



NEAR ZERO WASTE IN TURKEY

MOVING TOWARD A CIRCULAR ECONOMY BY MONETIZING WASTE

CIF-GDI DELIVERY CHALLENGE CASE STUDY - DECEMBER 2019





PROJECT DATA

PARTNER ORGANIZATION

Climate Investment Funds' (CIF) Clean Technology Fund (CTF) and the European Bank for Reconstruction and Development (EBRD)

ORGANIZATION TYPE

International Organization

DELIVERY CHALLENGES

- Entrenched lack of knowledge and awareness made it difficult to replicate demonstration projects
- Complex regulatory and legal requirements made it difficult to use and trade waste

DEVELOPMENT CHALLENGE

Waste minimization and pollution prevention

COUNTRY AND REGION

Turkey

PROJECT TOTAL COST

USD 220 million¹

PROJECT DURATION

2015-2020

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¹ Approximate amount as some figures are in USD and others are in EUR

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EXECUTIVE SUMMARY

Waste minimization and pollution prevention are major development challenges for Turkey given its population and industrial growth. Industry is a large contributor to waste generation, but a number of barriers and risks prevent companies from being first-movers and adopting new practices and technologies that could reduce waste.

To encourage companies to reduce waste, in 2015 the European Bank for Reconstruction and Development (EBRD) launched the Near Zero Waste (NØW) program with three interlinked components: 1) a selection of sub-projects supported by concessional financing from the Climate Investment Funds' (CIF) Clean Technology Fund (CTF) and technical assessments to help companies adopt new waste minimization techniques and technologies, 2) policy dialogue to strengthen legislative and regulatory frameworks around waste minimization, and 3) knowledge sharing activities to encourage implementation of best practices. By reducing first-mover risks and showcasing successful demonstration projects, the program aimed to inspire wide replication of successful approaches that would reduce greenhouse gas (GHG) emissions.

However, as the program progressed and the scale of the challenge came into better focus, NØW implementers realized that more was needed to remove barriers to change and reach the scale they were aiming for. They identified two **delivery challenges** that were limiting success. First, it became apparent that implementation of demonstration projects alone was not sufficient to overcome the entrenched lack of knowledge and awareness among business leaders. Second, complex regulatory and legal requirements made it difficult to use and trade waste limiting the program's potential impact.

To address these delivery challenges, the EBRD identified and implemented two solutions:

- 1 | Establishment of the **Turkish Materials Marketplace (TMM)**, a first-of-its-kind business-to-business marketplace in Turkey built on the concept of a circular economy. The TMM included: a dedicated e-commerce platform where participating companies could exchange underutilized materials; knowledge sharing events and workshops; and research grants to help companies identify investments related to waste minimization.
- 2 | Completion of a study on a complicated regulatory requirement called the **end of waste (EoW) criteria**. The EoW criteria is a European Union (EU) regulation that specifies when certain waste products can be used as secondary raw material, becoming useful inputs instead of waste. The study included guidance on legal, institutional, and operational frameworks required to implement the EoW criteria in Turkey. It developed a practical roadmap for the Ministry of Environment and Urbanization (MoEU) to implement the EoW criteria.

Together with its nine sub-projects, the TMM and EoW study led the NØW program to outperform its planned targets. As of 2019, it had achieved annual direct and indirect savings of 500,000 tons of CO₂e per annum, five times the target set at the beginning of the program at 100,000 tons of CO₂e per annum. It proved the success of previously untested models, techniques, and technologies and accelerated the pace of change toward circular economy principles.

The NØW program demonstrated the importance of blended finance to remove first-mover disadvantages and the importance of adaptability in program implementation. It directly addressed stakeholder concerns and had high, visible impact due to its early and continuous stakeholder engagement to address both technical and knowledge barriers.



INTRODUCTION

This case study examines the experience of the European Bank for Reconstruction and Development (EBRD) in implementing the Near Zero Waste (NØW) program in Turkey. The NØW program aims at mainstreaming circular economy principles in Turkey to address the development challenge of waste minimization and pollution prevention. It does this by investing in first-mover projects that demonstrate the viability of waste minimization techniques and technologies, and by converting waste into a resource with monetary value.

Through its multi-faceted components that address technical, financial, and regulatory requirements, the

NØW program has proven the success of previously untested models for waste minimization in Turkey and has outperformed its planned targets. Before NØW, no other program in Turkey brought together varied components that include concessional financing, technical knowledge and assistance, establishment of a waste marketplace, and regulatory assistance.

This case study traces why and how the NØW program has been implemented, and the two main delivery challenges it has faced: 1) an entrenched lack of knowledge and awareness made it difficult to replicate demonstration projects and 2) complex regulatory and legal requirements made it difficult

to use and trade waste. The case study draws on project documents as well as interviews with relevant stakeholders (see Annexes 2 and 3).

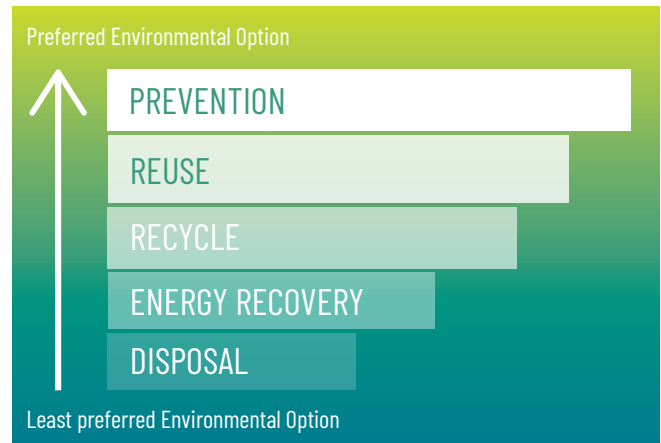
WHY A CIRCULAR ECONOMY?

Globally, the model of production and consumption where natural resources and materials are extracted, produced, and disposed only once in their lifetime is proving unsustainable. There exists a strong environmental and economic case to move away from such single-use paradigms and toward a circular economy. A circular economy is based on principles that follow a strict waste management hierarchy to ensure waste avoidance or minimization at source, re-use where possible, recycling into other products, production of energy from waste, and finally, disposal in a sustainable manner (see Figure 1). In several developing economies the opposite is pursued, i.e., a disposal-first approach, leading to significant environmental costs and unrealized economic opportunities.

On the economic side, the shortage of virgin resources and materials poses a challenge for sustained growth. A circular economy model extends the value of materials and systematically recovers and reuses resources throughout value chains across multiple lifetimes. On the environmental side, material intensity of economic systems translates directly into energy and emissions intensity. By minimizing waste, emissions generated through the processing and manufacturing of materials can be drastically reduced.

The NØW program assists industry and government stakeholders in Turkey in implementing best available techniques (BATs) and technologies on waste minimization to achieve positive economic and environmental impact and bring into practice circular economy principles.

Figure 1.
WASTE MANAGEMENT HIERARCHY





CONTEXT

DEVELOPMENT CHALLENGE: WASTE MINIMIZATION AND POLLUTION PREVENTION

Turkey's waste management infrastructure is insufficient to cover the country's needs and has not kept pace with increased industrial activity, lagging behind many of its European Union (EU) neighbors. In 2010, the waste sector contributed 8.23 per cent of the country's greenhouse gas (GHG) emissions which was about four times the average share among United Nations Framework Convention on Climate Change (UNFCCC) Annex I countries (IPCC 2007).

Growing population and rapid urbanization accompanied by increasing per capita consumption have strained Turkey's waste management infrastructure. The result is high emissions, particularly of methane and nitrous oxide, due to activities such as waste disposal in controlled or wild landfills/dump sites, wastewater treatment and discharge systems, and waste incineration and composting. Approximately 80 percent of Turkey's total emissions from waste comes from landfills (IPCC, 2007).

Besides the negative environmental impacts, large volumes of landfilled waste can cause outbreaks of infectious diseases, exposure to harmful substances, damage to biodiversity, land degradation, and soil and groundwater contamination.

When Turkey started EU accession negotiations in 2005, it undertook efforts to align its waste legislation with a range of EU Directives. The 2006 EU Integrated Environmental Approximation Strategy (2007–2023) covers waste management for Turkey and opened formally for negotiation in 2009. In 2010, the Ministry of Environment and Urbanization (MoEU) adopted the Strategic Plan 2013–2017, which defined concrete strategies, targets, and action plans to bring the Turkish waste management and wastewater treatment industry to EU standards. However, becoming EU compliant is a complicated, multi-step process that can take several years to accomplish given the volume and intricacy of regulations to understand and implement.

Recognizing the waste management challenge and Turkey's ambition to meet EU regulations, in 2010,

Box 1:

THE REPUBLIC OF TURKEY CLIMATE CHANGE STRATEGY (2010-20) WASTE MANAGEMENT GOALS:

Short Term

- Harmonization of legislation governing municipal wastes will be finalized by the end of 2010.

Medium Term

- The amount of waste reuse and recovery will be increased within the framework of the Waste Action Plan (2008-2012).
- 104 sanitary landfill facilities will be established and 76% of municipal

waste will be disposed at such facilities by the end of 2012.

Long Term

- Waste management hierarchy of source reduction, reuse, recycling, and recovery shall be implemented more efficiently.
- The amount of organic substances transferred to the sanitary landfills will be reduced, and biodegradable

wastes will be used in energy generation or composting.

- Landfill gas will be captured and used for energy generation directly or after being processed; and if these gases cannot be used for energy generation, they will be burned.

the EBRD commissioned a market assessment of waste management in Turkey. The study found that the industrial supply chain in Turkey was characterized by missed opportunities to decrease waste through reduction, recycling, and converting waste to energy. An intervention in the waste sector in Turkey could help remove barriers to improving waste management, making it more sustainable and moving Turkey toward greater resource efficiency and a circular economy. Moreover, the implementation of resource and energy efficiency approaches could yield significant savings across industrial sectors.

At the time, the MoEU and the EBRD recognized two main challenges for Turkey:

- ensuring compliance of local legislation with EU legislation, and
- minimizing waste and increasing recycled and recovered waste.

PROGRAM INTERVENTION: NEAR ZERO WASTE PROGRAM

The NØW program responds to Turkey’s challenges by assisting private companies with the implementation of state-of-the-art waste minimization techniques and technologies with high potential for replicability, particularly where there are clear market failures preventing uptake (see Figure 2).

When developing this program, the design team at EBRD recognized that the large size of the Turkish market, particularly the small and medium enterprises’ (SME) unorganized sector, required a multi-faceted approach. Challenges needed to be addressed on the regulatory, technological, and financing sides, and to make efforts on these dimensions successful, core knowledge and awareness gaps needed to be filled. Hence, the program was designed with three inter-linked components².

Program components:

Component 1 includes blending of EBRD financing of approximately USD200 million with concessional funds from the Climate Investment Funds’ (CIF) Clean Technology Funds (CTF) of approximately USD20 million to support eligible waste minimization and resource efficiency projects proposed by Turkish companies. Each selected sub-project receives a loan package with one part provided under EBRD’s regular loan terms and another part provided under CTF concessional terms (longer tenor and lower interest rate as compared to regular loan terms). Selected sub-projects go through a rigorous process to ensure that they can be replicated, their technology requirements are unique, and concessional funds are

2 Project documentation speaks of four components, but for readability in this case study components 1 and 2 have been combined into a single component 1.

Figure 2.
NEAR ZERO WASTE PROGRAM SUMMARY



necessary to remove first-mover disadvantages. Each sub-project includes technical assistance for project development and implementation, such as market feasibility assessments. The technical assessments are funded by the European Union Instrument for Pre-Accession Assistance (EU IPA)³ which provides support to countries to align domestic regulations with EU acquis.

Component 2 entails policy dialogue activities with government authorities to strengthen legislative and regulatory frameworks and implementation. This includes support to the MoEU, local municipalities, and sector associations in developing innovative and comprehensive frameworks for scaling up the implementation of waste minimization projects in Turkey.

Component 3 includes a number of coordination, knowledge sharing, and visibility activities, such as raising awareness on resource efficiency policy, voluntary guidelines, and financing options; developing a waste minimization knowledge network for government agencies, municipal entities, sector associations, and the private sector; and disseminating information and lessons learned regarding regulations, BATs, pilot projects and best practices.

3 The EU IPA is a means by which the EU provides financial and technical assistance to countries going through the EU accession process.



DELIVERY CHALLENGES

While implementing the NØW program, the EBRD team adapted specific activities within the three components to incorporate real-time learning and to solve emerging delivery challenges. The two main delivery challenges that emerged were:

CHALLENGE 1: ENTRENCHED LACK OF KNOWLEDGE AND AWARENESS MADE IT DIFFICULT TO REPLICATE DEMONSTRATION PROJECTS.

The EBRD had strategized that demonstration projects would have a strong impact on raising awareness about resource efficiency measures in different industrial sectors. However, information about these demonstration projects was difficult to communicate beyond industrial association meetings which occurred on an ad-hoc, sector-by-sector basis. There was no structured way to communicate across companies and sectors to build capacity, establish waste material exchanges, and inspire the widespread action and change that the NØW program sought to engender. It became evident that more than a few demonstration projects were needed to reduce the

risk perceptions surrounding waste minimization techniques and technologies.

CHALLENGE 2: COMPLEX REGULATORY AND LEGAL REQUIREMENTS MADE IT DIFFICULT TO USE AND TRADE WASTE.

The Turkish government adopted a new regulation on waste management in April 2015, largely modelled on the EU Waste Framework Directive and the European Commission (EC) decisions establishing classification for wastes. However, the secondary regulation related to the Turkish waste management legislation was complex to understand and implement, which created uncertainty for companies and disincentivized efforts toward use and trade of secondary raw materials.



TRACING THE IMPLEMENTATION PROCESS

PROGRAM DESIGN

In 2014, several incentives were coming together for the EBRD to pursue solutions to the waste management challenge in Turkey. First, the EBRD's own internal strategy included a sustainable energy agenda, and program developers were eager to expand their resource efficiency portfolios. Second, the EBRD had commissioned various sectoral studies that showed that waste management was an important challenge to tackle from an emissions perspective with few players proposing tangible solutions. Third, staff at EBRD was becoming more aware about waste minimization initiatives that had been successful elsewhere but had not been tested in Turkey.

Most importantly, ongoing conversations with manufacturing companies, such as plastics producer Ege Profil and glass manufacturer Sisecam, led to requests for EBRD financing to pilot new technologies to reduce production costs by using recycled raw material. These conversations gave the EBRD an in-depth understanding of the complexities and

first-mover risks involved in adopting technologies with low market penetration rates in Turkey. These risks included a lack of local expertise to operate new machinery/technology, a lack of infrastructure for establishing recycling schemes, risks in case of breakdown of new machinery, costs associated with training, high cost of supply parts from outside Turkey, and challenges in ensuring overall high-quality production with new technologies.

These factors—together with Turkey's agenda to address waste management in order to keep up with domestic economic growth and EU regulatory standards—drove the development of the NØW program. Designing the program took over a year with multiple stakeholders engaged within and outside the EBRD.

Within the EBRD, Environmental and Social Compliance Specialists worked on ensuring compliance with EBRD directive and national and EU standards. The Banking team determined the specific financial terms necessary to allow transactions to take place. The Economists determined the financial

feasibility of the program and determined criteria for selecting projects where concessional financing would not crowd out commercial finance. In particular, consultations with the economists were crucial in determining the right level of concessional financing that would not distort the private capital market.

Outside the EBRD, program developers consulted with CTF and EU IPA financiers to ensure sufficient funds for the different components of the program. Consultations were held with the MoEU to ensure legal compliance of the program and with companies such as Ege Profil and Sisecam to ensure that the program would directly address client needs.

As a result of these consultations, the following key features were determined for NØW program sub-projects:

- For each sub-project, an early-mover externalities analysis would be undertaken to prove need for concessional financing .
- CTF concessional financing could be a maximum of 20 percent of the EBRD loan component or USD 3 million, whichever was lower.
- The concessional loan would be provided for a tenure of 10 years (EBRD loans average five to seven years), at lower interest rates compared to market rates, and with no principal repayment for nine years.
- A technical assessment (EU IPA funded) would accompany each loan to assess the feasibility of the proposed technology or BAT, propose additional or new technological changes to make projects successful, and examine the green aspects of the technology to determine both the economic and environmental impacts.

The combination of these features made the NØW program unique in Turkey when it launched in

2015 (see timeline in Table 1). From 2015 to 2019, the program selected nine sub-projects from Turkish companies across a variety of industrial sectors. These have been supported with over 20 technical assistance investments and three market assessments. See Annex 1 for details on all sub-projects and Box 2 for highlights on the Ege Profil sub-project.

DELIVERY CHALLENGES AND SOLUTIONS

CHALLENGE 1: ENTRENCHED LACK OF KNOWLEDGE AND AWARENESS MADE IT DIFFICULT TO REPLICATE DEMONSTRATION PROJECTS.

When the NØW program started in 2015, investments in waste minimization technologies with low market penetration were perceived to be financially and technically risky in Turkey. Lack of knowledge and misinformation led many stakeholders to believe there were no commensurate financial returns to adopting new waste minimization BATs or technologies. These entrenched beliefs were difficult to disprove with no established communication channels within and between sectors to facilitate outreach and connection.

NØW program planners thought to tackle this lack of awareness through the demonstration effect. By showcasing successes (measured in terms of cost saving and waste reduction) within a few companies, it was assumed that other companies would be encouraged to replicate the BAT or technology. The main mechanism to spread such awareness was through industry associations.

The demonstration effect did have some success initially. For example, when NØW program participant Korozo, a manufacturer of packaging and film products, was able to reduce the amount of volatile organic compounds (VOCs) released into the environment through a new solvent recovery

Table 1
KEY MILESTONES OF THE NØW PROGRAM

DATE	NØW PROGRAM MILESTONE
2011	EBRD examines various program options and commissions sectoral studies to understand country needs. EBRD determines own strategic directions toward sustainable energy and resource efficiency.
2013-14	Conversations ongoing with the MoEU and Turkish companies highlight an opportunity to pursue a multi-faceted program such as NØW.
2013	Co-finance from EU IPA (approximately USD2.3 million) approved to provide technical assistance to identify and appraise resource efficiency investment opportunities.
2014	NØW program designed by EBRD.
March 2015	Proposed NØW program (converting USD20 million to direct lending by the EBRD) approved by CTF.
February 2016	Turkey Material Marketplace launched.
Sep 2017	Study on EoW commissioned.
March 2019	EoW study completed and presented to the MoEU.
Post 2020	Potential extension of the NØW program.

Box 2:
EGE PROFIL – THE FIRST NØW SUB-PROJECT

Ege Profil is the second largest polyvinyl chloride (PVC, or vinyl) profile producer in Turkey. In 2014, it recognized the need to upgrade its technology to enable a form of PVC recycling being used successfully in other countries. The company knew there were options to reduce and recycle waste in production and installation processes, but these options had never before been implemented in PVC profile manufacturing in Turkey. There were inherent risks and additional costs associated with being a first mover:

- Collecting post-consumer waste, including establishing collection centers and associated additional labor costs
- Improving commercial practices and supply chain management, including contracts, permits, and secondary legislation

- Conducting line trials before production, including associated production scraps and labor costs
- Controlling the volatility of raw materials and the quality of incoming materials, including laboratory tests, building inventory, and associated labor costs

To help Ege Profil make investment in waste management, the NØW program selected the company as its first sub-project. In 2015, Ege Profil received a EUR25 million EBRD loan and EUR1 million in parallel CTF concessional financing to construct a state-of-art and environmentally-friendly PVC profile manufacturing plant in Izmir province. The loan financed resource efficiency investments at the new plant, including photovoltaic solar panels; wastewater treatment; a combined cooling, heat, and power (trigeneration) plant, as

well as infrastructure to expand Ege Profil's PVC recycling activities.

The investment increased Ege Profil's PVC recycling rate to about 15 percent, in line with international best practice and higher than local competitor firms at 10 percent. The amount of recycled PVC at the plant increased by 800 tons per year, and the project led to annual direct and indirect GHG savings of 19,000 tCO₂ per year (also see Table 2 and Annex 1).

The project won the silver prize in the Environmental and Social Innovation category [at the 2017 EBRD's Sustainability Awards](#).

technique⁴, several other companies followed suit and invested in solvent recovery units using their own equity or commercial financing. While promising, the replication taking place was insufficient to bring about industry-wide shifts toward circular economy practices. Given the scale of industry in Turkey, project implementers soon realized that a more proactive approach was required to achieve widespread success.

SOLUTION: THE TURKISH MATERIALS MARKETPLACE

A materials marketplace was conceptualized to bring more companies together and create synergies for information sharing and material exchange. This idea was inspired by a similar marketplace run by the US Business Council that the EBRD team had heard about at global conferences.

To test its feasibility in Turkey, the EBRD held consultations with various industrial associations, including with the Turkish Industry and Business Association (TUSIAD) which is the largest business association in Turkey, covering 85 percent of Turkey's total foreign trade volume (excluding energy) and 50 percent of total private sector employment. This outreach helped adapt and refine the marketplace model to the Turkish context and made evident the need for equal emphasis on knowledge and materials exchange components.

The TMM launched in 2016, is a first-of-its-kind business-to-business marketplace in Turkey. It is built on the concept of a circular economy and complements conventional recycling and waste management systems. It includes a dedicated e-commerce platform where participating companies can exchange underutilized materials, turning one

company's waste into raw material for another. It also includes knowledge exchange meetings and workshops and a technical component to undertake research to identify investments related to replacing virgin resources with secondary raw materials. The TMM is financed by various donors including the government of Austria, EBRD's Shareholders Special Fund, and EU IPA. It is managed by the Business Council for Sustainable Development of Turkey (BCSD), a non-profit business association established in 2004 with the mission to accelerate the transition to a more sustainable future in Turkey.

Companies that want to be a part of the TMM must answer three essential questions: 1) What are the main raw materials they use? 2) What are their main waste materials? 3) What kind of reuse mechanisms do they have? The BCSD then identifies synergies between companies for materials exchange. BCSD holds regular workshops and meetings for TMM members to ensure the exchange of ideas and best practices. Inviting government stakeholders to these meetings further increases its attractiveness as companies can convey their regulatory compliance challenges directly to government counterparts.

IMPLEMENTING THE TMM

The TMM has been implemented in three distinct phases:

April 2016 – April 2017: Stakeholder consultations were held by EBRD and the BCSD to understand specific needs for the Turkish market. These meetings included existing BCSD members and other companies. By the end of this first year, 11 of 60 BCSD members joined the TMM. Yet, many companies remained cautious and questioned the regulatory endorsement of the TMM and its value-add in the absence of government endorsement. Companies questioned whether the material exchanges they would make would be compliant with government regulation.

April 2017 – April 2018: Engaging the MoEU became critical to recognizing the TMM as a regulatory compliant platform. During this second year, the MoEU

4 In the flexible packaging sector, the main inputs of the production are PP & PE films, aluminum foils, and solvent-based materials such as ink, lacquers, varnish, adhesives, and virgin solvents. In addition, pure solvents are also used in lamination, varnishing and in adjusting the viscosity of the ink. During application and drying of ink, the solvents evaporate causing VOCs to be released into the atmosphere with potential negative impact on the environment and human health. Installation of solvent recovery units to reduce VOC emissions is not a local regulatory requirement and had not been done before the NØW program invested in Korozo.

provided a formal endorsement letter highlighting the importance and usefulness of TMM. Further, the EBRD established a TMM Steering Committee, consisting of representatives from the relevant ministries—MoEU and the Ministry of Industry and Technology—as well as Turkish development agencies and authorized institutions for waste management, to discuss legislative issues around circular economy and waste minimization. Through the Steering Committee, challenges faced by companies were brought directly to the attention of government officials.

By the end of this phase, the number of companies on the TMM tripled to 33. Despite this, material transactions on the TMM were limited as companies found it difficult to match their exact requirements to the materials put up for exchange. It became evident that more technical support was needed to allow companies to translate membership into savings.

April 2018 – ongoing: Brainstorming with the EBRD and BCSD teams has led to the idea of circular vouchers: small sized research and development grants (EUR25,000 each) to help companies understand relevant BATs and technologies to reuse inputs and take advantage of the TMM and the NØW program. Since April 2018, 11 circular vouchers have been allocated by EBRD, proving to be win-win solutions for both the recipient companies and the BCSD. The recipient companies have increased their understanding of innovation in material efficiency,

“We have been a member of TMM since 2018. After connecting with a supplier through the TMM, we changed our technology to use natural calcium waste in our food preservative production and received several awards for this product improvement and cost savings. We export this natural food preservative product to more than 6 countries now.”
Elif Gungor Reis, CEO, Arkim (natural food preservative manufacturer)

and BCSD has enhanced its understanding of the different sector-specific dynamics and needs that can help improve the responsiveness of the TMM.

KEY ACHIEVEMENTS OF THE TMM

The TMM is the first successful materials marketplace established in Turkey at the national level. Past efforts were not as successful and no attempt was ever made at this scale. The unique combination of knowledge and materials became key to TMM’s success. TMM will deliver GHG emissions reductions beyond those that CTF has directly financed ensuring the sustainability of outcomes.

The MoEU recognized the importance of the TMM for opening direct lines of communication with companies to get their feedback on government programs and to understand their regulatory grievances.

As of November 2019, the TMM had achieved the following:

- 100 Turkish companies were on the TMM platform
- 11 full scale material exchanges between member companies had occurred and 20 potential material exchanges had been identified
- Seven network meetings (general and sector-specific) had been held in Istanbul and Izmir, with about 100 individuals participating in each meeting focusing on sharing knowledge, showcasing best practices, and match-making to facilitate material exchanges among companies
- 11 circular vouchers had been distributed for a total of approximately €250,000

FUTURE PLANS

The EBRD aims to make the TMM a self-sustaining platform financed by a combination of membership and transaction fees. While it will take a few years to transition from a free service, TMM implementers have identified the following medium-term goals:

- Improving the quality of companies' participation on the TMM platform. TMM membership is increasing, as is participation in workshops and network meetings, but the platform is not currently being used to potential. More technical support is required to increase exchanges between companies and introduce circularity in business by making businesses rethink procurement and waste management.
- Increasing awareness about the TMM within and outside Turkey to bring in global knowledge and expertise. For example, the TMM could connect to other circular economy networks such as Circular Hotspot in the Netherlands⁵.

“Going to the TMM meetings has allowed us to observe what the needs of different sectors are. We can directly answer questions and share our plans which has accelerated multiple conversations”
Volkan Yanmaz - *Head of Section, Ministry of Environment and Urbanization*

DELIVERY CHALLENGE 2: COMPLEX REGULATORY AND LEGAL REQUIREMENTS MADE IT DIFFICULT TO USE AND TRADE WASTE.

A core component of the NØW program is to create conducive platforms for dialogue and assist the government with regulatory constraints, but this goal has proven more challenging to achieve than originally envisioned. The implementing team did not fully appreciate the complexities in bringing about regulatory change and supporting Turkish authorities to align domestic regulations to the EU.

One of the main regulatory constraints to emerge from discussions with NØW sub-project companies

5 Circular Hotspot is a public-private platform in the Netherlands in which companies, knowledge institutes and local authorities collaborate with the aim of exchanging knowledge and stimulating entrepreneurship in the field of circular economy. <https://hollandcircularhotspot.nl/en/>

and TMM members was the lack of end-of-waste (EoW) criteria in Turkey. EoW is an article included in EU Waste Framework Directive 2008/98/EC that specifies when certain waste can cease to be waste and instead obtain a status of a product (or a secondary raw material). This usually entails recovery or recycling under certain specified conditions determined separately for each type of waste selected as a candidate material. With EoW, previously designated waste material can be classified as secondary raw material and used as input again. Certain secondary raw materials in the market that can be used directly in the production process and recycled and reused continuously, for example, glass, steel, copper, iron, and aluminium.

The EU Waste Framework Directive is fully transposed in Turkish regulation except for the article on EoW criteria, which was omitted to be studied and included later because it was considered highly technical and difficult to understand and enforce. However, its absence meant that companies that wanted to use material classified as waste in their production were subjected to burdensome bureaucratic procedures to obtain and maintain environmental licenses. Without proper EoW criteria that was easy to understand and implement, it was too cumbersome for industries to try to exchange waste material given the risk of violating regulations. Moreover, it limited the ability of Turkish companies to monetize selected waste streams for export to the EU. The lack of EoW criteria in Turkey emerged as a key regulatory obstacle in enforcing circular economy concepts in Turkey.

The MoEU had synchronized regulations for by-products and alternative raw materials and was working toward developing EoW criteria, but consultations through the TMM Steering Committee raised the urgency of this issue. In 2017, the MoEU asked the EBRD to help speed the process by developing a roadmap to incorporate EoW criteria into the Turkey's Waste Management Regulation. While the original NØW program did not foresee regulatory support for specific waste criteria, its importance was elevated by TMM members and NØW project companies to advance circular economy concepts.

SOLUTION: THE EOW TECHNICAL STUDY

In early 2018, EBRD commissioned, on behalf of the MoEU, an EoW criteria study to assess approaches to valorise waste streams (such as scrap iron and steel, aluminium, copper, plastics, paper, glass cullet, and biodegradable waste, including food and agricultural waste) in line with Article 6 of the EU Waste Framework Directive. In March 2019, the EBRD met with stakeholders directly impacted by the EoW regulation to determine how to proceed in determining the criteria and to set the goals of the technical study.

The study – Guidance for EoW Implementation in Turkey – implemented by engineering firm AECOM, included guidance on legal, institutional and operational frameworks required to implement EoW criteria in Turkey. The main objectives of the study were:

- Provide analysis of the concept, rationale, and principles of EoW and assess waste streams which could be the best candidates for the EoW criteria
- Assess the economic, social, environmental, and legislative impacts of implementing the EoW criteria for the identified waste streams
- Provide suggestions for simplifying the legal framework for by-products and secondary raw materials
- Provide guidelines on how to set EoW criteria and provide suggestions to the MoEU on incorporating the criteria into the current legislation and streamlining the administrative procedures to facilitate EoW-related application procedures
- Provide a quantitative analysis of successful examples from the waste valorization and business-to-business materials exchange initiatives within the EU
- Prepare guideline to help industry stakeholders understand the EoW process and categorization as by-product or alternative raw material, including guidance on the administrative steps, timeline,

procedure, and monitoring of material exchanges with special focus on integrating the concept into TMM activities

Released in March 2019, the study revealed that determining the EoW is a multi-year, multiple step process with working groups needed for each category of waste material. It also answered key questions that were raised by the MoEU to start putting into place the EoW criteria.

The study shed light on whether Turkey should set its own EoW criteria or use the existing EU EoW criteria. The MoEU was concerned that the criteria as developed for the EU would not be applicable in the Turkish context as the demand and supply factors in Turkey may differ and information asymmetry may distort market dynamics. However, the study found that there would be limited scope for amending the requirements of the EU EoW regulations as any amendment would negate the main advantage of free trade with the EU.

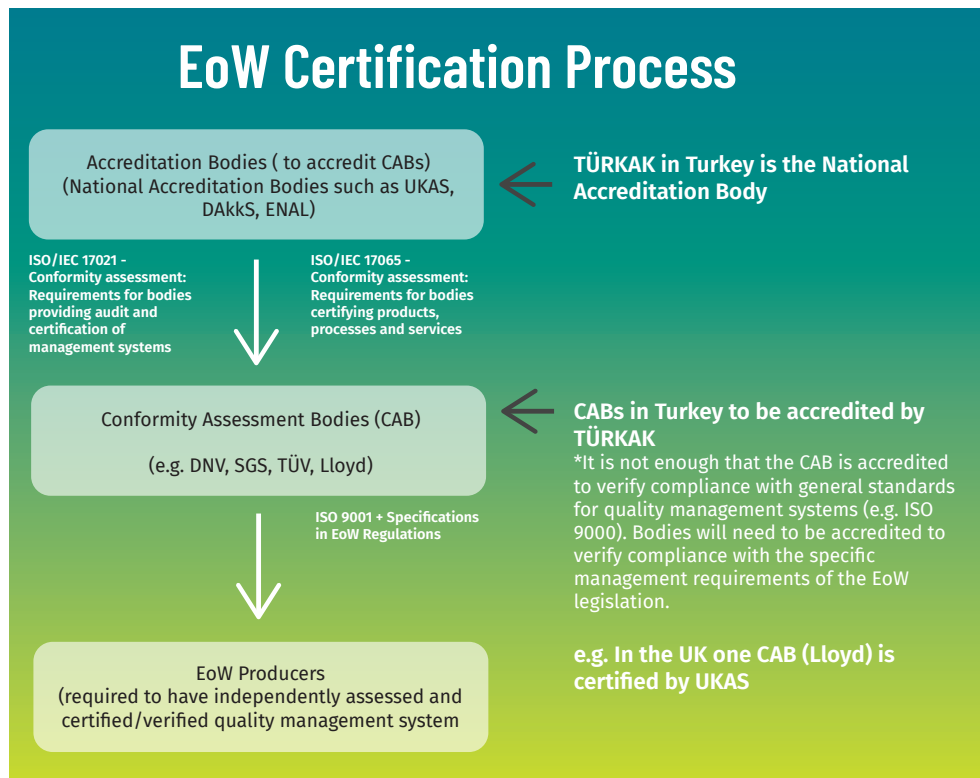
The study examined EU experiences and concluded that adopting EU EoW criteria for glass cullet would be a good starting point for Turkey. It recommended establishing a technical working group with the Turkish glass industry to start discussing the techno-economic feasibility and applicability of EU's glass EoW criteria to Turkey.

The study identified Turkey's main EoW stakeholders as the MoEU, the National Accreditation Body (TÜRKAK), accredited conformity assessment bodies (CABs), and EoW producers. For each of these stakeholders, the study detailed specific roles and responsibilities to make EoW enforcement possible, including, for example, a model for EoW certification processes (see Figure 3).

KEY ACHIEVEMENTS AND FUTURE PLANS OF THE EOW STUDY

Lack of EoW definition in Turkey's waste management regulation was a core obstacle in putting circular economy concepts into practice in Turkey. By developing this roadmap for the MoEU to pursue,

Figure 3.
PROPOSED END OF WASTE CERTIFICATION PROCESS



the NØW program made significant contributions to accelerating its implementation. The MoEU endorsed most of the recommendations provided by this study and decided to set-up a working group on glass cullet.

Further, the study helped build local technical capacity on EoW. The MoEU learned about

international and national experts who could help them take forward the analysis and implementation. The MoEU is also planning to commission an additional study in 2020 to draft a regulation on implementing the EoW criteria and to conduct a cost-benefit analysis of its various components, building on the work done in this first study.

“We benefitted a lot from the EoW study. We learned about what it was and how to apply it. It gave us specific steps on how to move forward.”

Volkan Yanmaz - Head of Section, Ministry of Environment and Urbanization



RESULTS

The NØW program through its various sub-components created the impetus for change and overshot its targets by a high margin. NØW sub-projects have achieved 500,000 tCO₂e in annual direct and indirect⁶ CO₂ savings, five times the original target of 100,000 tCO₂e. The results were achieved with USD 14.6 million of CTF funding and USD 200 million of EBRD co-financing. This has encouraged program developers to seek additional funds for a planned next phase of the program to enter into different sectors, such as textiles or construction.

Table 2 highlights the annual savings each NØW sub-project achieved in direct and indirect GHG emissions, energy, materials, and water. See Annex 1 for more details.

Beyond these resource savings, the NØW program had the following landmark achievements:

⁶ Direct GHG emissions are emissions from sources that are owned or controlled by the reporting entity. Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity but occur at sources owned or controlled by another entity.

Proven success of a previously untested model:

The NØW program is the first of its kind in Turkey. The innovative blended financing model—with loans and concessional financing—had never before been tested for waste minimization in Turkey. Nor had a marketplace for exchanging knowledge and materials ever been established at this scale. Through its strategically planned components and adaptability during implementation, the NØW program has proven that reducing GHG emission through direct investments in resource efficiency works in multiple industrial sectors. Resource efficiency investments in technologies that have yet to fully take off in Turkey can be cost effective and can give companies an edge over competitors. Other companies can see that the advantages of technological upgrades outweigh early-mover risks and may be motivated to replicate and scale up NØW successes.

Accelerated pace of change: The sub-project investments made through the NØW program make financial sense, and several companies that took advantage of NØW investments are trail-blazers in their own right. Some innovative companies may

Table 2
ACTUAL ANNUAL RESULTS OF NØW SUB-PROJECT⁷

PROJECT	INVESTMENT (EUR)		ANNUAL DIRECT AND INDIRECT GHG SAVINGS (tons CO ₂ e /per year)	ANNUAL ENERGY SAVINGS (MWh)	ANNUAL MATERIALS SAVINGS (tons)	ANNUAL WATER SAVINGS (m ³)
	EBRD	CTF				
Ege Profil	25	1	19,000	37,800	1,050	30,000
Sisecam	40	2	280,000	140,000	435,000	-
Korozo	29	0.92	14,600	5,000	2,200	-
Sütaş	21	2.74	160,000	64,000	350,000	-
Tersan	17	1.3	20,000	80,000	14,000	-
Akkim	12	1	10,040	40,697	7,970	275,425
Sarten	25	2	6,276	12,884	1,286	-
Işık Organic	14.5	1.5	3,025	2,239	2,379	1,505
Duran Doğan	2.4	0.6	759	-	780	-
Total	183.9	13.06	513,700	382,620	814,665	306,930

7 EBRD finance was provided to companies for multiple uses, including the resource efficiency technologies that they implemented.

have invested in resource efficiency eventually, but the NØW program sped the rate of change and gave them the technical and financial confidence to be first movers. Several companies, such as Sarten and Duran Dogan, have stated that, without the NØW program, they would have delayed investment by several years, hoping to observe another company test new systems and take on first-mover risks. Given the urgency of

change required to reduce to GHG emissions, this acceleration is a noteworthy achievement of the NØW program.

Similarly, the MoEU planned to work on EoW criteria, but NØW technical assistance helped to clearly map the way forward and has accelerated their action by several years.

“The technical study under NØW provided us the technical and financial proof-of-concept. It justified for us internally what we had been thinking about doing. We would have not proceeded as the pace that we did if were not for the NØW program. Globally as demand for resource efficiency increases, we can stay ahead of competitors”
Dikran Acemyan - General Manager, Duran Dogan (cardboard packaging manufacturer)

“EBRD and CTF financing brought forward our plans to replace old technology with a newer, more efficient one. We may have still gone ahead and deployed this technology to reduce waste and production cost because it made sense to us, but we would have done this many years later.”
Kenan Cakir - General Manager, Sarten (metal containers manufacturer)



LESSONS LEARNED AND FUTURE PLANS

LESSONS LEARNED

1 Importance of blended finance: Blended finance is a successful mechanism to remove first-mover risks and enable the uptake of techniques and technologies that have a low market penetration rate in waste minimization. It has increased the pace of change in Turkey and systematically helped remove barriers by reducing risk. All nine NØW sub-projects have implemented a technique or technology that had previously not been tested in Turkey.

2 Importance of engaging relevant stakeholders early: Engaging stakeholders early in the design phase leads to higher stakeholder buy-in during implementation and helps to ensure client-needs are fully addressed. In the NØW program, stakeholders influenced the program design and provided feedback at every step of implementation. The concessional financing and technical assessments—central to the NØW program—were inspired by EBRD client suggestions. Moreover, engaging the government early led to their endorsement of the TMM when it was needed and, later, their acceptance of the EBRD as a technical partner of the EoW criteria.

3 | The power of knowledge: Technical solutions alone can be insufficient if inherent knowledge and capacity gaps are not addressed. Combining knowledge services with technical solutions is key to changing entrenched behaviors and information gaps in Turkey. All components of the NØW program address knowledge gaps through assessments, research, knowledge sharing, and knowledge brokerage.

4 | Importance of adaptability during program implementation: Adaptability and flexibility during program implementation are key to tackling unexpected obstacles and enhancing the chances of success. While the main components for the NØW program were determined upfront, neither the TMM nor the work on EoW were originally envisioned. Their importance came to light once the NØW program was underway, and program managers and financiers were able to recognize the need to add these activities to the knowledge and regulatory components. This flexibility created room for creativity and the ability to take on new risks.

FUTURE PLANS

Given the success of the NØW program, the EBRD plans to extend it beyond 2020. In the next phase of the program, the EBRD envisions moving companies toward more circular business model thinking, that is, thinking holistically about the entire life cycle of products and full value chain of companies instead of specific BATs or technologies. Planned resource efficiency measures may extend to supply chain savings, corporate governance, or procurement changes. Instead of focusing technical assessment on specific waste streams or technologies, these assessments will consider the entire business process and factor in internal and external factors that can enhance resource efficiencies. Other components of the program may also be expanded including the TMM and additional regulatory support to the Turkish government.

“CTF’s concessional financing was crucial when we were convincing clients to take the leap of faith on new waste minimization technologies. Together with the technical assessments, the concessional financing is what convinced the clients to move forward and take risks. Without the concessional financing, knowledge transfer, and technical assistance combination, achieving what we have now would have taken an additional five to ten years”

Hande Islak - Deputy Director of Corporates, EBRD Turkey

ANNEX 1: NØW SUB- PROJECT SUMMARY

PROJECTS SIGNED

SHORT DESCRIPTION

Ege Profil

Construction waste, a major source of PVC waste, represents 11% of Turkey's municipal waste streams, and is predominantly (70%) deposited in landfills. The loan from the EBRD and financing from CTF was used to construct a new state-of-art PVC profile manufacturing plant, including photovoltaic solar panels, a tri-generation plant, and a water recovery system, and to expand the company's PVC recycling activities. As Turkey lacks structured markets and policy mandates for recycling, Ege Profil's plan to source PVC from recycled sources sets a national precedent.

The project won the silver prize in the Environmental and Social Innovation category [at the 2017 EBRD's Sustainability Awards](#)

[Watch the video to learn more about innovation at Ege Profil](#)

Şişecam

Şişecam is the largest glass manufacturer in Turkey. The NØW investment supports Şişecam's efforts to boost glass recycling in Turkey. This project included acquiring a minority stake in Şişecam Çevre Sistemleri A.Ş., a newly established recycling arm of Şişecam, and financing glass recycling equipment and energy efficiency investments. Through the NØW program, glass recycling capacity for the company doubled.

The project won the silver prize in the Environmental and Social Innovation category [at the 2017 EBRD's Sustainability Awards](#)

Korozo

Korozo is one of the largest flexible packaging manufacturing companies in Europe and the largest in Turkey with nine manufacturing plants across the country. The Bank's project with Korozo involved the construction of an innovative solvent recovery system and a tri-generation plant for its new state-of-the-art Çorlu plant in Tekirdağ. The new solvent recovery system makes possible to recover 99% of the solvent used and replaces about 70% of the current intake of virgin solvent. The emission of pervasive airborne solvents to the atmosphere decreased by about 2,200 tons per year.

Furthermore, NØW investments significantly improved energy efficiency of Korozo by implementing the best available technology through a tri-generation plant.

[Watch the video to learn more about innovation at Korozo.](#)

Sütaş/Enfas

Sütaş Group is the largest dairy group in Turkey. Its energy arm, Enfaş, is a leading bioenergy company in Turkey. The NØW program enabled Enfaş to increase its biogas-based power production capacity and enter into the market of organic fertilizers by establishing new large production facilities in Aksaray, Tire, and Karacabey. With NØW support, Enfas introduced an innovative and unique biomass supply chain model, a first of its kind in Turkey, which entails the transformation of organic wastes from animal farms, agro-processing industries, and municipalities. Rather than ending up in landfills and lagoons, this waste is transformed into useful bioenergy and organic fertilizers.

ANNEX 1: CONTINUED

PROJECTS - SIGNED	SHORT DESCRIPTION
Sütaş/Enfas <i>continued</i>	<p>The project won the Gold award at in the Sustainable Energy Category at the 2018 EBRD's Sustainability Awards.</p> <p>Watch the video to learn more about innovation at Sütaş Group.</p>
Tersan	<p>NØW investments were used to construct a floating dock near Istanbul to service, repair, and maintain commercial maritime vessels. The design of the floating dock includes several technologies to minimize the environmental impact and externalities of the ship repair operations. Use of electric powered equipment (cranes) instead of fossil fuel-powered equipment, switching to a central gas supply system from the use of gas cylinders, and alternative generators for electricity reduced operational costs, enhanced safety and reliability, and reduced Tersan's GHG emissions by 20%.</p>
Akkim	<p>NØW investments financed Akkim's medium-term investment program comprised of product investments, implementation of efficiency initiatives across different production units, R&D activities, and environmental, health, and safety improvements. Akkim implemented a sulphate removal system which results in significant savings on resource consumption. A tertiary treatment process was also installed to recover some portion of water discharged and used as raw water in the process.</p>
Sarten Ambalaj	<p>Sarten Ambalaj is one of the major manufacturers of metal containers for a variety of industries and product categories, including shelf stable packaged food, edible oils, aerosols, pesticides, engine oils, and paints in Turkey. Blended finance under NØW program supported a reduction in the consumption of steel plates in metal packaging and decreased energy and materials use in the production of plastic packaging. The company implemented a technology to produce thinner metal cans. Manufacturing thinner packaging products not only reduces the use of raw material to be processed, it also reduces the consumption of energy in production (natural gas for curing/drying and electricity for cutting).</p>
Duran Dogan	<p>Duran Dogan is a producer of metallized cardboard packaging that primarily supplyies to the premium products market. The NØW project involved supporting the company's investments to produce a fully recyclable packaging product and implementing a plastics recycling program. The new recyclable product diverts cardboard and plastics from landfill or incinerator and plastics are recycled at the company site and transformed into r-PET.</p>
Işık Organic	<p>Işık Organic is implementing technologies to process two new products which will result in significant waste reduction and recovery in raw materials and packaging. The first is a frozen puree product that upcycles underutilized raw materials that are the sorted-out through which it is expected that 1,577 tons of underutilized raw materials will be recovered annually. The second new product is freeze dried organic fruits which has longer shelf-life than the traditional dried fruits without any added preservatives and is light in weight, which makes it convenient for transportation. This product requires less packaging material due its significantly reduced weight.</p>

ANNEX 2: STAKEHOLDERS INTERVIEWED

NAME	POSITION	ORGANIZATION
Ela Yilmaz Akdeniz	Principal, Energy Efficiency & Climate Change, EBRD Operation Leader of NØW Program	EBRD
Bengisu Kilic Gokberk	Analyst, Energy Efficiency & Climate Change	EBRD
Adonai Herrera-Martinez	Director, Environmental Funds	EBRD
Deniz Yurtsever	NØW Program Manager	EBRD
Erol Ozenbas	Principal Banker Agribusiness	EBRD
Emre Oguzoncul	Principal, Energy Efficiency & Climate Change	EBRD
Hande Islak	Deputy Director of Turkey, Corporates	EBRD
Nazli Arikan	Principal Banker Agribusiness	EBRD
Ryan Alexander	Associate, Climate Finance and Carbon Markets, Energy Efficiency and Climate Change	EBRD
Tankut Erkan	Principal Banker – Corporates	EBRD
Basak Bengu	R&D Manager	Kastamonu Entegre (TMM member)
Bulent Kursun	Mechanical Engineer, R&D	Kastamonu Entegre (TMM member)
Munever Bayhan	Manager	Business Council for Sustainable Development
Sabri Suha Ekici	R&D Engineer	Sarten (NØW Portfolio client)
Salih Sahin	Financial Controller	Sarten (NØW Portfolio client)
Kenan Cakir	General Manager	Sarten (NØW Portfolio client)
Ahmet Ozbas	Chief Financial Officer	Sarten (NØW Portfolio client)
Dikran Acemyan	General Manager	Duran Dogan (NØW Portfolio client)
Zeren Meray Denecli	Chief Financial Officer	Duran Dogan (NØW Portfolio client)
Volkan Yanmaz	Head of Section, Industrial Waste Recovery, Directorate General of Environmental Management	Ministry of Environment and Urbanization
Ece Dinsel	Specialist, Industrial Waste Recovery, Directorate General of Environmental Management	Ministry of Environment and Urbanization

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