

康恒模式：静脉产业园区固废处理

SUS's Model: Waste to Energy in Eco-Industrial Park

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October 25, 2018



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1. 静脉产业园 Eco-Industrial Park
2. 静脉产业园的运作模式 Operation of Eco-Industrial Park
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第一部分 静脉产业园

Part One Eco-Industrial Park



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静脉产业最早是由日本学者提出，把废弃物排出后的回收、再资源化相关领域形象地称为静脉产业，就如同人体血液循环中的静脉一样。是以保障环境安全为前提，以固体废弃物处理处置、节约资源、保护环境为目的，运用先进的技术，将生产和消费过程中产生的固体废物转化为可重新利用的资源和产品，实现各类固体废弃物的再利用和资源化的产业。

静脉产业园是指建立以静脉产业为主导的生态工业园，将传统的“资源——产品——废弃物”的线性经济模式，改造为“资源——产品——再生资源”闭环经济模式，实现生活和工业垃圾等固废变废为宝、循环利用。

The concept of **Venous Industry** was created by Japanese environmentalist for promoting reduce, reuse and recycle of waste, like the vein blood circulation in human body. For environmental safeguards, Venous Industry aims to properly treat and dispose of waste and to save resource and protect the environment by reusing and recycling different kinds of waste with advanced technologies.

Eco-Industrial Park, based on Venous Industry concept, is to change “Resource – Produce - Waste” model into “Resource – Product - Recyclables” model, and to reuse and recycle MSW and industrial waste.

本电子版内容如与中国环境出版社出版的标准文本有出入，以中国环境出版社出版的文本为准。

HJ

中华人民共和国环境保护行业标准

HJ/T275-2006

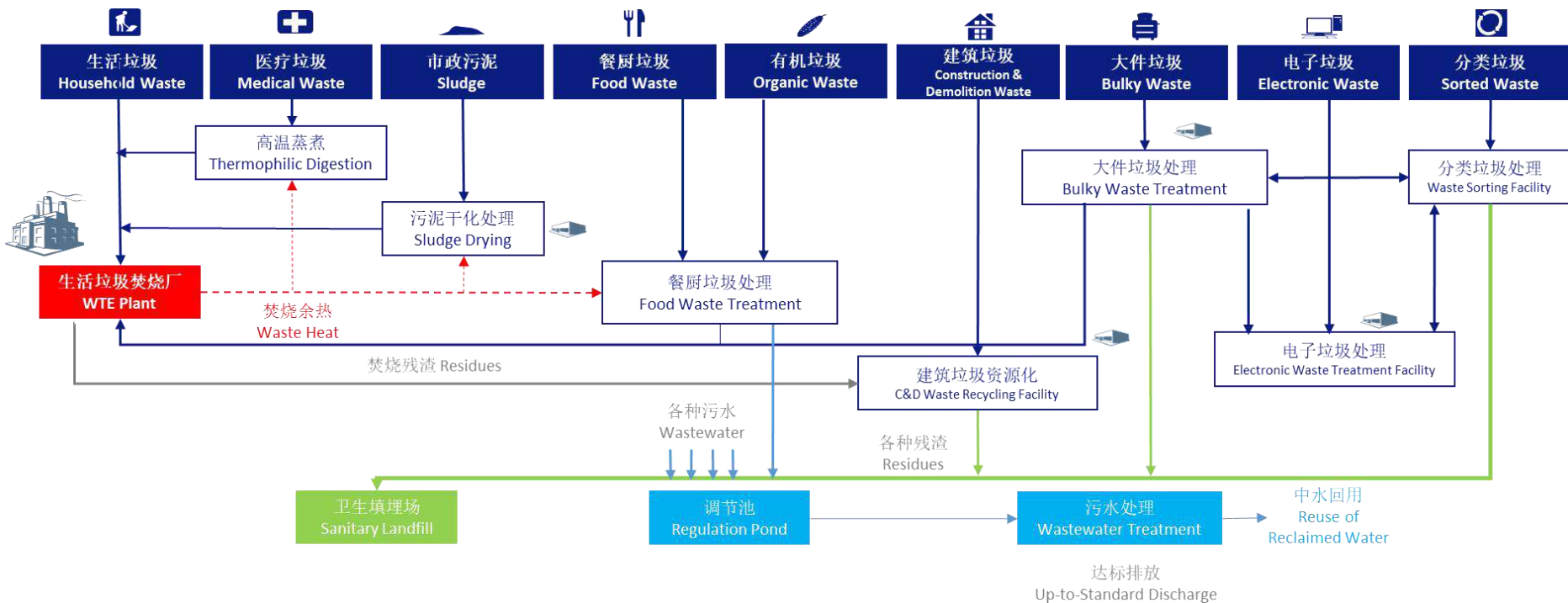
静脉产业类生态工业园区标准（试行）

Standard for Venous Industry Based Eco-industrial Parks
(On trial)

2006-06-02 发布

2006-09-01 实施

国家环境保护总局 发布



静脉产业园处理原则和特点：

- 1、以垃圾焚烧发电项目为核心，实现能量流和物质流循环利用。垃圾焚烧发电提供能量（电力或蒸汽），最终通过焚烧无害化彻底处理其他项目和工艺产生的残渣和沼渣等，如沼渣、干化后污泥、医废残渣等。
- 2、实现固废的彻底无害化循环处理，有害固废不再流出。一个园区可支撑一座城市健康运转，避免多处、重复选址。
- 3、满足节约化协同处理的经济性要求。园区内各项目工艺和流程需统一规划和设计，流程合理、工艺科学。
- 4、实现环保宣传和公益性教育功能。
- 5、静脉产业园核心项目—垃圾焚烧发电对温室气体减排贡献。根据国家发改委颁布的《国家重点推广的低碳技术目录》，1200t/d的生活垃圾焚烧发电厂平均每年可减少8.2万吨二氧化碳排放量，属于国家认证的低碳技术。另据国家能源局统计，2017年，中国垃圾焚烧发电共处理垃圾1.06亿吨，则二氧化碳减排约计1985万吨。

Principles and Features of EIP

1. To maximize energy recovery and material utilization. Electricity and heat generated from WTE plant can be utilized for treating medical waste, sewage sludge, food waste in other facilities in EIP. The residues from these facilities then are sent back to WTE plant for combusting with MSW.
2. To realize the close loop of waste treatment in EIP, and to minimize the land acquisition for the cities.
3. To make waste treatment cost-effective. All facilities and treatment processes are planned and designed as an integrated system.
4. To realize the function of public environmental education.
5. Stoker type WTE is a low carbon technology recognized by NDRC, that a 1200t/d WTE plant can reduce 82ktCO₂e per year. According to NEA, 106 million tons of MSW were treated in 2017, therefore resulting in the emission reductions of 19.85 million tons of CO₂ equivalent.

《住房城乡建设部等部门关于进一步加强城市生活垃圾焚烧处理工作的意见》 Opinions on Further strengthening MSW Incineration issued by MOHURD

推进产业园区建设。积极开展静脉产业园区、循环经济产业园区、静脉特色小镇等建设，统筹生活垃圾、建筑垃圾、餐厨垃圾等不同类型的垃圾处理，形成一体化项目群，降低选址难度和建设投入。

Promoting the industrial parks development, especially EIP, circular economy industrial park and featured towns, and integrating the treatment processes for MSW, C&D waste, kitchen waste, etc., reducing the difficulty to land selection and investment cost.

住建部、发改委、环保部 《生活垃圾处理技术指南》 Guideline to MSW Treatment Technologies issued by MOHURD, NDRC and EPD

规划和建设生活垃圾综合处理园区是节约土地资源、加强生活垃圾处理设施污染控制、全面提升生活垃圾处理水平的有效途径。Planning and implementing integrated waste treatment EIP is an effective way to save land resource, to strengthen pollution control on waste treatment facilities and to improve the treatment levels.

《国务院关于加快发展节能环保产业的意见》 State Council's Opinion on Speeding up Energy Conservation and Environmental Protection Industries

建设“城市矿产”示范基地。推动再生资源清洁化回收、规模化利用和产业化发展。

Establishing a “mining city” demonstration base and promoting clean recycling, scaled-up utilization and industrial development for the recyclables.

1、商业模式明确：PPP、BOT、特许经营。保证长期稳定可靠性。

Clear Business Model, including PPP, BOT and other concessions, makes long-term stable operation.

2、收入政策支持：国家统一的可再生能源电价+地方财政支付的处理费。国家发改委于2012年801号文制定并颁布了《关于完善垃圾焚烧发电价格政策的通知》。

Revenue policies, that is national renewable feed-in tariff + waste tipping fee by local government. In 2012, NDRC issued "Notice on the policy to improve waste to energy feed-in tariff".

3、税收优惠：增值税劳务70%即征即退，所得税三免三减半。关于印发《资源综合利用产品和劳务增值税优惠目录》的通知（财税〔2015〕78号）

Preferential taxation: 70% VAT refund; 3-year exemption and 3-year half imposition of enterprise income tax.

4、投资政策支持：电力接入系统由电网企业投资；土地原则上采用划拨方式。

Investment incentives: The project's grid connection system is invested by Grid Company. The land is allocated by government.

小园区 以各种城市垃圾处理为主的园区

Small Park for treating different kinds of municipal solid waste

- 生活垃圾 household waste
- 餐厨垃圾 food waste
- 市政污泥 sewage sludge
- 建筑垃圾 construction & demolition waste
- 炉渣 combustion bottom ash
- 填埋场 landfill
- 其他 others

目前我们行业的园区主要都是小园区。

SUS is engaged in Small EIP for treating MSW.



典型项目 Typical Projects

- 青岛小涧西垃圾处理园区 Qingdao Xiaojianxi EIP
- 黄岛静脉产业园 Huangdao EIP

大园区 实现城市固体废物全面回收利用处理

Large Park for recycling recyclable solid wastes

- 生活垃圾 household waste
- 餐厨垃圾 food waste
- 污水厂污泥 sewage sludge
- 医疗垃圾 medical waste
- 建筑垃圾 C&D waste
- 填埋场 landfill
- 其他 others
- 危险废物 hazardous waste
- 电子垃圾 electronic waste
- 汽车拆解 end-of-life vehicles
- 废旧金属 scrap metals
- 橡胶塑料 rubber and plastic
- 纸张等 paper and cardboard



典型项目 Typical Projects

- 北京鲁家山 Beijing Lujiaoshan EIP

园区的功能越来越复杂和多元化 EIP becomes more complex with diverse functions.

小园区发展到大园区 Developing from small park to large park

第二部分 静脉产业园的运作模式

Part Two Operation of Eco-Industrial Park



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政府的关键工作 Government's Major Works

- 编制园区规划和工作计划 To make EIP planning and working schedule
- 进行园区基础设施建设 To carry out infrastructure construction
- 编制各子项前期方案，子项边界条件清楚，且项目成熟后确定各子项的投资人 To compile the proposals for sub-projects with clear boundaries. To determine each subproject investor once the subproject is well prepared.

优点 Advantages

- 流程简单，容易理解 Simple procedure and easy understanding
- 每个子项边界条件清晰 Clear boundary for each sub-project

缺点 Disadvantages

- 政府承担责任多，对政府专业能力要求高
Requiring the government with different technical capabilities to take the responsibilities
- 各子项的工艺衔接，将来存在较大障碍 Barriers for integrating different subprojects in future

适合：各种园区均适合 Applicable for both EIP types

卫生填埋场 Sanitary Landfill

- 一期规模720吨/日，库容710万立方米。
720 TPD in Phase I with 71 million cubic meter capacity
- 二期规模1800吨/日，其中飞灰产物130吨/日。
1800 TPD in Phase II. Fly ash 130 TPD
- 政府建设运营。
Government responsible construction and operation

垃圾焚烧发电厂 Waste to Energy Plant

- 一期规模1500吨/日，由上海环境投资建设运营。
1500 TPD in Phase I developed by SEG
- 二期规模2250吨/日+污泥500吨/日，由康恒环境投资建设运营。
2250 TPD MSW + 500 TPD Sludge in Phase II WTE Plant, invested by SUS

园区渗沥液处理站 Leachate Treatment Plant

- 一期900吨/日；二期1000吨/日。
900 TPD in Phase I; 1000 TPD in Phase II.





项目规模2250吨/日+500吨/日污泥，总投资约13.9亿，2017年底开工建设，计划2019年初进行投产。

With the capacity of 2250 TPD MSW and 500 TPD sludge, the total investment of the Project will reach RMB 1.39 billion. The Project started construction in the end of 2017 and is expected to be put into operation in early 2019.

模式二 一园一企，整体PPP

Model B as one PPP project invested and implemented by one developer only

政府的关键工作 Government's Major Works

- 政府编制园区整体项目建议书及可研报告，确定园区整体边界条件 To compile entire EIP proposal and feasibility study and to determine overall EIP boundary
- 组织园区整体招投标，确定投资人 To organize bidding and to select one investor for entire EIP project

优点 Advantages

- 后期政府和企业的责任明确 Clear responsibilities between government and developer after implementing the project
- 政府不用投资园区基础设施建设，缓解压力 The government needs no investment for the infrastructures in the EIP.

缺点 Disadvantages

- 招投标边界复杂，对政府专业能力要求比较高 Complex bidding targets, high requirement for government's professional capability
- 流程较难理解，政府采购时间拉长 Obscure procedures and prolonged governmental purchase process

适合：适合小园区模式 Applicable to Small EIP



项目规模2250吨/日垃圾+100吨/日餐厨，总投资约16.7亿，2017年底开工建设；计划2019年初投产。

With the capacity of 2250 TPD MSW and 100 TPD kitchen waste, the total investment of the Phase I project will reach RMB 1.67 billion. The Project started construction in the end of 2017 and is expected to be put into operation in early 2019.



模式三 整体合作，分步实施

Model C Overall cooperation, step-by-step implementation

政府的关键工作 Government's Major Works

- 政府与企业达成合作意向，签订园区合作框架协议 To achieve a framework cooperation agreement on EIP between government and enterprises
- 按照项目先后次序，分项目分步骤实施 To implement the subprojects one by one and step by step

优点 Advantages

- 对政府的专业性要求不高 Low requirement for government's technical capability
- 方便控制和调整 Easy to control and adjust

缺点 Disadvantages

- 一开始不可能所有问题考虑清楚，可能出现一些后续的问题 Some new problems may occur during the project implementation period

适合：适合大园区模式 Applicable to Large EIP

案例：中信珠海生态产业园 Case: CIPIC PE Zhuhai EIP



- 生活垃圾焚烧厂（一期建设规模1200 t/d；二期建设规模3000t/d）
Waste to Energy Plants (Phase I: 1200 t/d; Phase II: 3000 t/d)
- 包含餐厨垃圾处理厂、医疗垃圾处理厂、污泥处理厂、污水处理厂、粪便处理厂等
Including kitchen waste treatment, medical treatment, sludge treatment, sewage treatment, feces treatment, etc.

案例：中信珠海生态产业园——生活垃圾焚烧发电厂 Case: Zhuhai EIP WTE Plant



- 生活垃圾焚烧厂（一期建设规模2*600t/d）
Waste to Energy Plant (Phase I: 2*600 t/d)
- 烟气处理工艺：SNCR+半干法+干法+袋式除尘
Flue gas cleaning process: SNCR + semi-dry deNO_x + dry deNO_x + fabric filter to remove dust
- 烟气排放标准高于欧盟2010标准
Air pollutants emissions lower than emission limits set out in IED 2010

第三部分 康恒环境简介

Part Three SUS Environment



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中国业绩地图 BOT / PPP WTE Plants (incl. EIP WTE) – Map of Track Records

截止2018年7月 by the end of July 2018

● 垃圾焚烧发电 Waste to Energy

超20座, 超4.5万吨/日

Over 20 WTE plants with the capacity more than 45,000 TPD

● 污泥处理 Sewage Sludge

超900吨/日 Over 900 TPD treatment capacity

● 餐厨垃圾处理 Kitchen Waste

超600吨/日 Over 600 TPD treatment capacity

● 医疗垃圾处理 Medical Waste

超45吨/日 Over 45 TPD treatment capacity

▲ 垃圾焚烧发电项目
● 垃圾焚烧设备供应
■ 生物质新能源项目



静脉产业园——投资业绩 Typical WTE Projects

珠海 1200+1800吨/日
Zhuhai WTE 1200 + 1800 t/d



宁波 2250吨/日
Ningbo 2250 t/d



太原 3000吨/日
Taiyuan 3000 t/d



黄岛 3750吨/日
Huangdao 3750 t/d



青岛 2250吨/日
Qinadao 2250 t/d



西安高陵 2250吨/日
Xi'an Gaoling 2250 t/d



浙江杭州 5200t/d
Hangzhou 5200 t/d



江西南昌 2400t/d
Jiangxi Nanchang 2400 t/d



三河 3000吨/日
Sanhe 3000 t/d



广西梧州 2000t/d
Guangxi Wuzhou 2000 t/d



河南光山 1200t/d
Henan Guangshan 1200 t/d



承德双滦 Chengde Shuangnuan

吉林榆树 Jilin Yushu

湖北广水 Hubei Guangshui

沈阳西部 Shenyang Western

- 辽宁黑山 Niaoning Heishan
- 贵州三穗 Guizhou Sansui
- 河南镇平 Henan Zhenping

谢谢!

Thank You!

October 2018



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