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IFC Advisory Services in Eastern Europe and Central Asia

Municipal Solid Waste Management: Opportunities for Russia

SUMMARY OF KEY FINDINGS



In partnership with



NL Agency
Ministry of Economic Affairs, Agriculture and
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SUMMARY OF KEY FINDINGS

Municipal solid waste (MSW) management system is one of the key components of a country's overall environmental and resource efficiency framework.

Inefficient MSW treatment in Russia today is causing both negative environmental impact and results in suboptimal use of raw materials and energy.

If Russia optimized its MSW management policy and implements modern technologies, by 2025 it could fully shift towards environmentally friendly MSW management system and recover up to 45% of waste. As a result, by 2025 more than 200 m t of MSW will be recovered to raw materials and energy instead of landfilling. This will require investing up to 40 bn EUR and will generate additional 2bn EUR in revenues from recoverable fractions.

Municipal solid waste (MSW) is waste generated by households and similar waste from businesses. MSW management systems include the collection, haulage, recovery, and disposal of waste, conducted by specialist entities and coordinated by local authorities.

Some necessary improvements to the MSW management system are already being discussed and implemented by experts and officials at the national and sub-national levels.

This study aims to facilitate the development of the sector by offering a scenario-based assessment of market potential and by recommending ways through which to eliminate obstacles to development in the sector. It also analyzes the impact of various types of interventions, particularly those that promote private sector participation.

The findings of the study will help national and regional authorities make more informed policy-related and strategic decisions in determining the most efficient waste management system in the local context, in prioritizing treatment types, and in determining the measures needed to support the implementation of such initiatives. Market operators (including companies that collect, haul, and recover waste), as well as potential investors, will find useful information on the factors governing project economics and the choice of waste treatment strategies.

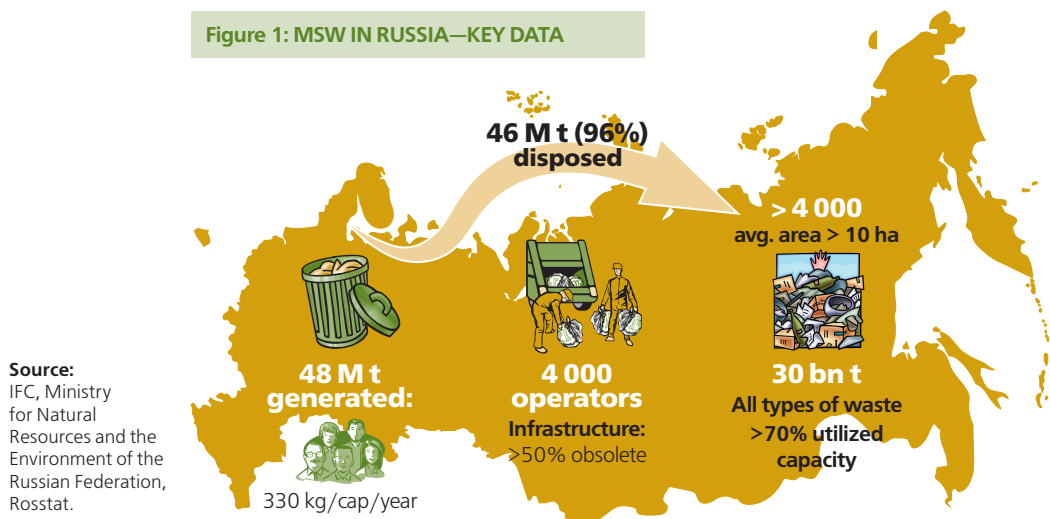
1) THE IMPORTANCE OF A MORE EFFICIENT MSW MANAGEMENT SYSTEM


Current waste management practices in Russia are resource-inefficient and result in negative environmental impacts. While EU Member States recover, on average, up to 60 percent of MSW, Russia's waste recovery rate is nearly zero. If this trend continues, Russia will need to double its MSW disposal capacity in 10 to 15 years.

The volume of MSW in Russia has been steadily increasing in recent years: according to available data, more than 48 million metric tons of MSW was generated in 2010 — i.e., more than 330 kilograms per capita per year. This is significantly lower than the EU's generation rate of 510 kilograms, but much higher than Russia's own generation rate in 2000. It is expected that by 2025 MSW generation in Russia will reach 450 to 500 kilograms per capita per year, or more than 60 million metric tons of MSW annually. At present, around 95 percent of all MSW is sent for disposal: a situation which, inevitably, has **negative environmental and economic consequences**.

More than 80 percent of landfill sites came into existence more than 20 years ago: while this varies according to location, **up to 30 percent do not meet current sanitary standards**. Toxic substances accumulate in a landfill, infiltrating the soil and groundwater and polluting the air. This can have a number of short-term effects (such as combustion and landfill fires) as well as long-term impacts (decreased biodiversity, soil fertility and harm to human health).

Figure 1: MSW IN RUSSIA—KEY DATA



The background of the entire image is a dense, chaotic pile of municipal solid waste (MSW). It includes various types of plastic (bottles, bags, fragments), paper (shredded, crumpled), and organic waste (food scraps, twigs). The colors are mostly muted browns, greys, and whites, with some bright spots of red, blue, and yellow from plastic debris.

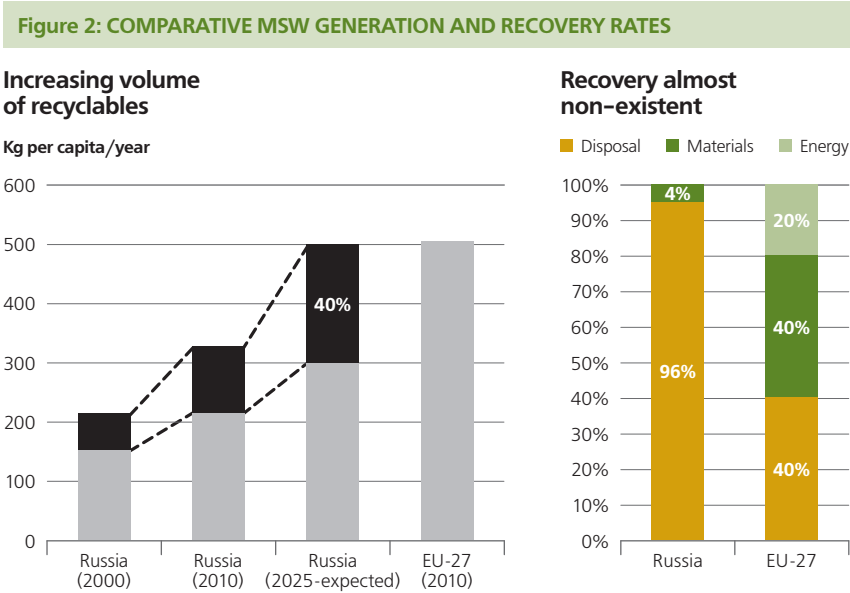
In 2010, Russia generated more than 48 million metric tons of municipal solid waste. Around 95 percent of all MSW was sent for disposal.

At present, up to 30 percent of waste disposal facilities in regions throughout the country do not meet sanitary requirements, and expansion opportunities are severely limited.

The size of most landfill sites (many covering more than 10 hectares) exacerbates these impacts. In total, official estimates indicate that over 32 billion metric tons of MSW are accumulated at landfill sites. The remaining capacity of landfills is estimated to be, on average, between 30 and 35 percent: this means that **by 2025 Russia is likely to need to double its capacity to accommodate growing volumes of waste.** The current rate at which new capacity is created **does not ensure the ability to process projected volumes.**

This challenge is compounded by the fact that between 50 and 70 percent of Russia’s **waste collection and haulage infrastructure is obsolete.** Moreover, formal MSW collection services do not extend to a number of small towns and villages. In terms of **resource efficiency,** current low recovery rates in Russia result in the inefficient use of raw materials and energy: and international best practice would suggest **significant potential for MSW recovery.** In the United States, for example, up to 40 percent of all municipal waste is recovered; EU Member States typically recover around 60 percent of municipal waste—ranging from 25–30 percent in the Czech Republic, Slovakia, and Poland to 95–99 percent in Austria, Belgium, and Switzerland. To address the challenges and opportunities of better MSW waste management and recovery in Russia the following questions must be answered.

- (i) What MSW management system would be best suited to Russia? What initiatives are necessary to make the current MSW management system fully efficient?
- (ii) What rate of waste recovery is achievable in Russia? What technologies and approaches could feasibly be adopted throughout the country?
- (iii) What specific measures must be adopted by government agencies at various levels—i.e., local, municipal, and federal, as well as service providers and other stakeholders? What might be the impact of these on the wider MSW sector?



Source: Eurostat, IFC, Rosstat.

2) THE OPTIMUM WASTE MANAGEMENT SYSTEM FOR RUSSIA

Russia has two alternatives available to it in attempting to improve the situation: a greater focus on sustainable disposal, or the adoption of better waste recovery. This latter option could lead to a recovery rate of 40–45 percent by 2025, which would reduce demand for new landfill capacity by 20–30 percent.

An effective waste management system typically exhibits two **key characteristics**:

- (i) the existence of strategic priorities and targets in waste management; and
- (ii) the clear and effective establishment of providers, technologies, and methodologies for solid waste treatment appropriate to the area under management.

Various options for solid waste management in Russia have been modeled. This assessment was based on experience in EU Member States—experience in these countries being a practical benchmark for a number of reasons:

- i) trends in consumer and industry behavior in Russia are similar to those in the major EU economies; and
- ii) Russia's largest urban areas, in which the greatest volumes of waste are generated, are similar to those in EU Member States in terms of population density, industry, and commerce.

The key strategic priority in EU Member States is the **sustainability of the waste management system**. This is achieved by:

- (i) providing the population with access to quality waste management services (collection and haulage);
- (ii) ensuring the environmentally safe treatment of all types of waste; and
- (iii) recovering valuable resources and energy to reduce volumes for disposal, and by avoiding the use of raw inputs where feasible.

It is essential that these conditions also be met in Russia if the country is to move forward from its current situation. Completing the first of these stages would require Russia to:

- (i) upgrade and extend existing truck and container fleets nationwide;
- (ii) implement effective control systems (including the weighing of waste, radiation monitoring, etc.) over incoming waste streams at landfill sites; and
- (iii) undertake the rehabilitation and sanitary improvement of disposal sites currently in poor condition, including full closure where necessary.

Implementing these measures in Russia **would require capital investment estimated at up to €18.5 billion, €3.5 billion of which would be devoted to the upgrading and extension of the truck and container fleet.**

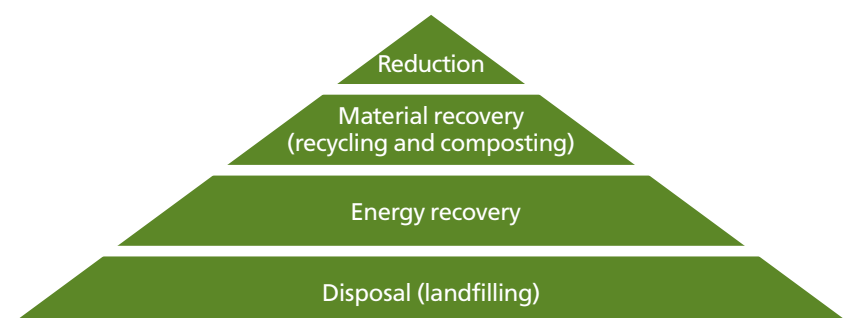
Once these initiatives have been implemented it would then be necessary to develop longer-term solutions for the upgrading of the waste management system. As indicated in section 2, above, various developed economies have adopted different waste management principles to that end—and while these have often resulted in varying waste recovery rates, the same level of health and environmental safety has, broadly, been assured.

If Russia were to focus on the sanitary treatment and disposal of MSW, a fully **sanitary disposal system could be established by 2025**, at a cost of approximately **€33.5 billion**. Such a disposal-oriented scenario assumes the implementation of ad hoc and/or currently scheduled small-scale recovery projects, with recovery rates of up to five to seven percent. The **breakeven cost per capita** of this scenario would amount to **€30–35 per annum** (at 2010 prices).


On the basis of experience in EU Member States, the prioritization of waste recovery over safe disposal is driven by two key factors:

- (i) **the feasibility of recovering materials and energy** from specific fractions, as well as recovery project economics; and
- (ii) **the alternative cost of disposal**—to society, and in terms of long-term environmental damage.

Figure 3: HIERARCHY OF PRIORITIES FOR SUSTAINABLE WASTE MANAGEMENT



Source: Peterson, C., "Sector Note 4: Cities and Solid Waste," in: International Bank for Reconstruction and Development/World Bank Group, Dastur, A., Moffatt, S., Suzuki, H., and Yabuki, N. (2009), *Ecological Cities as Economic Cities*.



Current accumulated landfill waste in Russia is enough to load the Trans-Siberian railroad to full capacity for 2,400 years.

The establishment of a modern waste management system in Russia would require capital expenditure in excess of current annual investment in fixed inputs in the transportation and communications sectors.

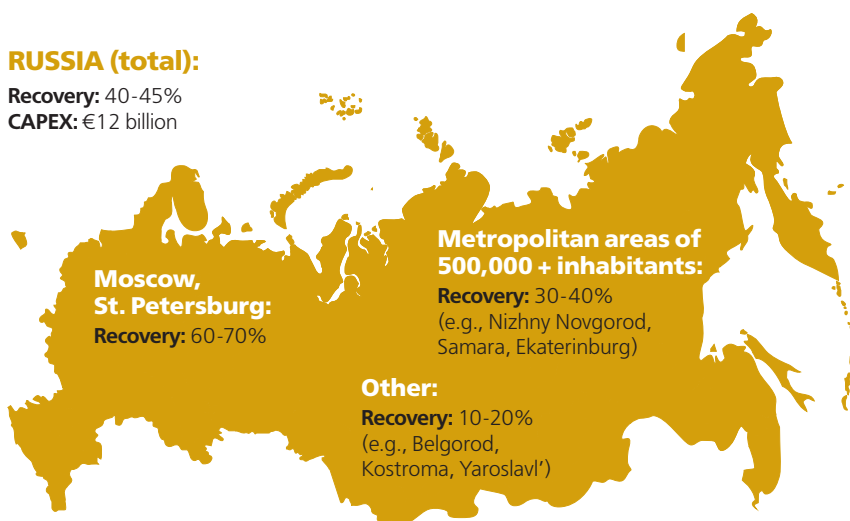
For these reasons recovery targets are determined by the European Commission, with countries and sub-national entities responsible for enabling projects and technologies that facilitate the fulfillment of such targets. This is consistent with the “ladder principle,” a core component of waste management policies since the 1970s, which prioritizes all forms of prevention and recovery over end-of-pipe solutions.

In practice, any ultimate waste management solution will be dependent upon various macroeconomic factors prevailing in the specific region or urban conurbation in which such system is situated. These may include:

- (i) welfare and consumption patterns, as well as business and commercial activity;
- (ii) population size and density (particularly in urban areas);
- (iii) the availability (or scarcity) of land;
- (iv) demand for secondary materials and energy;
- (v) the standard of pre-existing transport infrastructure; and
- (vi) other factors (climate, seasonal changes, etc.).

Taking the above factors into account, if Russia were to adopt a recovery-oriented approach to waste management now, **the target recovery rate of 40 percent could be achieved by 2025**. Doing so would require **€40.5 billion in investment** but this would, in turn, generate an additional **€2 billion in revenues** from the sale of recovered materials and energy. The breakeven cost per capita under this scenario would be similar to that under a disposal-oriented approach—i.e., **€30–35 per annum**. In other words, **Russia could adopt a waste management policy which would generate revenue while saving resources and energy—at no greater cost per capita than the costs of a disposal-oriented approach**.

Figure 4: POTENTIAL REGIONAL MSW RECOVERY STRATEGIES (by Conurbation Type)



Source: IFC.

Is a uniform approach to waste recovery necessary (or, indeed, viable) for a country as vast and as economically and geographically diverse as Russia? In such a case it might be more appropriate to adopt policies specific to the needs of individual regional (metropolitan) conurbations. Figure 4, below outlines three categories of conurbations for which alternative approaches might be appropriate.

It can be assumed that metropolitan areas such as those concentrated around Moscow and St. Petersburg will enjoy higher recovery rates, while in the smallest and least densely populated areas only basic recovery technologies are likely to be implemented.

This model is based on the typical ranges (in terms of cost per metric ton) observed in projects in European Union Member States and, more recently, in Russia. The cost per metric ton can vary considerably (by up to ten-fold) depending on the technology used—i.e., from the lowest-cost option (basic mixed-waste recovery) to more sophisticated technologies such as incineration with energy and heat recovery (see Table 1, below).

Table 1: COMPARATIVE COSTS AND EFFICIENCY OF ALTERNATIVE RECOVERY STRATEGIES

Type of treatment technique	Recovery rate (range, %)	CAPEX (range, €/metric ton)
Material recovery (mixed waste)	5-20	100-250
Material recovery (separate collection of organics)	15-30	200-300
Material recovery (multi-fraction separate collection)	30-40	300-400
Production of biogas from biomass	20-30	300-500
Composting	30-40	400-600
Waste incineration with energy and heat recovery	80-85	800-1,200

Source: IFC.

The framework of measures for each of the clusters is indicative: this model can be fine-tuned to accommodate field data for any specific region or urban conurbation.

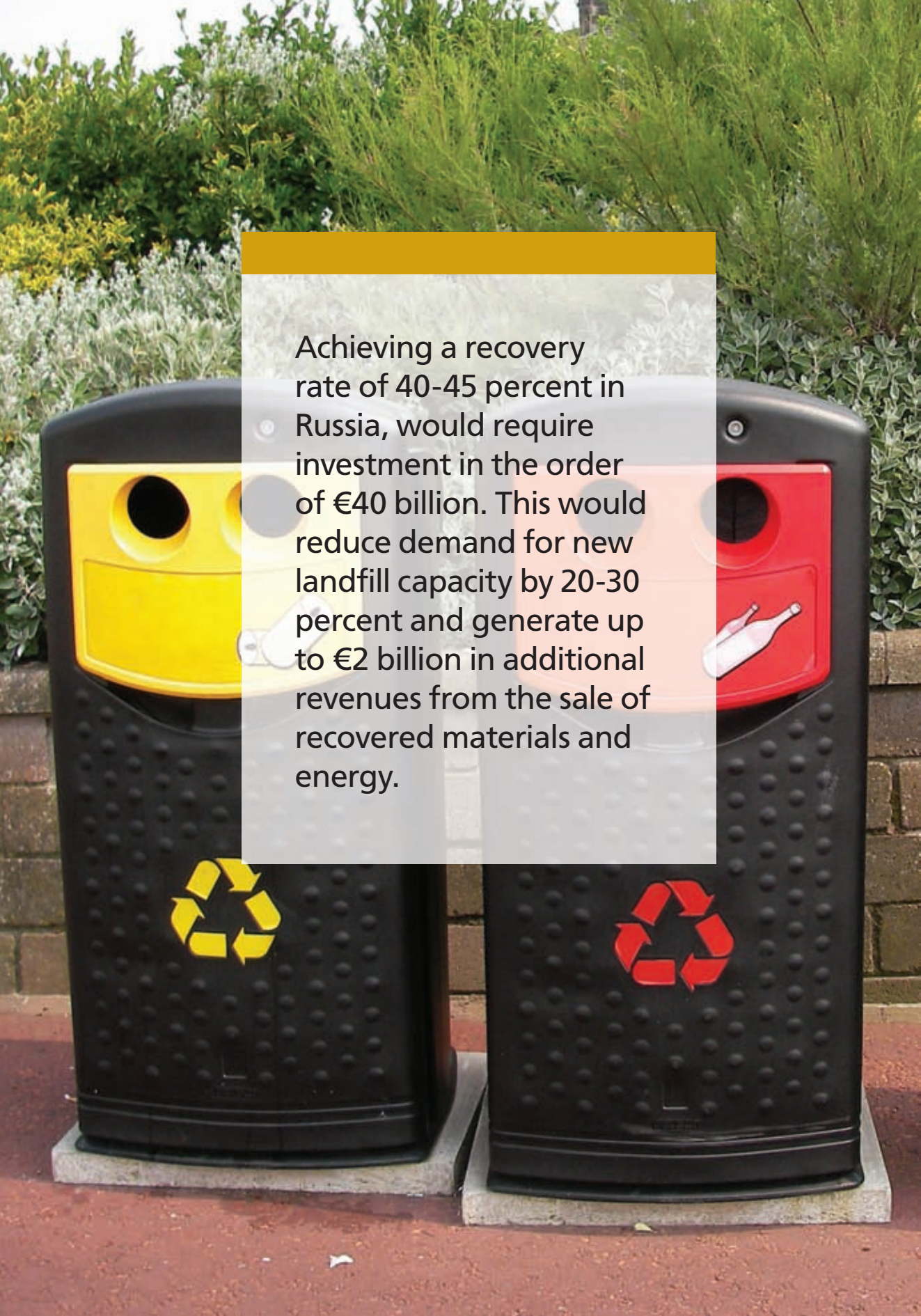
The costs and recovery rates of disposal- and recovery-oriented strategies are outlined in Table 2, below.

Table 2: MSW MANAGEMENT SCENARIOS FOR RUSSIA—CAPEX BREAKDOWNS AND OUTCOMES

Measures	Scenarios	
	Disposal-focused	Recovery-focused
Upgrade of collection and disposal infrastructure (€ billion)	18,5	
Construction of new recovery facilities (€ billion)	0*	12
Construction of new disposal facilities (€ billion)	15	10
TOTAL (bn EUR)	33,5	40,5
Recovery rate by 2025	5-7%	40-45%
Breakeven cost per capita (€/metric ton per year)	30-35	

Source: IFC.

* Excluding currently scheduled projects

The image shows two large, black recycling bins standing side-by-side on a red brick path. The bin on the left has a yellow top section with a circular opening and a yellow recycling symbol on its front. The bin on the right has a red top section with a circular opening and a red recycling symbol on its front. A semi-transparent grey rectangular box with a yellow header is overlaid on the center of the image, containing text. The background consists of a brick wall and dense green foliage.

Achieving a recovery rate of 40-45 percent in Russia, would require investment in the order of €40 billion. This would reduce demand for new landfill capacity by 20-30 percent and generate up to €2 billion in additional revenues from the sale of recovered materials and energy.

3) ENSURING MORE EFFICIENT WASTE MANAGEMENT IN RUSSIA

In order to unlock investment and private sector activity, significant administrative risks and weak project economics have to be rectified. It is essential to establish clear property rights over waste and to empower local authorities and/or communities to play a more active role in waste management. Tariffs and payments must be linked to its actual impact on the environment. Extended producer responsibility would also stimulate the inflow of capital in this sector.

It is evident that the MSW management sector is a growing market, and that it represents significant potential for waste recovery. However, to date only about 30 percent of the market is served by private operators—only a few of which operate across different metropolitan areas, and even fewer of which implement large-scale waste recovery projects that have any impact regionally. While current legislation on waste management is under review (with new legislation intended to introduce greater incentives for waste recovery)¹, no accord has yet been reached on the specific measures that must be taken to effect this. Systemic change is critical at this point.

The problems faced by investors in waste management initiatives in Russia fall into two distinct categories—**administrative** and **financial**.

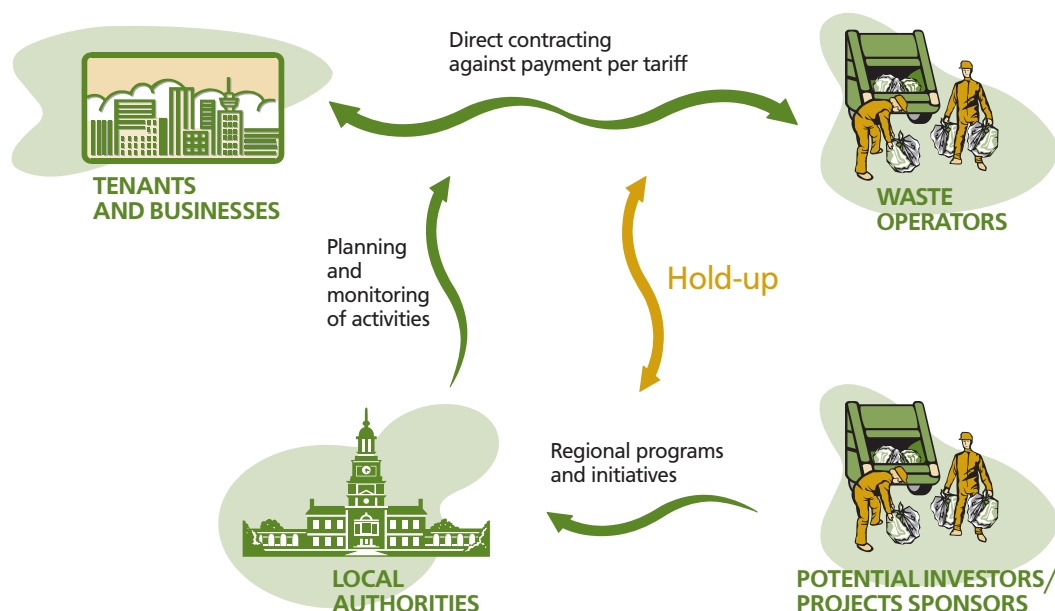
The **administrative** situation in Russia with regard to MSW is comparable to that faced by some Eastern European countries in the late 1990s and early 2000s, when municipalities struggled to cope with ever increasing waste volumes at a time when the quality and functionality of disposal facilities grew steadily worse. In most cases the introduction of significant or unprecedented (“one-off”) tariff increases was not feasible, and regulation in force at that time did not allow for the treatment of waste management facilities and/or resources as potentially revenue-generating structures (through public–private partnerships etc.) or as assets against which finance could be raised.

¹ Federal Law No. 89-FZ “On Production and Consumption Waste,” adopted 24 June 1998. Draft Law No. 584399-5 “On Amendments to the Federal Law “On Production and Consumption Waste”” is currently under review. Available at: [http://asozd2.duma.gov.ru/main.nsf/\(Spravka\)?OpenAgent&RN=584399-5](http://asozd2.duma.gov.ru/main.nsf/(Spravka)?OpenAgent&RN=584399-5)

Waste management in Russia is governed by **multiple lines of responsibility**. On one hand, it is viewed, in legislative terms, as a **municipal (or sub-national) service** while, on the other hand, various entities (including housing management companies and individual tenants) have the right to enter into **individual agreements with collection and haulage service providers** for the provision of services in a competitive environment. Thus, there is **no single entity to channel, enforce, and monitor a regional waste management strategy**. Any potential investor (including one entering into a public–private partnership) would have to coordinate the efforts of several groups of market players. At the same time, there is **no legal mechanism to establish and enforce any such long-term agreement**, once achieved.

A typical “market map” is outlined in Figure 5, below. The buyer–seller relationship in many regions represents a closed circuit and delays do occur in the absence of coordinated intervention on the part of various entities.

Figure 5: MARKET MAP (CURRENT SITUATION)



Source: IFC.

The risks arising from delays and non-performance are the main reasons why private investors are reluctant to enter public–private partnerships in the waste management sector, even where a significant proportion of other risk is borne by the relevant municipality (or other local authority).

Financial issues are closely related to tariff levels and the way that these are regulated. The following issues persist:

- (i) treatment and disposal tariffs are approved by sub-national authorities on a “cost plus” basis (subject to strict cost controls, particularly for vulnerable populations—CAPEX depreciation can have severe implications in this context if major capital refurbishment is envisaged) while collection and haulage tariffs are set on a competitive basis;
- (ii) for a significant proportion of end-users (including both commercial entities and domestic residents) tariffs are not linked to the actual volumes or types of waste generated; and
- (iii) tariffs rarely include allowances to cover the cost of future remediation of environmental impacts.

This situation results in tariffs being imposed at a level **sufficient only to provide basic services** (which can often be sub-standard), with no capacity for capital investment or the mitigation of future environmental impacts.

It is often not possible **to justify a higher level of payment** since the services provided are deemed by many of the local government authorities responsible for tariff policy to be “socially significant” and thus subject to strict regulation and price controls. **Commercially attractive** projects tend to be implemented only in those sectors (such as packaging) with **high sustainable demand** for secondary resources. Even here, however, take-up can be low: even where paper and cardboard packaging is collected in its entirety from retailer outlets and warehouses (the current “sweet spots” for collection) the volumes collected typically comprise only 10 percent of total volumes of this type of waste.

Measures Necessary to Overcome Current Administrative and Financial Issues

1. MARKET COORDINATION MECHANISM.

Experience in EU Member States has proved the efficiency of implementing the “single agent” principle. Under this principle, a single agent (or a limited group) is empowered to act on behalf of a community as a buyer of waste management services. In Russia it is natural for sub-national and/or inter-municipal entities to become such agents since these “own” virtually all of the disposal infrastructure to be upgraded. Such “single agent” is then deemed to be responsible for the implementation of competitive bidding for infrastructure upgrades, for competitive bidding for the provision of collection and haulage services, and for the monitoring and administration of cash flows. Once the private sector becomes more active, and begins to offer more tailored waste management solutions to specific groups of end-users, waste management associations begin to develop and, increasingly, govern this process (in a similar manner to the role currently played by housing management associations in the residential sector). The full transparency of any “single agent” (in terms of its activities and authority), as well as clear procedures governing the terms of its operations, are crucial to the success of such market coordination mechanism, however.

A potential market coordination scheme is outlined in Figure 6, below.

Figure 6: POTENTIAL MARKET ORGANIZATION THROUGH A COORDINATING AGENCY



Source: IFC.

2. TARIFF SETTING MECHANISM.

Linking tariffs to volumes and types of waste can be achieved by introducing “pay-as-you-throw” tariffs, including pre-paid bags, boxes, and stickers for bulky waste. Given the preponderance of multi-family housing in Russia, however, such a system would be at severe risk of non-payment and abuse, and would require considerable investment in enforcement. Nonetheless, there is evidence to suggest that the development of separate collections and increased awareness of responsible waste disposal and recycling can lead to systems becoming more efficient and allowing for at least a partial link between consumption patterns and payments for waste collection (with welfare or other subsidies made available where appropriate).

3. WASTE RECOVERY INCENTIVES.

An efficient way of making waste recovery more attractive to the market is to include all direct and related costs in the price of disposal. This can be implemented through the imposition of environmental charges and the “full pricing” principle. The former are already being used with regard to industrial waste in Russia, in the form of compensation for the non-remediable environmental impacts of landfill. Environmental charges can also be structured to include a component to generate central funds to address the problem of accumulated waste, regardless of location.

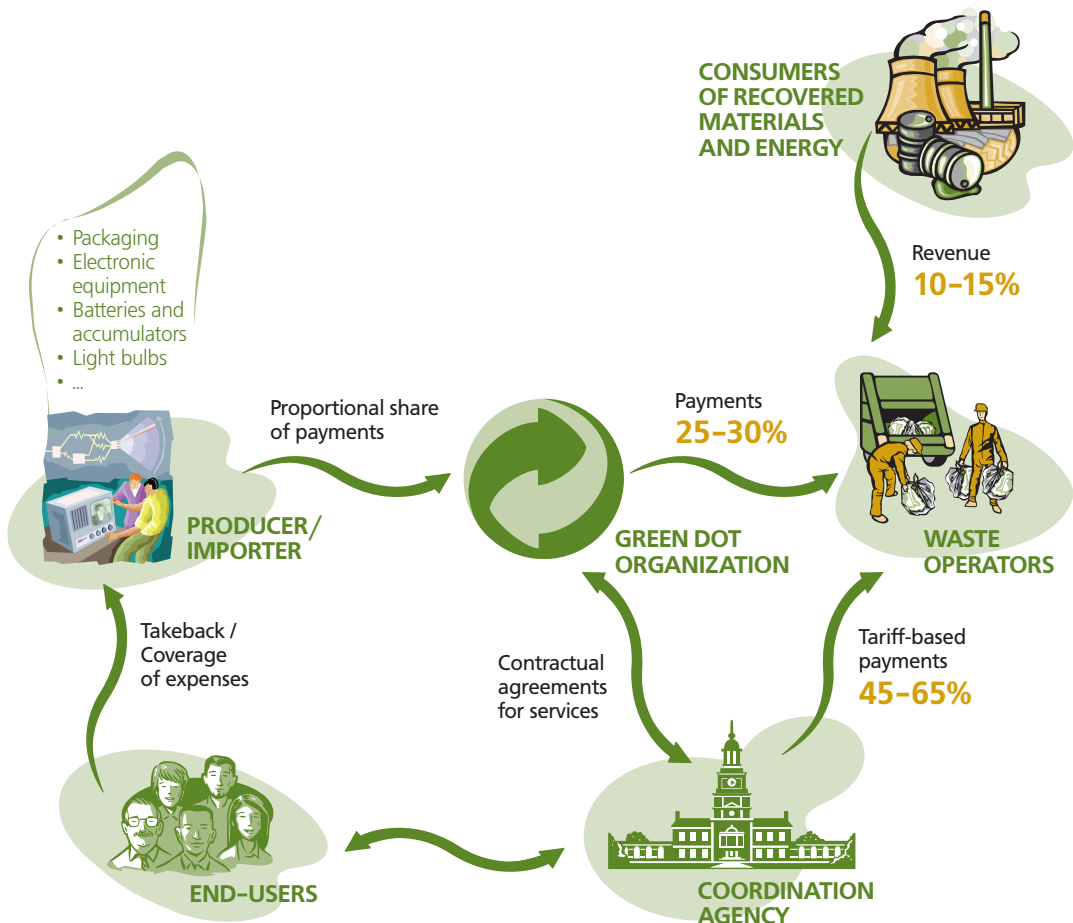
“Full pricing” means the inclusion not just of the ongoing expenses of sanitary operation, but also costs relating to the closure and rehabilitation of specific sites.

With regard to Russia, a combination of both environmental charges and “full pricing” would appear to be the most efficient solution for fair pricing. Such a combination would incentivize service providers and investors to seek more cost-efficient solutions for waste management, in a competitive environment.

4. MECHANISMS FOR PRIVATE SECTOR ENGAGEMENT AND FINANCING.

Industrial supply chains are essential players in the waste management market across the globe. The key to engaging these in Russia would be through the extended producer responsibility principle (EPR). This principle essentially obliges producers to channel sold goods for treatment at the end of the lifecycle. This can be performed by an individual organization (or a group), or delegated to professional service providers (through intermediaries) on a chargeable basis. It is estimated that implementation of this principle in Russia could cover up to 30 percent of treatment costs; revenue from recyclables would not exceed 10–15 percent. At the same time, the price of such goods would not increase significantly.

Figure 7: ILLUSTRATION OF THE EXTENDED PRODUCER RESPONSIBILITY PRINCIPLE



Source: IFC.

Figure 7, below illustrates how this principle creates a system that integrates into the overall market relationship framework and the resulting cash flow structure. If implemented in Russia, EPR could create a strong incentive for industries to integrate waste recovery into their supply chains and enter into public-private partnership agreements, either directly or jointly with service providers.

5. RAISING AWARENESS

The efficient communication of market opportunities and initiatives to end-users is critical to the success of programs and projects in this sector. Today, Russia faces the dual challenge of building demand for quality waste management services while demonstrating that this can indeed be achieved through the implementation of specific policies and projects. The following are essential in meeting this challenge:

- (i) raising wider public awareness of the impacts of MSW, for both the environment and human health;
- (ii) effectively communicating the features (as well as the advantages and disadvantages) of specific waste treatment methods, and the consequences of their introduction in specific regions or municipalities;
- (iii) effectively communicating policy innovations, programs, and initiatives to ensure engagement and compliance; and
- (iv) continuous training of end-users to ensure responsible behavior.

Raising public awareness helps promote responsible behavior that preserves both the environment and human health, as well as building market demand for MSW management services. For this reason it is important that awareness raising be allowed for in project budgets: experience in European Union Member States suggests that the costs of effective awareness raising in this sector can be as much as five percent of total capital expenditure.

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