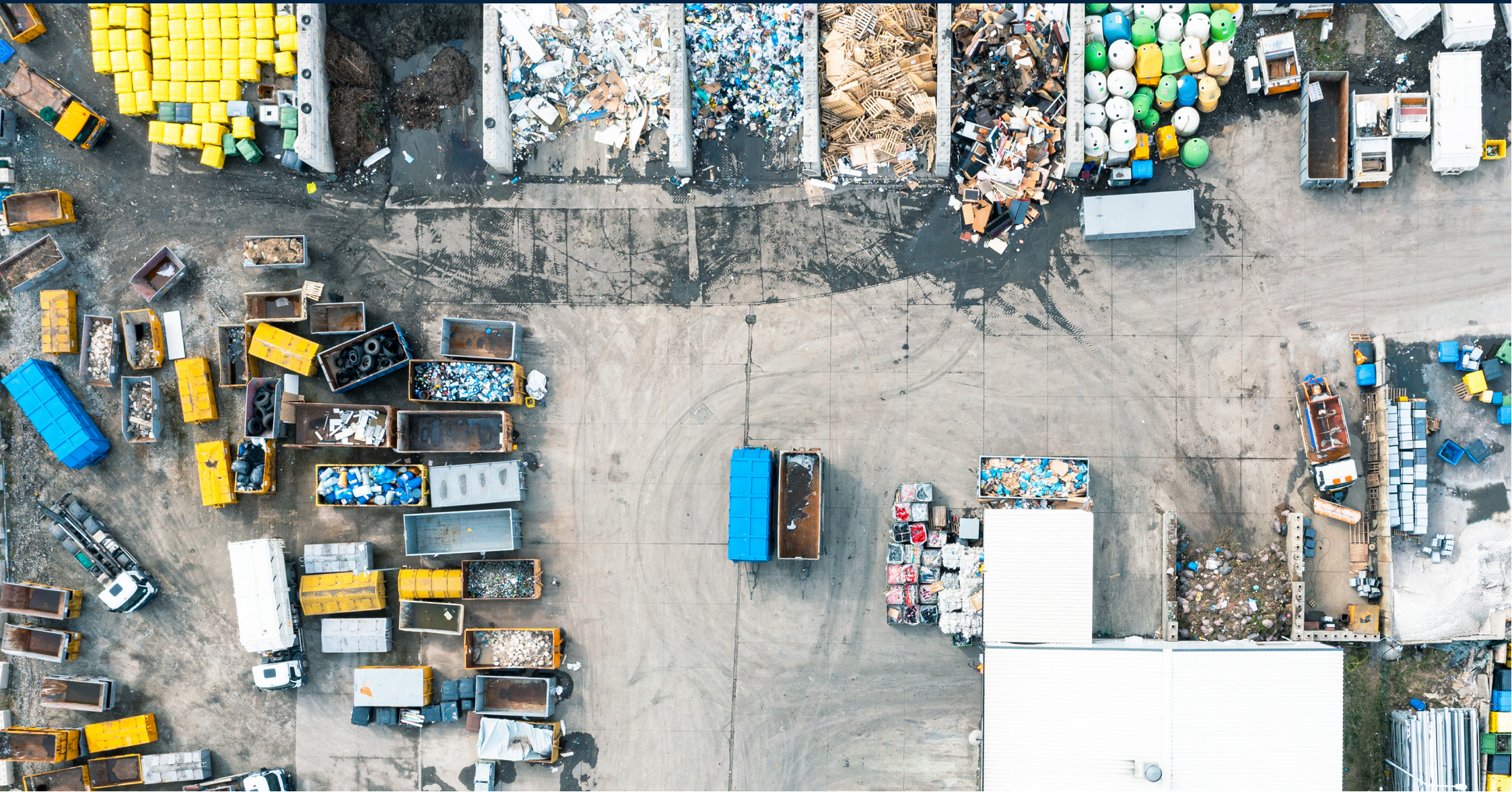# Waste Management

Connectivity Playbook

Benefits of IoT for **Waste Management**

IoT has progressed significantly in the last 10 years so, how does this affect your smart metering?
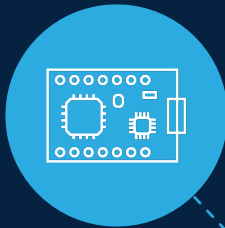
Traditional	With IoT
Rigid routes and fixed pickup plans leading to disposal shortfalls or empty runs	Reduced cost and effort due to data-driven pick-up planning and route optimization
Manual measurement and collection methods for bins and dumpsters	Remotely monitored sensors detect fill-level and status of containers and bins
Difficult traceability of disposal routes due to missing consistent data collection	Performance tracking of collection crews and driving routes
Security risks when collecting data in hazardous waste disposal	Automated audit requirements for health and environmental reporting
	Allows for new services such as container search, alarms, access-control, or on-demand pick-up

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Advantages of IoT **Along the Value Chain**

While the benefits of IoT are clear, how will this directly affect your business?

Sensor manufacturers

Differentiate from others by simplifying the connectivity decision making for the rest of the value chain in the industry vertical.

Waste management solution providers

Offers data-base services to customers, helping to make disposal processes more efficient and turn disposal data into valuable business insights, e.g. for inventory management.

Application service providers

Develops new applications for end customers in the industrial vertical through access to aggregated data.

Bin and container manufacturers (OEMs)

Set themselves apart by being able to offer a pre-connected product from the beginning, simplifying customers' connectivity decision and operation.

Governments and municipalities, enterprises or independent waste management providers

Use smart waste management solutions to reduce operating costs, enhance business processes, improve safety, and offer advanced services for customers.

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An Overview of **IoT Applications**

Understanding the applications of IoT are important to ensure that you can connect to what you need.

IoT Application	Transmission		Typical Data			Explanation
	↑ Send	↓ Receive	Status	Usage	Location	
Public waste bins	↑		✓			Measure fill-level and integrity of public waste bins to optimize pickup plans.
Public bottle banks	↑		✓			Measure fill-level and integrity of public bottle banks to optimize pickup plans or to allow for immediate pick-ups.
Public paper banks	↑		✓			Measure fill-level and integrity of public paper banks to optimize pickup plans or to allow for immediate pick-ups.
Residential waste bins	↑		✓	✓		Measure fill-level and integrity of residential waste bins to optimize pick-up plans. Some solutions allow for secured access for authorized persons only.
Residential waste container	↑		✓	✓		Measure fill-level and integrity of residential waste containers to optimize pick-up plans. Some solutions allow for secured access for authorized persons only.
Residential waste bins	↑	↓	✓	✓	✓	Track and trace high value containers to remotely monitor status (fill-level) and integrity. Containers send notifications or alerts in case of malfunctions or irregular usage.
Residential waste container	↑	↓	✓		✓	Track and trace containers with high protective data trash to constantly monitor guarantee the safety of the asset.

Sources: Analysis Mason, Beecham Research, 1NCE

Status monitoring: Identifier, On-Off status, Integrity, alerts Usage data: consumption data, time patterns, pressure, voltage etc. Location: GPS localization or other.

Mapping Applications **Requirements**

To support your connectivity solutions, uncover what applications 1NCE can provide for your business.

Fully covered   Depends on use case

	National (fixed objects)	National (moving objects)	International (fixed objects)	National (moving objects)

Data Volume / Speed (High → Low)

5G

4G

2G/3G and LTE-M

- Public bottle banks
- Public paper banks
- Residential waste container
- Residential waste bins (NB-IoT)

- Industrial waste container
- Security containers
- Public waste bins

Coverage / Scalability (Low → High)

Sources: 1NCE, Statista, Beecham Research

Most common **connectivity types** within the use case:

2G (GPRS)
- Common option for waste management solutions providing widespread coverage that is sufficient for basic functions that sensors provide, e.g. on smart bins.
- Multiple solutions operate with a battery charged by solar panel.

3G (LTE)
- Viable solution for more advanced waste management solutions, such as connecting drivers' phones and tablets to central systems not required for basic functionality.

Bluetooth Short-range radio signals
- Can send data when a receiving device is within range e.g. each bin can have a radio fitted that connects to a dustbin lorry when it passes.

NB-IoT
- Specifically designed for simple, static sensor type applications.
- Will likely become a leading connectivity option for smart waste bins.
- Cheaper option and provides the required bandwidth, in addition to having more operators committed.

LTE-M
- Possible long-term alternative to 2G, though the use of NB-IoT might be more widespread.

LoRa, Sigfox
- Suitable connectivity options for smart bins, particularly in terms of cost
- The challenge is that companies wanting to offer connected bins will want a solution that works in all countries, and not just a subset of countries/regions.

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1NCE Offering

1NCE is a perfect match with the Waste Management solutions, meeting all basic requirements while addressing key challenges:

Requirements	Typical customer challenge	Why 1NCE is the best match?	Standard solutions
Data & Pricing	• All-in-1 solution • Cost transparency • Low & high data project support	• **All-in-1:** 10 EUR/10 years for connectivity & software • **One-time cost:** no monthly or hidden fees • **Lifetime Flat:** 500 MB, 250 SMS + extra **High Data IoT:** 5 EUR/GB, speed 25 Mb/s	• Complex & fragmented pricing, costly integrations • Monthly, fixed & hidden fees • No high-data requirements met
Coverage	• Global coverage • Cellular and LPWA radio technology • Multiple network and operator switch	• **173 countries coverage;** no zoning or local pricing discrepancies. • Integration with **LPWA networks.** • **Freedom-to-Switch** to change providers without replacing a SIM.	• Region or zone-restricted coverage • NB-IoT and LTE-M limitations (10-20 networks globally) • Complex contracts and vendor lock-in
Services	• Device control through one interface • Interoperability with 3rd party services	• **Device monitoring and management** included • **3rd party software,** like Datacake, Mender, Microsoft Azure, natively integrated with 1NCE OS and CMP	• Extra costs for monitoring & data management • Limited compatibility with third-party IoT software
Longevity	• Supports emerging technologies • Ability to switch operators • Services that are liable for the device lifecycle	• **NB-IoT or LTE-M** for devices with lifecycle of 10+ years • **eSIM (eUICC)** for flexible, multi-operator functionality • **Reliable cellular-based networks** & Tier 1 operators	• Limited LPWA, especially in challenging environments • Extra costs due to network or service changes • Short-term contracts and pricing models

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The 1NCE **Promise**

Simplify your value chain with **an all-inclusive model** and additional features & services.

1NCE **All-in-One** Solution

1NCE IoT **Lifetime Flat**
10 EUR for 10 years lifetime subscription

1NCE Connect

- ✓ 500 MB, **250** SMS
- ✓ **173 countries** coverage
- ✓ **NB-IoT, LTE-M**, 2G, 3G, 4G
- ✓ Connectivity management platform
- ✓ **Unlimited** API usage
- ✓ VPN, APN **included**

1NCE OS

- ✓ Device Authentication
- ✓ Energy Saver
- ✓ Device Inspector
- ✓ Device Locator
- ✓ Device Integrator
- ✓ Freedom-to-Switch

1NCE **SIM Card**
depending on the application

- + IoT SIM **Card Business** 1 EUR
- + IoT SIM **Card Industrial** 2 EUR
- + IoT SIM **Chip Industrial** 2.50 EUR

Extra Services

Top-up Option
when a device reaches data limits in 10+ years

- + Extra **500** MB & **250** SMS **for 10 EUR**

Lifetime **Extension**
for those who want to exceed 10 years

- + Extra 10 years **for 10 EUR**

1NCE **Plugins**
available to trial **for free**

- + **FOTA** by Mender
- + **Data Visualization** by Datacake
- + **Azure IoT Integration** by Tartabit
- + **Device Debugging** by Memfault

Alternative Products

1NCE **High Data IoT**
for projects with high data requests

- + **5 EUR/GB**, speed 25 MB/s

1NCE.com

About **1NCE**

Delivering **IoT software and connectivity** for life.

1NCE is a company offering a software platform for connected products that delivers future-proof, hassle-free IoT in 173 countries and regions. The software platform enables customers to easily, securely and reliably collect device data and turn it into actionable intelligence. This accelerates time-to-market for data collection projects by months, increases device lifetime by years, and allows efficient management of sensors from initial deployment to the end of the product lifecycle. More than 23,000 users and 60 Fortune 500 companies trust 1NCE with 30 million connected products worldwide.

With over 8% of our customers being from the Infrastructure sector and 6% from Smart City, 1NCE witnesses the high relevance of IoT to Waste Management and can anticipate rapid growth in the following years.

Learn more about:
- [Waste Management](#)
- [Infrastructure](#)
- [Smart Cities](#)

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