Packaging PPP Waste to Energy Projects - ADB's Experience

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ADB's PRIVATE SECTOR OPERATIONS DEPARTMENT

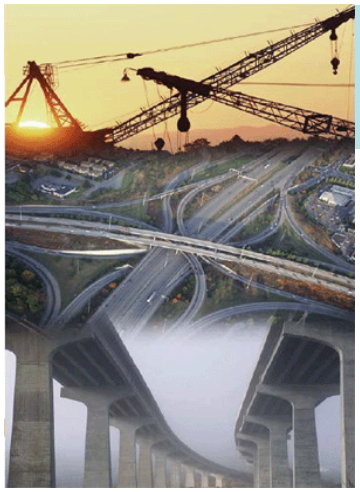
Innovation.Impact.Integrity.

What We Do

PSOD is ADB's only department responsible for assistance to private sector projects.

Our Mandate

- formulate and implement ADB strategies
- provide financial assistance on a non-sovereign basis
- mobilize funds
- invest in private equity funds
- monitor portfolio and manage risk



Infrastructure

- Energy (incl. Power)
- Transport
- Telecommunications
- Water
- Urban Infrastructure

Capital Markets & Financial Sector

- Banks
- Non-bank Financial Institutions
- Private Equity Funds

Providing Clean Energy & Addressing Climate Change

Solar

Wind

Hydro

Waste-to-Energy

Climate Finance

Energy Efficiency

Geothermal

ADB'S ENGAGEMENT IN WTE SECTOR

Municipal Waste-to-Energy Project (PRC)

ADB's first private sector WTE project

- Support China Everbright International to build and operate 6 WTE facilities with an aggregate capacity of 132 MW
- $650m project expands waste treatment by 6,200 tons per day, and power output by 630 GWh/yr
- ADB's role:
  - $100 million ADB direct loan
  - $100 million syndicated commercial loan (B-loan)
  - $653,000 technical assistance for knowledge dissemination and capacity building
- ADB's first private sector WTE project, meeting EU2000 Standards for flue gas emission with advanced grate incineration technology

Municipal Solid Waste in Asia

Providing viable solution to MSW is one of the priority areas for ADB and PSOD.

- Municipal solid waste (MSW) management is one of the most serious environmental and social challenges in the region,
- For instance, the PRC is now the world's 2nd largest MSW generator with annual waste volume of over 220 million tons. Yet the PRC's per capita MSW is still at 120 kg per annum, which is less than a quarter of OECD average of 560 kg per annum,
- As the PRC adds another 200 million or more urban residents by 2030, it leaves a significant upward potential for MSW,
- Significant proportion of MSW in the region is currently untreated and dumped in the un-engineered landfills,
- Highly relevant to ADB mandate and strategies.

Opportunities and Challenges for Financing WTE Projects

Barriers: financial institutions find it difficult to finance WTE projects.

Opportunities

- Growing market with big potential
- Structure is essential to generate cash flows
- Strong financial benefits

Challenges

- New sector with limited experience
- Undeveloped technology
- Lack of regulatory regime
- Potential municipality risk

RISKS, MITIGATIONS AND ADB PROJECT STRUCTURE

Risks and Mitigations – Technology

Major challenge for the government and the financiers: find an appropriate technology

- **For ADB to finance, the technology should be…**
  - Well proven
  - Clean
  - Reasonable upfront capex
  - Sizeable
- **Not so many technology options satisfy all of these**

No "preferred" technology but mass incineration (grate/stoker) has been chosen so far

Risks and Mitigations – Environmental and Social

Some of environmental and social concerns over WTE is real and some are myths.

- **Environmental issues**
  - The more segregation/recycling, the cleaner
  - Even with mass incineration, many advanced technologies can satisfy stringent standards such as EU2000, dioxin in particular
  - Fly ash hazardous and unrecyclable in many cases and should go to engineered landfills; bottom ash usually not hazardous but how to reuse?
- **Social issues**
  - Typical NIMBY facility
  - Highly sensitive in some countries (due to bad experience in the past)
  - In many cases residents change their view after completion, especially when compared with landfills

WTE is not as contentious as some might think; however, negative perception persists. Extensive consultation during planning and monitoring during operation are indispensable

Risks and Mitigations – Project Sponsor (Investor)

Capacity of the project sponsor is crucial for the success.

- **Technical capacity**
  - Experience in relevant technology
  - Experience in developing countries
  - Institutional capacity in troubleshooting
- **Financial capacity/creditworthiness (especially if on BOT)**
  - Government delegates waste treatment for a very long term (e.g. 25 years)
  - Capacity to make equity contribution and experience in raising commercial finance
- **Relationship with EPC contractor**
  - Pros and cons for investor-contractor
  - Construction/completion risk

Like other BOT-based infrastructure projects, WTE heavily relies on the overall sponsor capacity. Selection of the sponsor should be transparent and sound

Risks and Mitigations – Waste Supply and Quality

Fuel supply risk is a major risk for any thermal power plants. In WTE, waste is the "fuel".

- **Waste supply risk**
  - If sufficient amount of waste is going to be supplied
  - Possibility of competing facilities in the future?
  - Responsibility for waste collection and delivery
- **Waste quality risk**
  - Commingling of incombustibles or hazardous waste
  - Is waste calorific value sufficient to run WTE plant without supplemental fuel?
  - Impact of economic development (waste amount and composition), promotion of recycling (proportion of plastic waste in particular)

Private sector operators and financiers need to get comfortable with the waste supply arrangement and assurance that the waste characteristics fit the WTE facility

Risks and Mitigations – Tipping Fee and Tariff

Financial sustainability of WTE plants depends on revenue structure.

- **Electricity tariff**
  - Offtaking a must, feed-in-tariff (FIT)/adder scheme a key
  - PRC: FIT of CNY0.65/kWh ($0.106)
  - Thailand: THB5.9-7.7/kWh (incl. adder of THB3.5/kWh, $0.182-0.237 in total)
- **Waste Tipping fee**
  - Theoretically speaking, tipping fee can be zero if waste calorific value is high and FIT provides sufficient revenue; in reality, local governments always need to pay tipping fee
  - From ADB's experience in PRC, 2/3 of revenue from tariff and 1/3 from tipping fee ($8-15 per ton on average)
  - Reliance on local government for waste supply and payment of tipping fee

Sound FIT scheme should be in place to attract investors. WTE can potentially save waste management cost of local govts but not an opportunity for revenue generation

Risks and Mitigations – Concession and Risk Allocation

Concession agreement a key for proper risk allocation and overall structuring.

- **Concession agreement**
  - Long-term (25-30 years), exclusive right, first refusal right, termination regime
  - Government responsibilities include (i) waste collection, segregation and delivery, (ii) land acquisition (if any), and (iii) payment of tipping fee
  - Minimum waste supply guarantee a must (waste quality guarantee preferred but not a must)
  - Private sector investor (concessionaire) commits to construction and operation of WTE facility, in compliance with emission and other environmental standards
  - Arrangement of finance also responsibility of the concessionaire
  - PRC – simple but commonly used concession agreement template
- **Power purchase agreement (PPA) with utility (or other offtakers)**

Investor and local govt should carefully enter into a well-structured concession agreement with right counterparty – it is also a key to attract commercial financing

Risks and Mitigations – Structuring and Financiers' Concerns

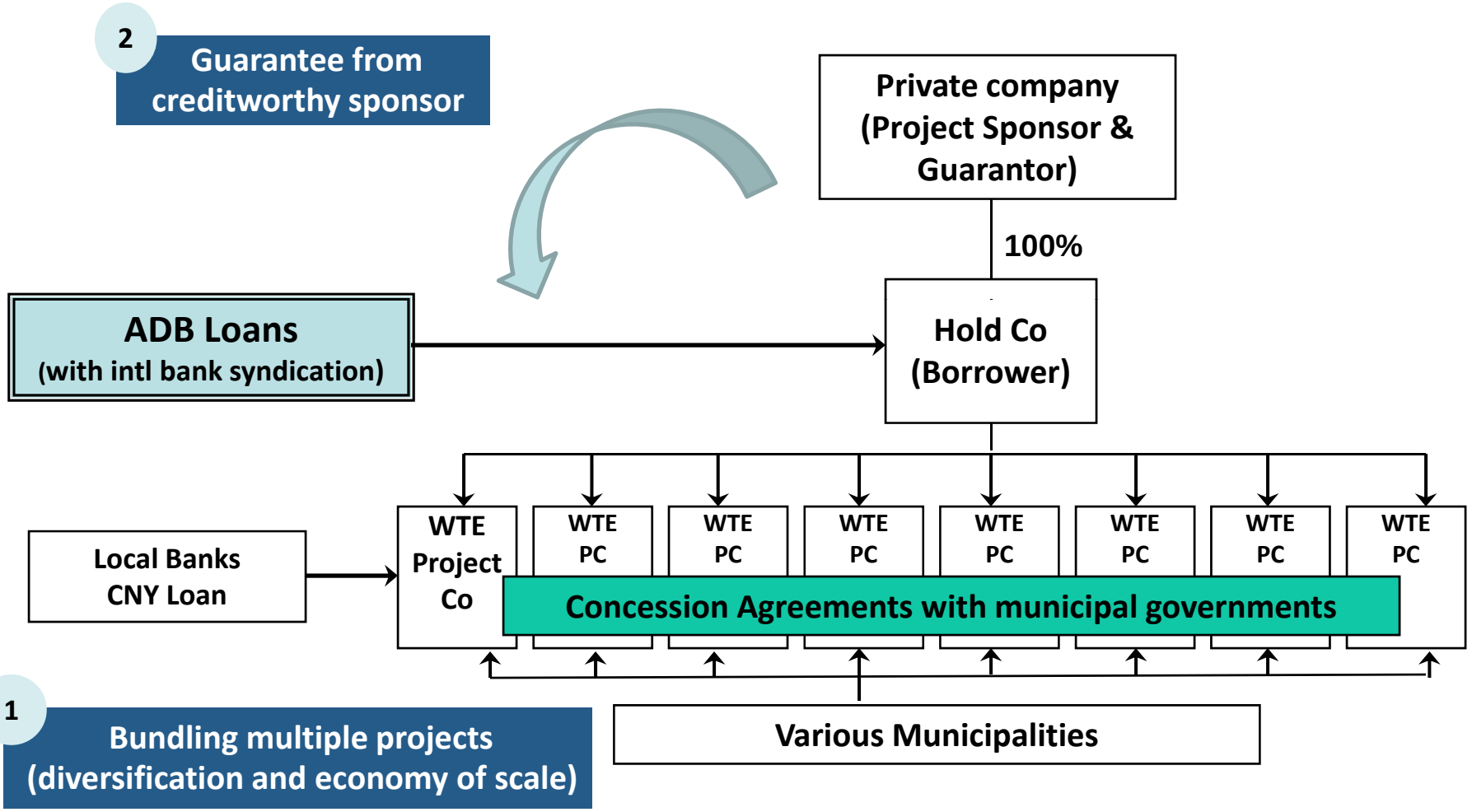
Financial structuring is another key for successful PPP/BOT.

- **Stable cash flow with a good concession agreement, FIT/PPA**
  - Financiers can get comfortable to extend long-term loans
  - Project financing (with adequate debt-to-equity ratio)
- **Key remaining concerns**
  - No fundamental mitigation for municipality risks (cf. conventional power projects)
  - Project size tends to be small (relative to transaction costs)
  - Currency mismatch?
  - Local banks may be able to overcome these, but less experienced in the sector
  - Any central government support?
- **Corporate finance to investor an alternative, but tenor will be shorter**

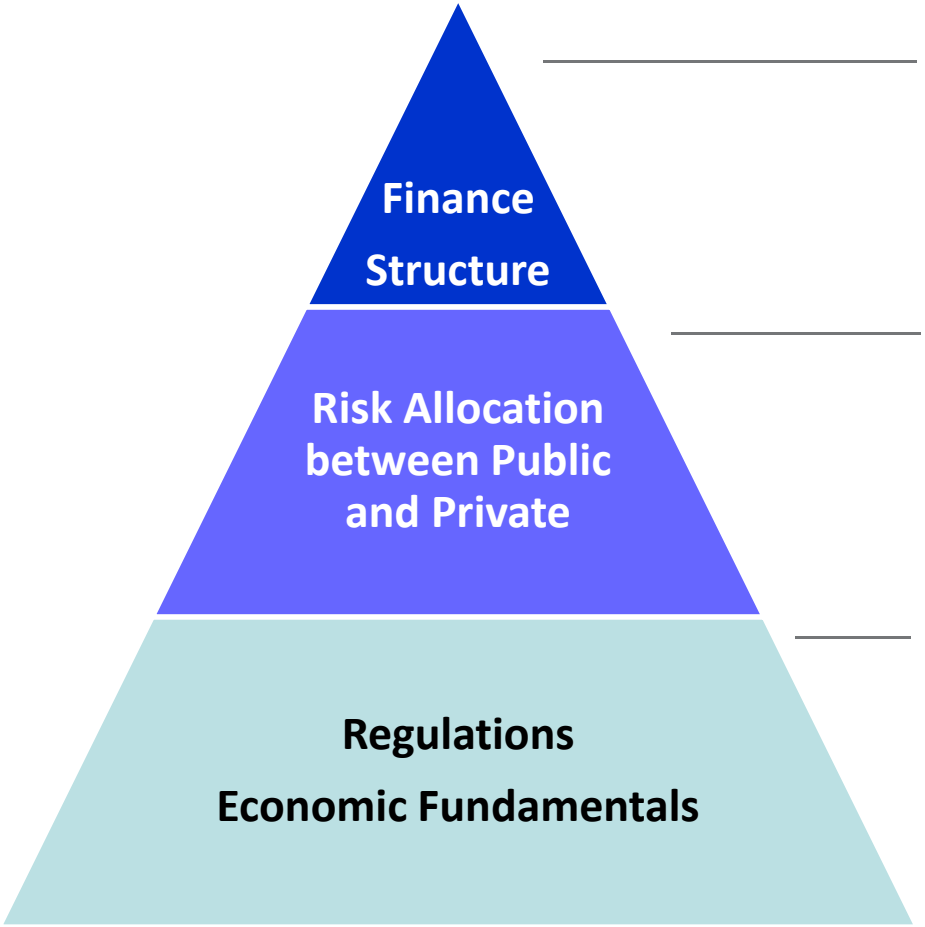
Except for a few large and creditworthy municipalities, standalone project financing can be difficult (especially from international banks)

ADB Project Structure

Innovative "portfolio approach" to diversify and mitigate individual project risks.



Summary of PPP Key Ingredients



- Flexible financing structure
- Minimize transaction costs of smaller projects

- Equitable risk sharing : risk should reside with party most able to manage it. Commercial Issues such as tenure, termination regime and step-in rights.

- Key items:
  - Essentiality
  - Equitable tariff structure
  - Model concession
  - Transparency

Track Record to Date (China Everbright Project)

Overall technical and financial performance (more than) satisfactory

- Performance of WTE plants has been better than originally designed
  - Avg boiler and turbine-generator availability close to avg performance in the US
  - Avg gross energy generation of 346 kWh/ton, net generation of 285 kWh/ton
  - No supplemental fuel required (only start-up diesel)
  - Lime and carbon feed rates vary from plant to plant
  - SNCR installed in several plants to reduce NOx to meet EU2000 standards
- Independent experts consider this is sustainable as long as routine maintenance and major overhaul, repairs and replacement works continue
- Each plant financially viable with all financial covenants met
  - FIT of CNY0.65/kWh ($0.106)
  - Tipping fee varies from place to place ($8-15/ton)
- $100 million syndication of B loan with commercial banks successful

SUMMARY/CONCLUSION

Summary/Conclusion

- **WTE is a growing and promising sector in many Asian countries**
  - ADB private sector operation continues to be active in WTE sector in the region
- **PPP, in particular BOT structure is possible for WTE, despite variety of risks**
  - Proven technology, transparent regulatory regime on waste management and renewable energy (offtaking and FIT), sound concession agreement and creditworthy project developers keys for bankability
  - Financial and structural reality (especially inherent exposure to municipality risk and small project size) makes it difficult to do project financing
- **Although ADB does not have preference on technology as such, so far our experience has been limited to mass incineration WTE projects**
  - Does not rule out other technologies if it is proven and with sound structure
- **Increasing number of commercial banks interested in and becoming keen to finance WTE projects**

Contact Us

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Thank You!