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## Establishment of Eco-industrial Parks

- Focus on regional recycling economy and enterprise clean production
- Scientific planning of regional product system and industrial structure distribution
- Supplement and improve the Industrial Chain of Cycling Economy
- Improve overall resource utilization of parks
- Promoting regional energy saving
- Improve regional environmental quality
- Achieve overall development goals of Shanghai Chemical Industrial Zone
- Eventually build internationally competitive resource-saving, environment-friendly, technologically advanced world-class chemical Eco-Park



- Through the introduction of advanced production technology, the total industrial wastewater discharge is greatly reduced.
- Total quantity of WW is 37,500 ton/d after projects of Phase One go into operation, the impact on the surrounding environment is greatly reduced.

- Environmental investment of SCIP is up to 1.045 billion U.S.D, accounted for 10.41% of the total investment
- 1.174M m<sup>2</sup> of public green area has been built
- The afforestation coverage rate will reach 25%.





	<p>The detailed design report of natural treatment systems of Shanghai Chemical Industry Park</p> <p>EDAW Co. Ltd.</p> <p><b>2005 -12</b></p>	
	<p><b>Participants</b></p>	
	<p>Luo Xiong, Msc. Eco-engineer EDAW (SH)</p>	<p>Qi Zhou, PhD. Prof. of ES&amp;E Tongji University</p>
	<p><b>Alexander J. Horne</b> , PhD. Emeritus professor Berkeley, UCLA</p>	<p><b>Alan Johnson</b> Sr. Landscape Architect EDAW (SF)</p>
	<p><b>Slavomir Hermanowitz</b> , PhD Prof of EE Berkeley, UCLA</p>	<p><b>Kerry Mc Walter</b> Eco-Engineer EDAW (SF)</p>
<p>Wenshan He, Eco-PhD. EDAW (SH)</p>	<p>Ming Li, Landscape Architect EDAW (SH)</p>	

# Artificial eco-wetland of Shanghai Chemical Industry Park

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- The artificial eco-wetland of SCIP is surface flow wetland
- The wetland is inverted L-shape, at the northeast corner of Chemical Industry Park, covering an area of 33 hectares.
- China's first try on constructed wetlands for wastewater treatment of chemical zone.



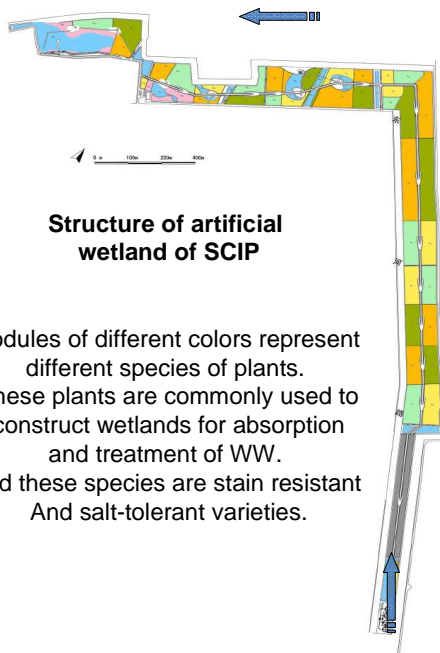
## 生态湿地水循环系统



## Processing mechanism and expected treatment effect

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- The wetland WW treatment principle is: When water flows through the wetland ecosystem composed by soil, aquatic plants and microorganism, the pollutants are precipitated, evaporated, degraded or absorbed by physical, chemical and bio-chemical processes, to achieve the purification purpose.
- According to calculations, the parameters of wetland effluent water quality will be significantly improved.
- BOD is expected to decrease 84%, COD 70%, SS 99.4%. Concentration of various toxic substances will also be significantly reduced.



川蔓藻 *Ruppia maritima*



芦葦 *Phragmites communis*



水烛 *Typha angustifolia*



水葱 *Scirpus tabernaemontani*



宽叶香蒲 *Typha latifolia*



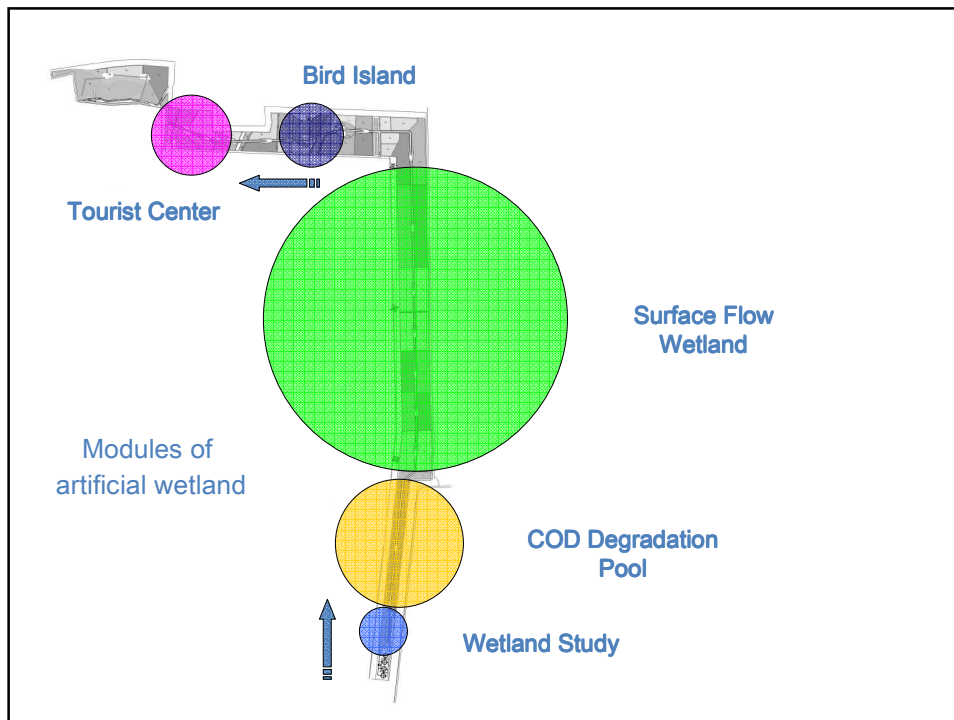
菵 *Zizania sp.*



睡莲 *Nymphaea tetragona*



茭菜野菱 *Trapa sp.*



## Operation Goal of Artificial Eco-wetland

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- In 2008, use central water for circulation, open up the wetland processes to ensure plant growth, gradual enrichment of microorganism and gradual maturation of wetland. At the same time, explore the control experience of water level, flow rate and residence time of wetland, and conduct water quality monitoring, to accumulate basic data.
- In 2009, mix the central water and treated organic waste water which reaches discharge standard, to carry out pilot work of wetland test cell. According to the test results, in the second half of 2009, gradually introduce part of the compliant organic wastewater into the large wetland for test run, strengthen the monitoring and accumulate data.
- In 2010, according to results of the test run, use treated organic effluent as the main water source for wetlands in order to eventually achieve the purpose envisaged in the

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Wageningen University  
www.wageningenur.nl

## Purification function of artificial wetland

Process	Target pollutants
Biological effects affecting chemical conversion process	nitrogen 、 BOD、 organic
Precipitation and burial	Phosphide, suspended solids, carbide
Sedimentation	Metal, sulfide
Flocculation and sequestration	Metals, dissolved organic carbon, pathogens
Plant absorption	Nutrients, micronutrients
UV degradation	Pathogens, COD
Volatilization	Organic toxins, organic chemicals

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## Pollutant removal of artificial wetland



- Removable pollutants in artificial wetlands have a wide range, including N, P, SS, organics, trace elements, pathogens, etc.
- The study results show that the BOD<sub>5</sub> removal rate of artificial wetlands is up to 85%-95%, COD removal rate is more than 80%. BOD<sub>5</sub> concentration of treated effluent is about 10mg/l, SS is less than 20mg/l.
- As organic nutrients of heterotrophic microorganisms, the majority of wastewater organic compounds is eventually transformed into microorganisms and CO<sub>2</sub>, H<sub>2</sub>O.

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## Significant environmental features and benefits

- Wetlands are closely related with survival, reproduction and development of human. It is ecological landscape with most biological diversity, and most important living environment of mankind
- It is not only offering a variety of resources to the production and living of human race, but also has great environmental features and benefits





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## Ecological effects of wetland

- Natural wetland environment provides a rich food and good survive and reproduction space for birds and fish. It plays an important role for species preservation and protection of species diversity.
- Wetlands also have an irreplaceable role to other systems in resisting flood, regulate runoff, pollution control, climate regulation, soil erosion control, and promote deposition reclamation, landscaping, etc.





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## The economic benefits of wetlands

- Provide a wealth of animal and plant products
- Provide reed as important raw material for light industry, i.e. paper & pulp
- Provide water resource in water transportation, water storage and water supply.






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## Social effects of wetlands

- Water body of wetland has important social benefits, on the environment, climate regulation, provision of relaxation space.
- Increase the area of water, blend natural water features with artificial water. Close to nature, enjoy nature, increases water sights and beautify the environment .
- Wetlands are not only having social benefits of beautifying the environment,, but also has high economic value.





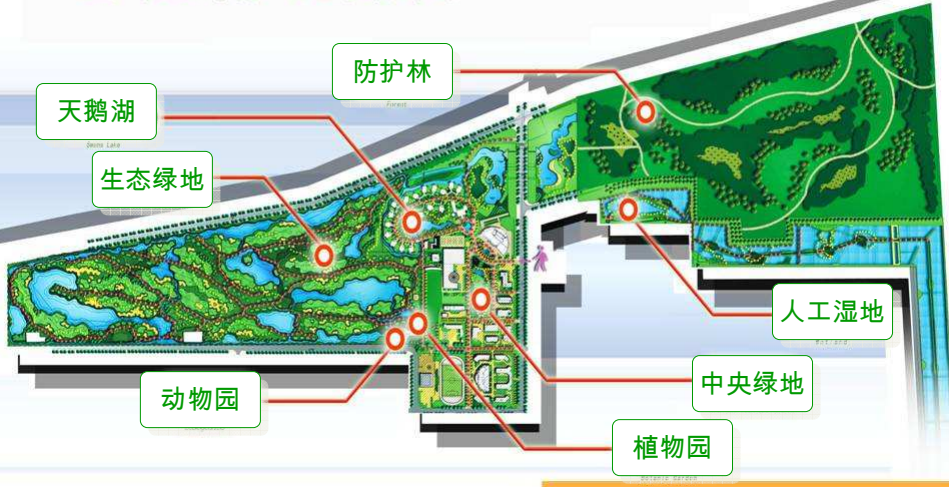
## Wetland preservation our responsibility and examination

- In the field of environmental protection, wetlands, forests and oceans are considered as the three ecological areas of the world
- Wetlands not only have significant ecological functions such as water maintain, water purification, water storage and drought prevention, but is also area of rich biodiversity
- Wetlands preservation is very important. forests are the lungs of nature, wetlands are nature's kidneys.



## 上海化学工业区生态园 SCIP Ecological Garden

生产与生态平衡、发展与环境和谐



## Integration of environmental protection benefits the construction of eco-industrial park with balance of production and ecology



## Overall goal of Eco-Industrial Park Planning

- Lead the chlorine chemicals and fine chemical production chain, drive the rapid development of regional economy
- Adhere to recycling economy and clean production, foster the development of resources and integrated industries, promote regional energy conservation, improve the overall resource utilization level of park
- Improve regional environmental quality, to achieve overall development goals
- Build an internationally competitive resource saving, environment friendly and technologically advanced world-class chemical eco-industrial park





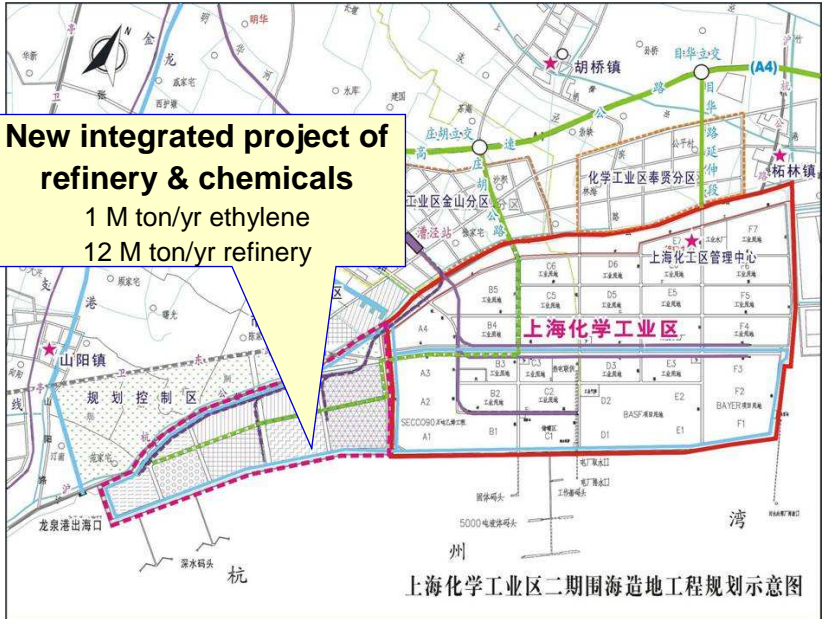
## Construction of chemical eco-industrial park with characteristics

- Scientific planning and logical distribution
- Circular economy and energy saving & emission reduction
- Coordinate regional economic development and ecological environment improvement
- Continuing to explore, innovate, sum-up, and improve
- Construct distinctive chemical eco-industrial park



of hollands

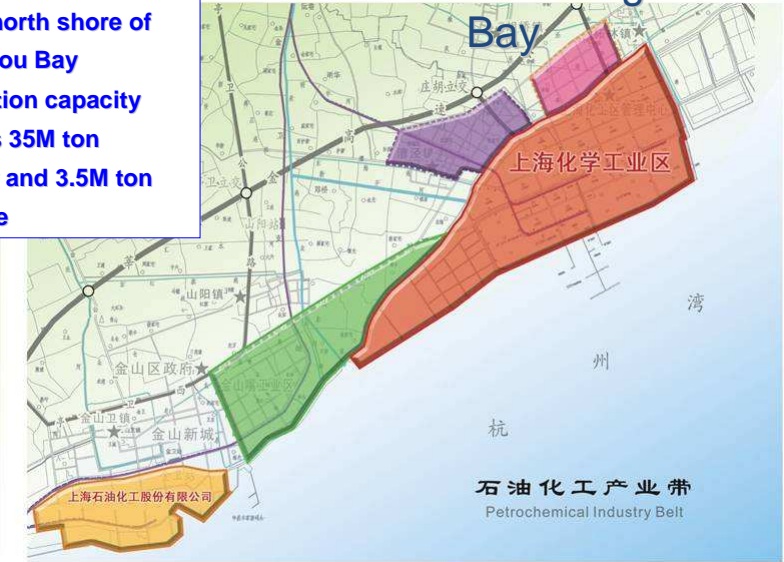
**New integrated project of refinery & chemicals**  
 1 M ton/yr ethylene  
 12 M ton/yr refinery



上海化学工业区二期围海造地工程规划示意图

- The formation of 60 km<sup>2</sup> petrochemical industrial belt in north shore of Hangzhou Bay
- Production capacity reaches 35M ton refinery and 3.5M ton ethylene

# Chemical industry zone of north shore of Hangzhou Bay



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**Shanghai Chemical Industry Park will build a world-class petrochemical base with internationally competitive power and circular economy demonstration bases**

