

Finance for Solid Waste Systems in Developing Countries

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Solid waste service is costly.

- Total cost for solid waste collection, transfer, and disposal is typically \$40-80/tonne.
- Per capita waste generation is 0.2-0.3 tonnes/year.
- 60-70% of total cost is for collection.
- Full solid waste service requires 1-2% of GDP.

Adequate cash flow is essential.

- 50-70% of total cost is for recurrent expenditure – labor, fuel, tires, oil, spare parts.
- Labor and fuel are priority expenditures.
- If there aren't enough recurrent funds, spare vehicles are cannibalized for parts.

Sources of capital funds:

- Municipal bond issues for facilities, including intergovernmental tax credits that recognize externalities.
- Municipal borrowings for vehicles, such as from national development banks.
- Renewal funds replenished by special taxes, user charges, tipping fees.
- Intergovernmental transfers.
- Private sector investment.

Private involvement raises recurrent budget requirements.

- Recurrent budget must be higher to involve the private sector.
- Contractors have to pay monthly for their debt service for investment, and they borrow from short term notes at high commercial interest rates.
- Few municipalities could afford to support private sector investment.
- Mostly old non-specialized private vehicles are hired.

Limited progress in the last decade.

- Multilateral and Bilateral development organizations reduced funding, assuming there would be private investment.
- Investment climate was poor, due to political intervention in contracting and uncertain contract continuity.
- Municipalities were commonly restricted in the size and length of contracts.
- Labor laws restricted staffing reductions to enable private sector service.

Solid waste is a public good.

- Uncollected and poorly disposed solid waste adversely affects public health and environment.
- All municipal residents and visitors benefit from any solid waste services, regardless of whether they directly participated.
- Excluding some residents from services, adversely affects others.

For regional or global externalities:

- Intergovernmental transfers to upgrade disposal to desired national standards.
- Intergovernmental transfers to encourage compost as a carbon sink and means of upgrading land for agriculture.
- International transfers to encourage emission reductions to reduce climate change.

Examples of financial transfers:

- USA Superfund to remediate hazardous releases, including qualifying municipal dumps.
 - 1980-2005+ Comprehensive Environmental Response, Compensation and Liability Act, and subsequent amendments.
 - Funded with taxes on crude oil and certain chemicals, eventually 8.5 \$BB.
 - 45,000 sites assessed, about 1,600 placed on National Priority List.
 - Private responsible parties sued by Govt. to reimburse the trust.

Examples of financial transfers:

- Israel Solid Waste Subsidy Program
 - 1994-2003 financial support to municipalities.
 - Covered 5 years of cost increases for increased disposal and haulage from implementing improved new landfills.
 - Covered recycling communal bins and a fee for each tonne of waste recycled.
 - Covered half the cost of backyard composting devices.

Examples of financial transfers:

- EU funds to upgrade disposal for EU accession countries.
 - 2000-5+ Instrument for Structural Policies for Pre-Accession
 - Grants to upgrade infrastructure to meet EU standards, averaging over 1 BB Euros annually.
 - Funds up to 75% of landfill civil works investment
- EU cohesion funds
 - 2000-5+ Assists less prosperous member countries to meet EU standards – about 28 BB Euros.

Examples of financial transfers:


- UK Landfill Tax Credit
 - Taxes every tonne landfilled – 50 BB Pounds/year – mostly funds remediation of solid waste activities.
 - Landfills given exemption for donations to environmental improvements.
 - Similar landfill taxes in France, Italy, and Netherlands.
- Ireland Recycling Partnership
 - 1997 payment for every tonne of packaging waste recycled – over 60 MM Euros thus far.

Examples of financial transfers:

- USA Tax Exemptions
 - For bond issues for resource recovery plants
 - For investment in landfill gas recovery
- Various US States Recycling Subsidies
 - 5-15% price preferences for recycled content
- Global Environmental Facility
 - funds to promote climate change improvements – 1991-2005+ – ~5 \$BB.
- Carbon Finance
 - funds to purchase green house gas emission reductions – 2000-2005+ - ~1\$BB.

Examples of emission purchases:

- Landfill methane gas capture to flare or recover.
- Composting or anaerobic digestion to avoid landfill gas.
- Transfer stations reduce vehicle emissions.
- Recycling captures inherent energy in recyclable materials.

A dramatic landscape with a dark, stormy sky and a bright light source on the horizon over a body of water. The sky is filled with dark, heavy clouds, and a bright light source, possibly the sun or moon, is visible on the horizon, creating a strong lens flare and illuminating the water. The water is dark and choppy, with a small yellow light reflecting on its surface. The overall mood is somber and atmospheric.

Most service benefits occur within municipal boundaries and warrant being covered by municipal revenues.

Ideally.....

- Delegate more authority to municipalities to
 - Raise capital for investments, and
 - Establish fees and taxes to cover recurrent costs and debt service.
- Encourage municipalities to enter inter-municipal agreements for specific facilities with economies-of-scale (~300 tonnes/day for most facilities...~400,000 residents).

Cost recovery is recommended.

- People are willing to pay for good service.
- Free riders and illegal dumpers are commonly identifiable from papers in their waste.
- Earmarked user charges enable reliable revenues for service delivery.
- Large generators may be influenced by quantity-based charges...polluter pays principle.

Cost recovery mechanisms:

- Property-tax additions for solid waste.
- User charges attached to water or electric bills.
- User charges billed separately to all waste generators.
- Tipping fees at transfer and disposal facilities.

Charges are based on city-wide costs.

- Service to the poor is often more costly
 - small loads, poor access.
- Value of waste from the poor is less – fewer recyclables, more ash and sand.
- Charges should be proportional to income:
 - Property area,
 - Water consumption, or
 - Electricity consumption.
- Only large generators pay by volume.

Additional revenue sources:

- License fees from private subscription operators.
- Franchise fees for service zones.
- Sales from recyclables, compost and landfill gas.
- Carbon finance from sale of CO₂equivalent emission reductions.
- Landfill, environmental, or tourist taxes earmarked for solid waste.

Conclusions:

- Explore all financing options,
- Tie economic incentives to desired environmental externalities,
- Decentralize financial responsibility and authority to municipalities.



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