

HYDROCARBON ENGINEERING

Volume 14 Number 5 - May 2009

**Experience Sulzer -
Technology engineered to last!**

SULZER

While the last 12 months have been dominated by economic upheaval and the arrival of a worldwide recession, the oil and gas industry has certainly not been short of activity. The price of crude soared at US\$ 147/bbl in July last year, crashing to US\$ 33/bbl in December; yet demand for oil remains weak, with the current price hovering below the US\$ 50/bbl mark. Financial uncertainty has forced investors to tread with caution, and projects suffering delays has become a familiar sight. In spite of this, 2009's *World Review* reveals that preparations are being made for the inevitable growth in demand and increase in crude prices.

This year, North America reached a milestone in its political history, and while the oil and gas industry has not been subject to such revolution, some noteworthy projects are underway. ConocoPhillips and EnCana Corp. are collaborating on a US\$ 3.6 billion refinery expansion programme at the Wood River Refinery in Illinois, while two of ExxonMobil's three expansion projects are located in the US, an investment costing a total of US\$ 1 billion.

Somewhat of a formality, investments in Asia and the Pacific Rim are heaviest in China and India, with China National Petroleum Corp. commencing work on a US\$ 1.2 billion refinery project in China. Meanwhile, Vietnam strode into 2009 with ambition, opening its first refinery at Dung Quat, and with two more under construction, to be in operation by 2013.

In Africa, Nigeria has been under the spotlight on more than one occasion. In January, due to the dry run of reforms in the industry, Abubakar Yar'Adua was sacked from his post as Group Managing Director of the Nigerian National Petroleum Corporation (NNPC); while March witnessed the removal of subsidies on petroleum products and the privatisation of Nigeria's refineries in a bid to encourage private investors. With the NNPC now collaborating with a selection of local and foreign investors in the development of four Greenfield refineries, the future looks promising.

Eastern Europe hit the headlines in January when the Russia/Ukraine gas dispute was rekindled. Although an agreement was reached by the end of the month, irreparable damage to diplomatic relations and customers' confidence was unavoidable. Across the continent, one of the largest facilities producing diesel from renewable feedstocks is to be built in the Netherlands, and the development of the Adriatic LNG facility signals the world's first offshore LNG receiving and regasification terminal.

The Middle East harbours 56% of the total world oil reserves and recent developments show a vested interest in continuing to exploit this. Contracts have been designated to build four new refineries in Iraq with a combined total capacity of 750 000 bpd, and vast expansion projects are underway at the Ras Tanura refinery in Saudi Arabia and at the UAE's largest refinery at Ruwais.

Biofuels are presenting new opportunities for development in Latin America, with news that Gold Star Biofuels has secured a contract to build eight biodiesel production facilities throughout Chile. Also worth mentioning is that the governments of Venezuela and Ecuador have agreed to invest US\$ 6.6 million to build the largest oil refinery on the Pacific Coast of South America.

With climate change becoming a genuine concern and environmental policies and regulations ever tightening, the *World Review* is littered with conversion projects to cut harmful emissions such as sulfur and greenhouse gases. OPEC meeting this month for the second time this year is representative of the industry's current vigilance; but the number of sizeable projects, as detailed in the following pages, should offer comfort to even the most sceptical readers.



2009

WORLD Review



Nynas AB, Sweden is using Intergraph® SmartPlant® Enterprise to help expand and increase production capacity.



collaboration, converts crude bio oil byproducts of pine pulping into second generation biodiesel for shipment to diesel refining facilities.

SunPine will be using a newly patented process to manufacture biodiesel from a main feedstock of crude tall oil (CTO), a byproduct of pine pulping, and combine it with vegetable oils such as jatropha or castor oils to create tall diesel (CTD). With environmental approvals recently in place, SunPine AB will begin initial construction in the summer of 2008, with biodiesel production startup planned for October 2009.

Efficient operation of the distillation column is critical to profitability of biodiesel production, impacting cost, output and regulatory compliance.

Nynas AB seeks to expand its refiner base and double its production capacity by 2020, and has chosen Intergraph® SmartPlant® Enterprise to assist in this.

TURKEY

Emerson Process Management's project engineering and PlantWeb® architecture has enabled a new bioethanol production plant operated by Tarkim to start up a month early and produce almost 30% above target levels. Emerson's PlantWeb solution at Tarkim includes 381 field instruments, 108 control valves and 124 on/off valves, using HART communications protocol.

This year, Lukoil, Russia, intends to supply petroleum products to the Turkish market from its own refineries in Burgas, Bulgaria, Odessa, Ukraine, the ISAB refinery in Sicily, Italy, and the Tupras refineries in Turkey.

In July 2008, the Lukoil Group signed an agreement for a 100% acquisition of Akpet, Turkey.

Despite the current global financial situation, Lukoil plans to expand its Turkish business by investing approximately US\$ 37.5 million. The company hopes to have the Akpet gas stations rebranded in compliance with Lukoil by 2011 - 2013. Lukoil, as part of its Turkish development programme, seeks to invest a total of US\$ 400 million in the local network.

Türkiye Petrol Rafinerileri AS (Tüpras) has commissioned Shell Global Solutions to assist in its refinery optimisation programme at its four refineries. This is part of the company's efforts to improve operations and maintain its strategic importance as the country's energy supplier.

The refinery previously used diesel as the main diluent in fuel oil production. Replacing a portion of the diesel with kerosene will free more valuable distillates and reduce the total fuel oil production. Lowering the product quality giveaway will reduce the amount of distillate downgraded to fuel oil and therefore the volume of the fuel oil pool.

These contracts are expected to be completed by the end of 2009.

At the beginning of 2008, Sandvik Process Systems was awarded a contract to manufacture and supply sulfur solidification and handling plant for the Lukoil-Nizhegorodnefteorgsintez refinery in the Nizhniy Novgorod region. The plant includes four Rotoform granulation/pastillation units as well as additional systems for storage, bagging and railway loading. Equipment was delivered in February 2009 and Lukoil plans to install and put it in operation by mid 2009.

As EPC contractor for the Khabarovsk refinery, Spanish engineering company Tecnicas Reunidas has confirmed an order with Sandvik Process Systems for a complete sulfur solidification and handling package covering granulation, silo storage and bagging of sulfur granules. Due to the ambient temperatures, the entire system will be installed inside a building. Delivery is expected by the middle of 2009.

Technip has also been awarded a contract by Sibur Neftehim worth € 45 million. The contract is for a lump sum engineering and procurement contract to expand an ethylene plant in Kstovo.

This project will also be carried out by Technip's operating centre in Zoetermeer, the Netherlands. The contract covers detailed engineering, procurement and supply of main equipment and materials. Technip will also provide technical assistance during construction, commissioning and startup.

Yokogawa Electric Corporation has signed a strategic partnership agreement with JSC Gazprom Neft. Under this strategic partnership agreement, the first ever between an instrumentation manufacturer and Gazprom Neft, Yokogawa will introduce its solutions on a priority basis at four of the company's refineries. These solutions will include integrated production control systems and operation support software for efficiency improvement and event analysis.

Yokogawa will also contribute to a Gazprom Neft programme for reducing total cost of ownership by offering technical support with the design, delivery, service, operation and engineering of control systems.

Using this strategic partnership agreement with Gazprom Neft, Yokogawa will expand its business in Russia's oil and natural gas industry.

Yokogawa Electric Corporation has announced that its subsidiary, Yokogawa Electric CIS Ltd, has signed a contract with Taneco to become the main automation contractor for a refinery and petrochemical project. The complex is to be constructed in Nizhnekamsk, Russian Republic of Tatarstan.

As the designated control system supplier for Taneco, Yokogawa will receive control system orders from each of the companies that are building plants for this complex. The construction project will be executed in three stages. The first phase orders will be completed by the beginning of 2009 and are estimated to be worth US\$ 69 million. Orders for all three stages are expected to total US\$ 107 million.

The first stage includes the construction of refining facilities, sulfur recovery facilities and an aromatic complex. The second and third stages will complete the construction of heavy oil crackers, polypropylene and polyethylene plants.

Yokogawa will design the control system for these plants and will deliver an integrated process control system that will include an integrated production control system, a safety instrumented system, and a plant information system.

SERBIA

Petrolinvest used COADE's CADWorx and CAESAR II in the design of a US\$ 25 million light petrol isomerisation plant addition for the Novi Sad oil refinery.

SPAIN

Burckhardt Compression has received an order for three Laby® (labyrinth piston) compressors for the LNG receiving terminal that is part of the new regasification plant in the port of El Musel in Gijon, Northern Spain. Delivery of the compressors will take place in mid 2010. The new installation will have an initial storage capacity of 300 000 m³ of LNG, split between two storage tanks, 150 000 m³ each, with a total emission capacity of 800 000 m³ of natural gas per hour. Two more storage tanks, which will take the final emission capacity up to 1.2 million m³ natural gas per hour, will be built at a later date.

Técnicas Reunidas Group, an engineering, procurement and construction (EPC) company, has chosen the Intergraph® SmartPlant® Enterprise solutions suite and signed a long term software agreement for its engineering design and data management projects.

Sandvik Process Systems is to supply sulfur solidification plant for Repsol's Cartagena refinery. Overall investment in the refinery, including infrastructure and environmental work, makes it the largest project in this sector in Spain in recent years. Engineering company Intecs Industrial/Madrid is acting in a consortium on behalf for Repsol Petroleum. Delivery is scheduled for August 2009.

Soteica supplied, configured and commissioned its online energy system, Visual MESA, at the Repsol Cartagena refinery in 2008. The optimisation model includes the fuel (including CO₂ emissions), electrical, steam, boiler feed water and condensates system. This is the seventh Repsol site where Soteica has deployed a turnkey Visual MESA installation.

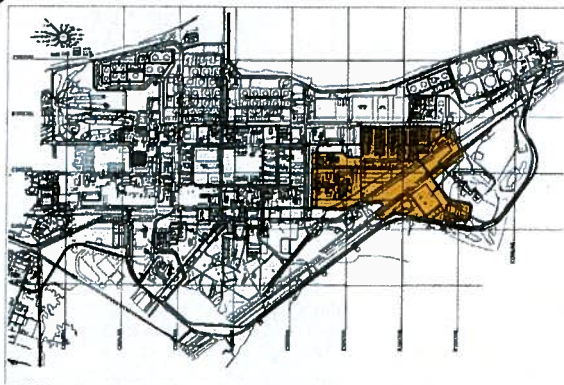
SWEDEN

In June 2008, Preem AB and Haldor Topsøe A/S entered into a development agreement in order to hydrotreat 70% LGO and 30% renewable organic material in the form of raw tall diesel (RTD) in a revamped MHC unit at Preem's refinery in Gothenburg.

Haldor Topsøe's scope of work includes fundamental research, catalyst supply, engineering and commissioning. The unit is expected to start up in early 2010.

The process is environmentally friendly since it is tailored to treat tall oil derived material, as well as other renewable resources, rather than crops used for human nutrition.

Invensys Process Systems (IPS) has announced that the Swedish biorefinery SunPine AB will use Invensys SimSci-Esscor's PRO/II simulation software for modelling a new biodiesel refining operation in Pitea. The new plant, which is a member of the Solander Science park biofuels



Ras Tanura refinery, Ras Tanura, Saudi Arabia.

increase efficiency and maximise the life of equipment units using state of the art technology.

GE Sensing Inspection technologies has received a significant order for the supply of flare gas flow metering systems for the Pearl GTL project in Qatar. The order for GF868 digital ultrasonic flowmetering systems, comprising flare transmitters, transducers and flowcells, was placed by MW Kellogg, on behalf of Qatar Shell GTL Ltd.

This follows a similar order placed for another section of Qatar's North Field. Sponsored by Qatar petroleum and Shell, the Pearl GTL project includes transporting and processing the gas to extract natural gas liquids and ethane and the conversion of the remaining gas into clean liquid hydrocarbon products.

SAUDI ARABIA

Aker Solutions is providing engineering, procurement services and construction management (EPCm) for YANBU National Petrochemical Company's (YANSAB) world scale polyolefins complex in Yanbu. The project, awarded by Saudi Basic Industries Corporation (SABIC), is being executed on a joint venture basis with SINOPEC.

The new facility will include a polyethylene plant and a polypropylene plant, together with the associated product handling facilities. The new plants, part of a major new ethylene complex, will each have a nameplate capacity of 400 000 tpy. The new production operations will apply the latest cutting edge technologies and the complex is expected to come onstream in 2009.

Axens has been awarded a design package for the new 400 000 bpd full conversion refinery in Jubail. The refining and petrochemical complex is scheduled to start up in 2012. Among the units that are being designed by Axens and its Alliance partners are a 32 000 bpd vacuum gas oil fluid catalytic cracker (VGO FCC) and a ParamaX™ Aromatics Complex producing 700 000 tpy of paraxylene and 143 000 tpy of benzene.

The FCC unit, designed to produce in excess of 10 wt.% propylene, is one of the latest from the successful 25 year FCC alliance between Axens, Shaw, IFP and Total. The paramaX Technology Suite comprises a 68 000 bpd naphtha hydrotreater and Aromizing™ continuous catalytic regeneration (CCR) reformer to produce gasoline blend stock and mixed xylenes.

In October 2008, Lummus Technology, a CB&I company, was awarded a contract by Ibn Rushd, a SABIC affiliate, for the license and basic engineering of the proprietary CATOFIN® technology utilising Süd-Chemie's latest CATOFIN catalyst. With a capacity of 650 000 tpy, the plant will be

the largest single line propane dehydrogenation facility in the world. The plant will be located in Yanbu, and is scheduled for startup in 2011.

In November 2008, Advanced Polypropylene Company and Lummus Technology, a CB&I company, announced the successful commissioning of a polypropylene complex in Al Jubail. The plant, which has a capacity of 455 000 tpy, is currently operating above the nameplate capacity. CB&I served as the PMC contractor on this fast track project, which was completed in 32 months from EPC award to mechanical completion.

Chevron Lummus Global (CLG) has signed contracts with Saudi Aramco and Total SA, to provide process technology for two hydrocracker units, with a total capacity of 120 000 bpd, planned for a 400 000 bpd refinery in Jubail.

The refinery will process heavy Arabian crude oil, and the two hydrocracking units will convert vacuum gas oil and heavy coker gas oils into high quality products such as Euro 5 compliant diesel and cat cracker and reformer feed that meet more stringent environmental standards.

Dow Technology Licensing, a business unit of The Dow Chemical Company and its consolidated affiliates (Dow) and Saudi European Petrochemical Co. (IBN ZAHR), a Saudi Basic Industries Corporation (SABIC) joint venture, announced the startup of the world's single largest polypropylene (PP) train. The facility is located in Al Jubail Industrial City on the Persian Gulf Coast and uses UNIPOL™ Polypropylene Process Technology to manufacture homopolymers and random copolymers. The nameplate capacity is 500 000 tpy of PP resins.

The startup is the third facility at the IBN ZAHR-SABIC JV in Al Jubail to employ the UNIPOL PP process. With this facility and another being built in Yanbu, SABIC will have nearly 1.8 million tpy capacity using UNIPOL™ PP process technology.

The Linde Engineering Division has announced that on-spec ethylene production at the Tasnee ethylene plant in Al Jubail, was achieved, following mechanical completion, six weeks ahead of schedule.

The plant, which was built for Saudi Ethylene and Polyethylene Company (SEPC) by the consortium Linde Engineering and Samsung Engineering Co. Ltd, with Fluor as project managing contractor (PMC), has a capacity of 1 million tpy.

The production was achieved by Linde and Samsung in a difficult environment with a shortage of qualified manpower and tight markets for material and equipment supply. The cracker was a joint venture between Tasnee, Sahara and Basell, and is the first to come onstream ahead of other cracker projects in Saudi Arabia that were also commissioned in 2005.

Saudi Basic Industries Corp. (SABIC) has decided to standardise on Intergraph® SmartPlant® Enterprise, to facilitate data handover from its engineering, procurement and construction (EPC) contractors to its affiliates' plants and assist in every aspect of the plant life cycle. This includes design, procurement, construction, commissioning, operation, maintenance, expansions, retrofits and decommissioning, if applicable.

Among the SABIC affiliates that have already begun implementation of SmartPlant Enterprise solutions are: Jubail United Petrochemical Co. (JUPEC); Eastern Petrochemical Co.

(SHARQ); YANBU Petrochemical complex (YANPET); YANBU National Petrochemical Co. (YANSAB) and Al Jubail Fertilizer Co. (ALBAYRONI).

The Ras Tanura refinery expansion is a key project in Saudi Aramco's programme to significantly increase the refinery's capacity. The project will increase capacity from 550 000 bpd to approximately 950 000 bpd and will supply middle distillates such as diesel and kerosene to help meet the country's rapidly growing domestic fuel consumption needs. WorleyParsons has been undertaking project management, front end engineering design, contract bid package development, detailed design support, detailed design package preparation and construction management services, in preparation for the release of tender packages in 2009. The expansion project is expected to complete in 2012.

SYRIA

Prosernat provided the design and construction of a Drizo™, gas dehydration package at Palmyra. The capacity is 267 million ft³/d.

TURKMENISTAN

Prosernat has supplied design and construction of MEG and TEG dehydration plant for Technip and Petronas, with a capacity of 1 x 9.5 m³/h, and 2 x 293 million ft³/d.

UAE

The Abu Dhabi Oil Refining Company (Takreer), UAE, has awarded Axens a contract which includes the use of four of



Shah Gas Development, Abu Dhabi, United Arab Emirates.

its technologies along with the world's largest residue fluid catalytic cracker (RFCC) which is part of the Axens, Shaw, Total and IFP FCC Technology Alliance.

The Axens technologies to be included in the expansion at the Ruwais Industrial Complex include, unsaturated LPG reatment unit, C4 cut purification system, butane isomerisation unit and FRCC whole cracker naphtha hydrotreater.

The centrepiece of the grassroots expansion will be the 127 100 bpd unit. The R2R includes the most advanced components in FCC technology, including impact feed injectors, RSRSM riser termination device, KFBE™ structured stripper packing, SCMSM selective cracking mixer and PetroRiserSM external riser for propylene production. To date, over 40 FCC licenses have been awarded to the Technology Alliance.



GEA

☞ *Now join hands, and with your hands your hearts . ☞*

William Shakespeare



Dear friends, dear business partners,

side by side we passed 10 happy years – we struggled together and for each other, we experienced ups and downs. And on this basis we created a successful union. Today, after exactly one decade, we decided to formally and officially manifest our strong partnership.

GEA Wiegand GmbH and GEA Jet Pumps GmbH get married with all the bells and whistles. And in order to facilitate things for all of us we agreed on the common name GEA Wiegand GmbH.

From 2009 on we will work as a strong team hand in glove to pursue the world of process engineering together. Start this future together with us.

If you have further questions, please contact us under +49 7243 705 360.

Process Engineering **GEA Wiegand GmbH**

Einsteinstrasse 9-15, 76275 Ettlingen, Germany

Tel. +49 7243 705-0, Fax +49 7243 705-330

E-mail: info.gewi.de@geagroup.com, Internet: www.gea-wiegand.com

ACHEMA

11-15 May 2009 in Frankfurt/Main, Germany, Halle 4.0, Stand D13-G22

