

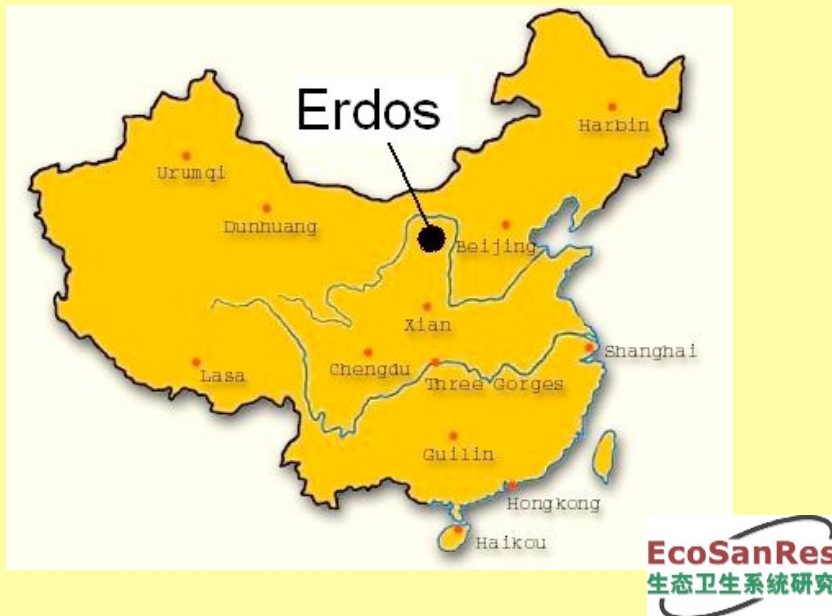
INTRODUCTION TO THE CHINA—SWEDEN ERDOS ECO-TOWN PROJECT

Qiang Zhu
Research Professor, Senior Advisor
China – Sweden Erdos Eco-town Project
Dongsheng District, Erdos Municipality,
017000, Inner Mongolia, China
Email: zhuq70@163.com

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GENERAL INTRODUCTION

- The China – Sweden Erdos Eco-town Project (EETP) is part of the Sida sponsored EcoSanRes Programme, which is set out to explore ecological sanitation applications in urban and peri-urban areas.
- It locates at the Haozhaokui Village, Dongsheng District, Erdos Municipality, Inner Mongolia Autonomous Region in the north China.



Features of Dongsheng

- Population: about 300 000
- Area 2200 km² with altitude of 1400 -1500m
- Cold, dry and windy climate: yearly mean temperature 5.6°C, annual precipitation 350mm, potential evaporation 2500mm
- In Erdos, locate the biggest coal and natural gas mine in the State
- GDP per capita in 2003 exceeded US\$2000
- Water shortage has become the bottle neck

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Issues to be tackled in the EETP

- Providing ecosan solutions for human excreta management in multi-storey and single-storey buildings
- Providing ecosan solutions for greywater from multi-storey and single-storey buildings
- Providing ecosan solutions for source separation of solid and organic household waste
- Establishing ecostation

Associated studies are planned to include

- Public acceptance and awareness of ecosan solution in the urban area
- Public health aspects of the proposed technologies and policies
- Agricultural implications of closing the loop
- Institutional and legal measures required for the eco-towns development, and
- Financial implications of building eco-towns

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Physical features of EETP

- In the first phase, forty two 4-5 storey buildings to be built for 826 households (2900 populations) in the Haozhaokui area
- Eco-station composed of GRW treatment plant, a storage pond, composting plant for faces and compostable waste, solid waste center and the management building
- A local estate developer called Daxing Company has been undertaking construction and marketing of the housing project.



Four to five storey buildings built by an estate developer -- Daxing Co.



Ecosan system in EETP

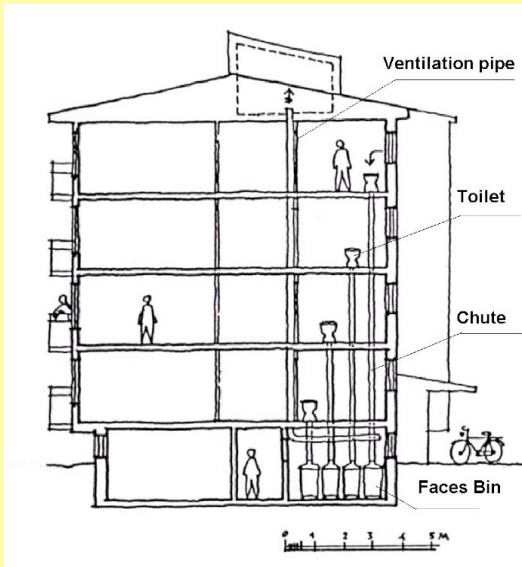
The Ecosan system in EETP is composed of four sub-systems to treat the four waste flows from the households, namely, faces, urine, GRW and solid waste

Components of EETP

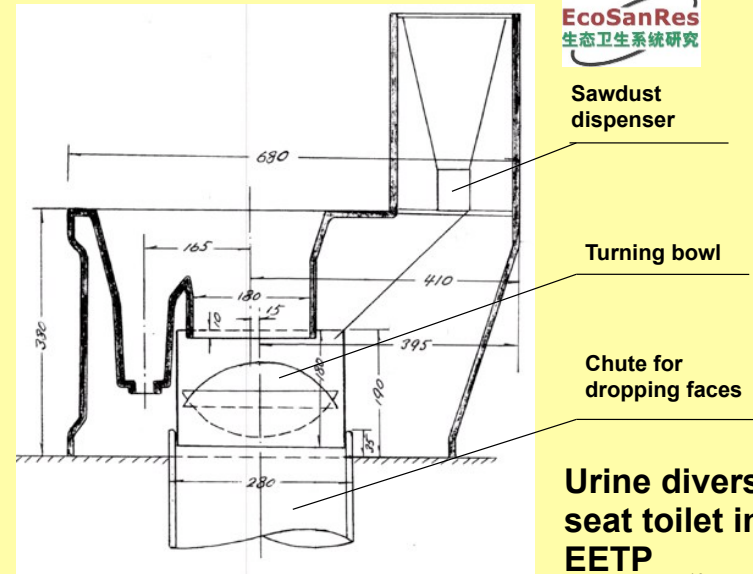
- Faces system
- Urine system
- Grey water system
- Solid waste system



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- Faces system**
- Urine diversion seat toilet
 - Faces drop chute
 - Faces bin and bin cover
 - Ventilation system



Sawdust dispenser

Turning bowl

Chute for dropping faces

Urine diversion seat toilet in EETP



Urine diversion toilet developed by Swedish and Chinese experts, manufactured in Meilong Co, Chaouzhou, China



Turning bowl and install cylinder, all made of stainless steel plated with Teflon

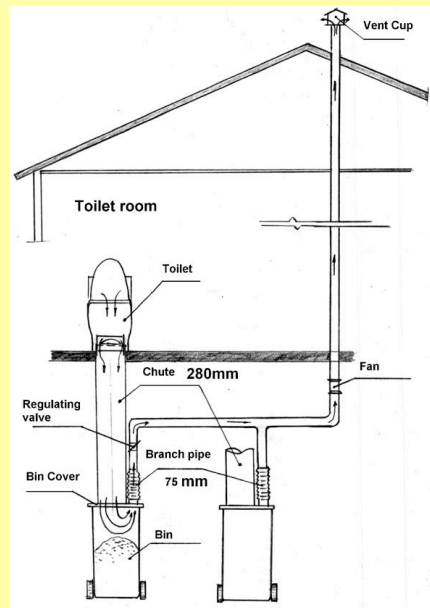


Solution 1 of turning of bowl: A rod is pushed by the lid when user seats on it to turn the bowl over for receiving the feces



Solution 2 of turning bowl:

The bowl is turned by a lever system connected with the toilet lid. When the lid is lifted up the bowl turns.



Ventilation system in EETP



Chute

Main ventilation pipe

Branch pipe

Ventilation pipe and the fan in the basement



Air tight bin cover: To ensure the ventilation effect, the way that air passes should be well sealed

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Sawdust dispenser is to add sawdust before and after use of the toilet. User needs to push a button on the right rear side of the toilet.

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Another type of sawdust dispenser

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Urine system

- Urine outlet in the seat urine diversion toilet
- Urinal
- Urine pipe
- Urine tank



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Suction truck for urine

Urine quick coupling in the urine tank



Grey water system

- Capacity: 80 liters/person/day, design flow: 250m³/d
- GRW pipes and inspection well
- Septic tank
- Complex tank



GRW Treatment Plant

Most of the treatment plant are underground, only a small operation room is on the surface



Design parameters of GRW treatment

	Color	COD _{cr}	BOD ₅	SS / turbidity	NH ₃ -N	PO ₄ ³⁻	pH	Cation Surface activator	Total remain Chloride	Coli bacteria
Raw GRW		400	250	200	25	5	6-7			
Drain Class II	80	120	30	30	25	1.0	6-9			
Reuse	30		20	10NTU	20		6-9	1.0	1.0	3/l



(Unit: mg/l except for color, pH, turbidity, Coli bacteria)



Post-treatment pond (3800 m³)
To store the treated GRW and further improve the quality

Compost plant



- To compost faces and compostable kitchen waste with high temperature composting.
- Faces is stored in the bin for about 3 months and then transported to the plant.
- Kitchen waste is collected every day and sent to the plant.



- Some additives including material containing carbon and effective bacteria will be added in the compost.

Compost plant under construction



Solid waste management

At the first stage, household waste is to be source separated into two parts: compostable and others

Waste Container
835×430×890 mm

Waste Collect Bike
1200×600×550 mm



MONITORING, RESEARCH AND DEVELOPMENT

- **Social study:** to investigate the public acceptability, performance and perspective on the ecosan system
- **Faces system study** includes:
 - ü Observation of the toilet, absorbent, bin and bin cover
 - ü Measurement and experiment of the composting plant
 - ü Testing and improvement of the ventilation system
 - ü R&D of the single chute eco-toilet system for multi-storey building
- **Urine system study** includes observation of urinal, urine pipe and measurement of urine tank as well as property test of fresh and stored urine



MONITORING, RESEARCH AND DEVELOPMENT (cont'd)



- **GRW study:** includes
 - ü Monitoring and evaluation of the built GRW system
 - ü Study on the feasibility of reducing running cost and energy consumption of existing system
 - ü Study on the properties of raw GRW and small scale experiment of different treatment options
- **Study on agriculture reuse** of the composting product and urine includes
 - ü Effect of using compost and urine on enhancing the crop yield and quality
 - ü Comparison of using compost and urine with the chemical fertilizer and pig manure
 - ü Long term effect of using urine on the soil property and the counter measures
 - ü Coupling effect of using compost and urine as well as recycling GRW for irrigation on the crop yield

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MONITORING, RESEARCH AND DEVELOPMENT (cont'd)

- **Economic evaluation of Ecosan system** as compared with conventional system: this study will compare the Ecosan system with the conventional one by conducting a cost and benefit (direct and indirect) analysis. One of the emphasis is to take the environment impact into consideration when analyzing. The result based on the Project will be extended to a medium size city like Dongsheng.
- **Environment impact assessment** of the Ecosan system
- **Policy study**
- Set up, operation of **Managing Information System** for the Monitoring and R&D Programme



SIGNIFICANCES OF THE EETP

- Completion of The EETP can produce a firstly built model in China and even in the world to show a **new pattern of human settlement related to the environment.**
- **Global significance**
 - ü Set up a model for water resources conservation: water supply for household can be reduced by 1/4 to 1/3 by avoiding toilet flushing
 - ü Set up a model on resources conservation by recycling human excreta, GRW and solid waste
 - ü Set up a model for avoiding / reduction of environment pollution



National significance

- China is now advocating building of a resources conservation society and to develop recycling economy under the goal of setting up well-off society. The EETP is a sanitation model exactly conforming to these principles.
- Urbanization in China is expected to be a high rate in the future 20-30 years. The Ecosan approach demonstrated in EETP will be a cost-effective and environment friendly way for providing toilet for the new urban dwellers and to avoid pollution.
- Water scarcity in China is becoming one of the crises in the new century especially in those areas with serious water shortage like Erdos. Using the Ecosan approach can mitigate this crisis in water shortage cities that has amounted to 400 out of the total of 660.

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Problems and counter measures

- On the household side, one of the improper performances of the households is to pour water into the toilet. Reason of this is owing to that the households are not used to this new system but also due to some imperfection still exist in the system. For example it is necessary to find convenient way for the household to clean the toilet without using water.



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Problems and counter measures

- The households have complained a lot on the odor problem. Through many investigations the problem was found mainly due to that the Ecosan system has not been installed perfectly:
- All urine tanks have not been sealed on the top and the inlet pipe is not submerged under liquid so the ammonia in the tank is sucked up to the toilet room and causes bad smell.
- Lacking of “S: trap under the urinal
- More than half of the fans have not been installed.
- Many sections of GRW pipes are blocked.



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Problems and counter measures

- Lacking of enthusiasm of the estate developer is a main problem. Compared to the conventional housing project, the developer has to input more for the Ecosan system.
- The UD toilet system costs more than double of that of the flushing toilet system.
- The GRW treatment plant and solid waste station that usually is part of the municipal work now is undertaken by the developer.
- Some of the commitments to the developer from the government have not been fulfilled.
- Actually there is a shift of the responsibility from the municipal government to the developer in EETP. To make compensate to the developer for their extra burden by issuing appropriate favorable policies and incentive measures by the government is necessary.



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Problems and counter measures

- Awareness building and education to the households is also essential for the success of the EETP. General speaking, the flushing system is the favorite of most of the urban population. They regard the dry system as retrogress of the life style. To change their mind by carrying out environmental and health education is the key for making such a project successful. To be a user of the ecosan system should be regarded as honorable contribution to the conservation of the environment and natural resources.



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Problems and counter measures

- Continuous effort in improving the ecosan system is also essential. We should provide a clean, safe and convenient system for the household. In this regards, many components of the system have to be improved. EETP is just a start of a try in changing the tradition of human settlement in the urban condition.



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SIGNIFICANCES OF THE EETP (cont'd)

Local significance

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