



Dunwell Engineering Company Limited

*Your Water Treatment
& Resources Management Partner*

OUR BUSINESS

- Provision of water & wastewater treatment solutions, design and installation of systems for municipal / industrial wastewater treatment & reuse and water purification;
- Provision of odor control and sludge reduction solutions;
- Provision of VMAT-advanced used oil treatment and recycle systems;
- Provision of resources management services on energy and water consultations;
- Provision of flammable gas storage engineering services including design, installation, overhaul and inspection of gas holder tanks;
- Provision of maintenance and operation services for treatment plants and facilities



Water Treatment

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MUNICIPAL SEWAGE REUSE



Sham Tseng DMBR Systems



Stonecutters Island DMBR Systems



To Kwa Wan DMBR & RO System

Global freshwater resource is running short. Amongst the possible measures, use of reclaimed water is a long-term strategy with significant meanings. As part of the Hong Kong Government's Total Water Management programme, Dunwell has installed three water reclamation facilities at Drainage Services Department's sewage treatment works for in-plant application of reclaimed water. The produced effluent from Dunwell Membrane Bio-Reactor (DBMR) and RO is reused for ground & facility washing, toilet flushing and landscape irrigation.



GREYWATER REUSE

A DMBR system was adopted in a 6 star casino hotel in Macau for saving up to 200m³/day of fresh water

Greywater refers to wastewater generated in households, hotels or office buildings from streams without fecal contamination, i.e. all streams except for the wastewater from toilets. Sources of greywater include, sinks, showers, baths, clothes washing machines or dish washers.

Although greywater contains fewer pathogens and dissolved organics than domestic wastewater, it still needs to have proper biological treatment and clarification prior to reuse. With the advantages of small footprint and membrane separation, Dunwell's Membrane Bio-Reactor (DMBR) can be easily built in a small plant room of building to recycle greywater into clean effluent.

Greywater reuse in urban water systems provides substantial benefits for both the water supply subsystem by reducing the demand for fresh water, as well as the wastewater subsystems by reducing the amount of wastewater required to be conveyed and treated. Due to absence of dissolved salt, the treated greywater can be used for irrigation and toilet flushing.

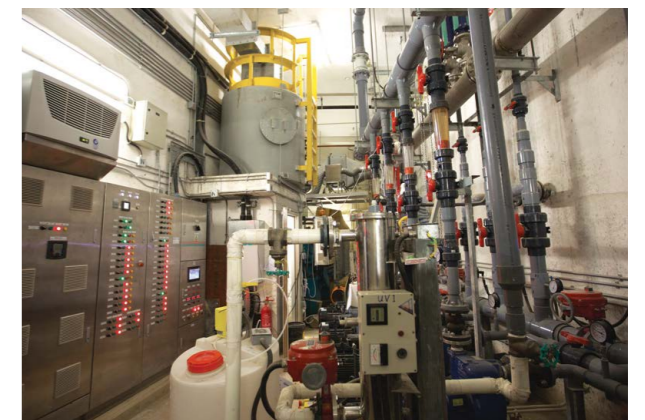
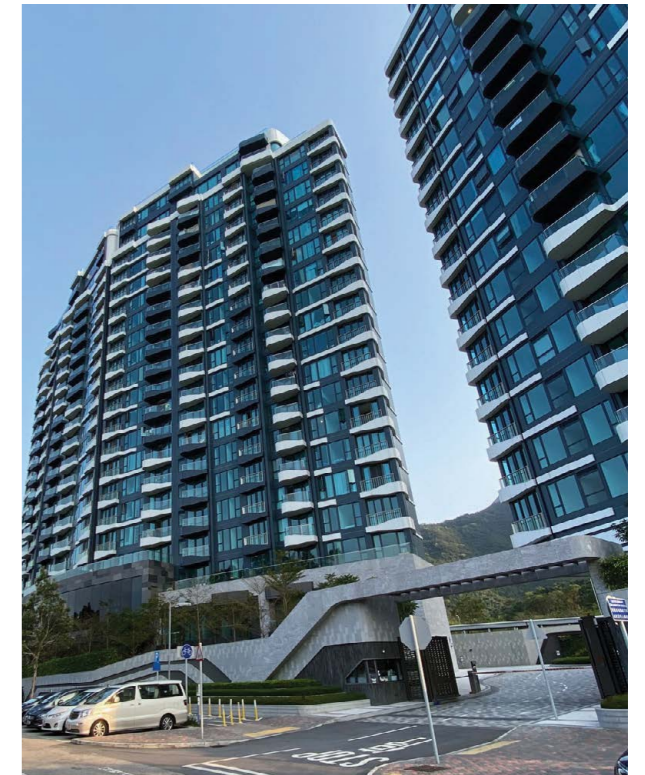
Not only hotels, the technology is also applicable to green residence and commercial buildings



RESIDENTIAL SEWAGE REUSE

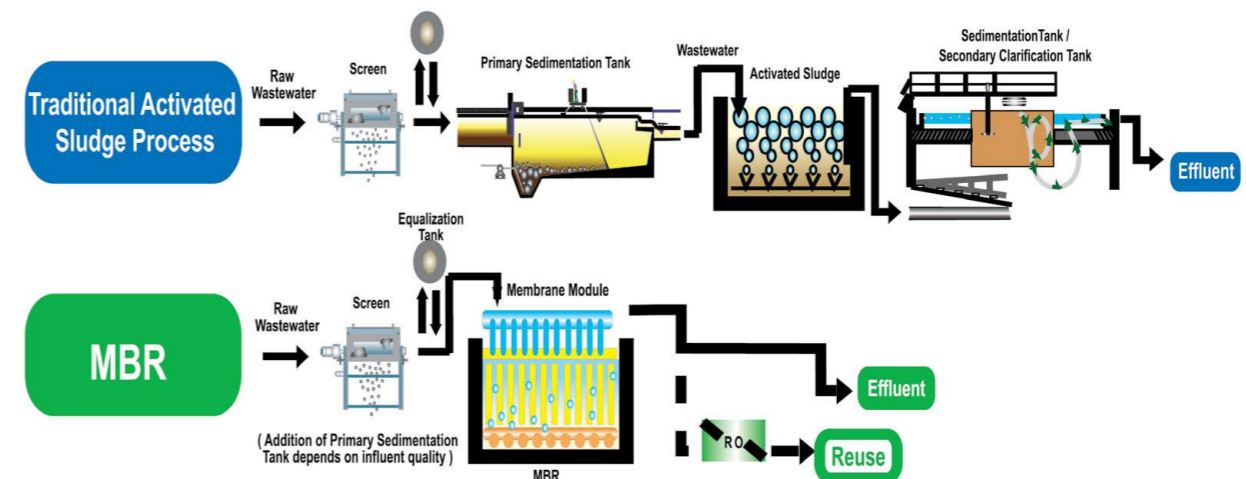
Following the development on rural areas of New Territories and Outlying Island and increased of environmental awareness, the demand on on-site sewage treatment and recycling is growing. Remote areas like Clearwater Bay, Discovery Bay, Lok Wo Sha, Southern Lantau Island and Kam Tin are not connected to the public sewer. As such, sewage treatment system has to be planned before commencement of development.

In Hong Kong, every square foot of land is extremely valuable. A compact and effective sewage treatment are the criteria for selection of sewage treatment process. Dunwell Membrane Bioreactor (DMBR) sewage treatment and recycling system can satisfy with these requirements. Utilizing the biochemical reaction and membrane separation technology, DMBR can help to save maximum 50% of space required by the traditional sewage treatment system and its high quality effluent can be directly discharged to coastal areas or reused for irrigation, toilet flushing and floor washing. Since 2017, DMBR has been treating the sewage from more than 2,000 of apartments, houses and hotel rooms.



Comparison between DMBR & Traditional AS Process

Process	Performance	Maintenance	Sludge Conc.	Energy Consumption	Space Saving	Bio Mass
AS Process	Fair	Fair	Low	High	Poor	Low
MBR	Excellent	Easy	High	Low	Good	High



CLUBHOUSE SEWAGE REUSE

Outdated sewage treatment plant and technology could be a nightmare to plant operators. Common problems include frequent system breakdown and lack of supply for replacement parts. However, without professional guidance, upgrading the existing sewage treatment plant may easily lead to interrupt of plant operation or suspension of sewage treatment. It could be a dilemma for plant operators.

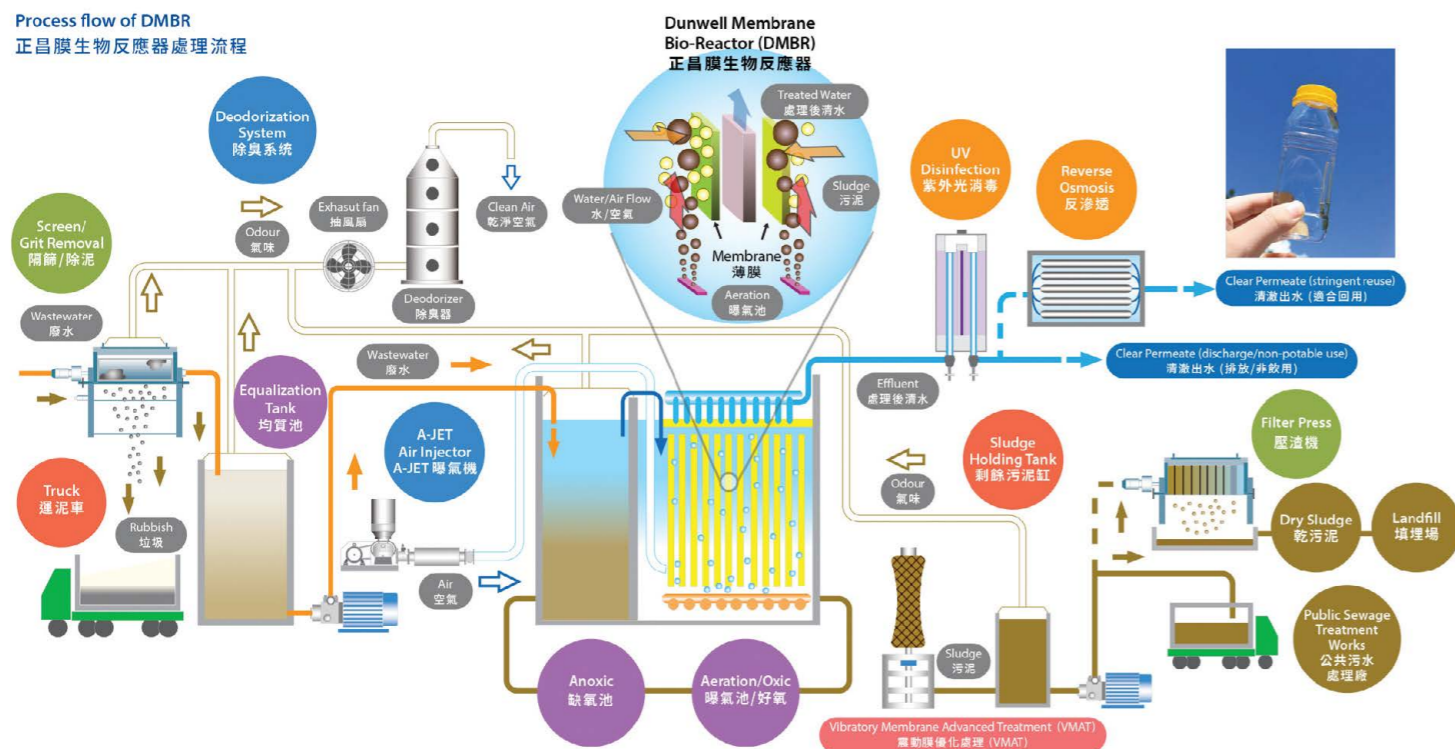


Only a simple incidence would create serious impact to the environment; especially, for the environmental sensitive zone



In Sai Kung, also known as the "Leisure Garden of Hong Kong", Dunwell's professional engineers successfully upgraded the outdated Rotating Biological Contactor (RBC) to the Dunwell Membrane Bio-Reactor (DMBR) without interruption of sewage treatment at a golf club. With excellent treatment quality, about 50,000m³ per annum of final effluent from DMBR is reused for irrigation. Besides, the plant room's odor problem has been substantially improved.

Process flow of DMBR
正昌膜生物反應器處理流程

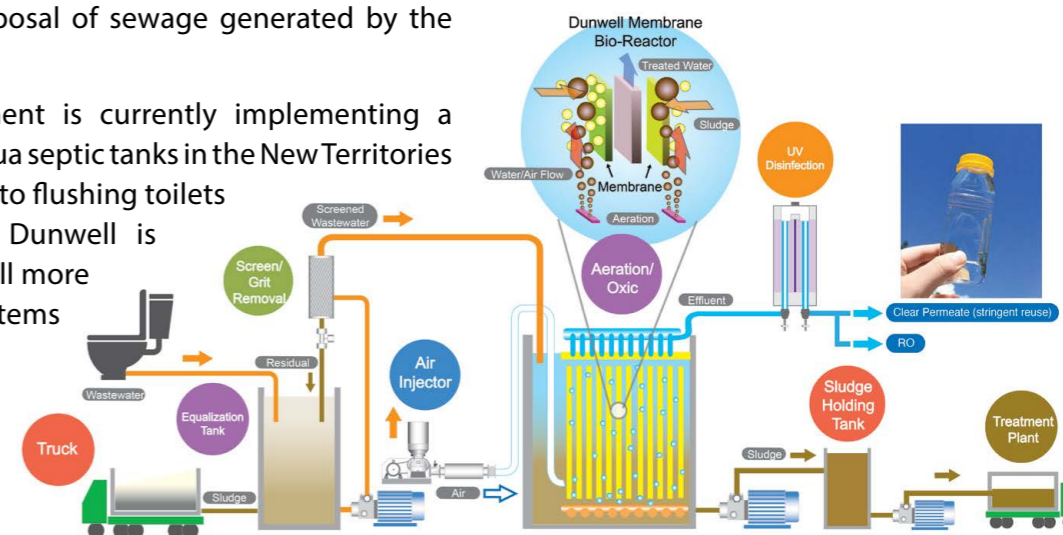
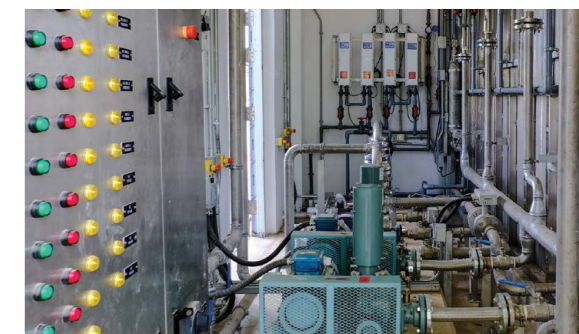


BIO-TOILET

Replacement of secondary clarification tank with ultra filtration membrane allows complete removal of suspended solid & biomass from treated water, ensuring a high quality effluent with close to zero sludge maintenance

Due to lack of public sewer in the vicinity of most public toilets, installation of small sewage treatment plants is a unique choice for disposal of sewage generated by the new flushing toilets.

Hong Kong Government is currently implementing a program to convert aqua septic tanks in the New Territories and outlying islands into flushing toilets by phases in which Dunwell is commissioned to install more than 180 Bio-Toilet systems to treat the sewage.



CONTAINERIZED SYSTEM

To cope with the needs of temporary construction sites with space constraints, Dunwell has designed to incorporate the entire Bio-Toilet system into a container which is compact, modularized and portable. The containerized system is factory installed, tested and designed to keep maintenance at a minimal level, providing reliable and efficient wastewater treatment. Its advantages are short delivery lead time, ease of relocation and fitting for sites with phased operations.

Applications

Containerized system can be used in applications such as water reuse, new housing developments, construction sites, parks, resorts, retrofits to existing wastewater treatment plant and pre-treatment for RO treatment system.

Design for applications from 5m³/day (1,300gpd) to 60m³/day (16,000gpd).



Features and Advantages

- Modular concept allows for phased construction of wastewater treatment plants and makes it adaptable to a wide range of size and flow rates.
- Compact design
- Factory installed and tested
- No construction works on-site
- Short delivery lead time
- Easy to relocate
- Web-based monitoring and control system
- Low-cost wastewater treatment system
- Minimal operator attention

DUNWELL MEMBRANE FILTRATION SYSTEMS

Ultrafiltration Ultrafiltration

Reverse Osmosis Reverse Osmosis

Ultrafiltration (UF) is used to remove the suspended solids, micro-organisms and improve turbidity.

Reverse Osmosis (RO) is used to further treat the UF effluent for removal of salts, bacterial spores and even certain bacteria and virus.

Applications :

- Lake Water Purification
- Secondary Treated Effluent Purification
- City Supply Water Purification
- Sea Water Desalination



Separation Process	Reverse Osmosis		Ultrafiltration			Particle Filtration		
	Nanofiltration		Microfiltration					
Relative Size of Common Materials	Aqueous Salt		Milk Proteins			E-Coat Pigment		Whole Broth Cells
	Metal Ion	Gelatin			Red Blood Cells		Fat Micelles	
	Endotoxin Pyrogen		Bacteria			Activated Carbon		
	Synthetic Dyes		Virus		Oil Emulsion			
	Lactose (Sugars)		Colloidal Silica		Blue Indigo Dye	Cryptosporidium		
					Giardia Cyst	Human Hair		
Microns	0.001	0.01	0.1	1.0	10	100	1000	
Approx Molecular Weight	100	200	1,000	20,000	100,000	500,000	1MM	5MM

LAKE WATER PURIFICATION



It is common for many large water consumers to directly extract water from lakes using a simple filtration process. However, additional processes are needed to treat lake water, the shore or contaminated with seawater. Extraction of Wei Yuen Lake inside The Chinese University of Hong Kong for irrigation and replenishment of cooling water is one of environmental targets for their Estate Management Office (EMO). However, high concentration of salts and suspended solids in the raw lake water is difficult for direct use.



By adopting our state-of-art Reverse Osmosis and Filtration System for treating the lake water, more than 360,000m³/year of crystal clear water is produced for irrigation and cooling water makeup. In other words, more than 360,000m³/year of city supply water is saved. It's not only a green project but it's also an economical solution to the end user.

SEAWATER DESALINATION

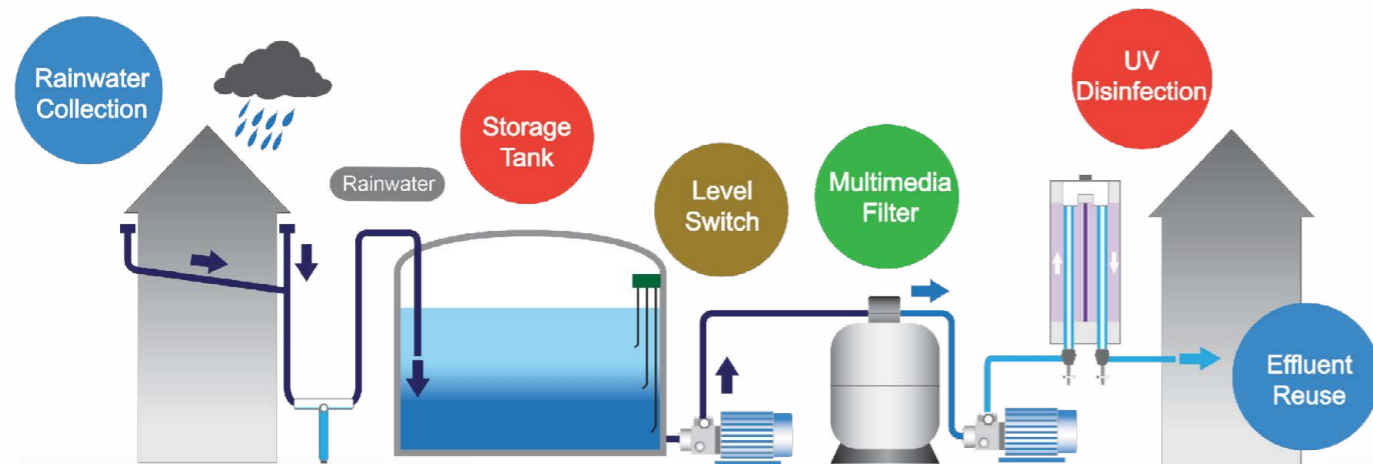
Reverse Osmosis (RO) System has been widely adopted to purify the sea water for the areas of world with limited of supply of fresh water. In Hong Kong, Dunwell has also been commissioned by Clearwater Bay Golf and Country Club to build a RO based seawater desalination plant to produce 2,500m³/day of freshwater for watering the greens.



RAINWATER RECYCLING

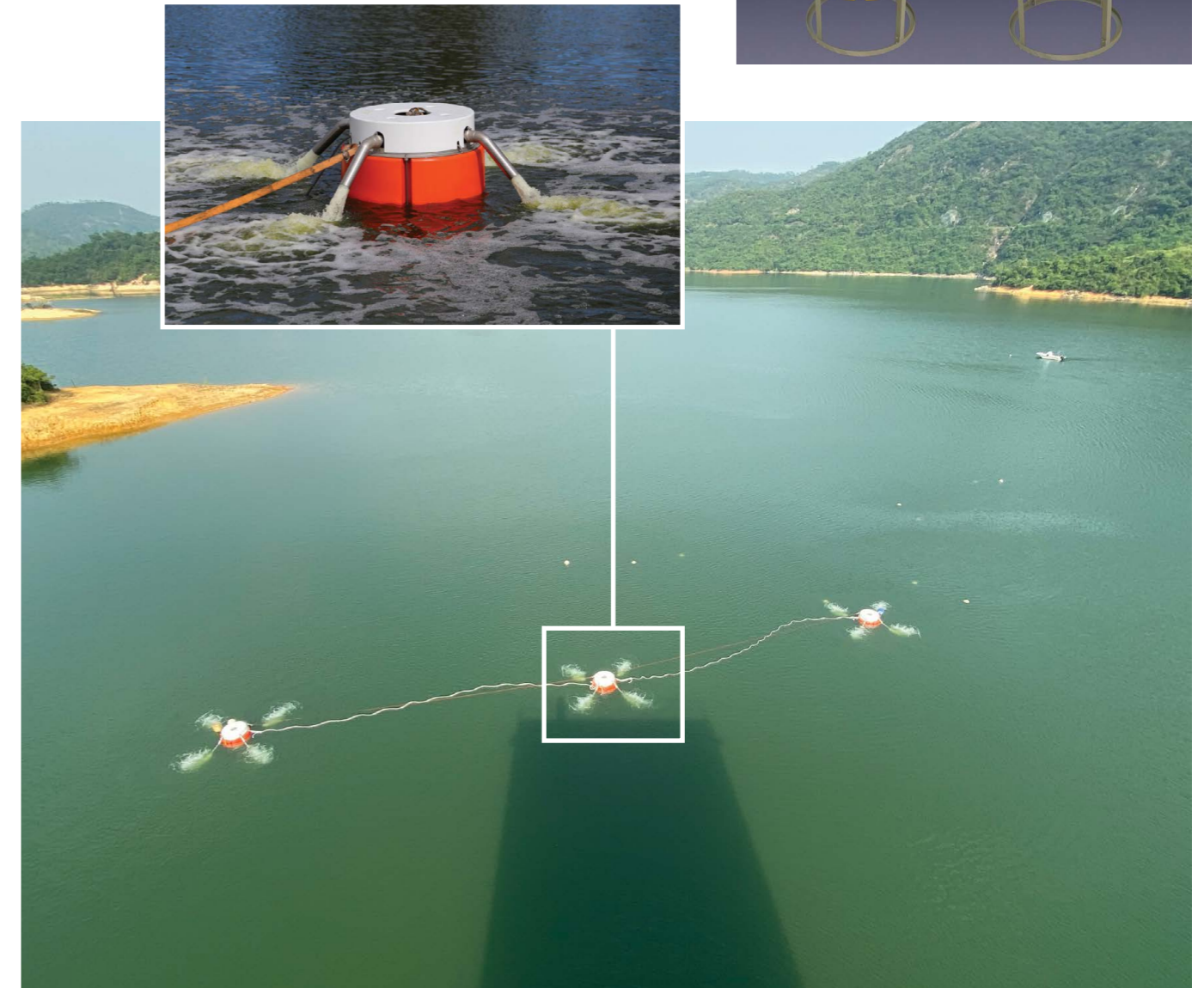
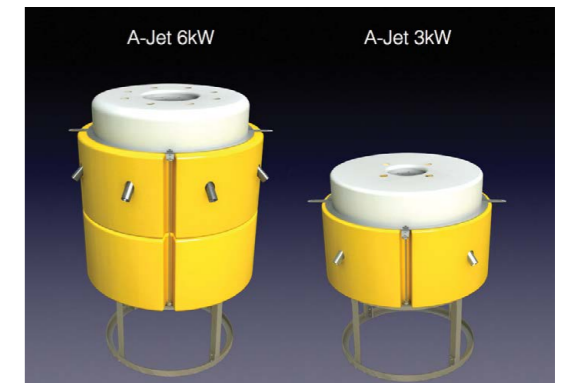
Effective recycling of rainwater can greatly reduce fresh water usage. Dunwell offers customized rainwater recycling system which collects, filters and sterilizes rainwater for irrigation or toilet flushing. By incorporating sand filters and UV sterilization lamp, the recycling system removes bacteria and organic contaminants to ensure that the effluent meets requiring standards and is safe to use.

The first flush device diverts the first few minutes of rainfall away from a rainwater recycling system. The first quantity of rainwater from the catchment area may contain a higher than average amount of accumulated dust, bird and animal faeces, leaves, and other debris. Therefore, using a first flush device can reduce most of the dirt go straight into the rainwater storage tank.



A-JET

The A-JET micro-bubble generator incorporates the newest micro-bubble technology which produces a range of bubbles from regular to micro size for water purification. In addition to transferring highly efficient dissolved oxygen (DO) into water, the regular bubbles improve water circulation, break down organic matters while the micro bubbles adhere to pollutants and act as a coagulant. Finally, a large amount of pressure and stored oxygen are released when the nano bubbles implode, hence destroying pathogen and purify the water.



FOOD PROCESSING WASTEWATER

Food processing wastewater is a major concern from the small food operations to large food processing plants. The high content of fats, oils and grease, and BOD₅ makes it increasingly difficult to comply with the environmental regulations governing the amount of waste that can be pumped into our sewers.

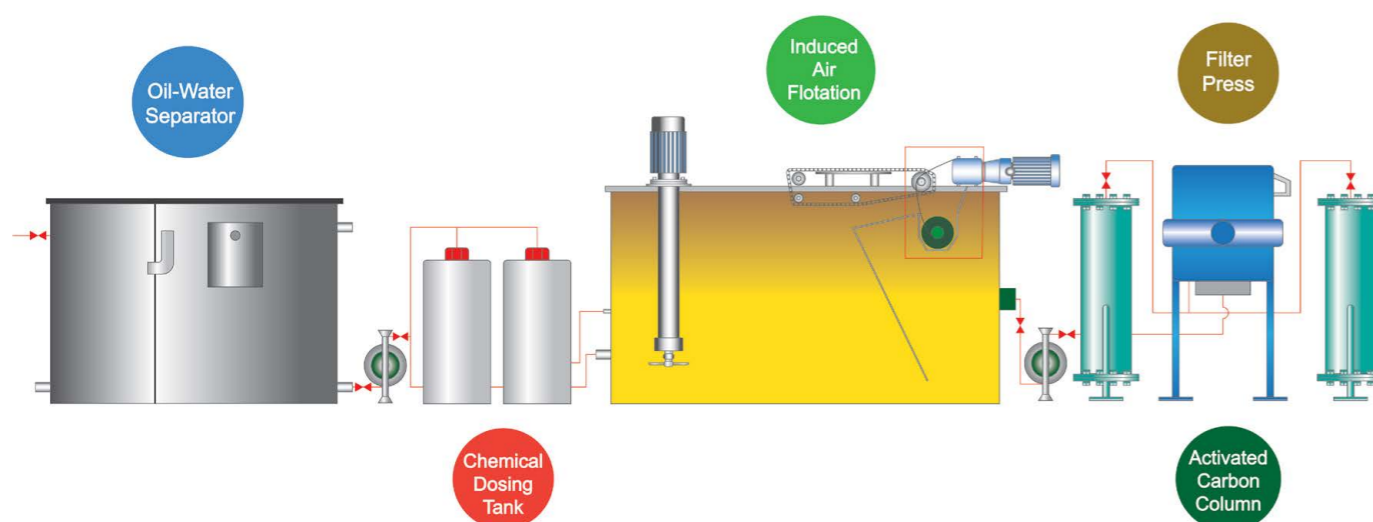
Dunwell Membrane Bio-Reactor (DMBR) technology is adopted at a holiday village campus to treat the oily wastewater from the canteen. The treated effluent can fully comply with the stringent requirements:

- NO_x ≤ 15 g/L
- BOD₅ ≤ 10mg/L
- E. coli ≤ 1 cfu/100ml



LAUNDRY WASTEWATER

The laundry wastewater treatment system is adopted in the laundry plant at Hospital Authority Supporting Services Centre. The treatment capacity is over 2,100m³/day. This laundry wastewater treatment system is designed to filter the residual lint generated from laundry water process, neutralize the pH value by applying residual chemical detergent and complying with EPD's regulations.



CHEMICAL ENHANCED PRIMARY TREATMENT

Dunwell Chemical Enhanced Primary Treatment (CEPT) system helps our client to produce high quality effluent with 95 - 99% removal of COD, suspended solids and oil & grease. Since 1996, Dunwell's CEPT systems are treating maximum daily flow of 80,000 - 100,000 L of car washing oily wastewater & quarry wastewater.



ABOVE GROUND OIL WATER INTERCEPTOR

Oil water interceptors are commonly used for treating oily wastewater from cars or floor washing in oil or gas service station. A multi-national petroleum company has installed Dunwell's Above Ground Oil Water Interceptors to treat oily wastewater generated in their stations. Adoption of above ground oil water interceptor can help to minimize the expensive civil works & the time-consuming vetting procedures in Buildings Department.



Through physical separation, suspended solids and oil in wastewater are separated. If needed, microfilter and activated carbon can be used to further remove or reduce the concentration of smaller suspended solids, Chemical Oxygen Demand (COD), surfactant and odour, etc. Similar systems have also been retrofitted in service depot of a public transportation company and brand name automotive dealer.

BIOLOGIC® SR2

Wastewater treatment plants, landfills and compost facilities are challenged with high and fluctuating costs related to energy usage, sludge accumulation and odor complaints. When a facility is under pressure from rising demand and aging infrastructure, problems escalate. Given the environmental and financial impact from these escalating problems, these facilities are under pressure to find solutions fast while dealing with limited budgets. BIOLOGIC® SR2 is just the right "Solution" and Dunwell is proud to announce our agreement with SciCorp International Corp for the exclusive distribution rights of BIOLOGIC® SR2.



BIOLOGIC® SR2 is a proprietary plant-based blend of organic micronutrients that stimulates specific aerobic, anaerobic, and facultative bacteria species. The product enables the rapid elimination of odors and reduction of biosolids. BIOLOGIC® SR2 does not contain bacteria or enzymes and is non-toxic and environmentally friendly.



BIOLOGIC® SR2 has proven worldwide to:

- Reduce aeration energy costs
- Stop odors and related complaints
- Improve stability of solids
- Reduce sludge and biosolids volumes
- Accelerate the compost process
- Increase Biogas production
- SAVE MONEY

For composting facilities, landfills, leachate ponds, transfer station, garbage container and grease traps

Benefits:

- Accelerates the breakdown of biosolids and increases methane production by up to 30%
- Increases activity rates of bacteria and rate of composting and biological breakdown of organic material/waste
- Prevents odors from sludge/biosolids
- Eliminates odors by reducing formation of H₂S, ammonia, and mercaptans
- Eliminates complaints from workers and neighbors



For municipal/domestic wastewater treatment plants

Benefits:

- Rapidly eliminates odors; reduces formation of H₂S, ammonia and mercaptans and eliminates complaints from workers and neighbors
- Accelerates the breakdown of biosolids and reduces operating costs related to aeration and sludge handling and disposal by up to 25%
- Reduces fats, oils and grease and scum
- Increases methane production from the aerobic and anaerobic digesters by up to 30%
- Increases activity rates of bacteria and biological treatment efficiency
- Significantly reduces accumulated organic sediment/sludge in holding tanks.
- Increased removal efficiency and reduces effluent concentrations for BOD, and COD
- Reduces overall plant operation cost



For agricultural odor control and wastewater treatment, including pig farms, poultry farms and manure tanks

Benefits:

- Reduces fats, oils and grease and scum
- Significantly reduces animal mortality via ammonia/H₂S control
- Eliminates odors: reduces formation of H₂S, ammonia and mercaptans and eliminates complaints from workers and neighbors
- Significantly reduces solids accumulation in manure ponds/tanks
- Significantly reducing pump out/dredging frequency



*BIOLOGIC and SciCorp are trademarks of SciCorp International Corp.

Manufacturer's address: 13-3300 Ridgeway Drive, Mississauga, L5L5Z9, ON, Canada

DEODORIZATION SYSTEM - ACTIVATED CARBON DEODORIZER/BIOLOGICAL TREATMENT

Striving to enhance the surrounding environment of wastewater treatment plants, deodorization systems are an important part of our design to treat the odorous air produced in the plant.

Activated Carbon Deodorizer

With its unique molecular structure, activated carbon can absorb and trap the odorous components such as H₂S and NH₃ within its pores and hence removing the odor from the gas. Since the process is simple and activated carbon is extremely durable, the filter only requires minimal supervision and maintenance.



Biological Odor Treatment System

By introducing the odorous air into the biological deodorization unit, the odorous components dissolve into water and are absorbed by the bacteria inside the water, as the bacteria acquires energy by oxidizing them. This method is low in both equipment and operation cost, and can be combined with the activated carbon method to obtain optimal result.



FILTER PRESS (SLUDGE HANDLING) **ISHIGAKI**

Wet sludge slurry is a by-product of the wastewater treatment process. The wet sludge slurry must be conditioned and dewatered for achieving 30% solid contents in the final sludge cake before disposal. As such, proper and professional sludge handling process is required. With years of experience, Dunwell chooses a high quality filter press from a Japanese professional manufacturer, Ishigaki, and adopts them in our wastewater treatment processes. Based on client's requirements and site constraints, we propose the best filter press combination to our clients for selection.

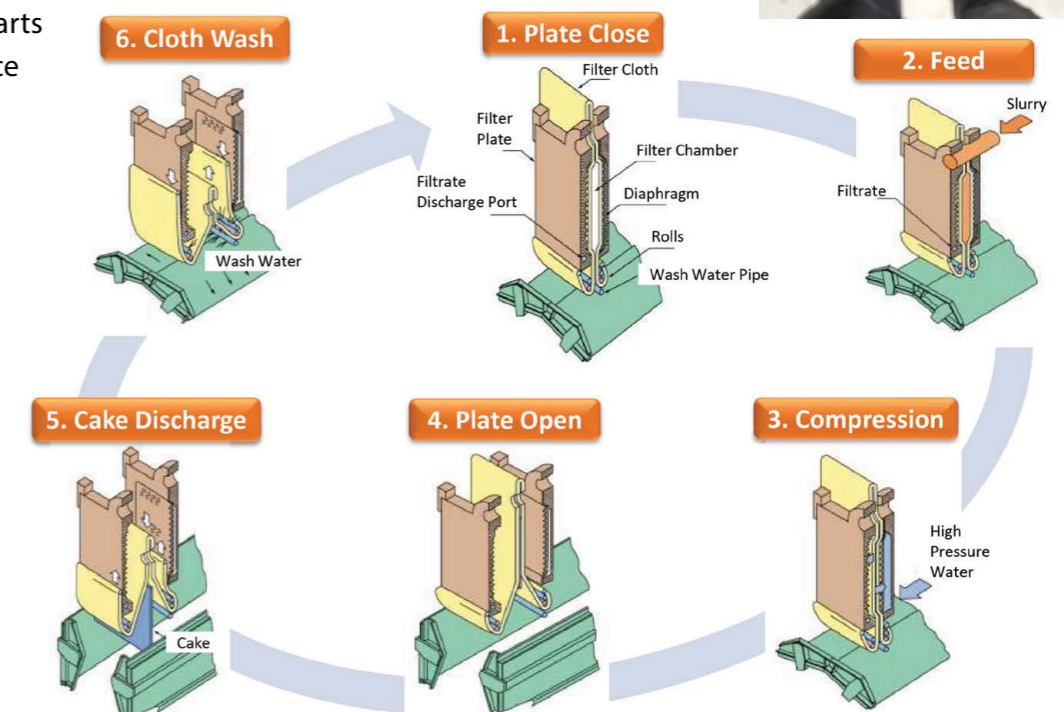


Features:

- Fully automatic operation**
 - 24hrs automatic operation
 - Cake discharge monitoring system
- High production capacity**
 - Easy to achieve at least 30% solids content in dry cake
- Large capacity is available**
- Robust and simple design**
 - Fewer moving parts
 - Easy maintenance

Technical features:

- Filtration area; from 65m² to 800m²
- Compression pressure; from 0.7MPa to 1.5MPa (Max 2.9MPa)



VIBRATORY MEMBRANE ADVANCED TREATMENT (VMAT)

VMAT is a membrane separation technology which applies ultra high tangential frequency mechanical vibration on membrane surface to prevent fouling. Membranes of different pore sizes and materials can be installed on VMAT to customize different applications and requirements. It is particularly suitable for high solids and oil content fluids on sub-micron level filtration applications, such as landfill leachate, oil-water emulsified wastewater in metal industry, PCB dry film developing wastewater, etc. Without addition of any chemicals, VMAT is purely a physical separation process and thus allows recycling of valuable uncontaminated resources from wastewater. The permeate can possibly be reused for industrial purposes.



With continuous effort in R&D and technological advancement, Dunwell has developed a breakthrough VMAT oil recycling technology that has been recognized with numerous international awards. VMAT process has created a new era and standard for the oil recycling industry worldwide. Its low temperature (85°C) & low pressure (50 psi) features imply a reliable and energy efficient recycling option for oil recyclers to achieve a fast ROI (less than 3 years) lubricant recycling business with a low carbon footprint.

Applications:

- Landfill Leachate
- Glass Grinding Wastewater
- Zero Liquid Discharge
- Boiler Chemical Clean Effluent
- Food Processing Wastewater
- Nano Particle Concentration
- Waste Emulsified Cutting Fluid Recycling



VMAT®



ENVIRONMENTAL IMPACT ASSESSMENT & CONSULTANCY

With growing environmental awareness around the world, most development projects are opting for a technical evaluation and consultancy from the environmental industry to assess possible effects of the project.



Dunwell provides expertise for a full rounded environmental impact assessment and consultancy in defining strategies for reducing the impact to relevant environmental aspects and optimizing different resources for your development projects.

Our services include:

- Water consumption auditing and analysis
- Water balance modeling
- Optimization of water usage
- Identification of optimal water management practices for operational and environmental purposes
- Development of reuse and disposal strategies
- Environmental permit / Project profile application
- Water Pollution Control Ordinance (WPCO) Compliance services

GAS HOLDER CONSTRUCTION

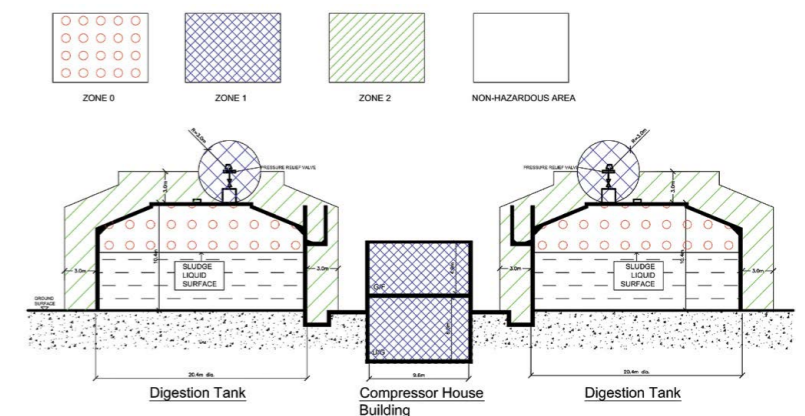
Dunwell specialized in design, installation, building and overhauling of gas storage tanks since the year of 2000. We are the leading gas storage engineering services provider in Hong Kong and Macau.



Energy recovery from sewage treatment plant & steel mills

INSPECTION & MAINTENANCE

We provide inspection service for different kinds of gasholders including dry seal and water seal types by our specialized competent persons. And we also provide zoning classification survey service for sewage treatment plants.

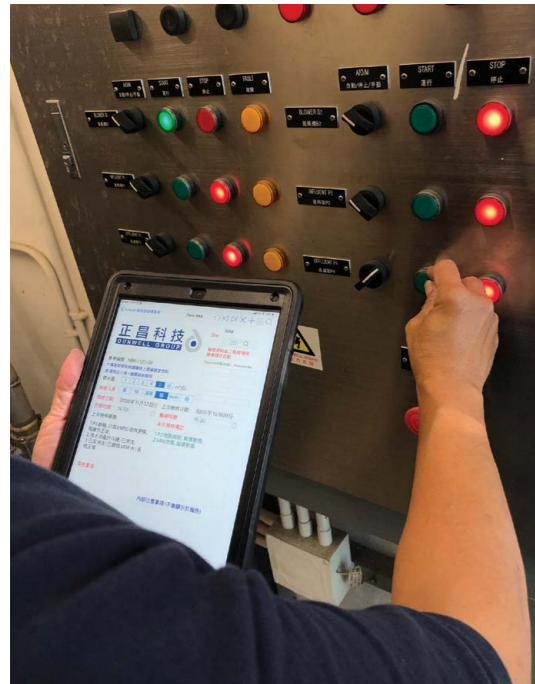


Biogas survey for four sewage treatment works of DSD

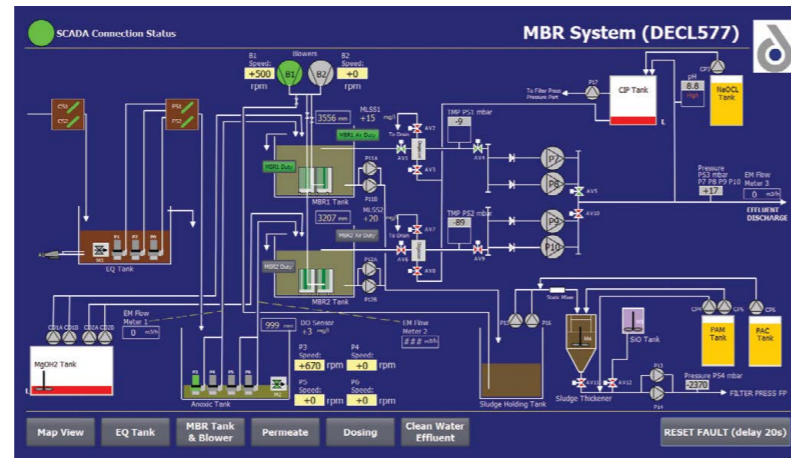


Internal examinations of dry sealed gasholder at sewage treatment work

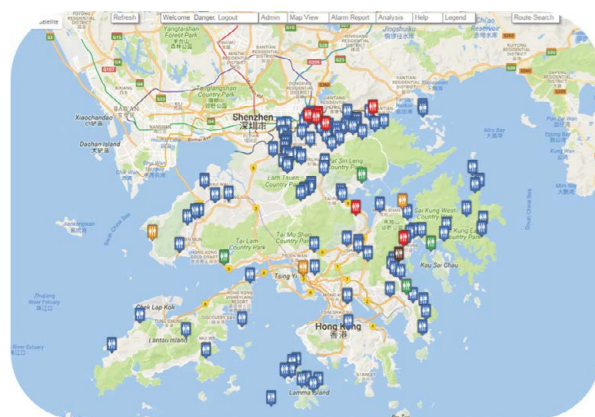
Plant Maintenance & Operation Services



Routine maintenance is critical for all kinds of water and wastewater treatment facilities. Proper maintenance not only ensures the effectiveness and efficiency of system operation, but also avoids unnecessary downtime as well as unplanned and expensive repairs.



Dunwell offers quality and reliable Maintenance Management Programme, Preventive Maintenance, Process Operation and Overhaul Services for different types of water and wastewater treatment plants. A broad range of service package can fulfill the needs of different treatment facilities, as well as extend the lifespan of equipments and ensure the effluent quality meets the standards.



Dunwell's Remote Monitoring & Control Platform allows internet-accessible to the sewage treatment plant. The system has the following features which include web-based monitoring on all control parameters and alarms, web-based reporting, IP cam monitoring, and SCADA function. These functions provide the capability of adjusting the parameters to ensure smooth and optimal system operation and managing the online acquired data for future review and analysis.



Dunwell Engineering Company Limited is an environmental technology company specialized in providing solutions and services on water & wastewater treatment, used oil treatment & recycling, plant maintenance & operations, resources management, and other environmental engineering related consultations.



2018 Gold Medal with the Congratulation of Jurys at the 46th International Exhibition of Inventions of Geneva
第46屆日內瓦國際發明展評判特別嘉許金獎



2008 Hong Kong Awards for Industries Technological Achievement Grand Award
香港工商業獎：科技成就大獎



2017 Hong Kong Awards for Industries Equipment & Machinery Design Grand Award
香港工商業獎：設備及機器設計大獎



2008 National Environmental Science Award The Silver Prize (Beijing, China)
中國環境保護科學技術獎二等獎(中國北京)



2017 Hong Kong Awards for Industries Technological Achievement Award
香港工商業獎：科技成就獎



2006 IChemE Awards Environment Award (London, U.K.)
國際化學工程師學會環保大獎(英國)



2017 Hong Kong Awards for Industries Innovation & Creativity Award
香港工商業獎：創意獎



2006 Wall Street Journal - 9th Asian Innovation Award Bronze Prize (Singapore)
華爾街日報-第九屆亞洲創新獎銅獎(新加坡)



2017 FITMI Innovative Technology Achievement Award
FITMI 創新科技成就大獎



2005 Hong Kong Awards for Industries Machinery & Equipment Design Category Grand Award
香港工商業獎：機器及設備設計大獎



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