





MAINLAND  
UTILITY  
BUSINESSES

# Caring for Future Generations

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We invest in the gas infrastructure that enables our customers in mainland China to enjoy a reliable supply of clean energy in their homes and businesses. With the establishment of our wholly-owned subsidiary, Hua Yan Water, we are not only engaged in the provision of clean water resources including water supply and wastewater treatment services, but also expanding into new ventures such as converting food waste into energy that will power communities for our future generations.

## MAINLAND UTILITY BUSINESSES

### Clean Energy for Mainland China

In 2018, we operated 131 city-gas projects in 23 provinces, autonomous regions and municipalities across the country. The number of customers served during the year exceeded 27 million, or 9 per cent more than the year before.

Our business performance during the year was satisfactory. The growth in city-gas sales was particularly strong, with an increase of 18 per cent over the previous year, to reach a total volume of gas sales of about 23,000 million cubic metres.

The increase in gas sales volume can be mainly attributed to the Chinese government's natural gas utilisation policy, which is accelerating the pace of coal-to-gas conversion. Other key factors influencing the rise in gas sales included cooler weather during the 2017-2018 winter and changing consumer habits, especially with regard to the fast-growing demand for space heating in the regions north of the Yangtze River.

Since 1994, we have been providing clean-burning gas and related products and services that help to create greater value and a greener future for our customers throughout mainland China.



Official opening of our underground salt-cavern gas storage facility in Jintan, Changzhou, Jiangsu province, which began operating in October 2018.

The industrial sectors performed particularly well as many businesses have been converting their boilers and furnaces from coal to natural gas. In the commercial sector, we were able to acquire more than 18,200 new customers during the year, mainly in the restaurant sector, as we stepped up our efforts to promote the safety of piped natural gas versus bottled liquefied petroleum gas.

We see room for further growth in this market as natural gas is still a relatively new fuel in mainland China, where it accounts for about 8 per cent of the total energy consumption currently. The consumption of natural gas should continue to increase to 360 billion cubic metres by 2020 for the whole of mainland China.

By 2030, it is expected that natural gas will make up 15 per cent of all the energy consumed in the country.

In addition, there is tremendous potential for bringing new projects on stream in the Greater Bay Area, where we currently have more than 20 joint venture projects. The government-backed development plan for the Greater Bay Area, which encompasses Hong Kong and Macao along with nine cities in southern Guangdong province, presents numerous investment opportunities.

# Warmth



Distributed energy systems (DES) remained the focus of our business in the city-gas market in 2018. Towngas Energy Investment (Shenzhen) Company, a wholly-owned subsidiary of the Group specialising in distributed energy projects, has recorded strong growth since its establishment in 2017.

Combined heat and power systems have become widely accepted among commercial and industrial customers, particularly in industrial parks that require a centralised energy supply. Unlike conventional systems that supply gas to individual boilers and production lines, DES makes use of high efficiency natural gas power generators and large boilers, while simultaneously creating hot water, steam or chilled water through waste heat utilisation.

With a total of over 20 DES projects underway, we have become widely accepted in the market. Our reputation as a leader in this technology was further cemented in December 2018, with the signing of a strategic cooperation agreement with Tsinghua University to establish a Regional Comprehensive Energy Planning Technology Joint Research Centre.

We see a promising future for this business, as DES can guarantee energy efficiency rates of more than 70 per cent and its use has received the support of the Chinese government as part of its strategy to reduce carbon emissions. To capitalise on the opportunities presented by DES, we will explore new projects and continue investing in this sector. Our target is to achieve 3.5 billion cubic metres in natural gas sales through DES by the year 2022.

## Securing a Reliable Gas Supply

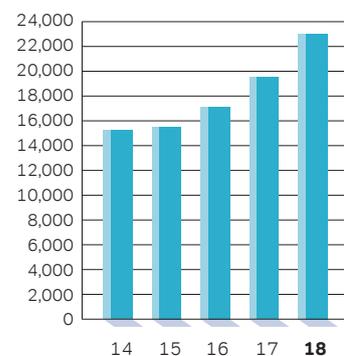
The midstream facilities in which we invest, including gas infrastructure such as long-haul pipelines and gas storage facilities, enable us to secure a reliable supply of natural gas for our customers.

One of the key projects in our midstream business is our underground salt-cavern gas storage facility in Jintan, Changzhou, Jiangsu province. Starting with an initial storage capacity of 460 million standard cubic metres of gas, the first phase was commissioned in October 2018 and began supplying gas in the following month. The project, which is the first underground gas storage facility in mainland China built by a city-gas enterprise, will have a total storage capacity of 1 billion standard cubic metres when it goes into full operation in 2022.

As well as substantially increasing our storage capacity, the facility will allow us to regulate gas supply and prices more effectively. It enables us to

## China Joint Ventures Gas Sales

(million m<sup>3</sup>)



save gas in the summer months when demand and fuel costs are lower and provide additional gas supply during the winter peak load to our city-gas projects. In this way, the fluctuations in supply and demand are evened out, leading to a more stable supply of gas.

In the near future, we will also be able to sell the stored gas on the open market. It is expected that in mid-2019, the Chinese government will merge the gas pipeline assets of its three state-owned oil and gas companies and form a national pipeline company. This will then allow third-party access to the national grid, thus ensuring a flexible supply of gas.

This tap water plant is owned and operated by Foshan Water Environmental Protection Co., Ltd, in Foshan, Guangdong province.



At the same time, we have been expanding our liquefied natural gas (LNG) receiving terminal facilities in order to supply mainland China with the clean energy it requires to replace coal. At present, China cannot meet the demand for natural gas domestically and imports about half of its supply. That percentage will continue to increase in the years ahead.

China's supply of LNG primarily comes from Australia, Indonesia, Qatar and, as of July 2018, from Russia via the Northern Sea Route on the Arctic coast to the Rudong LNG Terminal in Jiangsu province. In the years ahead, Russia will be a key supplier of gas to China, with 3 million tonnes of LNG shipped per year and, more importantly, a piped gas supply to the northeastern region of China starting at the end of 2019.

To accommodate the growth in imported gas, we plan to invest in several other LNG terminal projects. These were under negotiation during the year, with some expected to come on stream in 2020.

## Clean Water Supply and Food Waste Recycling

We have been engaged in the water supply and wastewater treatment business since 2005 through our wholly-owned subsidiary, Hong Kong & China Water Limited (Hua Yan Water). In 2018, Hua Yan Water had eight projects underway in mainland China, including water supply, domestic sewage and industrial wastewater treatment. During the review period, Hua Yan Water sold 610 million tonnes of water, an increase of 31 per cent over 2017. As of the year end, the Company served more than 2.24 million customers.

In a milestone for the Group, in 2018 we invested RMB550 million in Foshan Water Environmental Protection Co., Ltd (Foshan Water Environment Protection) to acquire 26 per cent of that company's shares. The investment is our first water services project in the Greater Bay Area and the first to open in southern China.

Our new food waste project at Suzhou Industrial Park was set up by Hua Yan Water using its experience in sewage treatment.



Foshan Water Environmental Protection currently has 15 water plants, providing up to 1.94 million tonnes of water every day to more than 800,000 households. In addition to supplying water, Foshan Water Environmental Protection is planning to expand into environmental projects.

Since governments at various levels in mainland China have put a high priority on clean water resources, we see tremendous potential for the expansion of the industry and our investments in the water business.

The Group's first food waste project, located at Suzhou Industrial Park, went into trial production in February 2019. The plant can handle 500 tonnes of food waste, green waste and landfill leachate daily for

conversion into natural gas, oil products and solid fuel that will be used in the Park. Organic fertiliser will also be produced using Swedish technology and our own expertise. We plan to extend this business to cities outside Suzhou and are exploring the potential for more food waste projects, mostly in eastern China.

### Premium Products, Premium Services

In 2018, we continued to fulfil the needs of more than 27 million customers across the country by providing a selection of quality products, such as space heaters, kitchen appliances and cabinets, as well as gas-related services.

We have been offering customers safe, high-quality gas appliances under the Bauhinia brand since 2005 and, in 2015, began offering a Total Kitchen

Solution of premium kitchen equipment and cabinets under the Mia Cucina brand.

During the year, the Bauhinia name continued to gain recognition in the market, with over 771,000 Bauhinia branded appliances sold. Of these, over 30,000 were gas dryers and more than 30,000 were space heaters. In 2018, we saw a breakthrough in sales of water heaters and clothes dryers for households, which led to an increase in gas consumption per household.

Higher-end products such as household heating systems were especially popular. We have high hopes for this business in mainland China, where the market for these products is huge.

Our reliable, high-quality clothes dryers under the Bauhinia brand have been growing in popularity among mainland customers.



Our Mia Cucina line of high-end kitchen cabinets, stoves and other kitchen equipment has also achieved encouraging results since it was introduced in mainland China in 2017. During the year, we sold a total of over 4,100 Mia Cucina packages to property developers and individual home owners as part of our Total Kitchen Solution.

Following the success of our Mia Cucina cabinet displays in various cities last year, we plan to set up a grand showroom in early 2019 at Suzhou Industrial Park, aimed primarily at developers of building projects. We expect that this showroom, along with our ongoing marketing efforts, will help us to build the brand even further in mainland China.

To serve our customers more efficiently, we offer an e-commerce platform, Towngas Lifestyle, to bring customers a wide selection of high-quality

## Gentleness



lifestyle services and products. This convenient online platform provides one-stop e-services and a variety of products, including festive foods, kitchenware and gas-related insurance.

### Setting the Standard in Customer Service

We are justifiably proud of our customer service in mainland China and are constantly looking for new ways to raise our standards even higher.

In addition to 269 customer centres across 86 mainland cities, another key platform we have established for serving

customers is our Virtual Customer Centre (VCC). Accessible through websites, social media and mobile apps, the VCC in 2018 served over 3.5 million members, who made over 3 million gas-related service transactions on the platform, including bill payments.

Also during the year, we continued to promote Total Quality Management (TQM) in mainland China and received strong support and enthusiastic input from employees for this programme. Focusing on



This quadcopter drone is just one of the many advanced tools used by our technical professionals to ensure the safety of our network.



the highest standards of craftsmanship, courtesy and integrity, it enables us to take customer service to a new level of excellence.

In the past 15 years, our senior management have been making personal visits twice a year to the operations of selected joint venture companies to inspect the quality of work of our frontline staff and set an example for them.

Another distinguishing feature of TQM is our Three Courtesies service programme, emphasising

“manners”, “etiquette”, and “politeness” in the daily interactions of our people with customers. The Three Courtesies was also the theme of the 2018 Service with a Smile Ambassadors contest, organised every three years to recognise our frontline staff and enhance service quality. During the contest, 45 ambassadors out of over 1,500 participants were selected as “exemplars” for promoting our service culture of professionalism, integrity and courtesy among our joint ventures and in the community.

### Safety at Home and at Work

We are firmly committed not only to maintaining but improving our high standard of safety among our staff and the many customers we serve.

To that end, we make regular safety inspections at our customers’ homes to ensure that their gas installations and equipment are in safe working order. Originally launched in Hong Kong during the 1990s, these inspections were introduced in mainland China

when we started operating there and have now become a common practice throughout the industry. Additionally, we have made a tremendous effort to educate our customers about gas usage safety by sharing our experience and tips with them on the proper handling of gas and gas appliances.

Within our own operations, we conduct regular safety and risk audits every two years. In 2017/18, we evaluated 106 of our joint venture companies. All of these companies met the requirements, and nearly half received an “excellent” rating with scores of more than 90 out of 100.

The overall safety record of our joint venture companies has improved significantly since 2009, as can be seen in the 80 per cent reduction in the incident rate over the past decade.

## 2018 Utility Businesses in Mainland China

### Towngas Piped City-Gas Projects

#### GUANGDONG PROVINCE

	Year of Establishment	Project Investment Rmb M	Registered Capital Rmb M	Equity Share %
Panyu	1994	260	105	80%
Zhongshan	1995	240	96	70%
Dongyong	1998	178	75	82.6%
Shenzhen	2004	–	2,878	26.47%
Chaoan	2007	185	99	60%
Chaozhou Raoping	2011	189	106	60%

#### CENTRAL CHINA

Wuhan	2003	1,000	420	49%
Xinmi	2009	205	85	100%

#### EASTERN CHINA

Yixing	2001	246	124	80%
Taizhou	2002	200	83	65%
Zhangjiagang	2003	200	100	50%
Wujiang	2003	150	60	80%
Xuzhou	2004	245	125	80%
Suining	2009	155	67	100%
Fengxian	2009	60	31	100%
Peixian	2015	300	100	100%
Danyang	2004	150	60	80%
Jintan	2006	150	60	60%
Tongling	2006	240	100	70%
Suzhou Industrial Park	2001	600	200	55%
Changzhou	2003	248	166	50%
Nanjing	2003	1,200	700	49%
Fengcheng	2007	206	88	55%
Pingxiang	2009	297	105	100%
Jiangxi	2009	52	26	56%
Zhangshu	2009	86	34	100%
Yonganzhou	2010	100	68	93.9%
Hangzhou	2013	2,988	1,195	24%

#### SHANDONG PROVINCE

Jinan East	2003	610	470	49%
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#### NORTHERN CHINA

Jilin	2005	247	100	63%
Beijing Economic-technological Development Area	2005	111	44	49%
Hebei Jingxian	2011	186	79	81%

#### NORTHWESTERN CHINA

Xi'an	2006	1,668	1,000	49%
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#### HAINAN PROVINCE

Qionghai	2008	110	50	49%
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### Midstream Projects

Guangdong LNG	2004	8,595	2,578	3%
Anhui NG	2005	–	336	20.61%
Hebei NG	2005	2,760	920	43%
Jilin NG	2007	360	220	49%
Henan NG	2012	125	60	49%
Jintan NG (Phase 1)	2013	180	100	64%
Jintan NG (Phase 2)	2018	890	300	100%
Huanghua Port LNG	2017	90	90	20%

### LNG Refilling Station

Nanjing (Marine)

	Year of Establishment	Project Investment Rmb M	Registered Capital Rmb M	Equity Share %
	2014	600	217	32.95%
<b>Water/Waste Treatment Projects</b>				
Wujiang	2005	2,450	860	80%
Suzhou Industrial Park	2005	4,705	1,597	50%
Wuhu	2005	1,000	400	75%
Suzhou Industrial Park (Industrial Wastewater Treatment)	2011	550	185	49%
Maanshan	2013	607	213	100%
Jiangbei	2013	1,049	374	100%
Suzhou Industrial Park (Food Waste Processing and Utilisation)	2016	220	75	55%
Foshan Water Environmental Protection	2018	824	824	26%

### Towngas China Piped City-Gas Projects

#### GUANGDONG PROVINCE

Foshan  
Shaoguan  
Qingyuan  
Yangdong  
Fengxi

#### EASTERN CHINA

Nanjing Gaochun  
Dafeng  
Tongshan  
Hubei Zhongxiang  
Maanshan  
Bowang  
Zhengpugang Xin Qu Modern Industrial Zone  
Wuhu Fanchang  
Wuhu Jiangbei  
Anqing  
Chizhou  
Tunxi  
Huangshan

Huizhou  
Tongxiang  
Huzhou  
Yuhang  
Songyang  
Changjiu  
Fuzhou  
Jiujiang  
Wuning  
Xiushui  
Yifeng  
Changting

#### SHANDONG PROVINCE

Jimo  
Laoshan  
Zibo  
Zibo Lubo  
Longkou  
Jinan West  
Weifang  
Weihai  
Taian  
Chiping

Linqu  
Laiyang  
Zhaoyuan  
Pingyin  
Feicheng  
Boxing Economic Development Zone  
Yangxin  
Wulian

#### HUNAN PROVINCE

Miluo

#### NORTHEASTERN CHINA

Benxi  
Chaoyang  
Tieling  
Fuxin  
Shenyang Coastal Economic Zone  
Yingkou  
Dalian  
Changxingdao

Dalian Economic and Technical Development Zone  
Anshan  
Lvshun  
Kazuo  
Beipiao  
Wafangdian  
Xinqiu  
Jianping  
Changchun  
Gongzhuling  
Siping  
Qiqihar

#### HEBEI PROVINCE

Qinhuangdao  
Yanshan  
Cangxian  
Mengcun  
Shijiazhuang

#### INNER MONGOLIA

Baotou

#### SOUTHWESTERN CHINA

Ziyang  
Weiyuan  
Pengxi  
Lezhi  
Pingchang  
Dayi  
Yuechi  
Cangxi  
Chengdu  
Zhongjiang  
Jianyang  
Pengshan  
Mianyang  
Xinjin  
Xindu  
Mianzhu  
Jiajiang  
Qijiang  
Guilin  
Zhongwei (Fusui)  
Xingyi  
Luliang  
Liujiang District,  
Liuzhou

### Midstream Projects

Xuancheng NG  
Taian Taigang  
Inner Mongolia NG  
Jinan-Liaocheng Pipeline & Chiping South Citygate

### CNG Refilling Stations

Qiqihar (Lianfu)  
Qiqihar (Xingqixiang)

### Distributed Energy Systems

Sichuan  
Shenyang Economic and Technical Development Zone  
Jiawang District, Xuzhou  
Jimo Chuangzhi New District, Qingdao  
Yangxin Economic & Technological Development Zone, Binzhou  
Changchun  
Guilin  
Tangshan Chengnan Economic Development Zone  
Boxing Economic Development Zone, Binzhou  
Xuzhou Biomedical Industrial Park

### Other Projects

Zhuojia Public Engineering  
Towngas Natural Gas Sales



HONG KONG  
GAS  
BUSINESS

# Enriching People's Lives

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In homes across Hong Kong, we are making people's lives easier and more convenient through the Total Kitchen Solutions we offer. Together with our popular Mia Cucina line of premium cabinets, our wide selection of appliances and accessories contribute to a more eco-friendly and enjoyable cooking experience.



## HONG KONG GAS BUSINESS

As one of Hong Kong's leading utility companies, Towngas is committed not only to providing customers with products and services of the highest quality but also to creating value for the community by offering solutions that help make the earth a greener, better place.

### Meeting Customers' Needs

Our overall business performance during the year remained satisfactory. The core gas business in Hong Kong continued to grow steadily as a result of the cooler weather and increase in tourist visits. In 2018, total volume of gas sales was 29,550 million MJ, a growth of 1.7 per cent over last year. The number of Towngas customers also reached 1,908,511, an increase of 25,104 from 2017.

The use of gas absorption chillers continued to grow in 2018. These dual-function chillers offer space cooling and heating as well as hot water while saving energy costs. Among the customers for this technology was Ocean Park, which commissioned a gas absorption chiller for its Ocean Theatre in the first quarter of the year to maintain stable pool water temperatures.



Our gas boilers at this local sauce factory provide steam for cooking the sauce ingredients, as well as sterilisation and space heating in the fermentation room.

We searched for potential new customers for our landfill gas technology, which is based on the green concept of turning waste into energy. Two projects currently employ this clean energy. One is our combined heat and power (CHP) system at the Alice Ho Miu Ling Nethersole Hospital in Tai Po, which began utilising processed landfill gas from the North East New Territories (NENT) landfill site in 2017. The other is our Towngas Telecom Data Centre at Tseung Kwan O, which in 2018 started harnessing processed landfill gas from the South East New Territories (SENT) landfill to fuel a gas absorption chiller.

We looked forward to installing similar landfill gas systems for other clients.

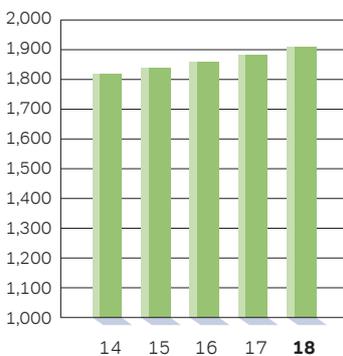
For the Alice Ho Miu Ling Nethersole Hospital project, we were delighted to win the Energy Project of the Year Award 2018 for the Asia Pacific Rim Region from the Association of Energy Engineers (AEE), which recognises innovative energy projects in the region.



We have introduced the TGC x Hello Kitty series of appliances for kitchens and bathrooms.

### Number of Customers

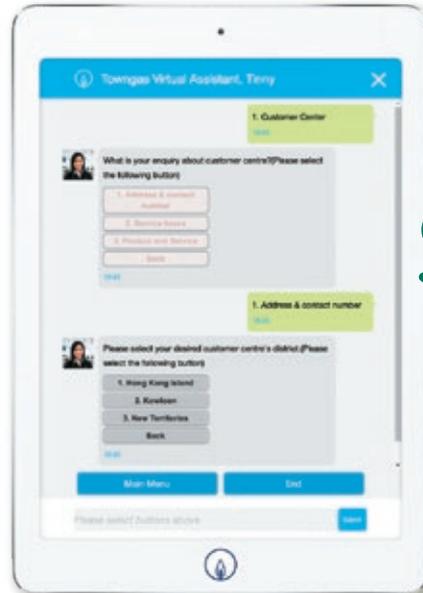
Company (Thousand)



Our branded appliances enjoy a high level of consumer acceptance, owing to their quality, innovative features and the backing of our service professionals. More than 283,000 appliances were sold during the year, representing a 3 per cent growth over 2017, in large part due to the supply of new public housing estates in 2018 and the concerted efforts of our marketing team.

New appliances developed by our in-house product research team included a hotplate equipped with Regenerative Electric Energy Module that converts heat energy to ignite the burners, without the need for battery replacement. Since batteries contain heavy metals and toxic chemicals that create a serious risk of soil contamination and water pollution, the introduction of this first-of-its-kind appliance in Hong Kong represented a breakthrough in environmentally-friendly cooking.

Our premium Mia Cucina kitchen line remained especially popular with customers, and in December 2018 we unveiled a new Mia Cucina display area at our North Point showroom. Mia Cucina also continued to be well-recognised by property developers in Hong Kong.



# Service

Meet Tinny, our new virtual assistant that responds instantly to enquiries about our residential services.



Hong Kong's first hotplate with Regenerative Electric Energy Module helps reduce waste because there is no need for battery replacement.

## Achieving Service Excellence

The success of our business depends on our ability to provide a safe, reliable and secure supply of gas to customers, who depend on us for the energy they use to cook meals for their families and water heating for their homes. Our one-stop shop services and frontline staff earned high customer satisfaction, as evidenced by the approximately 6,000 complimentary letters we received in 2018.

For the greater convenience of customers, we launched a virtual assistant, which makes use of AI technology to answer customer enquiries instantly. We also offered two more electronic payment options, including the

new Faster Payment System (FPS) and eWallet – AlipayHK for customers to settle their bills, in line with the market trend.

Continual innovation has helped us to improve productivity and service delivery. One of the innovations we developed was the Portable Multi-Tester, which allows our frontline technicians to quickly diagnose defects in gas water heaters. We also launched our digital mobility solution, which has changed the way we perform our inspection and maintenance services. Relaying service orders electronically to tablet devices carried by our frontline technicians, the system replaces traditional printed service orders and allows for instant retrieval of customer service records and data analysis.

During the year, we organised two MasterCraft contests to encourage our staff to achieve a higher standard of installation. For these contests, we invited technicians and contractors from Hong Kong and mainland China to demonstrate their expertise in installing Mia Cucina cabinets and appliances.

In recognition of the outstanding service quality provided by our customer service teams, we won gold awards in the categories of Digital Transformation and Contact Centre Service under the Customer Service Excellence Award 2018 organised by Hong Kong Association for Customer Service Excellence. We were also honoured to receive the *Sing Tao Daily's* Sing Tao Service Awards – After Sales Services Award for a tenth consecutive year and *East Week's* Hong Kong Service Awards – Public Utilities for the eighth year.

## 2018 Results of Towngas Service Pledge

### Reliability



Uninterrupted gas supply  
(over 99.99%)  
**99.990%**

3 days prior notification in case of supply interruption on account of maintenance or engineering work  
**100%**

Restoration of gas supply within 12 hours  
**100%**

### Safety



Emergency Team average arrival time  
(within 25 minutes)

**Average  
22.8 minutes**

### Appointments



Availability of maintenance and installation services within 2 working days

**Average  
1.1 days**

### Service Quality



Efficiency\*  
**8.92**

Courteous and friendly attitude\*  
**8.88**

### Speed and Convenience



Customer Service Hotline (calls answered within 4 rings)  
**96.13%**

Connect or disconnect gas supply within 1 working day  
**100%**  
(upon customer's request)

Deposit refunded at Customer Centres 2 hours after disconnection of gas supply  
**100%**  
(upon customer's request)

### Handling Suggestions



Reply within 3 working days  
**100%**

Resolution, or a statement of when the matter will be resolved, within 2 weeks  
**100%**

\* The result was based on surveys conducted by an independent research company. Our target is to exceed a score of 8 out of 10.

# Safety



## Safe and Reliable Infrastructure

At Towngas, we have a proactive maintenance and inspection regime that ensures our gas network remains highly reliable, with a low seepage rate and minimal disturbance from third-party construction activities. In 2018, we were pleased to note that we had achieved the best safety performance in our gas pipeline network. Additionally, we brought down the number of public reported leaks to the lowest in 30 years. Third-party damage incident was also reduced to 8, a single-digit figure for the second time in our record.

If any event demonstrated the robustness of our gas infrastructure and the professionalism of our people when handling extreme weather events, it was super typhoon Mangkhut, one of the most powerful storms to hit Hong Kong since 1946. All of our operation staff were either at

work ready to deal with the situation or on standby during the typhoon. Fortunately, there was no serious gas stoppage or damage to our network or plants thanks to the precautions we had taken beforehand.

In 2018, we continued introducing innovative tools to improve our piping works. These included a coring machine for removing pipes, which helps us avoid unnecessary road openings, as well as auto-pilot drones for inspecting difficult-to-reach slope pipes in remote areas. When roadwork is necessary, we can provide contractors with an accurate record of the location of our pipes, including their depth. As contractors undertake roadworks, we will coordinate closely with them and deploy staff to detect any gas leakages while they are digging.

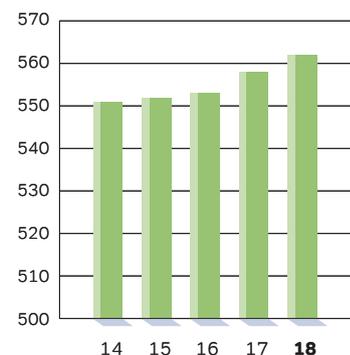
Additionally, we make use of an In-line Intelligent Pigging Inspection device that can be inserted into a pipeline without

interrupting gas supply. During the year, it helped us to inspect 137km of our 35 Bar high pressure network and determine that the integrity of our transmission gas supply network was satisfactory.

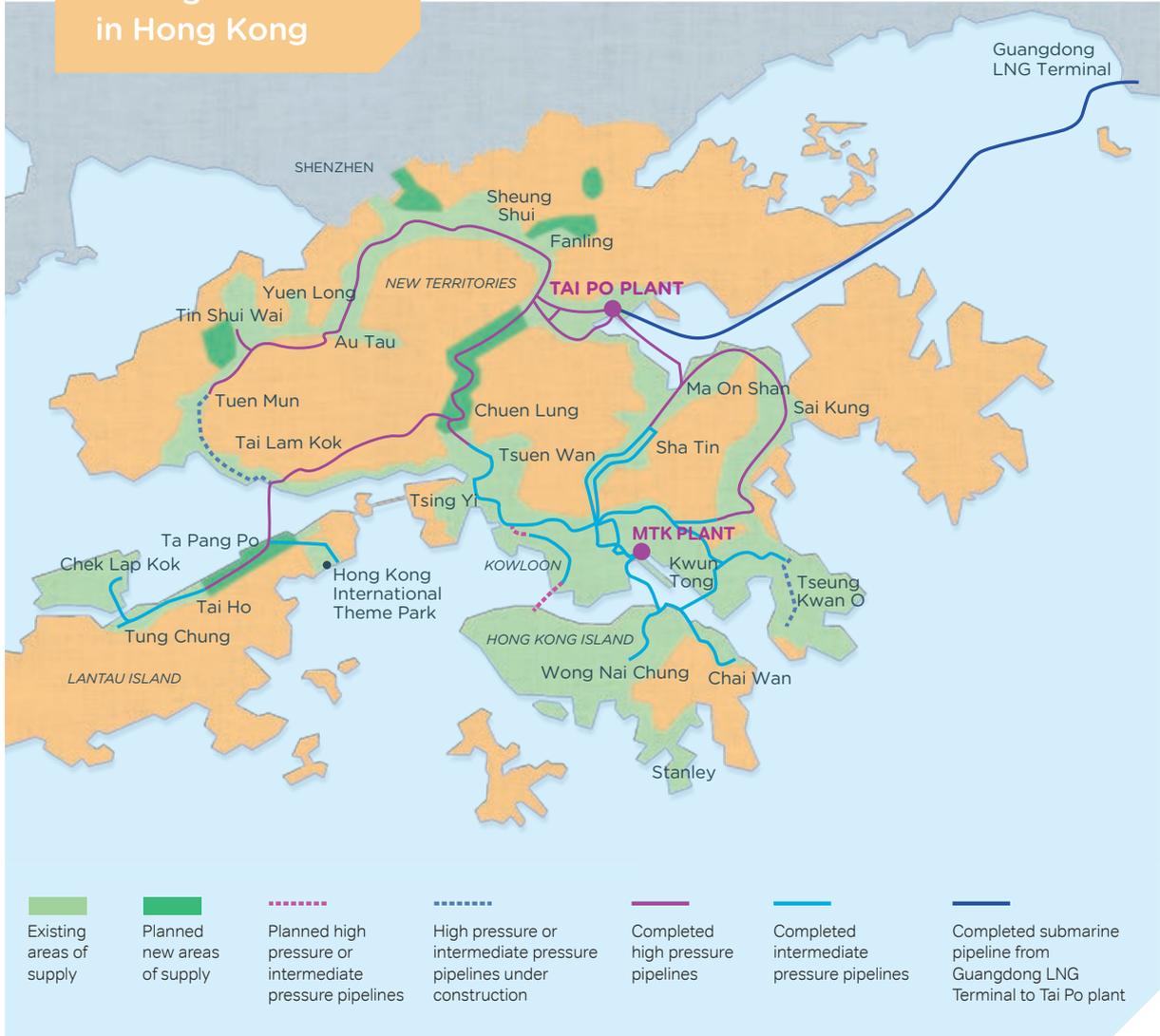
Work on our pipeline network during the year included the extension of the network between Tuen Mun and Tsuen Wan, which we expect to finish in mid-2019. When completed, it will form a ring-feed system that will dramatically increase supply security for North West New Territories. Progress was also made in the extension of our network to handle the gas supply needs of the third runway at Hong Kong International Airport and New Development Areas, as well as Water World and hotel developments at Ocean Park.

## Number of Customers per km of Mains

Company



## Towngas Network in Hong Kong





NEW ENERGY  
AND DIVERSIFIED  
BUSINESSES

# Heading in a New Direction

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Today, ECO Environmental Investments Limited is pursuing proprietary new technologies based on the concept of turning waste into high value renewable energy, chemicals and advanced materials. With our growing portfolio of green products that include hydro-treated vegetable oil (HVO) to be used as biofuel for vehicles, we are helping to create a brighter, more sustainable future for all.



## NEW ENERGY AND DIVERSIFIED BUSINESSES

The key proposition of our new energy business is to create value through the development of clean energy, chemicals and advanced material products that not only bring substantial returns to the Group and its investors but also address the pressing environmental challenges faced by the global community.

### New ECO Energy

In 2000, ECO Environmental Investments Limited (ECO) was established as a business platform for pursuing new energy opportunities. Since then, ECO has embraced the conversion of low value feedstocks into high value products as its core strategy. These feedstocks, which primarily comprise waste, are used to produce clean energy and advanced chemical and material products.

As symbolised by its company logo, ECO has always put ecological friendliness at the core of its business. Recognising that technological innovation would power its green journey, ECO has been strengthening its research and development capabilities and now has two research facilities in Shanghai and Jiangsu province, respectively.

Today, ECO has already developed a strong list of proprietary technologies, many of which are ready to be implemented and will be instrumental in defining ECO's competitive edge. With these technologies, a sustainable



Trial production began at ECO's HVO plant in Zhangjiagang, Jiangsu province, with the potential of making a significant contribution to carbon reduction.

business portfolio is gradually taking shape, including products based on unconventional gas resources, agricultural waste, bio-grease waste and tar oil.

ECO's vision is to become a world-class green industry leader, to provide solutions that overcome environmental challenges arising from climate change, and respond to sustainable development for future generations.

### From LNG to Advanced Biofuels

During the year, our liquefied natural gas (LNG) plant in Shanxi province marked its 10th anniversary of shipping LNG to customers. This plant liquefies the coalbed methane extracted from the seams of neighbouring coal mines and converts it into LNG, a source of green energy in high demand in the region.

Coalbed methane is a potent greenhouse gas (GHG) if inadvertently released into the atmosphere. By capturing coalbed methane and putting



This new plant set up by ECO started production of high-quality ethylene glycol in Ordos, Inner Mongolia Autonomous Region.

this unconventional gas resource into commercial use, ECO has been making a significant contribution towards the reduction of GHG emissions.

Following the 2015 Paris Agreement, in 2018 the EU signed off on a new set of Renewable Energy Directives. These Directives call for increasing Europe's overall renewable energy targets to 32 per cent by 2030 and raising its target for the transport sector to 14 per cent.

At Zhangjiagang, Jiangsu province, ECO has successfully put into trial production a plant to produce HVO. In 2018, two shipments of HVO totalling 7,000 tonnes were exported to European markets. As HVO can be readily blended with diesel oil, these shipments will help to meet Europe's renewable energy targets.



At ECO's R&D centre at Zhangjiagang, Jiangsu province, our researchers are developing new proprietary green technologies.

ECO's HVO is an advanced biofuel produced from palm oil mill effluent (POME), a feedstock with low indirect land use change (ILUC) impacts. Certified under the International Standard of Carbon Certification (ISCC) Scheme, ECO's HVO will help achieve a significant reduction in carbon emissions and meet the demand for more advanced biofuels as the world steps up its efforts to combat climate change. ECO is now expanding its HVO production facility at Zhangjiagang and is continuing to improve its process technology, while also exploring the potential of other feedstocks such as used cooking oil.

In addition to HVO, ECO has been researching the conversion of agricultural waste into cellulosic ethanol, another important advanced biofuel that can be blended with gasoline to offer significant reductions in carbon emissions.

### *From Fuels to High Value Chemicals*

After years of producing methanol from coal at its plant in Ordos, Inner Mongolia Autonomous Region, ECO has added an ethylene glycol (EG) production unit, which makes use of 40 per cent of the syngas derived from coal gasification.

Gasification is a clean technology for turning coal into syngas for further chemical transformation, without emitting flying ash, SO<sub>x</sub> (which is fully recovered as pure solid sulphur), or NO<sub>x</sub>. The EG produced from syngas has much

higher value than methanol, as it is a chemical in wide demand for the manufacture of polyester fibres. Since mainland China has an enormous textile industry and today imports most of the EG it uses, the prospect of producing this chemical from China's abundant coal resources has been widely welcomed by the industry.

The production of EG has opened the door for ECO to produce other high value chemicals. Among these, ECO has been researching the production of dimethyl carbonate (DMC) using two possible approaches: the more advanced carbonylation of methyl nitrite process, and the synthesis of methanol with carbon dioxide. ECO plans to test these new technologies in 2019 and sees particularly good potential for DMC, a fuel oxygenate additive that could help to reduce emissions of carbon and particulate matters.

ECO is also researching the production of high value chemicals using agricultural waste as a feedstock. After each harvest season in China, vast amounts of agricultural waste that are unavoidably produced have, until now, been either ploughed back into the field, which damages top-soil, or incinerated in-situ, which causes extensive air pollution. Our ECO's research, therefore, will have profound economic and environmental benefits for the country.



Agricultural waste produced during the harvest season is now being used by ECO as a feedstock for high value chemicals.

After years of R&D, ECO has successfully developed an innovative method to decompose agricultural waste into its three basic components, namely cellulose, hemicellulose and lignin. Our pilot production plant, situated in mainland China's corn belt of Tangshan, Hebei province, is expected to start trial production of furfural and paper pulp by the end of 2019. Further research is now on-going to exploit the vast potential of hemicellulose and cellulose.

### *Carbon Materials Development*

In the push to make transport more environmentally-friendly, many governments around the world are throwing their support behind electric-powered vehicles. Some European countries have even announced plans to ban internal combustion cars by 2040. Successfully electrifying transportation, however, will largely depend on breakthroughs in the continuing development of on-board power storage

technologies and a new generation of light-weight auto body materials.

To that end, ECO has developed a patented technology to extract high-quality activated carbon and mesophase pitch from tar oil, a by-product of the coke making process, with potential use in the manufacture of super capacitors, graphitic anode and carbon fibre. Currently, ECO is designing a demonstration plant in Inner Mongolia Autonomous Region for the manufacture of activated carbon and pitch to be used in carbon fibre spinning. Construction of the plant is expected to commence in 2019.

### *Business in Hong Kong*

Despite uncertainties in the global economic and political environment, the overall business performance of ECO in 2018 was positive.

Both our aviation fuel and LPG filling station businesses remained stable. Our airport-based aviation fuel tank farm operation, one of the largest of its kind in the world, received and delivered about 6.76 million tonnes of jet-A1 fuel to Hong Kong International Airport in 2018. Since the signing of a 40-year franchise agreement with Hong Kong Airport Authority in 2002, the operation has generated steadily increasing income. Our LPG filling station business, with five dedicated stations for taxis and minibuses, continued to run smoothly and sold nearly 60,000 tonnes for a revenue of over HK\$400 million.

In Hong Kong, we also make use of landfill gas collected from two strategic landfills: the North East New Territories (NENT) and South East New Territories (SENT). In addition to the NENT facility, which has been in operation since 2006, the new facility at SENT recorded its first full year operation in 2018. By collecting and utilising landfill gas

that would otherwise have been flared off, these landfill sites have substantially reduced in-situ GHG emissions. Furthermore, treated landfill gas is used as a substitute for naphtha in town gas production, which is the renewable portion of our energy mix.

### Telecommunications

Our telecommunications business in Hong Kong and mainland China is handled by Towngas Telecommunications Company Limited (TGT), which offers connectivity and data centre and cloud computing services for international and local telecommunications service providers, operators and corporations, among others. During the year, the business of this subsidiary continued to grow steadily.

In Hong Kong, our competitive advantage in this sector is based on our Glass-In-Gas (GIG) technology, which enables optical fibres to be installed within our extensive gas pipe network – a more cost-effective and interference-free alternative to traditional road opening methods. During the year, we extended our fibre network to Sai Kung so that customers there could enjoy the highly reliable transmission quality and comprehensive services

provided by TGT. This technology is also

being applied in mainland China, where we have obtained Technical Standards for Laying Fibre Casing Pipe in Gas Pipeline approval from China Gas Association. TGT is currently expanding its connectivity business on the mainland through cooperation with a strategic partner to integrate their combined resources.

TGT is also involved in the data centre business, leveraging its strengths in connectivity, the cloud and fog computing to deliver cutting-edge total solutions to customers. As a leading data centre infrastructure provider, TGT offers bespoke professional management and reliable cloud computing services through its world-class data centre in Hong Kong and mainland China.

Currently, TGT operates seven large-scale data centres in San Po Kong and at Tseung Kwan O Industrial Estate in Hong Kong, and in Beijing, Dalian, Dongguan, Harbin and Jinan on the mainland. Together, these data centres can accommodate up to 16,000 server racks.

International awards and recognitions received by TGT during the year included the Digital Transformation Award at the 13th China IDC Industry Annual Ceremony and the Solution of the Year FY17 at the Hitachi Vantara Partner Summit 2018.



# Cleanness

In order to capitalise on the fast-growing business demand for advanced data centres, TGT will be expanding its footprint to Taiwan and, ultimately, bringing its business know-how and expertise to the world.

## Information Technology

Our wholly-owned subsidiary, S-Tech Technology Holdings Limited (S-Tech), was set up to meet the information technology needs of our joint venture projects. The core activities of this business include the provision of software development, solution implementation and systems integration services for our city-gas businesses' advanced customer service and piping network management needs.

In 2018, the services of S-Tech's Towngas Customer Information Systems were provided to 85 per cent of the Group's city-gas joint ventures on the mainland, 64 per cent of which are now using the latest cloud version to reduce operational costs and shorten development cycles. A total of more than 15 million customers currently enjoy these services.

Other services offered by S-Tech to city-gas joint ventures include mobility applications for meter reading, maintenance services

and Regular Safety Inspections for residential, commercial and industrial customers, all of which are designed to save management costs and improve service quality.

In 2018, S-Tech launched a new product, the Artificial Intelligent Call Centre System, which has been implemented in several joint ventures. S-Tech also continued working on the integration of its Towngas Customer Information System with other systems, including the Virtual Customer Centre, NFC/remote meters, Towngas Payment Platform, Towngas Management System, as well as the e-Invoice platform.

## Civil and Building Services Engineering

U-Tech Engineering Company Limited (U-Tech) is a wholly-owned subsidiary of the Group providing consultancy and engineering contractor services in Hong Kong and Macao. Among the services it offers are utilities installation, infrastructure

construction, trenchless technologies, and civil and building services engineering for public and private projects.

In 2018, U-Tech celebrated its 20th anniversary and its growth from a small gas pipelaying contractor into a reputable multi-disciplinary engineering professional service provider today. The year was also significant for the Company's acquisition of the Permanent Group C Waterworks Tenderer qualification of the Hong Kong Government, its highest tender category. As a result, U-Tech became eligible to bid for unlimited tender sums from the Water Supplies Department. During the year, U-Tech also won a waterworks contract for the construction of a fresh water services reservoir and the associated pipeworks at Fanling.

Other new business secured in 2018 included U-Tech's first contract with Evergrande for fire

The environmentally-friendly TGT Dalian Data Centre 1 received the LEED CS (Core and Shell System) Gold Level Certificate of the U.S. Green Building Council.





U-Tech uses its expertise and advanced technology to provide first-class maintenance services for water facilities in Hong Kong's outlying islands, allowing residents to enjoy clean, potable water.

services installation works at their residential development at Tuen Mun and the first supply and installation of electrical works contract with Wheelock for their residential development at Plantation Road. U-Tech also acquired the first supply and installation of electrical works contract from Gammon Construction for Goldin's residential development at Homantin.

Recognitions of U-Tech's high quality and safety standards during the year included a fifth consecutive Safety Performance Award – Construction from the Occupational Safety and Health Council.

### Manufacturing

M-Tech Metering Solutions Company Limited (M-Tech), a wholly-owned subsidiary of the Group, develops and markets

proprietary smart gas meters. These meters are based primarily on Micro-Electro Mechanical Systems (MEMS) technology to ensure greater accuracy under various temperature and pressure conditions.

In 2018, M-Tech launched an advanced small commercial meter with MEMS technology that replaces conventional diaphragm meters. Since its launch in early 2018, the meter has become well accepted in mainland China for its pre-payment and smart metering functions that compile tier tariffs. Its features allow for tariff prepayments, tier tariff settings and gas consumption records to avoid conflicts in the event of a tariff adjustment. Others include gas safety functions that provide regular safety inspection alerts, excess flow cut-off and external interference alarms.

M-Tech is also developing other smart meters for residential applications, which are in high demand in Europe where customers are increasingly turning to smart meters.

Another wholly-owned subsidiary of the Group, G-Tech Piping System (Zhongshan) Company Limited (G-Tech) manufactures high-quality polyethylene (PE) pipes, supported by GH-Fusion Corporation Limited, which specialises in PE fittings.

During the year, G-Tech expanded its production capacity by adding a pipe extrusion production line at its plant in Maanshan, Anhui province, to attract new clients in the growing markets of eastern China. With the addition of the Maanshan plant in 2016, G-Tech currently operates two factories on the mainland, including its original extrusion plant in Zhongshan, Guangdong province.

As M-Tech and G-Tech continue to broaden their product range, both companies will be seeking further opportunities to acquire new customers in mainland China as well as in overseas markets.

## 2018 New Energy and Other Projects

### New Energy Projects

#### COAL MINING

Inner Mongolia Ordos Kejian

2011 681 486 100%

#### COAL-BASED CHEMICALS

Jiangxi Fengcheng

2009 1,250 350 40%

Inner Mongolia Ordos

2009 1,620 1,017 100%

#### CNG/LNG REFILLING STATIONS

Shaanxi Xianyang

2008 12 12 100%

Shaanxi Huitai

2010 54 27 100%

Shaanxi Lueyang

2014 21 13 100%

Shaanxi Fengxiang

2014 30 15 100%

Shaanxi Shenmu

2015 60 38 100%

Shaanxi Baoji

2015 29 14 100%

Shaanxi Zhouzhi

2016 14 10 100%

Shaanxi Weinan Gushi

2016 21 14 100%

Shaanxi Weinan Tianshi

2016 15 11 100%

Shaanxi Hancheng

2016 46 41 90%

Shanxi Yuanping

2008 40 20 42%

Shanxi Lingshi

2013 25 20 75%

Shanxi Xinzhou

2016 30 15 100%

Shandong Chiping

2010 30 15 100%

Shandong Dongping

2010 43 26 91%

Shandong Jiaxiang

2012 50 28 100%

Shandong Weishan

2014 58 29 100%

Shandong Shanxian

2014 28 14 100%

Shandong Linqing

2014 22 13 100%

Shandong Heze

2015 23 13 90%

Hebei Shijiazhuang

2014 65 31 100%

Xingtai (Gangxing)

2014 20 17 80%

Xingtai (Xinghua)

2016 24 23 80%

Henan Xinmi

2010 29 15 100%

Henan Anyang

2012 29 14 100%

Henan Kaifeng

2013 29 15 100%

Henan Linzhou

2013 30 20 100%

Henan Nanyang

2015 14 10 100%

Henan Wuyang

2017 15 15 85%

Inner Mongolia Huhhot

2014 28 14 90%

Inner Mongolia Wulatezhong Qi

2015 11 8 100%

Inner Mongolia Xiwuzhumuqin Qi

2015 30 15 100%

Inner Mongolia Chifeng

2015 30 15 100%

Inner Mongolia Chaha'eryouyiqian Qi

2015 30 15 100%

Inner Mongolia Xilingol

2016 30 15 100%

Inner Mongolia Ulanqab Huade

2016 29 14 100%

Inner Mongolia Ulanqab Chahar

2016 15 11 100%

Inner Mongolia Bayannur Uradqian Qi

2016 15 7 100%

Inner Mongolia Bayannur Linhe

2016 14 10 90%

Inner Mongolia Bayannur Hanggin

2016 13 10 90%

Ningxia Guangwuxian

2015 15 11 100%

Ningxia Qingtongxia

2015 21 15 100%

Ningxia Jinyintan

2015 28 14 100%

Ningxia Zhongwei

2016 18 12 100%

Ningxia Zhongwei Haixing Development Zone

2016 30 15 100%

Jiangxu Xuzhou

2015 40 20 80%

Anhui Maanshan

2006 15 11 30%

## New Energy Projects

### CNG/LNG REFILLING STATIONS

Jiangxi Pengze	2015	45	30	70%
Guangdong Guangzhou	2013	26	13	100%

### UPSTREAM PROJECTS

Shanxi LCBM	2006	600	200	70%
Jilin Tianyuan	2007	140	5	50%
Xuzhou COG	2014	450	150	80%

### COAL LOGISTIC PROJECT

Shandong Jining Jiexianggang Logistic Port	2011	540	180	88%
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### BIOMASS

Zhangjiagang	2014	840	271	100%
Hubei Xingzhou	2017	170	134	100%
Luanzhou	2017	280	140	100%

## Oilfield Project

Phetchabun Province in Thailand	2012	USD 181M	USD 12,000	100%
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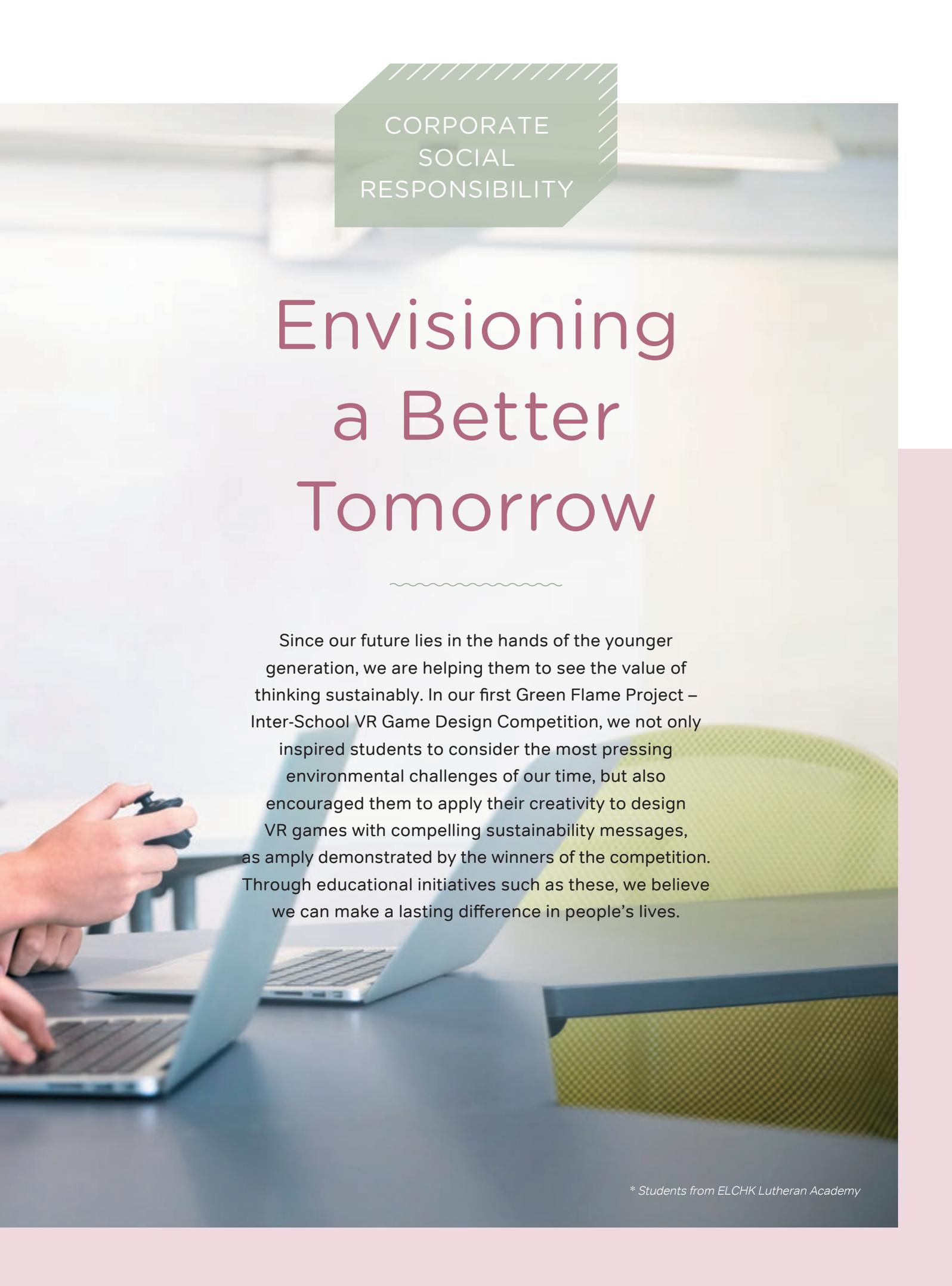
## Telecommunication Projects

Shandong Jinan	2008	80	40	90.1%
Shandong Jinan Chibo	2009	504	168	87.4%
Shandong Laiyang	2011	14	USD1.6M	90%
Xuzhou Fengxian	2011	11	8	100%
Xuzhou Peixian	2012	13	9	100%
Liaoning Dalian DETA	2010	14	10	49%
Dalian Yida	2011	190	76	90%
Harbin	2013	158	63	80%
Beijing Zhongjing	2014	14	10	49%
Beijing Chibo	2014	14	10	98.7%
Dongguan	2013	240	80	60%
Shenzhen (Qianhai)	2014	59	30	100%
Shenzhen (Interlink Connectivity)	2015	100	40	30%

## Other Projects

Shenyang Sanquan Construction Supervisory	2011	4	3	60%
ECO Engineering Management (Xi'an)	2014	13	9	100%
Suzhou Industrial Park Broad Energy Services	2012	170	71	25%
GH Yixing Ecology	2013	184	184	100%
Dalian (New Energy Technology)	2015	USD 4.75M	USD 4.75M	55%
M-Tech	2011	60	30	100%
GH-Fusion	2001	87	43	50%
G-Tech	2012	77.5	41	100%
Towngas Technology	2011	30	21	100%
S-Tech (Zhuhai)	2014	14	7	100%
ECO Engineering Management (Shenzhen)	2014	30	15	100%
Towngas Life Style	2015	7	5	100%
Towngas Payment Technology (Shenzhen)	2015	50	28	100%
Hong Kong & China Gas International Energy Trading	2016	125	50	100%
Mia Cucina Kitchen Cabinets (Shenzhen)	2017	125	50	100%
Inner Mongolia Ordos Carbon Material	2017	640	240	100%





CORPORATE  
SOCIAL  
RESPONSIBILITY

# Envisioning a Better Tomorrow

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Since our future lies in the hands of the younger generation, we are helping them to see the value of thinking sustainably. In our first Green Flame Project – Inter-School VR Game Design Competition, we not only inspired students to consider the most pressing environmental challenges of our time, but also encouraged them to apply their creativity to design VR games with compelling sustainability messages, as amply demonstrated by the winners of the competition. Through educational initiatives such as these, we believe we can make a lasting difference in people’s lives.

*\* Students from ELCHK Lutheran Academy*

## CORPORATE SOCIAL RESPONSIBILITY

### New Goals of Sustainability

To focus on the sustainability issues that matter most to us, in 2018 our Sustainability Committee endorsed the following four of the 17 Sustainability Development Goals (SDGs), launched by the United Nations in 2015 as part of its 2030 Agenda for Sustainable Development.

#### SDG 6 Clean Water and

**Sanitation:** Through Hua Yan Water, our water business in mainland China, we invest in and operate water and wastewater treatment projects and have recently invested RMB550 million in a new water services joint venture for the Greater Bay Area.

#### SDG 7 Affordable and Clean

**Energy:** In both Hong Kong and mainland China, we supply clean energy, including city-gas and landfill gas. We have also been developing environmentally-friendly energy businesses, such as the hydro-treated vegetable oil (HVO) plant in Zhangjiagang for the production of biofuel, which is cleaner than traditional fossil fuels.

At Towngas, we are committed to creating value for all of our stakeholders as part of our core strategy. By operating in a socially- and environmentally-responsible manner, we believe we can make a difference in people's lives and help contribute to a more sustainable world for future generations.

#### SDG 11 Sustainable Cities and

**Communities:** To meet the need for gas infrastructure in the cities and communities we serve, we make use of efficient processes and innovative technology to maintain a safe, reliable and affordable supply of gas.

#### SDG 13 Climate Action:

We recognise the need to cope with the effects of climate change and have taken action to address global temperature rises by conducting climate change risk assessments and decarbonising our business operations.

### Creating a Greener Future

We believe we can play a role in contributing to a greener future through our businesses. We strive to reduce our carbon footprints and develop innovative environmentally-friendly energy solutions that make our world a better place.

#### Developing Environmental Solutions

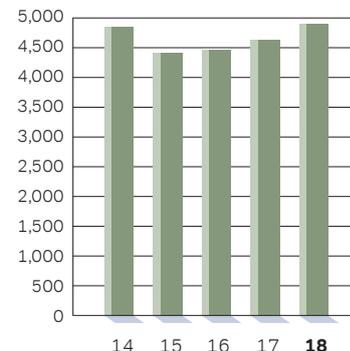
We continued to provide green energy solutions for our customers through initiatives such as our landfill gas projects, which since 1999 have reduced

total carbon emissions by 430,000 tonnes – the amount of carbon absorption of 18.5 million trees in one year. With our successful landfill gas project at Alice Ho Miu Ling Nethersole Hospital in Tai Po, we are exploring more potential applications, particularly for hospitals and data centres, to undertake similar landfill gas projects.

In our own operations, we started work on a Cloud Based Energy Management System. This new system will allow us to access information more efficiently, monitor our operations more closely, and create better energy-saving plans through means such as chiller plant optimisation.

### Revenue per Employee

Company (HK\$ thousand)





During our organic farming events, members of the public and Towngas staff experienced low-carbon living by planting vegetables and sharing the harvest.



## Green

As a supporter of Hong Kong's Feed-in Tariff (FiT) Scheme promoting renewable energy, we planned to install solar power facilities at our premises, including off-take stations.

To prepare for the new waste regulations in Hong Kong, we reviewed our waste management practices and published an *In-house Green Event Practical Guide* to help internal parties reduce and recycle waste when organising events.

### *Raising Public Awareness of Sustainability*

In 2018, we launched a green advertising campaign on public transport vehicles such as buses, trams and green minibuses, encouraging people to take action on environmental protection. Additionally, we organised a radio campaign

featuring well-known local DJs, who discussed green messages such as turning waste into energy, environmental cooking and appliance recycling.

To reduce paper consumption, we encouraged customers to use our eBilling service. During the year, we organised a lucky draw promotion for Towngas eBilling customers to register via our online Virtual Assistant for the chance to win prizes. For every new eBilling application received during the promotion period, we would donate HK\$10 to a green group chosen by the applicant. We will continue this donation programme in 2019.

We also supported a wide variety of public education programmes by green groups, including Green Earth's Plantation Enrichment Project (PEP),

WWF's Earth Hour and The Conservancy Association's Eco Rangers, among others. Additionally, we organised the Low Carbon Cooking So Easy event to promote a healthy, low-carbon lifestyle for kindergarten, primary school and secondary school students.

During the year, we also hosted visits for teachers, students and environmental groups at our facilities, including our headquarters, production plants and landfill gas utilisation sites, to raise awareness of our environmental initiatives.

### **Serving the Community**

We touch people's lives in many different ways, not only through the products and services we offer but through our programmes that help improve social integration and community wellbeing. Our Towngas Volunteer Service Team of more than 900 volunteers, which will celebrate

its 20th inauguration anniversary in 2019, spent 91,628 hours on 265 community service projects in Hong Kong this year, making up an accumulated record of 875,677 hours.

### *Caring for Those in Need*

We provided a variety of caring services for the elderly during the year, including the We Can Cook programme for the Young Old organised with the Hong Kong Sheng Kung Hui Welfare Council and Institution of Dining Art. Since 2016, this programme has been giving people who retire at an earlier age the opportunity to pursue their interest in cooking through classes taught by professional chefs.

To reach elderly people with Mild Cognitive Impairment, we again joined the Welfare Council to provide cooking classes as part of the Chef Anchor programme. First held in 2017, the programme this year offered a new cognitive training cookbook, *I Can Cook*, designed by occupational therapists and Towngas cooking instructors. A Towngas Chef Anchor Volunteer Team was also established to visit elderly participants in their homes and record their progress for follow-up by social workers.

This programme has acquired a number of awards in Hong Kong and overseas, including the Best Dementia Care award in the 6th Eldercare Innovation Awards, Singapore.

To provide career opportunities for people with disabilities, Towngas supported SAHK's LOHAS Florists programme, which provided disabled students with training in flower art, pesticide-free farming and shop operations. We subsidised the purchase of farming equipment at the association's rooftop flower beds and invited students to the farm of our Volunteer Service Team to learn how to grow pesticide-free vegetables and fruits, which they could then sell in the local community. Moreover, Towngas and the association held a low-carbon cooking competition at the From Farm to Fork Carnival, where the ambassadors applied what they had learnt and cooked with the ingredients they had grown.

Other caring programmes included the annual Rice Dumplings for the Community campaign promoting the traditional wrapping of rice dumplings, as well as a mooncake donation programme for those in need. A similar programme was held in mainland China, where around 1,800 volunteers from Towngas China joined more than 90 of our joint venture partners to prepare nearly 51,000 dumpling packs and gifts worth RMB408,600 for over 13,300 beneficiaries. Moreover, we also continued to

run our traditional "Long-boiled Soup" campaign, during which we delivered 50,150 servings to the elderly in Hong Kong.

### *Engaging the Younger Generation*

As young people will help shape our future, we launched our first Green Flame Project – Inter-School VR Game Design Competition. Through this competition, we hoped to raise awareness of environmental issues among primary and secondary students and inspire them to design creative VR games based on environmental themes such as combatting climate change and reducing waste. The winning games were



A participant enjoys flame cooking with assistance from a volunteer of the Chef Anchor programme, which helps patients with Mild Cognitive Impairment regain their confidence.

also showcased during our Green Fun Fair at a shopping mall, helping to spread the green messages to the public.

In mainland China, our colleagues continued to carry out meaningful educational initiatives through programmes such as the Towngas Gentle Breeze Movement. During the year, we donated school uniforms, teaching aids and daily necessities to over 900 teachers and students. They also built Towngas China Charity Libraries and renovated student dormitories and teacher offices in Baotou, Inner Mongolia, and Changting, Fujian province. Since 2013, the Towngas Gentle Breeze Movement has invested more than RMB3.5 million, helping 37 schools in areas of Jiangxi, Anhui, Jiangsu,

The Green Flame Project – Inter-School VR Game Design Competition was organised with HKEdCity to raise awareness of green issues among primary and secondary students.



Shandong, Guizhou, Shaanxi, Liaoning, Guangdong, Inner Mongolia and Fujian. This programme has earned us the 2018 Excellent Chinese Corporate Charitable Project organised by China Social Work Federation Corporate Citizenship Committee, CCTV, Tencent Charity Foundation and the CSR China Top 100 in The Third CSR China Education Awards.

### Building a Sustainable Workforce

Our people are the backbone of our company and the most critical element in our business success. During the year, we initiated a wide range of programmes that helped them build their professional skills, ensured their safety and wellbeing, and made them feel valued as employees of Towngas.



These young students at a school in a remote area of mainland China are benefiting from the teaching aids and daily necessities donated under the Towngas Gentle Breeze Movement.

One of the key challenges for Towngas was the ageing of the population in Hong Kong and mainland China. We recognise the need to look ahead and build up our talent pool to ensure a smooth and orderly operation.

#### *New Staff Development Initiatives*

To help us identify the right people for the right positions, in 2018 we developed the unique Growth = Innovation x Implementation Profile Analysis system for human resources planning. Under the system, we will be able to determine the best match for our people and place them in the teams where their abilities can be put to best use. This Profile Analysis tool is now being fine-tuned and will be rolled out in mid-2019.

In 2017, we developed the Young TLC+ programme for staff across different departments and locations who have 5 to 10 years of work experience. The programme, which is based on our Towngas Leadership Competency (TLC) Model for identifying and grooming future leaders for management positions, admitted 19 young staff members. They are expected to graduate in 2019.

Over the past 10 years, we have also been organising executive development programmes in mainland China with Tsinghua University. In mid-2018, we developed a new training format, with top-rated professors and industry leaders from leading universities and businesses conduct sharing sessions with our managers, thereby deepening their understanding of the mainland market, political landscape and competitive environment.

In 2018, we introduced our revised signature Towngas Management Programme in mainland China, which utilises our long experience in the gas business, our own business cases and our stories, all of which are unique to our company. As a first step, we began by training the trainers who will implement the programme in their respective locations with real cases and local examples. Ultimately, we expect to cover a total of 27 management topics, adding to the four that have already been initiated.



Towngas and Vocational Training Council joined together to launch Hong Kong's first Professional Diploma in Gas Engineering, which enables working adults to enhance their competence in the field.

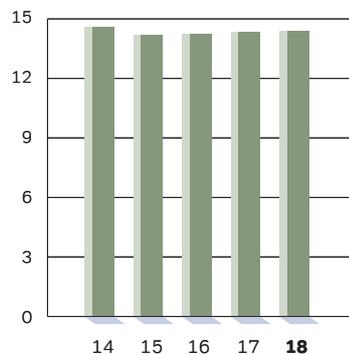
In addition to providing professional training to our employees and contractors in Hong Kong and mainland China, the Towngas Engineering Academy strives to disseminate gas engineering knowledge to relevant external groups, including working adults in the associated trades and students.

During the year, we worked with the Vocational Training Council (VTC) to introduce the Professional Diploma in Gas Engineering programme, the first diploma programme of its kind in Hong Kong. This part-time programme, which has been specially designed for working adults, gives equal emphasis to both theoretical and practical knowledge. Senior engineers and managers from Towngas will

act as lecturers, while learners will have the opportunity to gain practical work experience at the Towngas Engineering Academy. We also collaborated with the School of Energy and Environment at the City University of Hong Kong in September to launch a gas engineering academic unit as an undergraduate elective. Both the diploma and undergraduate programmes are designed not only to provide a talent pool for Towngas but to raise the standards and professionalism of the overall gas industry.

**Town Gas Sales per Employee**

Company (million MJ)



In 2018, we continued to promote our Three Courtesies programme, which since its launch in 2013 has become a key part of our internal corporate culture. This year, however, we began receiving requests from companies outside Towngas to teach their staff about this aspect of our culture. By spreading the messages contained in this campaign, Towngas can contribute to a more harmonious society.

*Staff Health and Wellbeing*

We make every effort to provide our employees with a work environment that is fair, equitable and fulfilling, while also acknowledging the importance of work-life balance.

We understand that many of our staff have family obligations, and therefore we provide flexible work arrangements for parents who have to attend their children's school activities during normal work hours. In addition, we set up a mother care room in support of our female employees who are breastfeeding after maternity leave.

We also regularly review and revise remuneration packages according to changes in social conditions and market trends. In 2018, for example, we enhanced our medical benefits and leave entitlement to give our employees better health protection and work-life balance.

For staff who must work during extreme weather conditions, we substantially increased their special allowance in recognition of the hardship they face and their support of the Company's corporate responsibility to serve the community. We especially appreciated those staff members who worked tirelessly during Typhoon Mangkhut in September to ensure there was no interruption to gas service.

As well as providing extensive training options for improving technical and professional skills, we offer non-business-related training such as talks and workshops for first-time parents, wellness and skincare. We also have a library, fitness facilities,

**2018**  
Environmental Performance  
Table (Hong Kong)

**Water Quality**



Total waste water output was 3.9 m<sup>3</sup>/TJ of town gas

**Chemical Waste**



Total chemical waste output was 0.5 kg/TJ of town gas

**Greenhouse Gas Emissions**



Greenhouse gas emissions from major gas production equipment was 347,489 metric tonnes in terms of CO<sub>2</sub> equivalent

**Air Quality**



Total NO<sub>x</sub> output was 4 kg/TJ of town gas  
Total SO<sub>x</sub> output was 0.02 kg/TJ of town gas

Total CO<sub>2</sub> output was 11.7 metric tonnes/TJ of town gas

**Ozone Layer Protection**



All of our vehicle air conditioning systems now operate with refrigerant R134A

All BCF portable fire extinguishers have been replaced with dry powder extinguishers

**Noise**



All installations and operations complied with the statutory requirements

No noise abatement notice has ever been received

All legal requirements relating to environmental protection were fully complied with.



The Safety Walk in mainland China helped raise colleagues' awareness of safety and health.

# Health



and a clinic where staff can enjoy free medical services and have their prescriptions filled.

The Towngas Recreation Club, which is especially popular with our staff for its wide range of sports and recreational activities, celebrated its 60th anniversary during the year.

In December 2018, we received the Family-Friendly Employers – Grand Award, recognising us as a multi-time winner of the Distinguished Family-Friendly Employer Award and for promoting innovative and creative family-friendly policies. We also won the 2017/18 Special Mentions (Gold) and 2017/18 Awards for Breastfeeding Support.

## *Occupational Health and Safety*

In 2018, we undertook a wide range of activities to ensure the health and safety of our staff. The highlight of the year was our HSE (Health, Safety and Environment) Walk, which was held in Hong Kong for the first time with our project companies in mainland China, to raise awareness of the importance of workplace safety and health. On 23 June, over 150 mainland ventures joined the campaigns and more than 14,000 staff and their family members at different locations participated.

Another key milestone during the year was our completion of the migration process from OHSAS18001 to ISO45001, the enhanced occupational health

and safety (OHS) management system. Following the migration process, an ISO45001 certificate was presented to Towngas in January 2019.

Other events promoting good OHS performance included the Outstanding Safe Foreman Award and a forum for contractors. Moreover, over 1,500 employees took part in our HSE Month and HSE Quiz activity, held in November.

In our quarterly promotion, we highlighted the importance of eye protection, heat stress management, work stress management and infectious disease control, among other topics. Training sessions

were also organised for employees and contractors covering topics such as work-above-ground safety, first aid and emergencies, confined space and tunnelling work, behavioural-based safety observations and others.

During the year, we conducted a safety audit in July to meet the legislative requirements of the Factories and Industrial Undertakings (Safety Management) Regulation and carried out more than 150 safety inspections across the Company to ensure our high safety standards were being met.

### Supplier Relationships

We work closely with our suppliers who are part of our green supply chain and help them to comply with our procurement policy.

In 2018, we conducted a Corporate Social Responsibility (CSR) audit of five selected suppliers, all of whom passed our requirements. We also invited 28 long-term partners to complete the CSR assessment form so that we could be certain their commitment to CSR was still on track.

In mainland China, over 90 per cent of our current major suppliers successfully implemented the 6S methodology for managing their production plants efficiently. In 2019, all new suppliers must achieve the 6S standard as one of the criteria for approval.



### Creating Long-term Value for our Stakeholders

We are committed to looking beyond the short-term and creating long-term value for our stakeholders and the communities in which they live. This is at the heart of our business and our continuing success as a company.

Through the policies we have enacted and the practices we have implemented, we aim to set the highest possible standards of social and ethical behaviour for

our staff, contractors and industry peers, while doing the utmost to mitigate the impacts of our operations on the environment.

By committing to sustainable development, we believe we can create a better world for the communities we serve. In the years ahead, we will continue to live by this commitment and align our activities towards fulfilling our vision “to be Asia’s leading clean energy supplier and quality service provider, with a focus on innovation and environmental-friendliness.”