

9th International Workshop on Decentralized Domestic Wastewater Treatment in Asia
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Case-study on Changshu PPP-project for rural wastewater treatment and application of household Johkasou

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Outline

- 1 Background of Changshu PPP Scheme for rural wastewater treatment**
- 2 Design and implementation of Changshu PPP-scheme for rural wastewater treatment**
- 3 Summary and Proposals**

Demands and Challenges

of Rural wastewater Treatment in China

- **A 500,000,000-rural-population urgently needs modern environmental sanitation services**
- **Deficiencies of the State Management System**
 - Responsibility Management: finance & organization
 - Industry Management: Master plans, Standards, supervises, supports.....
- **Deficiencies of the State Technology System (decentralized wastewater treatment)**
 - Manufacture
 - Installation
 - Running

CHANGSHU

the comprehensive demonstration county-area for rural wastewater



Jiangsu Province, China

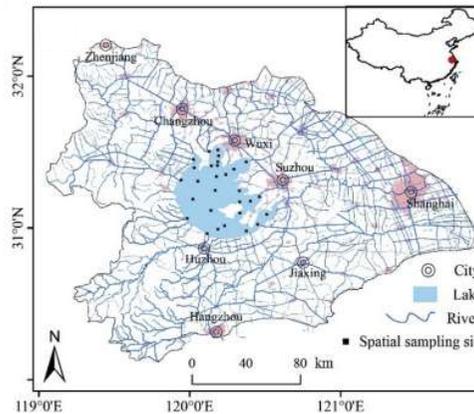


Suzhou, Jiangsu



Changshu County, Suzhou

- Changshu a **county-level** city
- Annual disposable income of **RMB 57,831**, developed area in China
- Resident population of **1,667,050**



Taihu lake drainage basin

- Located in the **protected area** of Taihu Lake Basin
- The **first case of global-county** rural wastewater treatment in China

Practice before the Johkasou project

Period I : 2008-2010

Progress

Deficiency

- Break the administrative division
- Optimize the layout of centralized system
- Invest >RMB 200 million to decentralized system

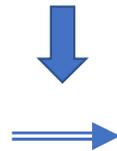
- The construction costs of pipeline in centralized system are too high
- For the decentralized system, completion rate < 40%, normal running rate < 15%

Period II: 2011-2014

- Establishing the first county-region unified running system: completion rate raised to 95%, normal running rate raised to 92%

- The quality of facilities not high, the average cost of water treatment RMB 3.2 per ton (electricity costs at 20%, maintenance costs at 60-70%)
- Equipment quality not improved significantly

Improved the quality of facilities and equipment in 2012-2014

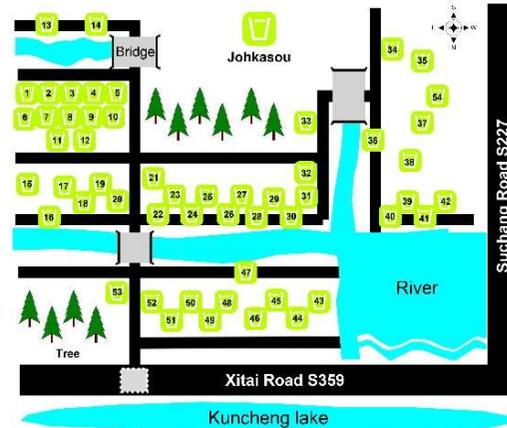


Construction cost increased from 10k ¥ to 25k ¥

First engineering application of household Johkasou in China



Dongqing Village



Johkasou distribution



Kubota Johkasou



Demonstration project

- 2013, RCEES cooperated with Kubota to implement 102-family Johkasou installation (54-sets)
- Lowered the household construction cost 18.7 k along with the quality advanced to world level

- Based on the demonstration, Changshu cooperated with the RCEES to introduce the Johkasou technology
- Carry out the PPP program of decentralized sewage treatment, and introduce CRRC* as the social capital

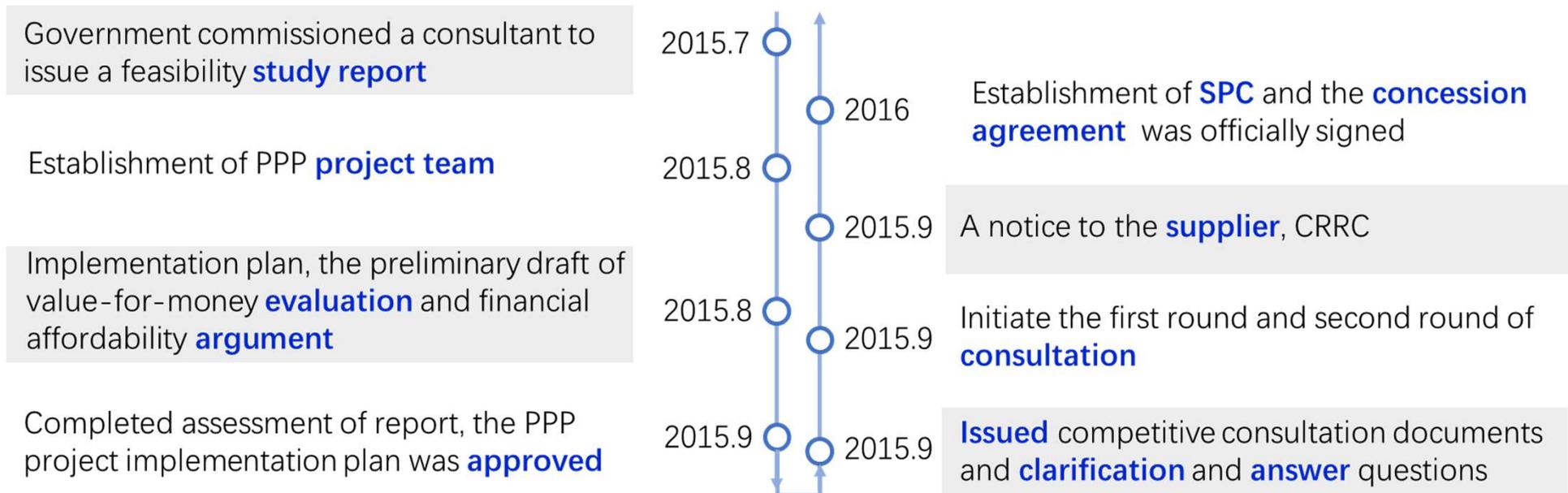
* China Railway Rolling stock Corporation Limited
A state-owned assets holding company in China

Changshu PPP scheme: the reasons and the process

- ❑ Ensure project quality and reduce supervision cost
- ❑ Promote application of innovative technologies
- ❑ Improve investment performance
- ❑ Set an example for the whole country



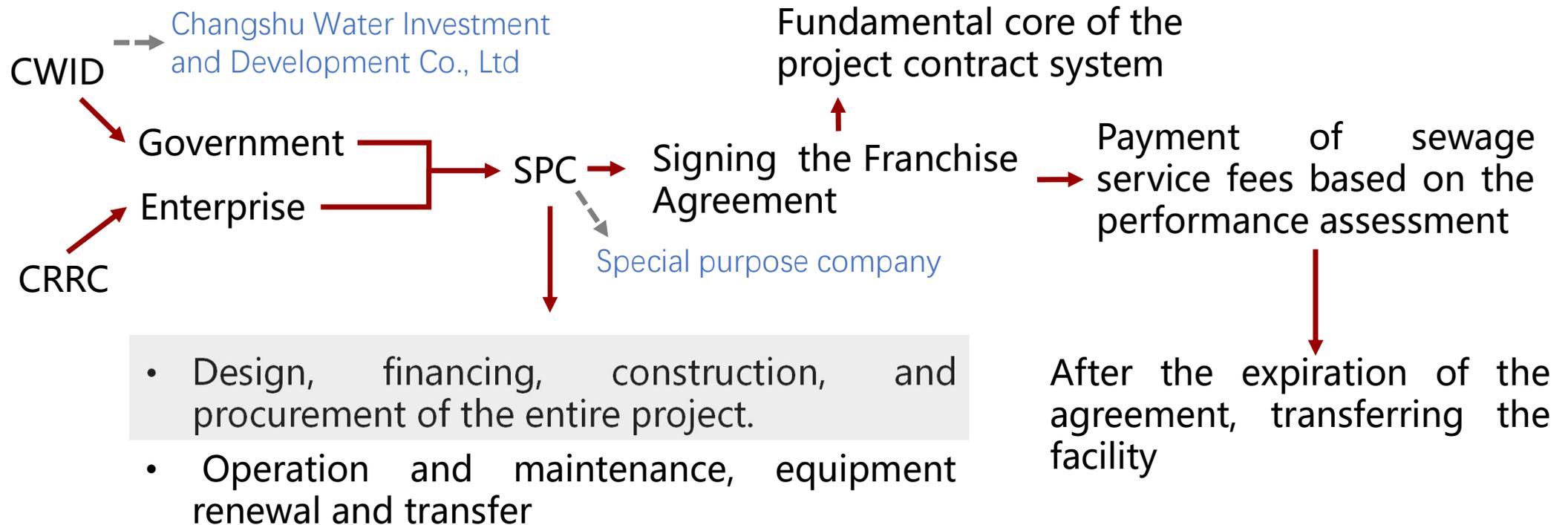
“The first crab”



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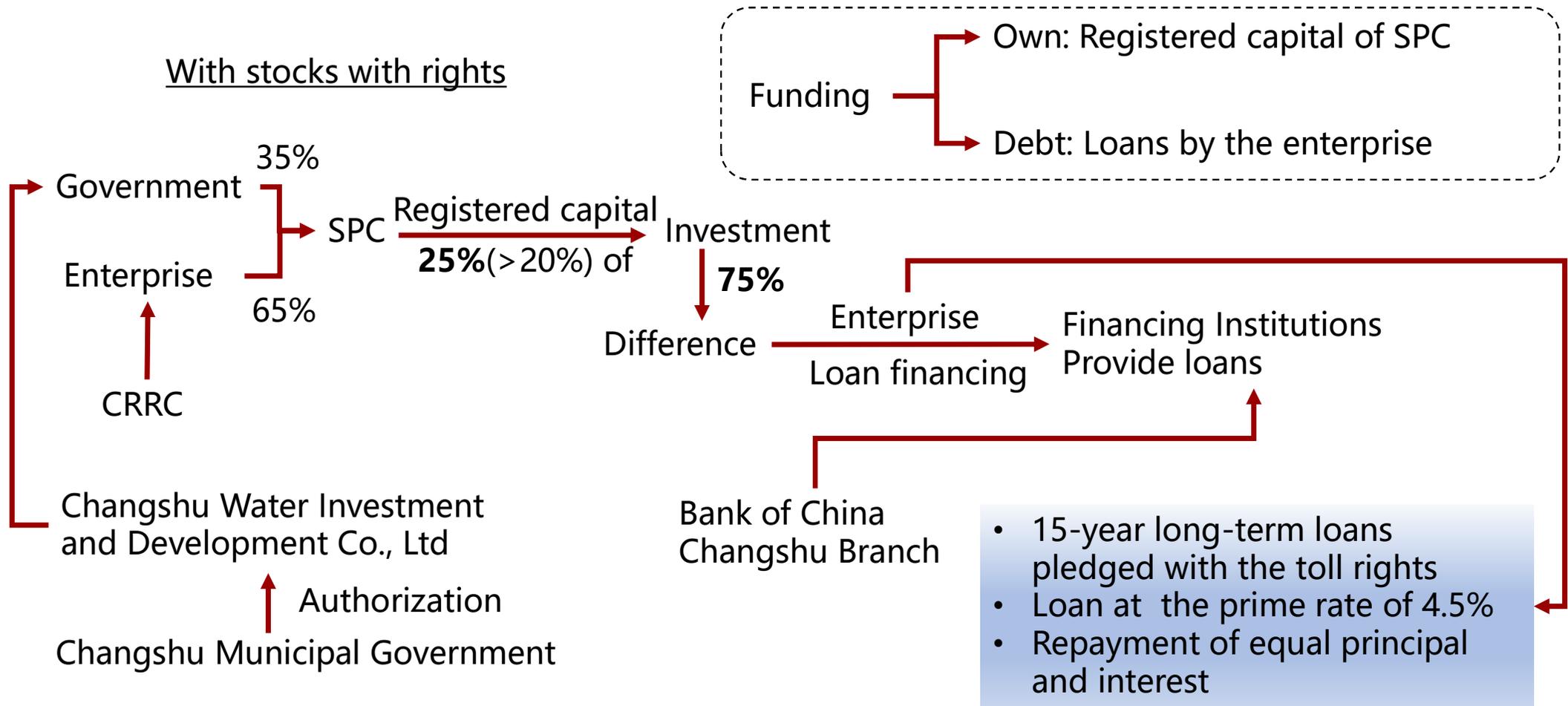
Design of the PPP project-Overview



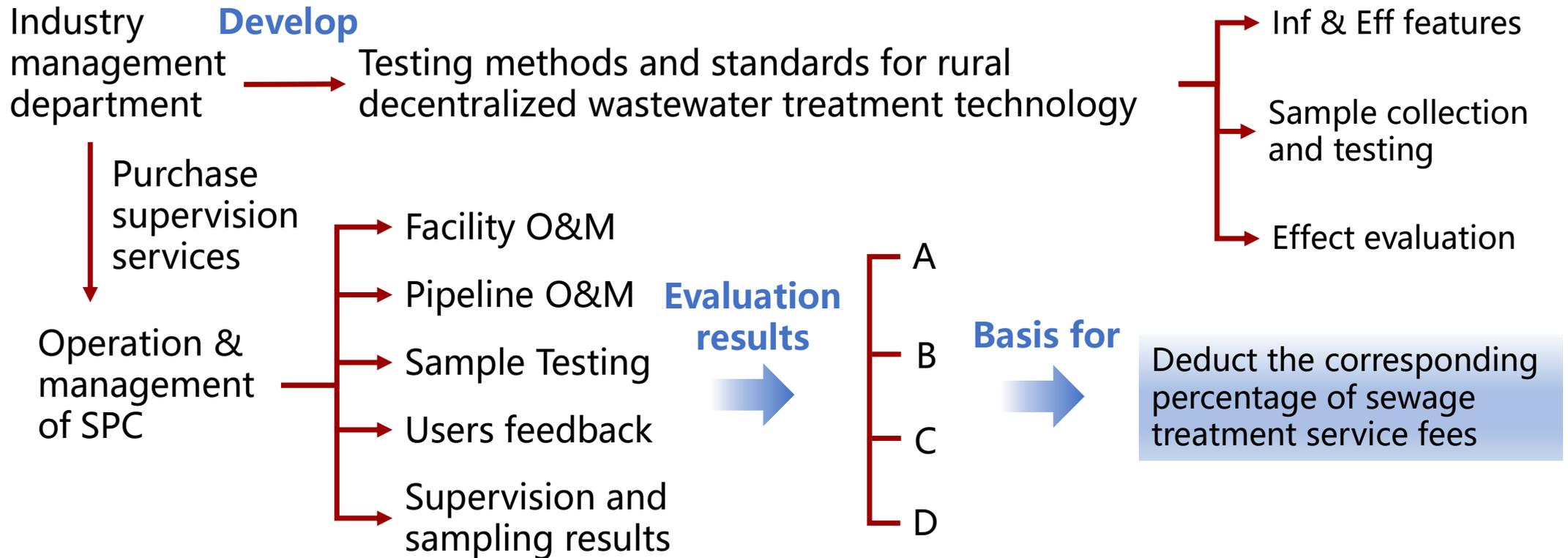
Standard period of agreement : > 10 years and < 30 years

Overall consideration, 26 years for this agreement, 1-year construction period and 25 -year commercial operation period.

Design of the PPP project- Investment and financing

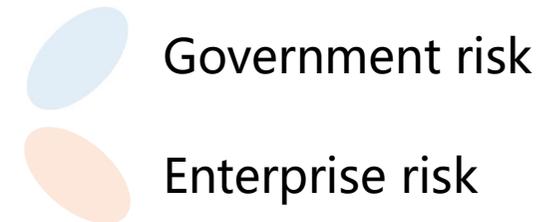
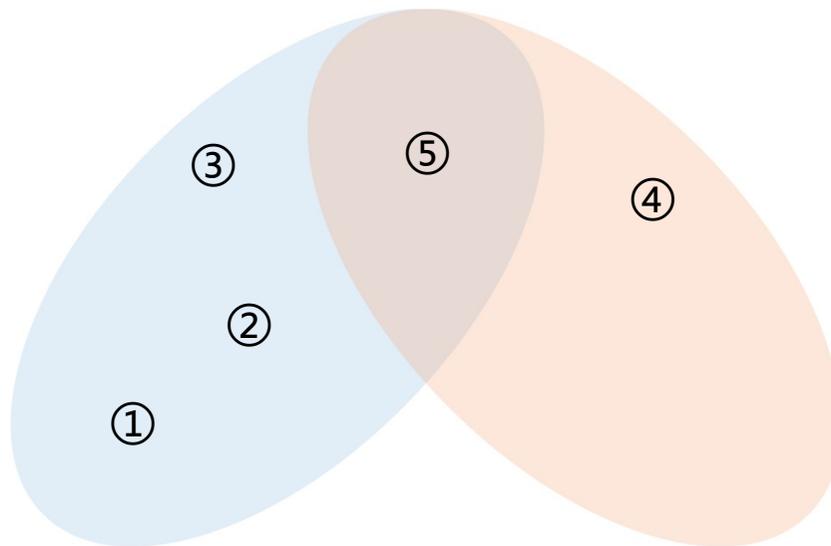


Design of the PPP project-Performance assessment methods



Penalties: If more than 3 consecutive or a total of 6 assessment periods get D, department in charge will cancel the qualification of operation and not pay the service fees.

Design of the PPP project-Risk allocation



③ Basic requirement

- Land acquisition
- Project approval
- Policy arrangement

④ Business

- Project construction
- Project maintenance
- Getting insurance

① Law

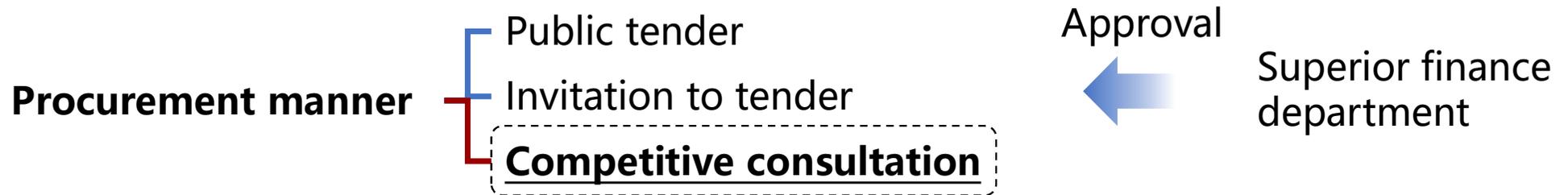
② Policy

③ Basic requirement

④ Business

⑤ Natural disaster

Implementation of the PPP project-Procurement flow



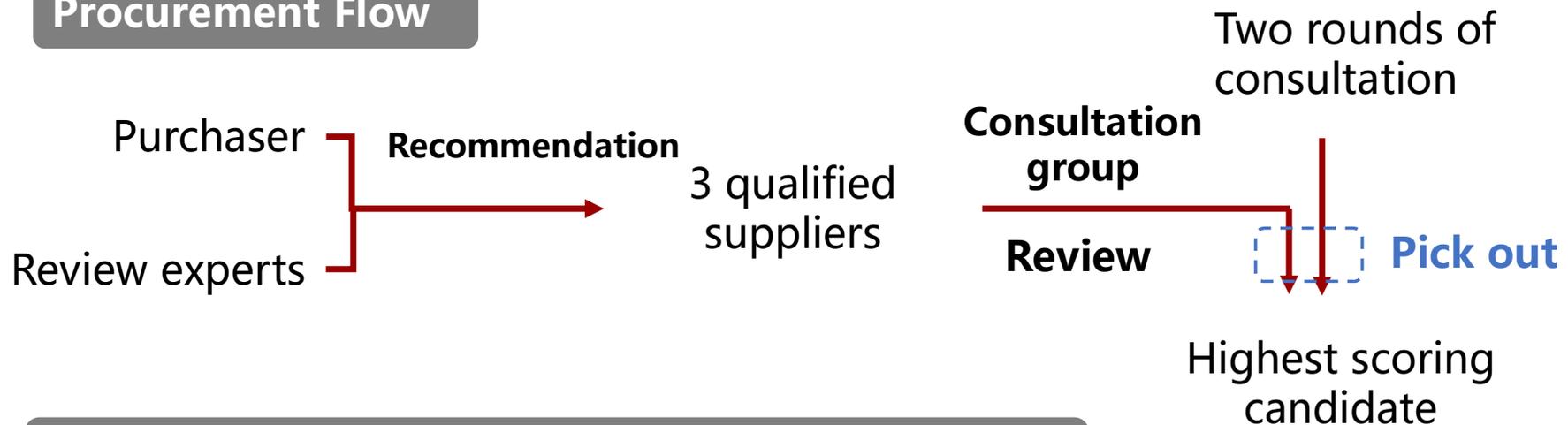
The Interim Measures for the Administration of Competitive Consultation in Government Procurement issued by the Ministry of Finance **stipulates** the following circumstances :

- (1) Confidential engineering
- ✓ **(2)** Engineering with very high professional requirements
- (3) Additional works that are linked to the large works that have been awarded
- (4) Urgent works that cannot allow bidders to prepare quotations
- ✓ **(5)** Open bidding or invitation to tender will not achieve the desired results of the project

**Not set the procedures of bid opening and evaluation.
Consultation between bidding and tendering unit**

Implementation of the PPP project-Procurement flow

Procurement Flow



For this emerging project, consultation is critical

- (1) **Clarify** the **needs** of both parties
- (2) Allow the government to procure **quality services** at a **reasonable price**
- (3) More complete to **examine** the **comprehensive strength** of the tender

Implementation of the PPP project-**Benefit for the SPC**

The finance bureau pays the annual service fee per household to the SPC according to the results of performance assessment.

Pricing basis

- The reasonable IRR is 8%-12%. **IRR** of this project was tentatively set at **7%** due to the high competitiveness and importance.
- After consultation, the fee for sewage treatment service was **RMB 1,935 /household/year** (PPP project Phase I, 2015).
- **Annual payment contains:** the average annual construction cost borne by the enterprise (discounted present value of each year), annual operating costs, financial costs, and reasonable profit.

Favorable condition

From 1st to 3rd year, no enterprise income tax. From 4th to 6th, the income tax is reduced by half, i.e. 12.5% of the profit, and **after 6th year, 25%** of the profit

Implementation of the PPP project-**Benefit for the SPC**

Pricing adjustment

The mechanisms of pricing adjustment:

- The service fee can be **adjusted once every two years**.
- If the **audit amount** of average household construction investment is **lower** than the **consultation quotation**, the government will have the right to reduce service fee.
- If the investor may obtain more similar service projects within Changshu in the future, the service fee can be reduced accordingly.
- If the Change in national or local wastewater discharge **standards causes the** capital expenditures or operating **costs variation**, the SPC can consult with the government for fee adjustment.
- The Government has the right to redeem the amount of transfer guarantee to **carry out overhaul** if the SPC fails to do that as required.

Implementation of the PPP project-Phase I to IV

During 2015-2022, Changshu City, a total of four county rural wastewater management PPP projects all enter the commercial operation period in turn.

Table 1 Changes in the content of PPP projects from Phase I to Phase IV

Phase	Contract-awarding time	Annual payment /(RMB/household/year)	Engineering Task	Technical mode	Eff standard
I	2015	1,935	Collection, treatment, remote monitoring	Onsite treatment	No specific requirements
II	2017	2,180	Adding: Public toilet collection, treatment	Onsite treatment	If Inf-COD>350 mg/L, meeting 60% of RE; If Inf-COD≤350 mg/L, China GB 1A.
III	2019	3,000	Adding: Separate drainage system, onsite septic tank	Centralized if possible	Local standard 1B; The facility drainage related to examination section shall be discharged nearby after ecological treatment; Inf of semi-centralized facility in COD≥120 mg/L;
IV	2021	2,877	Adding: Inf-sampling unit, deep treatment in-situ	Centralized if possible	Local standard 1B; The facility≥5 m ³ /d in the Taihu lake preserve grade 1 and 2, special value-limiting area (Almost GB 1A)

Implementation of the PPP project-Phase I to IV

Changes

- **Number of social capital**
- **Rate of service fee**
- **Effluent water quality standard settings**

Implementation of the PPP project-Phase I to IV

Changes

- **Social capital**

Change: Compared with other phases, Phase II introduced two social capitals and set up an additional 600-household incentive program (mid-term evaluation based on the construction, with the winner receiving additional concession agreements).

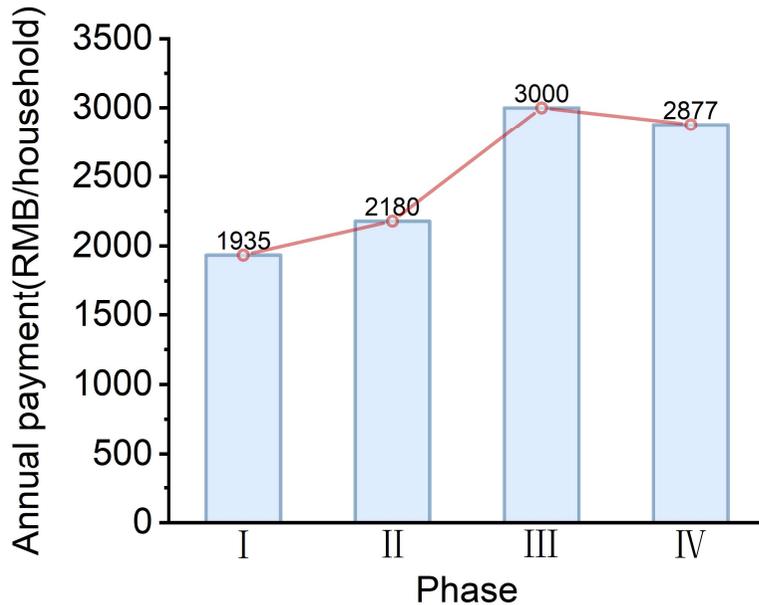
Purpose: Introduce incentive mechanism to guarantee the quality of project implementation.

Result: Due to the long cycle of the PPP project and the slow recovery of funds, which brought great risks to the enterprise. Coupling with the newly introduced social capital whose technology had the problem of unsatisfactory treatment effect, the PPP project in the later phase returned to one social capital, CRRC.

Implementation of the PPP project-Phase I to IV

Changes

• Annual payment



Annual payment

Phase I to II

No significant change in the average household input, and the technical mode is still dominated by household Johkasou

Phase II to III

38% ↑

- The principle of centralized collection, laying pipe networks and increasing pumping stations
- A septic tank in front of the inlet of the Johkasou
- Clear requirements for sludge treatment and disposal, and for improving effluent quality
- Rising raw materials, rising labor costs and normal annual inflation

Phase III to IV

4% ↓

- Decrease in the proportion of centralized wastewater treatment
- Full market competition for social capitals

Implementation of the PPP project-Phase I to IV

Challenge!!!

How to set the standard of effluent water quality?

Phase I The main water quality indexes referred to the class I B standard <GB 18918-2002>: COD 60mg/L, TN 20mg/L, SS 20mg/L or COD removal rate $\geq 80\%$.



Phase II The effluent standards are discussed in categories
For example: when the influent COD concentration is greater than 350 mg/L, the removal rate of each index should be met at not less than 60%, etc.



Phase III Except involved in the assessment section and protection zone of Taihu Lake (greater than 5 m³/d), which need to implement special emission limits (approximating GB 1B), the rest implement the target of local 1B standard.
For household treatment facilities, does not assess TN and TP

Outline

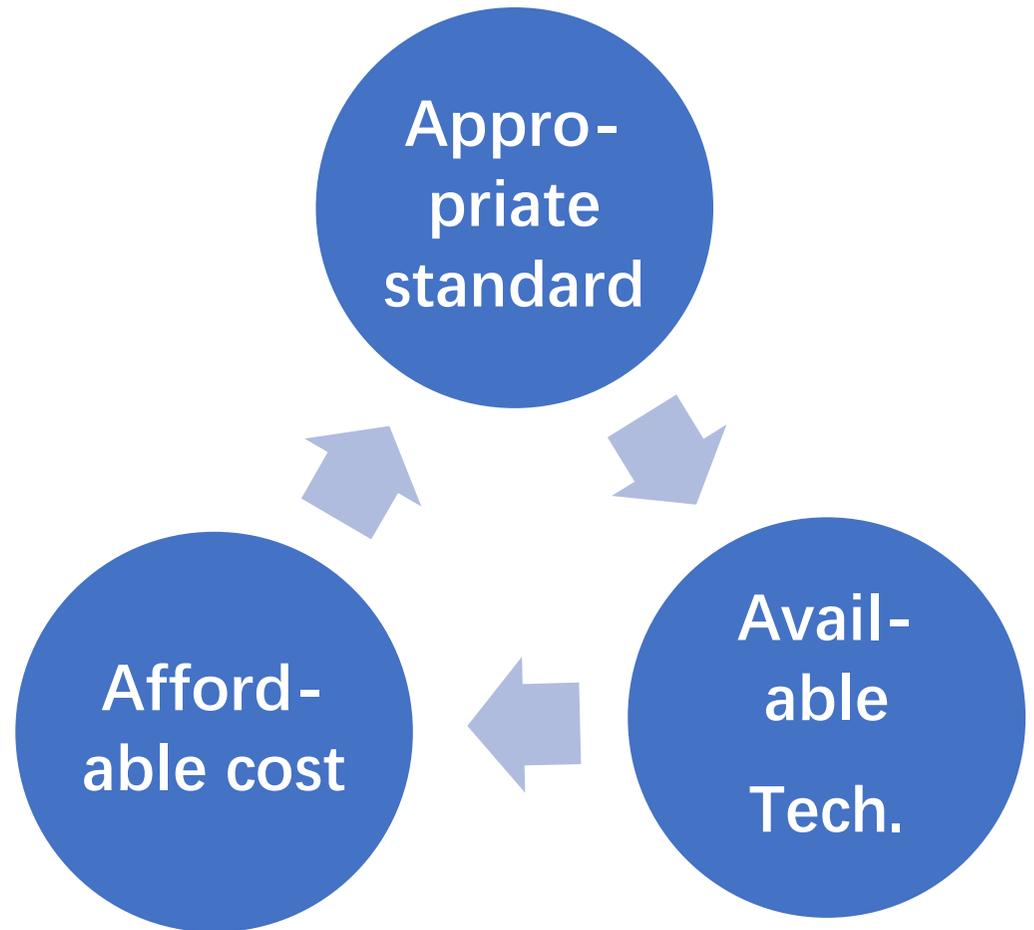
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Project summary and conclusive proposal

Good experiences of Changshu:

- 1. Household wastewater treatment may remarkably ease the finance burden of rural wastewater treatment, but the application of reliable technology such as Johkasou equipment is also critical.**
- 2. PPP model is a nice tool to ensure the project quality and is conducive to the application of innovative technologies. Whether it is necessary to finance from the society needs to consider the cost of financing.**

Lesson:
reasonable effluent
quality standards is
important!!!

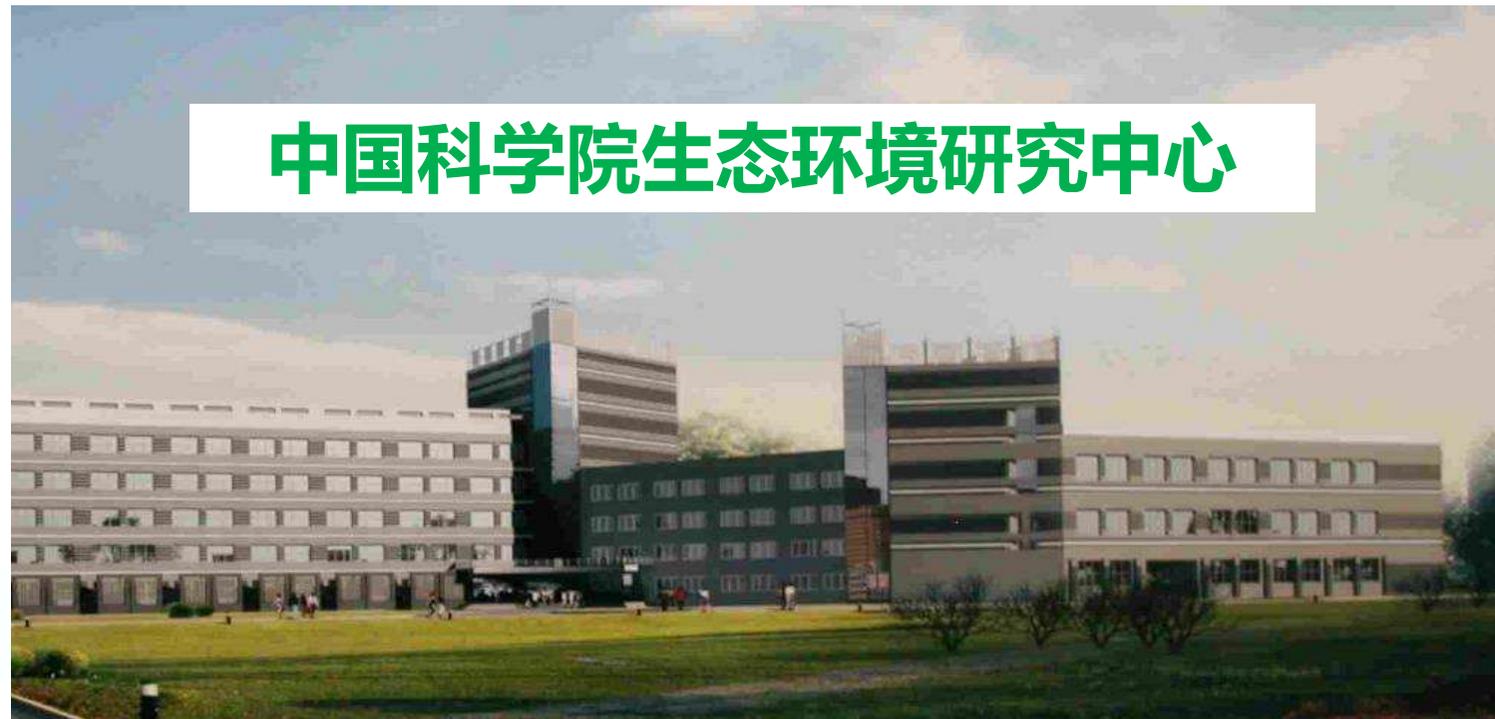


3A-Principles

Thanks for your attention, welcome to discuss and guide



Rural Environmental
Sanitation Team



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