# NEW ENERGY AND DIVERSIFIED BUSINESSES

Our new methanol upgrading process unit in Inner Mongolia

The plant in Inner Mongolia to upgrade methanol to automobile fuel substitute was undergoing commissioning

38 refilling stations now in operation, under planning or construction

Towngas Telecom celebrated 10 years of service and launched a new data centre in Tseung Kwan O

# CHANGING ENERGY FOR GOOD

# NEW ENERGY AND DIVERSIFIED BUSINESSES

In 2014, our new energy business continued to grow as a major pillar of our operations, with a focus on new technology applications. As China's national energy policy and energy mix changes and evolves, we are committed to developing new energy projects that are low in pollutant emissions. We continued to extend our liquefied natural gas (LNG) value chain and also advanced our biomass technology and methanol upgrading capabilities. As we remain focused on "Expanding New Horizons", our solutions will not only drive further growth for Towngas but also meet the challenges of a changing energy economy in the years ahead.

## New ECO Energy

ECO Environmental Investments Limited (ECO) is fundamental to our new energy vision and commitment to environmental protection. It is also a trailblazer in developing and deploying state-of-the-art technology to produce clean fuels.

Haze and air pollution are growing concerns on the mainland, and with the Chinese government binding the country to a 2030 cap in total carbon emissions, we can expect to see a growing migration from conventional land and marine transport fuels, greater recycling of industrial by-products and breakthroughs in converting agricultural waste into useful, eco-friendly energy products.

Drawing on the Group's rich breadth of chemical processing knowledge and engineering experience, ECO's focus is on developing technological innovations based around converting low-grade resources – such as by-products of industrial and agricultural processes – into high-value products in clean and cost-effective ways.

One key strategy for ECO is to develop its LNG value chain. On the supply side, our pioneering liquefied coalbed methane (LCBM) plant in Shanxi province has been running smoothly and registered a double digit increase in production in 2014, with continuous process improvement expanding annual capacity to 250 million cubic metres. We are beginning to extend our LNG capabilities to cover other unconventional resources, the near term one being coke oven gas (COG), a by-product of the coke-making industry which can be synthesised into methane and then liquefied into LNG. Our first two such facilities – in Xuzhou, Jiangsu province, and Heze, Shandong province – are now under construction and will each have output capacity of 75,000 tonnes annually. Upon their completion, by the end of 2015, these two facilities will greatly reinforce

ECO's research and development efforts are focused on the conversion of low-grade feedstocks into high-value energy products.

We deployed a new process to convert methanol into a higher value automobile fuel substitute at our methanol plant in Inner Mongolia.

our LNG supply capabilities in central and eastern China.

Our next targeted unconventional resource for LNG purposes is agricultural waste. This requires two innovative technologies developed by our research and development team – one to gasify agricultural waste into syngas, the second to turn syngas into methane for liquefaction. Work on these ground-breaking applications is maturing, and they are expected to be ready for commercial implementation by mid-2015.

On the demand side of our LNG activities, our gas refilling stations either in operation or under planning or construction increased in number in 2014 to 38. ECO's wider network of natural gas refilling stations is gradually taking shape, amongst others, in Shaanxi, Shandong, Shanxi, Henan and Liaoning provinces. We will continue to accelerate the growth of this network across mainland China. The stations provide clean LNG and compressed natural gas primarily to commercial vehicles as a substitute for the more polluting diesel. This will help mitigate the wide-spread and persistent hazy atmospheric conditions in the country, which are partially caused by pollutants from vehicular emissions.

Another exciting area of development concerns methanol. Our coal-based methanol plant in Inner Mongolia employs clean coal technology to generate syngas, which is then synthesised into methanol. It has been running smoothly and produced 240,000 tonnes of methanol in 2014. De-bottlenecking work at the plant is near completion and will boost the output capacity to 300,000 tonnes per annum. In November, we started commissioning of an additional clean methanol upgrading process to turn methanol into 140,000 tonnes of natural gasoline (a gasoline substitute chemical product) annually. We envisage this innovative process route will have huge market potential.

ECO's two major businesses in Hong Kong – an aviation fuel facility servicing Hong Kong International Airport, and dedicated liquefied petroleum gas (LPG) vehicular refilling stations – are operating smoothly. The ECO Aviation Fuel Facility supplied 5.8 million tonnes of fuel to the Hong Kong International Airport in 2014 and contributes steadily growing returns of investment. Our five designated LPG refilling stations serve 18,000 taxis and most of Hong Kong's minibuses round the clock, with sales accounting for roughly 30 per cent of the city's automobile LPG market.

In terms of our upstream oil business, our onshore oilfields in Thailand had a remarkable year, with several high yield wells successfully hit. Its crude oil production increased significantly to reach 6,000 barrels a day and an annual record of 1.4 million barrels,

ECO's pioneering LCBM plant in Shanxi province has been operating smoothly.

bringing substantial additional revenues despite the sharp fall in international crude price since the middle of the year.

Looking ahead, ECO will continue to be a leader in unconventional energy focusing on developing and employing cutting-edge technology to produce clean fuels to feed growing demand in mainland China and beyond.

## Telecommunications

With global use of data increasing exponentially, there is great demand for data processing and cloud computing services, and Towngas Telecom (TGT) has expanded in response to that demand with robust infrastructure and services. Leveraging the Company's vast gas pipe network by deploying advanced Glass-In-Gas technology, TGT has made the most of its competitive advantage in terms of cost and speed of underground fibre-optic deployment. We have provided fibre links and dedicated bandwidth service to large corporations, SMEs, telecommunications carriers and international network service providers.

In December 2014, TGT celebrated its 10th anniversary with the opening of a data centre in Tseung Kwan O, our second centre in Hong Kong. The state-of-the-art Tier 3+ data centre has a floor space of 22,000 square metres and is able to accommodate 3,000 server racks, half of which have been reserved since the centre's launch. By the second quarter of 2015, two data centres will be opened in Dongguan, Guangdong province, and Dalian, Liaoning province. TGT plans to expand its data centres to 10 in total in Hong Kong and mainland China in the coming three years.

In 2014, TGT also launched various new cloud computing services. Most notably, ACT, launched in collaboration with Aliyun, Alibaba's cloud computing subsidiary, provides a secure, cost-effective cloud platform for SMEs and software developers in Hong Kong, mainland China and further afield. Given the continuing trend towards outsourcing of hosting and telecommunications services to third-party operations, we expect TGT to experience significant growth in the years ahead.

## Information Technology

In 2014 we launched S-Tech Technology Holding Limited (S-Tech), a wholly-owned subsidiary whose principal operations include product development, solution implementation and system integration.

S-Tech hosts SMEs' infrastructure and software, from financial systems to point-of-sales, billing and corporate management solutions, offering cloud computing applications and other IT products as well as consulting services to companies both inside and outside of the Towngas Group.

Providing a one-stop-shop service for SMEs, S-Tech is headquartered in Hong Kong, with a mainland China branch in Zhuhai, Guangdong province. Its Towngas Customer Information System Integrated Cloud Solution won a Gold Award at the Hong Kong ICT Awards, in the Best Business Solution (Application) category. The award winning system is now being widely used among our city-gas project companies in mainland China via a cloud platform, which helps reduce system capital outlay and operating costs, in addition to a much shorter implementation time.

## Civil and Building Services Engineering

Our wholly-owned subsidiary U-Tech Engineering Company Limited (U-Tech) enjoyed another excellent year, providing consultancy services and engineering contractor works on utilities installation, infrastructure and building services for public and private projects in Hong Kong and Macau.

During the year, U-Tech completed an electrical installation project covering 2,000 flats across phases two and three of a residential development in Lok Wo Sha, Shatin.

Our construction of a large scale box culvert and a sewage pumping station for the Kai Tak Development Area also progressed well, as did a 60 km water supply pipeline replacement and rehabilitation project in the New Territories. The project was started in 2011 and is due to be completed in 2015, while another project, involving the laying of 1.9 km of water main in Tai Po, is on course for completion towards the end of 2016.

U-Tech was also awarded a number of new contracts during the year, including a contract from the Highways Department to construct a pedestrian link at Tsing Yi Station and a coach lay-by at Sai Kung. It also won a contract to undertake electrical installation work for phases four and five of the Lok Wo Sha residential development, as well as electrical and MVAC (air-conditioning) installation contracts for a hotel development at Wo Yi Hop Road, Kwai Chung.

## Manufacturing Facilities

As part of our commitment to maintaining the highest standards of safety across the supply chain, we design and manufacture polyethylene (PE) piping and jointing parts for both gas and water systems.

G-Tech Piping System (Zhongshan) Company Limited (G-Tech), our wholly-owned subsidiary, continues to supply piped gas operators with quality PE pipes manufactured under stringent quality control. It has expanded its distribution coverage with new logistics hubs and warehouses in Liaoning, Jilin and Shandong provinces. The business has been supported by GH-Fusion Corporation Limited, our joint venture with the British Fusion Group, which specialises in PE fittings.

In 2014, G-Tech's overall sales increased by about four times compared to 2013, with production

Located in Tseung Kwan O, our state-of-the-art TGT Hong Kong Data Centre 2 is able to accommodate 3,000 server racks.

G-Tech's manufacturing plant in Zhongshan supplies gas operators with PE pipes manufactured to the highest standards.

capacity now surpassing 4,000 tonnes. Production capacity will be further increased in 2015.

M-Tech Metering Solutions Company Limited (M-Tech) strives to develop and bring to market the latest smart gas meter solutions. M-Tech's smart gas meters using Micro-Electro-Mechanical Systems (MEMS), are not affected by the temperature or pressure of the gas they measure and therefore provide more accurate readings. M-Tech is now developing a series of new MEMS models to replace traditional diaphragm gas meters.

In 2014 the subsidiary achieved High-Tech Enterprise status – a national level qualification in mainland China that comes with tax advantages. A total of 89 Towngas China's companies have now purchased M-Tech's smart gas meters. We are looking into supplying smart gas meter solutions to all our city-gas businesses, as well as to other gas operators in mainland China and overseas.

## New Energy and Other Projects in 2014

| | Year of Establishment | Project Investment Rmb M | Registered Capital Rmb M | Equity Share % |
|---|---|---|---|---|
| **NEW ENERGY PROJECTS** | | | | |
| **Coal Mining** | | | | |
| Jiangxi Fengcheng | 2008 | 1,100 | 236 | 25% |
| Inner Mongolia Erdos Xiaoyugou | 2009 | 447 | 120 | 70.1% |
| Inner Mongolia Erdos Kejian | 2011 | 450 | 150 | 100% |
| **Coal-based Chemical** | | | | |
| Jiangxi Fengcheng | 2009 | 1,250 | 350 | 40% |
| Inner Mongolia Erdos | 2009 | 1,170 | 400 | 70.1% |
| **CNG/LNG Refilling Stations** | | | | |
| Shaanxi Xianyang | 2008 | 12 | 12 | 100% |
| Shaanxi Huitai | 2010 | 54 | 27 | 100% |
| Anhui Maanshan | 2006 | 15 | 11 | 30% |
| Shanxi Yuanping | 2008 | 40 | 20 | 42% |
| Dalian DETA | 2010 | 40 | 20 | 49% |
| Shandong Chiping | 2010 | 30 | 15 | 100% |
| Shandong Jining | 2010 | 11 | 8 | 100% |
| Shandong Dongping | 2010 | 43 | 26 | 91% |
| Henan Xinmi | 2010 | 29 | 15 | 100% |
| Shandong Jiaxiang | 2012 | 50 | 28 | 70% |
| Henan Anyang | 2012 | 29 | 14 | 100% |
| Shanxi Lingshi | 2013 | 25 | 20 | 75% |
| Guangdong Guangzhou | 2013 | 26 | 13 | 100% |

## NEW ENERGY PROJECTS

| | Year of Establishment | Project Investment Rmb M | Registered Capital Rmb M | Equity Share % |
|---|---|---|---|---|
| **CNG/LNG Refilling Stations** | | | | |
| Henan Kaifeng | 2013 | 29 | 15 | 100% |
| Henan Linzhou | 2013 | 30 | 20 | 100% |
| Shanxi Pinglu | 2014 | 27 | 14 | 100% |
| Shandong Weishan | 2014 | 58 | 29 | 100% |
| Shandong Shanxian | 2014 | 28 | 14 | 100% |
| Hebei Shijiazhuang | 2014 | 65 | 31 | 80% |
| Shaanxi Lueyang | 2014 | 21 | 13 | 100% |
| Inner Mongolia Huhhot | 2014 | 28 | 14 | 90% |
| Shandong Linqing | 2014 | 22 | 13 | 100% |
| Xingtai Ningjin | 2014 | 20 | 17 | 80% |
| Shaanxi Fengxiang | 2014 | 30 | 15 | 100% |
| **Upstream Projects** | | | | |
| Shanxi LCBM | 2006 | 600 | 200 | 70% |
| Jilin Tianyuan | 2007 | 140 | 5 | 50% |
| LCMM Project | 2010 | 520 | 180 | 50% |
| Xuzhou COG | 2014 | 453 | 151 | 80% |
| Heze COG | 2014 | 450 | 150 | 70% |
| Jiexiu COG | 2014 | 480 | 250 | 60% |
| **Coal Logistic Project** | | | | |
| Shandong Jining Jiaxianggang Logistic Port | 2011 | 540 | 180 | 55% |

## TELECOMMUNICATION PROJECTS

| | | | | |
|---|---|---|---|---|
| Shandong Jinan | 2008 | 80 | 40 | 90.1% |
| Shandong Jinan Chibo | 2009 | 170 | 68 | 65.5% |
| Liaoning Dalian DETA | 2010 | 14 | 10 | 49% |
| Dalian Yida | 2011 | 190 | 76 | 90% |
| Shandong Laiyang | 2011 | 14 | 10 | 90% |
| Xuzhou Fengxian | 2011 | 11 | 8 | 100% |
| Xuzhou Peixian | 2013 | 13 | 9 | 100% |
| Harbin | 2013 | 158 | 63 | 80% |
| Dongguan | 2013 | 240 | 80 | 60% |
| Shenzhen | 2014 | 59 | 29.5 | 100% |
| Beijing Zhongjing | 2014 | 14 | 10 | 49% |
| Beijing Chibo | 2014 | 14 | 10 | 90% |

## OTHER PROJECTS

| | | | | |
|---|---|---|---|---|
| Shenyang Sanquan Construction Supervisory | 2011 | 4 | 3 | 60% |
| M-Tech | 2011 | 30 | 30 | 100% |
| GH-Fusion | 2002 | 87 | 43 | 50% |
| Towngas Technology | 2011 | 30 | 21 | 90.1% |
| Suzhou Industrial Park Broad Energy Services | 2012 | 170 | 71 | 25% |
| G-Tech | 2013 | 27 | 13.5 | 100% |
| GH Yixing Ecology | 2013 | 184 | 184 | 100% |
| S-Tech (Zhuhai) | 2014 | 7 | 5 | 100% |
| Zhangjiagang (Chemical) | 2014 | 610 | 205 | 100% |
| ECO Engineering Management (Shenzhen) | 2014 | 30 | 15 | 100% |
| ECO Engineering Management (Xi'an) | 2014 | 13 | 9 | 100% |

## OILFIELD PROJECT

| | Year of Establishment | Project Investment USD M | Registered Capital USD | Equity Share % |
|---|---|---|---|---|
| Phetchabun Province in Thailand | 2012 | 181 | 12,000 | 100% |