



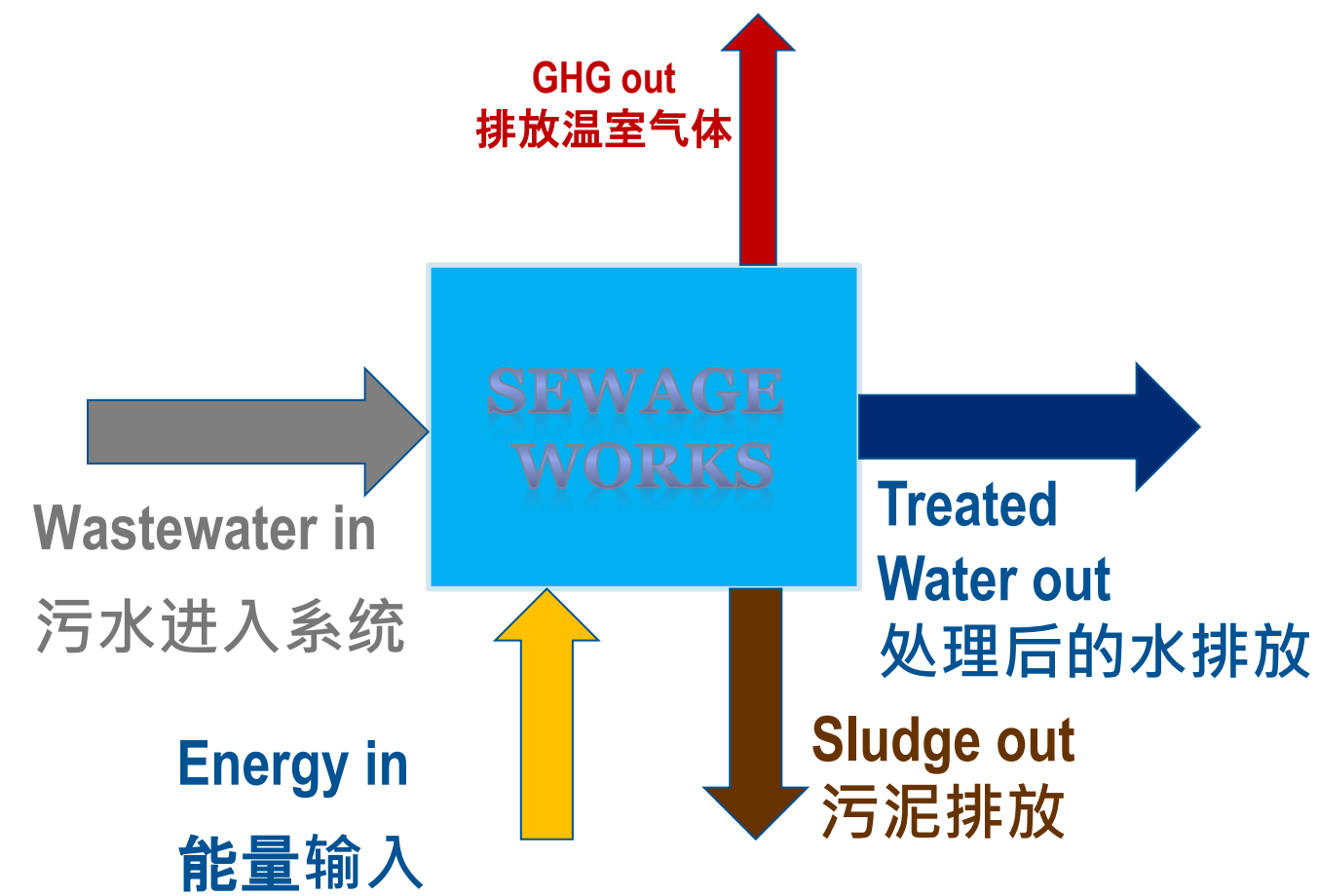
Water Reuse in a Circular Economy

Östen Ekengren
IVL-Swedish Environmental research institute
Osten.ekengren@ivl.se

 **ivl**
SVENSKA
MILJÖINSTITUTET

WHAT WE HAVE: A TREATMENT FACILITY

常规落后做法：
污水处理厂仅仅
是一个处理设施



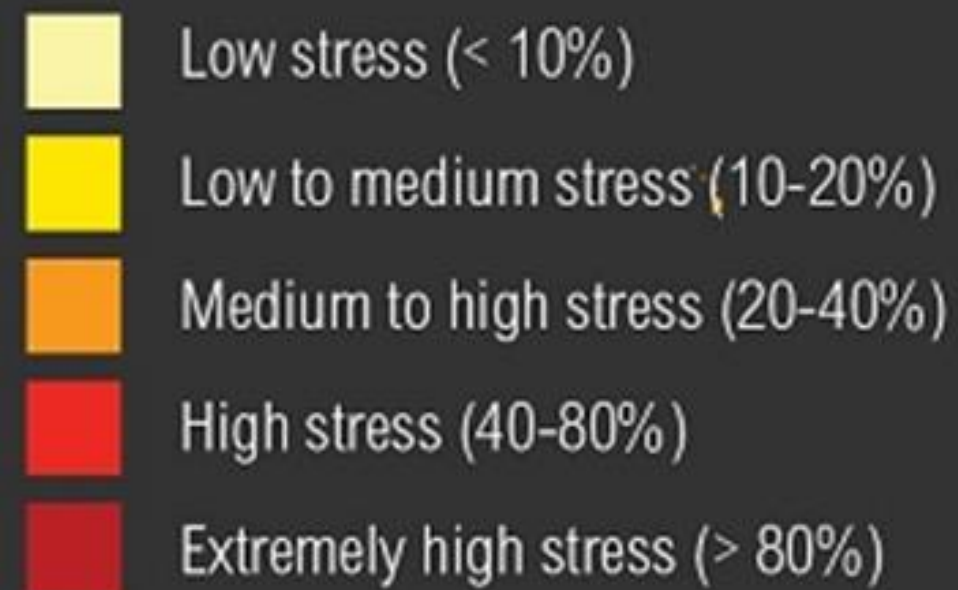
Problems/Challenges问题和挑战

- The water sector is a major energy user 污水处理行业消耗大量能源
- GHG emissions 温室气体排放
- Treated water is not used 处理后的污水无法再利用
- Outflows may contain pollutants, viruses, pathogens, pharmaceutical residues etc. 排水还有很多污染物：病菌、病原体、药物残留
- Sludge seen as a problem 产生的污泥还是问题

GLOBAL WATER STRESS

WATER STRESS BY COUNTRY

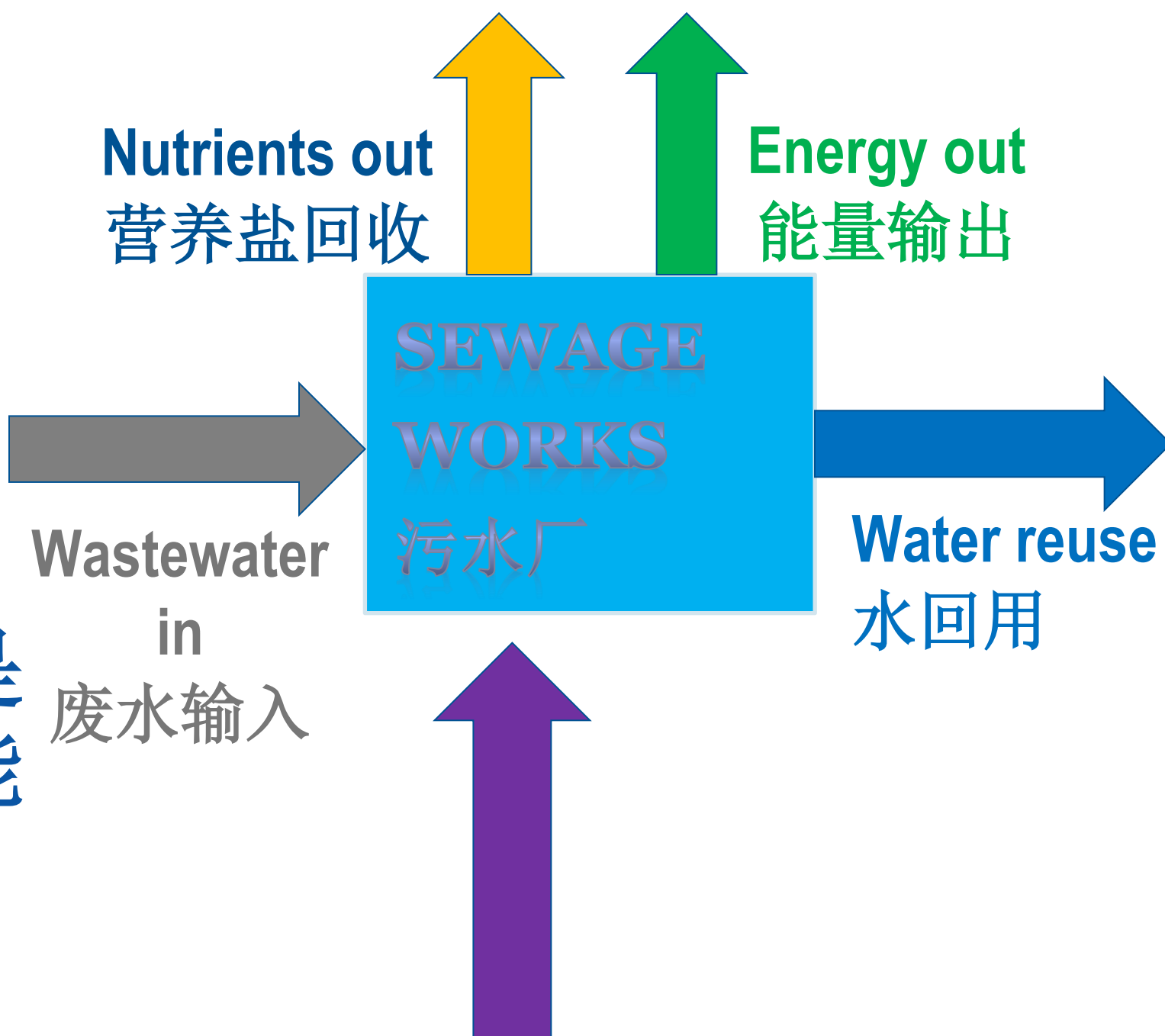
ratio of withdrawals to supply



This map shows the average exposure of water users in each country to water stress, the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means more water users are competing for limited supplies. Source: WRI Aqueduct, Gassert et al. 2013

**WHAT WE
WANT: A
PRODUCTION
FACILITY**

我们期望的是
建设一座产能
设施



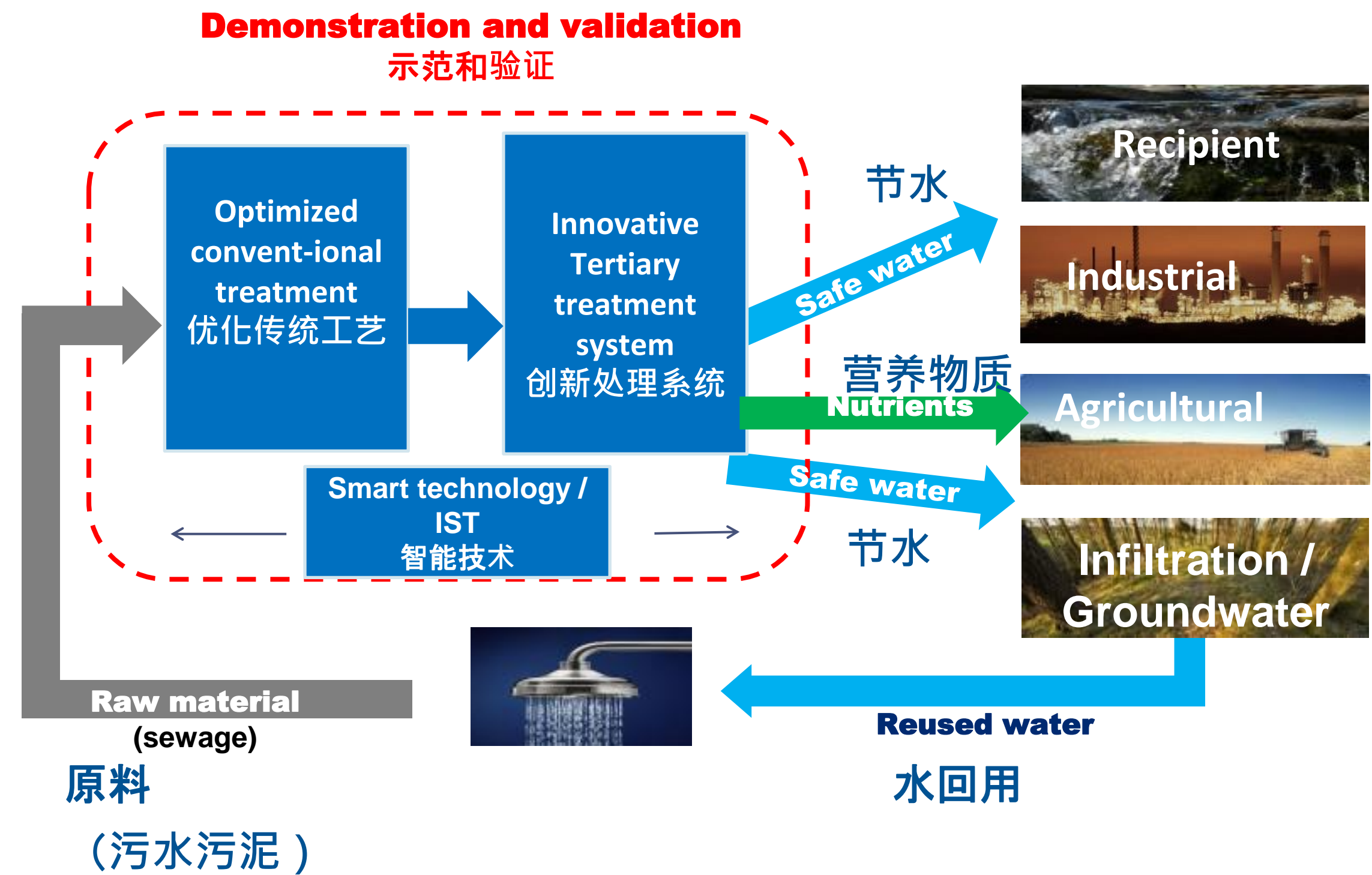
Opportunities 机遇

- **Waste as a resource** 废物资源化
- **Net energy production** 净产能过程
- **Nutrients recovery/reuse** 营养盐回收再利用
- **Improved treatment (P, N, Pharmaceutical residues)** 对氮磷和药物残留的深度处理
- **Water reuse** 水回用

A unique R&D facility 一个独特的研发设施

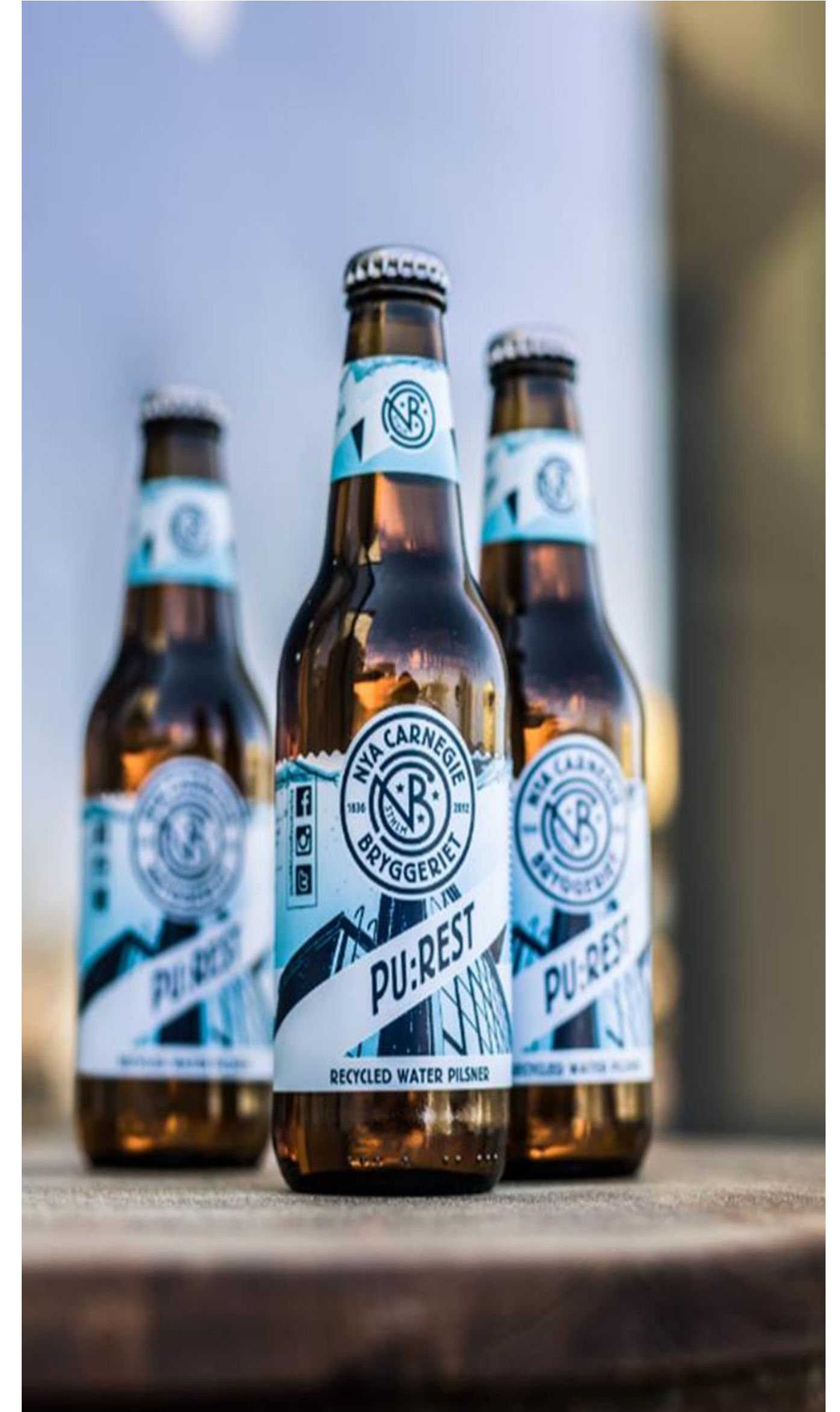
- Access to different wastewaters
- 接入不同的污水
- Five different treatment lines
- 五条不同的处理线
- Relevant scale to get realistic results for upscaling
- 规模合理，可以规模化生产
- Mobile treatment modules
- 移动式处理模块
- Sludge handling
- 污泥处理
- biogas production 沼气生产
- System integration 系统集成
- Applied and basic research 应用型研究和基础研究
- 5 Universities two Research Institutes 5所大学+2所研究所





BEER BREWED ON REUSED WASTE WATER

- PU:REST – Sweden's first beer brewed on waste water
- Water from Stockholm Wastewater
- Collaboration with IVL



BIOGAS沼气

233 plants (133 waste water treatment plants)

233个沼气工厂（133个建在污水处理厂）

1400 GWh

(734 GWh for vehicles 734GWh用作汽车燃料)

Reduced volume of sludge

极大的减少污泥量

In Stockholm: 斯德哥尔摩市有280辆公交车和15000辆汽车用沼气做燃料。

280 buses, 15.000 cars

WASTE WATER MANAGEMENT



- Integrated resources management
production of biogas from digested
waste and waste water sludge
- Reuse of treated waste water is needed
more and more- cheaper and smarter
- Synergies between water & sewage,
waste and energy

