UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

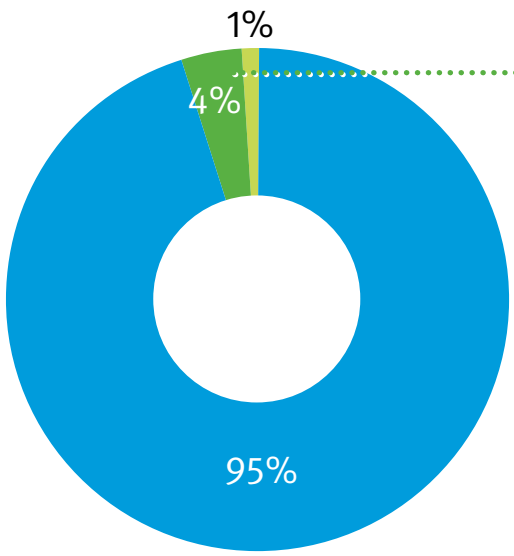
ECO-INDUSTRIAL PARKS VIET NAM

OPPORTUNITIES AND REGULATORY CHALLENGES FOR INDUSTRIAL WATER REUSE IN VIET NAM

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

THE STATUS QUO OF INDUSTRIAL WATER REUSE IN VIET NAM

Water uses in Viet Nam (yr 2005)



Key water intensive industry sectors:

- Food and beverage processing
- Textile processing
- Chemical manufacturing

Main industrial uses of water:

- Process water
- Cooling
- Steam generation

Water withdrawal by source (yr 2005):

- Total water redrawal = 82.03 km_3
- Surface water = 98.1% (80.45 km_3)
- Groundwater = 1.7% (1.4 km_3)
- Direct use of treated wastewater = 0.2% (175 million m_3)

Source: Food and Agriculture Organization (FAO) of the United Nations (2016). AQUASTAT Viet Nam profile. www.fao.org/nr/water/aquastat/countries_regions/VNM/

Existing policy and regulatory framework

Current regulatory framework in relation to industrial water reuse

Decree 80/2014/ND-CP (Article 24) on the management and reuse treated wastewater. Reusing treated wastewater must meet the following requirements:

- Quality of treated wastewater must comply with appropriate standards and national technical regulations applicable to intended applications, not affecting the community's health and safety, and ensuring environmental hygiene;
- Treated wastewater has to be delivered to the user by a separated piping system, ensuring no intrusion and no impact to clean water supply system in the same area;
- The Ministry of Natural Resources and Environment (MONRE) shall coordinate with other related ministries.

Circular 04/2015/TT-BXD regulates that treated wastewater to be reused for direct applications (e.g. agricultural irrigation, watering trees, cleaning roads and vehicles, reuse in industry) has to meet national standards of used water for the corresponding applications.

- For example, wastewater reuse for watering trees has to meet column A QCVN14/ 2008/BTNMT and a plan for the wastewater reuse must be approved by MONRE or other relevant ministries (Ministry of Agriculture).

Currently companies submit a request letter to MONRE outlining their intention for reusing wastewater. MONRE will review the request and provide instructions customised to each case, including additional documentation that is required. An approved Environmental Impact Assessment (EIA) is compulsory.

Current challenges

- There is currently **no detail guidance on how to obtain the approval** from the government for reusing wastewater. There are national standards issued by Ministry of Science and Technology, but it is often not known which standard is applicable in individual cases.
- It is a **long process to obtain government approval** for water reuse, because detailed data is required by the government on the water quality and intended reuse. Extensive monitoring and reporting systems are required for wastewater treatment and reuse.
- Companies must discharge their effluent to a centralized wastewater treatment facility or other treatment unit (Article 9, circular 35/2015TT-BTNMT). **Companies are not allowed to transfer their wastewater to another company** which does not have a wastewater treatment function registered in its business license.
- **Industrial water reuse is very sensitive,** because authorities are concerned that companies will take advantages of the approval to discharge unqualified treated wastewater into the environment.

CASE-STUDY ON INDUSTRIAL WATER REUSE: HEINEKEN DA NANG BREWERY

Overview

Heineken Viet Nam is a subsidiary of Heineken, the world's most international brewer. Originated in the Netherlands, the family-owned business brews and distributes over 300 beer and cider brands in more than 190 countries. Heineken Viet Nam was established in 1991 and now operates six breweries in Viet Nam. Heineken Viet Nam is the second largest brewer in Viet Nam with more than 3,500 employees. In 2017 and 2018, HEINEKEN Viet Nam was recognized as the most sustainable company in Viet Nam by the Viet Nam Chamber of Commerce and Industry (VCCI) based on the annual Corporate Sustainability Index.

Specific water consumption (hl/hl beer)

In addition to closely managing its water consumption, Heineken Viet Nam believes that prudent wastewater management is critical to sustain its valuable water sources and environment. Fresh water is a key ingredient for its products, making up approximately 95% of beer. In Viet Nam and around the world, the demand for water is increasing, driven by a rapidly growing global population, urbanization and economic growth. This calls for a careful, integrated approach in the way in which Heineken manages its water resources.

Heineken's brewery in Da Nang is located in the Hoa Khanh Industrial Zone. Since 2014, the Da Nang brewery has been recognized among the top 5 water efficient breweries in its Heineken peer group, making its performance on par with its peers in Portugal, Mexico and United Kingdom. Over the years, its water consumption has continued to decrease and is well below the Heineken global performance of 3.6 hl/hl.

Heineken's brewery in Da Nang

Source: Heineken Viet Nam 2017 Sustainability Report.

Opportunity for water reuse

Achievements of Heineken Viet Nam

Da Nang Brewery **Top 5** among water efficient breweries across HEINEKEN Group worldwide, since 2014

Reduced the effluent organic load discharged by **18.6%**, contributing to Vietnam's national target of improving water quality and preventing pollution

Wastewater Treatment Standards **surpassed government's requirement** and safe enough to sustain aquarium life and vegetation in our brewery

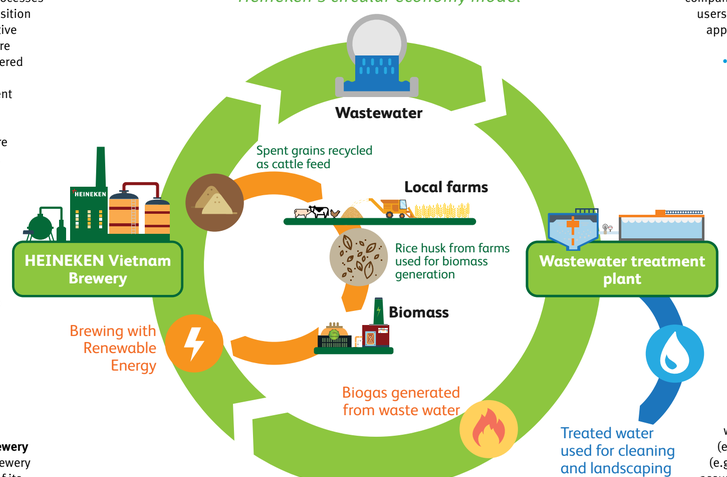
Over the years, Heineken's production processes have been continuously improved to transition towards a more regenerative and restorative model. The circular economy model, where resources are reused, recycled and recovered throughout the product lifecycle, allows Heineken to utilize resources in an efficient and responsible manner.

The goal of Heineken is to go beyond mere pollution abatement and to instead seek to create value from wastewater for the benefits of society and the environment as wastewater flows contain potentially useful matters such as nutrients and other organic matter. Having gone through the treatment process, the treated wastewater can be reused for productive processes. Heineken's treatment processes also allow energy to be recovered through sludge and bio-solids in the form of biogas – which is a renewable fuel used in our thermal mix. Heineken Viet Nam invested in an online monitoring system in order to track the quality and efficiency of the treatment.

Currently only a minor proportion of the treated wastewater from the Da Nang brewery is reused for gardening activities. The brewery has been investigating potential reuses of its treated effluent. As the brewery is located in the Hoa Khanh Industrial Zone, multiple neighbouring companies have been identified as potential users of the treated effluent for the following applications:

- Process water for a paper producer;
- Cooling water for Viet My Steel Company;
- Water to control dust from the Green Energy Company;
- Process water for multiple other companies located in the industrial zone;
- Water for the fire extinguishing system within the industrial zone.

Heineken's circular economy model



Source: Heineken Viet Nam 2017 Sustainability Report.

It is clear that enabling one or more of these industrial water reuses will provide substantial savings in water conservation while also providing economic benefits. The table below highlights the potential economic and environmental benefits of reusing the treated effluent from Da Nang brewery, while recognising that basic infrastructures (e.g. pipelines) and operational arrangements (e.g. long-term supply contract, quality assurance, regulatory permission) need to be in place to enable the industrial water reuses.

Table: Potential benefits of industrial water reuse at Heineken's Da Nang brewery

Potential environmental benefits		Economic benefits		Investments	
Item	m^3/yr	Item	Million VND/yr	Item	Million VND
Reduction in effluent disposal by Da Nang brewery	Up to 190,000	Reduction in effluent disposal fees for Da Nang brewery	665	Reservoir tank	7,500
Reduction in potable water use by recipient company/ies	Up to 190,000	Reduction in clean water costs for recipient company/ies	3,230	Pipeline system	780
Totals			**5,225**		**8,280**
		Indicative payback time = 2.1 years			

Assumptions:
- Disposal fee for A-type treated wastewater is estimated at 3,500 VND/m^3;
- Cost of clean water from municipal water supply system is estimated at 17,000 VND/m^3;
- Reservoir tank: Tank capacity of 5,000 m^3. Cost of tank estimated at 1.5 million VND/m^3;
- Pipeline system: 1000 meter of HDPE tube pipeline (Diameter 250 mm). Costs of pipeline estimated at 650,000 VND per meter. Additional parts estimated at 10% of pipeline costs. Labour cost for installation 10% of pipeline costs;
- Costs estimates for pipeline and reservoir tank are based on data of Vietnam National Cleaner Production Centre (VNCPC).

Enabling the water reuse at the brewery

Current challenges in Viet Nam's regulatory framework, as highlighted in previous section of this case study, hamper the further development and implementation of the identified reuses of the treated effluent from Heineken's Da Nang brewery. To eliminate these challenges, Heineken is interested to work with the authorities for a legal framework that allows the brewery to share its treated effluent with neighbouring companies.

Capturing the opportunities for industrial water reuse in Viet Nam

The demand for industrial water reuse is increasing in order to conserve water resources but also for companies to save on their production costs. Further, the Government of Viet Nam is pushing for the country to transition into a circular economy. Various initiatives are under development and being implemented to facilitate this transition. For example, the Vietnam Environment Administration (VEA) is planning to review existing regulations on the management of treated wastewater with a view of streamling these. Another government initiative is the implementation of Decree 82, as outlined below.

Decree 82: Policy framework to support industrial water reuse

The recently approved **Decree 82/2018/ND-CP 'Management of Industrial Parks and Economic Zones'** prescribes the planning, establishment and operation of policies on and state management of, industrial parks and economic zones. The Decree explicitly mentions instructions for the implementation of Eco-Industrial Parks (EIP)[1]. Value recovery and reuse of industrial by-products, energy, and water are key elements of the EIP concept. **The Decree 82 aims to further remove regulatory barriers to could hamper EIP development, including industrial water reuse.**

Decree 80/2014 regulates the drainage and treatment of wastewater including its reuse. As part of Decree 82/2018 (Article 42) it is compulsory for an industrial park to have at least one industrial symbiosis implemented in order to be recognized as an eco-industrial park. Industrial symbiosis is defined as the cooperation between enterprises to optimize the use of natural resources, including (waste)water. Therefore, both Decree 80 and Decree 82 include a focus on enabling the sustainable and safe reuse of industrial wastewater.

To support the implementation of Decree 82, it is envisaged that Ministerial circulars on industrial water reuse will be developed. These circulars will serve as national technical guidelines for both industries and government authorities to streamline the approval processes for industrial water reuse in a safe and sustainable manner.

In 2019, UNIDO will support the Government of Viet Nam with the development of the circulars for industrial water reuse in Viet Nam. This activity is led by the Ministry of Planning and Investment.

If you would like to learn more about this case study or be involved as stakeholder in the operationalization of Decree 82/2018/ND-CP on industrial water reuse in Viet Nam, please get in touch with us at EIP@unido.org.

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna International Centre • P.O. Box 300 • 1400 Vienna • Austria
Tel.: (+43-1) 26026-0 • E-mail: info@unido.org
www.unido.org