TECHNICAL ANNEX 2
NATIONAL DIGITAL PLATFORM AND MONITORING SYSTEM
IN THE FIELD OF MUNICIPAL WASTE MANAGEMENT

This technical annex describes the architecture, functions, and requirements for the national digital platform and monitoring system that ensure implementation of the National Strategy for the Transition to a Circular Municipal Waste Management System in Israel. The platform serves as the basis for collecting, processing, and publishing data, calculating KPIs (see Technical Annex 1), and supporting management decisions at the national, regional, and municipal levels.

This document is of a framework nature and may be used as a basis for preparing detailed technical specifications for the development and implementation of the digital platform.

1. Objectives and key functions of the digital platform
   The national digital platform in the waste sector is created to address the following tasks:
   • collection and consolidation of data from municipalities, regional corporations, operators, EPR systems, and other stakeholders;
   • standardization of reporting and reduction of the administrative burden on municipalities and operators;
   • timely and regular calculation of key performance indicators (KPI 1–10) and other analytical indicators;
   • support for decisions on infrastructure planning, tariff policy, educational campaigns, and investment prioritization;
   • ensuring transparency and public access to key data through an open online dashboard;
   • ensuring a linkage between waste policy and the climate, social, and economic agenda (through data exchange with other systems).

2. Structure of the monitoring system
   The monitoring system is built on a multi-level data structure and includes three main levels:
   • municipal level – primary reporting on volumes of MSW collection, separate collection, HHW, local hubs, tariffs, etc.;
   • regional level – aggregation of data on regional corporations and infrastructure facilities (sorting, landfills, compost/AD, WtE);
   • national level – consolidated statistics and KPI calculation, integration with climate and other national databases.
   Key data sets provided by the monitoring system include:
   • data on MSW generation (mass balances by sources and stream types);
   • data on recycling, composting, AD, and reuse;
   • data on landfilling and other forms of final disposal;
   • data on food waste and food sharing;

• data on household hazardous waste;
• data on circular hubs and public participation;
• financial data (system expenditures and revenues);
• data for assessing greenhouse gas emissions of the waste sector.

3. Logical architecture of the digital platform
   From a logical perspective, the national digital platform may be presented as the following interconnected components:
   • Data ingestion module (Data Ingestion Layer) – interfaces and APIs for receiving reporting from municipalities, operators, EPR systems, as well as importing data from related governmental information systems;
   • Data processing and validation module (Data Processing & Validation) – tools for checking completeness, logical consistency, and correctness of data, as well as transforming them into unified formats;
   • Data warehouse (Data Warehouse) – a centralized database in which normalized data on all waste streams, infrastructure facilities, financial indicators, and KPIs are stored;
   • Analytical module (Analytics & KPI Engine) – a subsystem implementing the calculation of KPI 1–10 and additional indicators, support for scenario analysis, modeling, and report generation;
   • Public dashboard and user interfaces (Dashboards & User Interfaces) – web interfaces for staff of governmental bodies and municipalities, and an open portal for citizens and NGOs;
   • Integration layer (Integration Layer) – APIs and exchange protocols with external systems (climate reporting, financial systems, air and water monitoring systems, etc.).

4. Data flows and reporting
   The digital platform must support standardized data flows from all key system participants. A typical list of reporting is provided below.

4.1. Municipalities and regional corporations
• volumes of MSW collected as mixed waste (tonnes/month, by districts and building types);
• volumes of separately collected fractions (packaging, paper/cardboard, glass, plastics, organics, etc.);
• data on local circular hubs (address, service type, volumes of incoming and outgoing items, number of users);
• data on infrastructure within the municipality (containers, sites, HHW collection points, eco-mobiles, etc.);
• financial data: expenditures for collection and hauling, maintenance of infrastructure, educational campaigns;
• data on contracts with operators and EPR systems.

4.2. Operators of landfills, sorting, recycling, composting, and WtE
• volumes of waste accepted by type (tonnes/month/year);
• volumes of waste sent for further recycling, composting, AD, WtE, as well as returns to landfills;

• data on fraction quality (contamination rate, share of useful material);
• data on energy output (for compost/AD/WtE) and methane capture;
• operational data for evaluating efficiency and GHG emissions (fuel, electricity, operating режим).

4.3. EPR systems and deposit operators
• volumes of collected and recycled streams by each category (packaging, WEEE, batteries, tires, etc.);
• financial flows (fees from producers/importers, expenditures on infrastructure and outreach/education);
• data on population coverage and infrastructure (collection points, containers, logistics).

4.4. Reporting frequency and formats
Minimum recommended frequency of data updates:
• municipalities and operators – monthly with consolidation at quarterly and annual levels;
• EPR systems and deposit operators – quarterly;
• specialized studies (waste composition/morphology, food waste, household surveys) – at least once every 2–3 years.

Reporting formats must be unified (templates, reference lists, codifiers for streams and facilities) and supported electronically (XML/JSON/CSV), with the possibility of automated upload via API.

5. Public dashboard and open data
   The public dashboard is a showcase for citizens, NGOs, researchers, and businesses and serves as a tool for transparency and public oversight. It is recommended to display on the dashboard:
   • the main KPI 1–10 at the national level with dynamics by year;
   • comparison of municipalities and regions by key indicators (kg/capita, % recycling, % landfilling, public participation, etc.);
   • a map of landfills, sorting complexes, composting/AD facilities, and WtE facilities with basic information (capacities, status, operator);
   • a map of local circular hubs and services, with a description of available services;
   • data on food waste and food sharing (as available);
   • key financial indicators (structure of system expenditures and revenues at an aggregated level).
   Part of the data may be published as open data sets (open data) for further analysis and the development of civic-tech solutions. At the same time, requirements for the protection of personal data and commercial confidentiality must be observed.

6. Integration with other governmental information systems
   The digital platform must be integrated with a number of other governmental systems, including:
   • the national climate reporting system (for transferring data on GHG emissions of the waste sector and receiving national data);
   • financial systems and the treasury (for accounting of landfill levies, subsidies, EPR

payments, etc.);
• territorial planning and cadastre systems (for accounting of the location of landfills, recycling facilities, and hubs);
• statistical systems (CBS) – for data exchange on population, households, and economic activity;
• environmental monitoring systems (air, water, and soil quality) – for integrated assessment of environmental impacts.
Integration must be carried out through secure interfaces and APIs with clearly defined exchange formats and access rights separation.

7. Data quality assurance and verification
   In order for the digital platform to be a reliable basis for decision-making, data quality assurance rules must be established:
   • standardized dictionaries and classifiers (waste types, infrastructure facilities, waste operations);
   • validation rules (ranges, logical links between indicators, inter-annual anomaly checks);
   • procedures for error correction and feedback to data providers;
   • regular sample audits of operators/municipalities reporting, including on-site inspections;
   • comparison of administrative data with results of independent studies (morphology, surveys, field measurements).
   It is recommended to develop a separate Data Governance regulation defining roles, responsibilities, and procedures for all participants.

8. Phases of implementation of the digital platform
   Implementation of the national digital platform is advisable to be carried out in phases, synchronizing it with the phases of Strategy implementation.

8.1. Phase 1 – Design and pilot (1–2 years)
• preparation of detailed technical specifications, taking into account KPI and reporting requirements;
• selection of the technological architecture and contractors;
• development of a platform prototype and pilot connection of a limited number of municipalities and operators;
• testing of reporting forms, validation procedures, and the first set of dashboards.

8.2. Phase 2 – Scaling and mandatory reporting (3–5 years)
• phased connection of all municipalities, regional corporations, and major operators;
• expansion of the set of indicators and platform functionality;
• transition to mandatory electronic reporting through the platform;
• launch of the public dashboard and open data.

8.3. Phase 3 – Integration and high-level analytics (5+ years)
• deep integration with climate, financial, and other governmental systems;

• development of advanced analytics and modeling modules (scenario analysis, forecasting);
• support for decisions on policy adjustment and long-term infrastructure planning.

9. Security and data protection
   The platform must ensure a high level of information security and data protection, including:
   • role-based access control (national level, regional, municipal, operators, public access);
   • encryption of data in transit and at rest, especially for sensitive financial and production data;
   • compliance with national legislation in the field of personal data protection and cybersecurity;
   • regular vulnerability tests and security audits;
   • backup and disaster recovery plans.
   When publishing open data, depersonalization and aggregation must be carried out to exclude the possibility of identifying individual households or operators' commercial secrets.

10. Roles and responsibilities in platform governance
    For effective functioning of the digital platform, it is necessary to clearly define the roles and responsibilities of the main participants:
    • National Waste Management Authority – owner and coordinator of the platform; defines requirements and manages development and operation;
    • Ministry of Environmental Protection – defines regulatory reporting requirements; uses data for policy and enforcement;
    • Municipalities and regional corporations – ensure timely and correct provision of data;
    • Operators of landfills, sorting, recycling, composting, WtE, and EPR systems – provide detailed operational and financial data;
    • Ministry of Finance and other профиль ministries – use data for budget planning and assessment of expenditure effectiveness;
    • NGOs, academia, and civic initiatives – use public data and participate in public oversight and independent evaluation.
    It is recommended to establish an inter-agency advisory council on data and the digital platform, which will participate in defining development priorities, discussing changes in reporting, and assessing data quality.