental communities observed that with modern MSW content, the presence of oxygen and a relatively low combustion temperature range, significant amounts of harmful gases such as Dioxins and Furans accompanied the flue gas emissions. The modern incinerators are equipped with post-incineration equipment to abate the Dioxin and Furan gases before they are emitted into the atmosphere. The gas abatement process is energy intensive. As such, as a technology to convert waste to energy, incineration is relatively inefficient compared to the best technologies available today.

Incineration also yields vast quantities of fly ash. This ash often contains high concentrations of heavy metals such as [lead](#), [cadmium](#), [copper](#) and [zinc](#) as well as small amounts of dioxins and furans. Even mixed with concrete these harmful elements are not arrested and will re-enter the environment in due time.

### **Best Available Technology: GasPlasma®**

This process treats MSW in high temperature ranges (3,000 to 8,000 degrees Centigrade) with minimal levels of oxygen. In this sealed environment, all the components in the MSW are broken down into their elemental parts. The

gaseous components form a synthesis gas (syngas) and the solid/ash components form an inert aggregate called 'Plasmarok®'. This is a commercial grade construction material used for grading, paving and aggregate in concrete mixes and in our consortia technology providers' case is an approved product by the European Environment Agency.



Due to the ultra-high temperatures and intense UV the char and tar problematic elements in the syngas are broken down allowing for direct feed into turbines or reciprocating engines delivering high levels of electrical and thermal power

Today, many European, American and Asian countries deem plasma gasification to be the best available technology to address the MSW and related issues.

### **Environmental Benefits of Plasma**

Plasma reduces harmful Dioxins and Furans to undetectable levels unlike incinerators as this is a primary concern to human health and the environment. The emissions from operating plants are below that of emission standards in Europe, Japan, and U.S. Any carbon dioxide produced is sequestered for downstream re-use applications.

GasPlasma® gasification process uses relatively little amount of energy to start up and maintain. The parasitic draw for some systems can be as low as 20%, thus 80% of the energy produced can be deployed for other commercial use.

GasPlasma® is very efficient in converting 97% of the waste fuel into a very clean hydrogen-rich gas and recyclable aggregate

GasPlasma® can handle multiple waste streams, whether liquids, solids or sledges. Besides MSW, plasma units can process tyres, motor oils, sewage sludge, medical waste, industrial waste and toxic waste.

### **The Project Team:**

Project Developer: **Total Recovery Solutions International (TRSI).**

The principals of TRSI have a considerable track record and experience in managing landfills. We are passionate about addressing the pressing issues related to MSW and related landfill sites: the harmful environmental impacts of buried waste and the shortage of landfill sites, especially in urban settings. As established experts in the MSW and landfill area, we are often called upon when the industry wishes to tackle these difficult problems. We have access to the best available technologies world-wide in addressing MSW-related matters. We have the vision, the technical and business acumen to implement creative solutions that literally leave no waste behind. Our goal is Total Recovery.

Technology Provider: **Advanced Plasma Power (APP)**

APP is a leading technology provider for advanced waste to energy fuel plants employing its globally patented Gasplasma® technology. After the removal of valuable recyclables, the Gasplasma® process treats a wide range of feedstock's including residual municipal solid waste and commercial/industrial waste converting it all into two high value outputs: a clean, high quality, energy-rich synthesis gas (syngas) and a solid, vitrified product each with multiple applications. The syngas can be used to generate electricity directly in gas engines, gas turbines and/or fuel cells or it can be converted to synthetic natural gas (SNG), hydrogen or liquid fuels. The solid product, Plasmarok®, is strong, inert and non-leaching and has a variety of valuable end uses, for instance, as a building material. The process is clean, modular and scalable, delivering high efficiencies and maximizing landfill diversion whilst minimizing visual and environmental impact

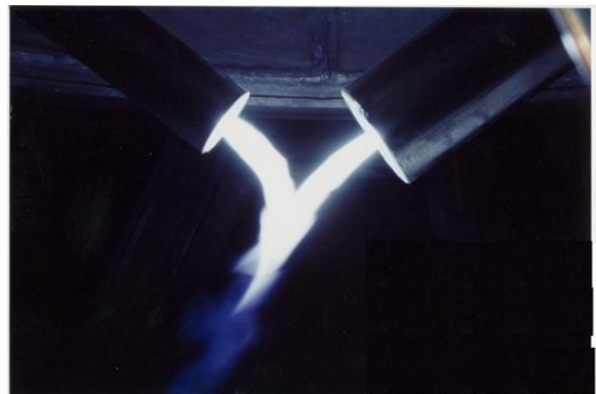
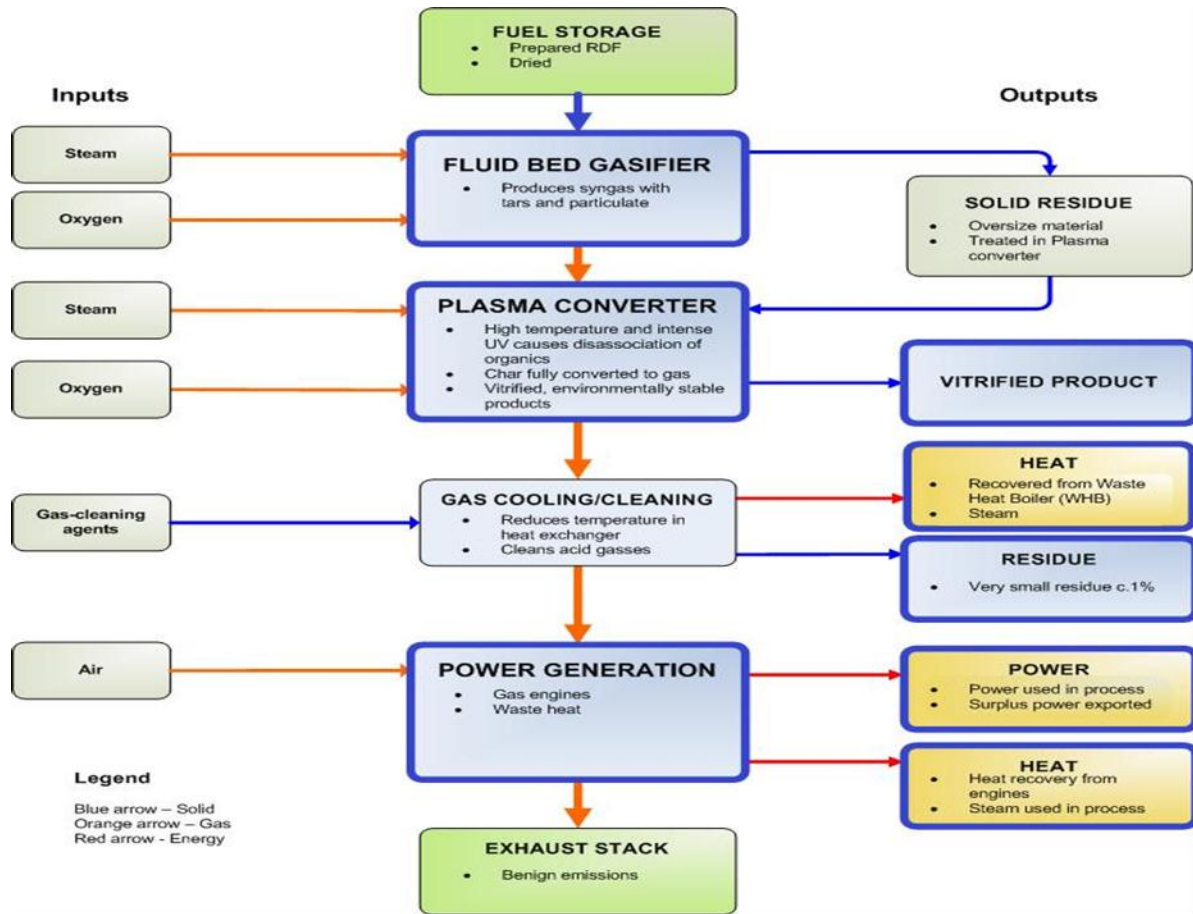
The Gasplasma® Process

The core Gasplasma® technology is a two-stage advanced conversion technology. It combines two long standing and well proven technologies (gasification and

plasma conversion) in a unique configuration to convert municipal and commercial waste into a clean, hydrogen-rich synthesis gas (syngas) and a vitrified recyclable product called Plasmarok<sup>®</sup>, which can be used as a high value construction material.

A full Gasplasma<sup>®</sup> plant comprises four main sections: 1) a waste reception hall and materials pre treatment facility (MPT); 2) the core Gasplasma<sup>®</sup> technology consisting of the Fluidized Bed Gasifier and Plasma Converter; 3) gas cleaning equipment to cool, clean and condition the syngas; and 4) a Power Island to generate renewable power and recover residual heat.





## **Key Benefits**

The Gasplasma® process has a number of advantages from an environmental, social and economic perspective. Environmentally, the process delivers high overall energy efficiency, maximum combined heat and power potential, minimal generation of secondary residues and very low plant emissions. Further, the process produces a high value construction material called Plasmarok® that is recognized as a product not a waste. This removes any environmental, regulatory and commercial risk stemming from concerns over the eco-toxicity of bottom ash.

The Gasplasma® process facilitates resource optimization as it enables almost complete landfill diversion and is complementary to recycling. The process can be used in conjunction with existing recycling schemes, as it takes waste that cannot be recycled and uses it to produce energy; thus maximizing the use of waste as a resource.

From a social perspective, a Gasplasma® plant is around 15m high, meaning that it can fit into a standard warehouse similar to the kind used for out of town business parks. This means a plant can be located, unobtrusively, on the edge of a town, taking waste from that town and supplying power and heat in return — a local, community solution to local waste management challenges and sustainable energy requirements. This can all be achieved at a cost that compares very favorably with other thermal waste treatment technologies, especially on a lifecycle analysis basis.

## **Widespread Applications**

The two products from the process, the energy-rich syngas and the Plasmarok® have a variety of end uses making the technology very flexible. The syngas can be used to generate electricity directly and efficiently in gas engines or gas turbines. As fuel cell technology advances rapidly, the syngas will be capable of being used commercially in fuel cells, thereby further improving electrical generation efficiency. Alternatively, the syngas can be processed into synthetic natural gas (SNG) for distribution in existing gas grids or into hydrogen or liquid fuels.

## **Landfill Mining: A New Concept**

The concept of recuperating a landfill site opens up a whole spectrum of opportunities especially as our primary sources of materials and fuels become ever more depleted. Furthermore the sites themselves, around which in many cases populations have grown, can be returned to developable land or parkland with amenity value.

## **A Real Opportunity**

The critical the world waste management capability, coupled with the urgent need to develop sustainable energy sources, has opened the door to the opportunity for waste-to-energy technologies to take center stage. The efficiency, key benefits and rationale that underpin processes such as Gasplasma® mean that there is a real opportunity to work towards a zero waste economy while delivering on renewable energy generation targets.

# Hong Kong Project Team

## Hong Kong Project Team

### TRSI – San Diego, California

#### Company History

TOTAL RECOVERY SOLUTIONS INTERNATIONAL, (“TRSI”) is a renewable fuels and energy production company. TRSI is made up of a team of professionals with over 60 years of waste processing in Southern California which has the strictest environmental laws in the world. TRSI has the ability to convert large volumes of carbon-based feed stocks from the entire spectrum of waste materials that are generated every day by small and large communities throughout the world into usable forms of energy. These communities need the long-term disposal solutions that TRSI provides. Waste is ever increasing in volume, and disposal options are consistently decreasing, forcing costs to skyrocket.

TRSI consists of a management team that has over 40 years of solid waste, waste to energy, landfill, transfer station, material recovery facility and liquid renewal fuels experience. TRSI utilizes only the best engineers and consultants for our projects. TRSI recognizes that in order to obtain project financing, you need to use commercially operating technology. Because of this, TRSI has aligned itself with Technip, a world class engineering, construction and management company for our Total Recovery Facilities. Technip has agreed to wrap any waste to energy project TRSI undertakes with a project performance guarantee with the condition that TRSI uses the technology chosen by Technip. Technip is technology unbiased and currently has a number of Thermal waste to energy conversion technologies that TRSI can use in its portfolio. TRSI custom designs each TRF for the specific site location and waste streams targeted. TRSI trains, staffs and manages each site.



TRSI Total Recovery Facilities (“TRFs”) receive all types of waste - including municipal solid waste (“MSW”), scrap tires, medical waste, construction debris, electronic waste, agricultural waste, automobile shredder residue and sewage sludge - and processes them all “under one roof.” There is **NO** residual leftover waste to be disposed of.

Our TRFs employ a suite of proven technologies to handle the waste received. The main product of our facilities is electricity. The by-products of our process are all marketable; these include recyclable materials, extruded plastics, metal ingots, and basaltic glass. TRSI TRFs produce no harmful emissions, generate their own electricity and, through modern heat and steam recovery, recycle and reuse their own water. This combination of technologies under one roof is revolutionary in the waste processing industry and the cornerstone of the TRSI approach.

Each TRSI – Total Recovery Facility will be engineered and constructed by the world-class engineering firm Technip, a 10 Billion Euro Company. Technip USA, Inc. has signed an agreement with TRSI to engineer, procure, and provide construction management for all facilities that TRSI develops. Each project that TRSI builds will be **Performance Guaranteed** by Technip USA, Inc. and its vendors for a specified amount of waste to electrical generation per day. Technip’s Performance guarantee assures the TRF will run and operate as designed.

TRSI has the solution to the world’s need for environmentally safe methods of waste disposal. We have the technology to convert various forms of waste to green electrical energy. We provide enormous positive impact on the communities we serve, not only through clean waste disposal, but also through job creation. We emit no harmful emissions, nor do we consume any fresh water or need any utilities from our communities.

## **Technip USA, Inc. – Claremont, California**

### Company History

#### **1958**

Technip was established in 1958 by IFP, Institut Français du Pétrole, as Compagnie Française d'Etudes et de Construction Technip.

#### **1960's**

First series of international successes with the completion of projects in Africa and Asia

#### **1970's**

Technip becomes an international group with the creation of an office in Rome and the creation of Technip Geo production, a subsidiary specialized in hydrocarbon field equipment. During this period, Co flexip – a firm specialized in the design, manufacture and supply of flexible subsea flow lines– is created by the IFP (French Petroleum Institute) and opens a flexible flow line manufacturing plant in Le Trait, France, as well as offices in Houston, Aberdeen and Rio de Janeiro.

#### **1980's**

The company underwent restructuring and rounds of layoffs in the mid-1980s. Technip lost FRF 1.42 billion (\$148 million) in 1984, when it had about 2,750 employees. They were on strike in January 1985 to protest job cuts. Company president Pierre-Marie Valentin told Platt's Petrochemical Report that the problems were due to Technip's high costs and relatively narrow range of process services. He added that the French engineering sector was in need of consolidation. Technip was able to take over competitor Creusot-Loire Enterprises (CLE), the project engineering unit of Creusot Loire S.A., during the industry downturn. CLE also was making layoffs, cutting its 1,100-strong workforce by a third.

Petro-Canada, which had been using Technip for consulting and repair work, invested in the company during its mid-1980s crisis. The French government soon stepped in, however. The oil company Société National Elf Aquitaine ended up with about one-third of shares. IFP retained a similar holding. The remainder was held by the TOTAL oil company, Gaz de France, and some French banks, which had written off loans worth FRF 428 million in the restructuring.

Technip was soon in the black again. Turnover reached FRF 7 billion in 1986, with a net profit of FRF 30 million. Hydrocarbons and bulk chemical work accounted for half of the group's business. By the end of the decade, Technip had joined the Soviet Union in an engineering joint venture and was building a number of plants in China. It also established a branch office in Abu Dhabi that would over the course of a couple of decades develop a considerable design capacity. By 1990 Technip counted more than 1,000 contract awards in 85 countries. Sales exceeded FRF 7 billion (\$1 billion) in the early 1990s and the company was profitable. It had 5,400 employees, more than half of them overseas. According to Reuters, international work was soon accounting for 92 percent of turnover.

### **1990's**

Technip USA, Inc. is listed on the Paris Stock Exchange and Coflexip is listed on the New York Stock Exchange. Coflexip acquires Stena Offshore while Technip becomes a world-leading engineering group through the acquisition of companies with strong technological expertise: *Speichim*, *Krebs* and *KTI*. Established in the United States, KTI enables Technip to set up in North America.

### **2000's**

Sales were a little shy of FRF 3 billion in 2000. In April, Technip acquired an initial 29.7 percent investment in Coflexip, an offshore construction specialist.

In October 2001, Technip acquired a majority (98.36 percent) holding in Coflexip as well as a controlling interest in ISIS, a holding company that formerly had been owned by the national oil institute IFP. The group was subsequently known as Technip-Coflexip for a couple of years. Coflexip had itself made a major acquisition in January 2001, buying Aker Maritime's Deep water Division.

Coflexip was merged with Technip in July 2003, when the group name went back to simply Technip. The company's corporate identity was updated, and three Paris offices employing 2,700 people consolidated into one tower in the business center La Défence. During the year, Technip Germany launched a joint venture with a unit of Russia's Lukoil.

With net sales of FRF 5.1 billion in 2004, the company was counted among the top five full-service engineering and construction firms for the hydrocarbon/petrochemical industry, which accounted for 95 percent of revenues.

Technip specialized in lump sum turnkey (LSTK) projects for major oil companies and governments in emerging markets, a business that was proving less attractive to U.S. companies. Technip continued to be heavily involved in the Middle East. Qatar gas II, a colossal \$4 billion LNG joint venture with Japan's Chiyoda Corporation, was launched toward the end of 2004. An executive told Middle East Economic Digest that the company had traditionally lost out to low-cost Japanese companies in the Gulf's LNG business. After acquiring Coflexip, Technip pushed into Egypt's offshore market, while it withdrew from Iraq, where it once had a thriving presence, due to security and political issues.



## Business Segments



### Subsea

- Design, manufacture and supply of deepwater flexible and rigid pipelines, umbilicals, and riser systems
- Subsea construction and pipeline installation services
- Five state-of-the-art flexible pipe and umbilical manufacturing plants
- Four spoolbases for reeled pipeline assembly
- A constantly evolving fleet strategically deployed in the world's major offshore markets



### Offshore

- Engineering and fabrication of fixed platforms for shallow waters (TPG 500, Unideck®)
- Engineering and fabrication of floating platforms for deep waters (Spar, semi-submersible platforms, FPSO)
- Leadership in floatover technology
- Floating Liquefied Natural Gas (FLNG)
- Management of construction yards



### Onshore

- Gas treatment and liquefaction (LNG), Gas-to-Liquids (GTL)
- Oil refining (refining, hydrogen and sulphur units)
- Onshore pipelines
- Petrochemicals (ethylene, aromatics, olefins, polymers, fertilizers)
- Biofuel and renewable energies
- Non-oil activities (principally in life sciences, metals & mining, construction)

**The best solutions across the value chain**

6 Technip Presentation

**Technip**



## Onshore

The Onshore segment covers all onshore transformation and transport installations for oil and gas, as well as petrochemicals and other industries.



### Onshore Field Development

Technip designs and constructs all types of development facilities for onshore oil and gas fields, from wellheads to treatment centers and product shipping systems.

Technip applies its know-how not only to new field development projects, but also to the revamping of existing facilities, notably through the optimization of the facilities and their control systems as well as bringing them into line with environmental standards.



### LNG / GTL - Gas Monetization

Technip is one of the world's leading companies for the conceptual design, engineering and construction of gas industry facilities. Drawing on more than forty five years of experience, we can provide our clients with innovative and optimized solutions whatever the gas treatment requirements.

- Liquefied Natural Gas (LNG)
- Gas-To-Liquids (GTL)
- Natural Gas Liquids (NGL) recovery
- Gas treatment

## Oil Refining



With 50 years' experience in oil refinery design and construction, Technip has completed 29 grassroots refinery projects and more than 150 refinery expansion and upgrade projects in more than 70 countries.

It is also one of the few engineering companies in the world to have engineered 8 grassroots refineries in the last 10 years.



## Hydrogen - Syngas

Technip, a market-leader in providing technology, design and construction for hydrogen and syngas units, has been involved in over 200 units worldwide-with capacities ranging from 1 to 480 tons per day - for use in the refining, chemicals/petrochemicals and metals producing industries.

## Onshore Pipeline



Since 1960, Technip has completed more than 140 onshore pipeline projects in over 40 countries. Altogether, this is a total length of 18,000 km with an aggregate contract value of US \$9.5 billion. Technip builds pipeline systems for:

- natural gas, LPG, NGL
- crude oil and oil products
- water
- liquid sulphur, brine, slurry

## Refining and Onshore Applications



Technip is the world's leading company for the conceptual design, engineering and manufacture of in-tank flexible pipe systems. The Coflexip® drain and rim fire protection systems are well known in the industry and have been installed in thousands of storage tanks worldwide.

Co flexlite® is a new RTP (Reinforced Thermoplastic Pipe) now being offered to the market which requires the fast installation of non-metallic, corrosion-free flexible pipelines for the transportation of oil, gas and water

## Ethylene



Technip engineers grassroots ethylene facilities including mega-crackers and plant expansions. Using the latest, most-effective proprietary technologies, the Group provides solutions at optimized cost. Recent activities include:

- 4 large grassroots plants (over one million tons per year each) since 2007.
- The world's largest mega-cracker with a capacity of 1.4 million tons per year on mixed feed started in 2008.
- 2 largest mega-crackers in Qatar and Saudi Arabia, with a capacity of 1.3 million tons per year each
- 8 large capacity furnaces in Thailand

## Petrochemicals



Technip's experience in the field of petrochemicals covers the design and construction of major fully-integrated petrochemical complexes, as well as a large number of individual petrochemical units:

- 10 fully integrated petrochemical complexes
- Over 400 individual petrochemical units
- Over 140 aromatics units
- Over 110 intermediate product units
- Over 150 polymer units, including 113 engineered polyolefin units

## Chemicals

Backed by a strong process and technology expertise, Technip has completed hundreds of projects from small units up to large chemical complexes.

Through decades of experience, Technip has acquired considerable engineering expertise and a range of capabilities enabling it to provide truly innovative solutions adapted to its clients' needs.



Technip designs and builds units or full chemical complexes for the production of:

- Organic intermediates for the plastic industry (acrylics, Isocyanates, polyamides, epoxy resins, polyesters, vinyl's, plasticizers)
- Plastics (nylons, PE, PVC and polystyrenes) and fibers (nylon, polyester)
- Inorganic intermediates such as electrochemical (sodium chlorate, chlorine dioxide, per chlorates, chlor-alkali) and soda ash...
- Fine chemicals (amino acids, pesticides, additives, pigments)
- Specialty chemicals (lubricants, greases, paints, inks, ...)
- Pyrotechnics and associated chemicals

## Fertilizers

Technip has designed and built, throughout the world, more than 400 fertilizer units in the following sectors:



- Ammonia
- Urea
- Nitric acid and ammonium nitrates
- Sulfuric acid
- Phosphoric acid
- Superphosphates and compound fertilizers

## Biofuels and Renewable Energies

Backed by 25 years of Biofuels experience, Technip has developed real expertise in this sector where it enjoys a leading position. For the bioethanol market, Technip technology enables the processing of any raw materials that may be used for the production of fermentation ethanol (sugar, starchy and cellulosic materials). Our processes have been developed to obtain a high yield with low energy consumption at a minimized cost. Technip has engineered over a hundred references in ethanol production plants.



In the biodiesel market, Technip has designed and built numerous production units based on Axens unique solid catalyst technology with capacities ranging from 100,000 to 250,000 tons/year.

## Advanced Systems Engineering

In the sectors of oil and gas field development, oil refining, petrochemicals and co-generation plants, Technip's ASE specialists provide high value-added solutions and services:



- Integrated refinery control/automation/ management Systems (Abu Dhabi, Belgium, Germany, Kuwait, Saudi Arabia)
- Automated control and optimization of 2,400 gas-lifted wells in Western Siberian oil fields
- More than 200 Distributed Control systems installed on over 120 industrial sites
- Design of control systems for unattended operations (Italy, Norway, Belgium)



- Advanced process control implementation (Italy, Kuwait)

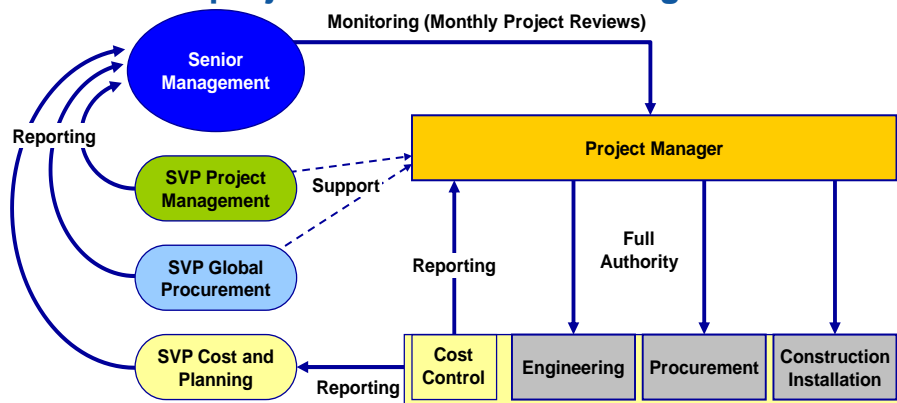
## Other Industries



Technip provides engineering and construction services for a wide range of industries such as Metals and Mining, Life Sciences, and Buildings and Infrastructures. In general, such projects are smaller than oil and gas projects, and thus have shorter average execution cycles.

- Mining and metals
- Life sciences
- Buildings and infrastructures

## Control of project execution – Planning and Review



- Two principles are concurrently implemented:*
- Project Manager: single point of accountability for each project
  - Senior Management: hands-on policy, supported by central expertise

**Technip**

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