T.R.
MINISTRY OF AGRICULTURE AND FORESTRY
GENERAL DIRECTORATE OF WATER MANAGEMENT

Water Efficiency Campaign

Water Efficiency
Guidance Documents Series
CONSTRUCTION OF RAILWAYS AND SUBWAYS

NACE CODE: 42.12

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Contents

Abbreviations

WWT	Wastewater Treatment Plant
EU	European Union
SSM	Suspended Solid Matter
BREF	Best Available Techniques Reference Document
EMS	Environmental Management System
MEUCC	Republic of Türkiye Ministry of Environment, Urbanisation and Climate Change
NOM	Natural Organic Matter
EMAS	Eco-Management and Audit Programme Directive
EPA	United States Environmental Protection Agency
IPPC	Industrial Pollution Prevention and Control
ISO	International Standards Organisation
BAT	Best Available Techniques
NACE	Statistical Classification of Economic Activities
GDWM	General Directorate of Water Management
RO	Reverse Osmosis
MAF	Republic of Türkiye Ministry of Agriculture and Forestry
TurkSTAT	Turkish Statistical Institute
NF	Nanofiltration
MF	Microfiltration
UF	Ultrafiltration
GW	Groundwater
SW	Surface Water

1 Introduction

Türkiye is located in the Mediterranean basin, where the effects of global climate change are felt intensely, and is considered to be among the regions that will be most affected by the negative effects of climate change. Projections on how our water resources in our basins will be affected in the future due to climate change show that our water resources may decrease by up to 25 per cent in the next hundred years.

For the year 2022, the annual amount of water available per capita in Türkiye is 1,313 m^3, and it is expected that the annual amount of water available per capita will fall below 1,000 cubic metres after 2030 due to human pressures and the effects of climate change. If the necessary measures are not taken, it is obvious that Türkiye will become a country suffering from water scarcity in the very near future and will bring many negative social and economic consequences. As can be understood from the results of future projections, the risk of drought and water scarcity awaiting our country necessitates the efficient and sustainable use of our existing water resources.

The concept of water efficiency can be defined as *"using the least amount of water in the production of a product or service"*. The water efficiency approach is based on the rational, sharing, equitable, efficient and effective use of water in all sectors, especially in drinking water, agriculture, industry and household use, in a way that protects water in terms of quantity and quality and takes into account not only the needs of humans but also the needs of all living things with ecosystem sensitivity.

With the increasing demand for water resources, changes in precipitation and temperature regimes as a result of climate change, increasing population, urbanisation and pollution, fair and balanced allocation of usable water resources among users is becoming more and more important every day. For this reason, it has become a necessity to create a road map based on efficiency and optimisation in order to protect and use limited water resources through sustainable management practices.

In the sustainable development vision set by the United Nations, aspects such as efficient, equitable, and sustainable use of resources—especially water—environmentally friendly production, and consumption mindful of future generations are addressed within the scope of the Millennium Development Goals, specifically Goal 7: Ensuring Environmental Sustainability, as well as within the Sustainable Development Goals, specifically Goal 9: Industry, Innovation, and Infrastructure, and Goal 12: Responsible Production and Consumption.

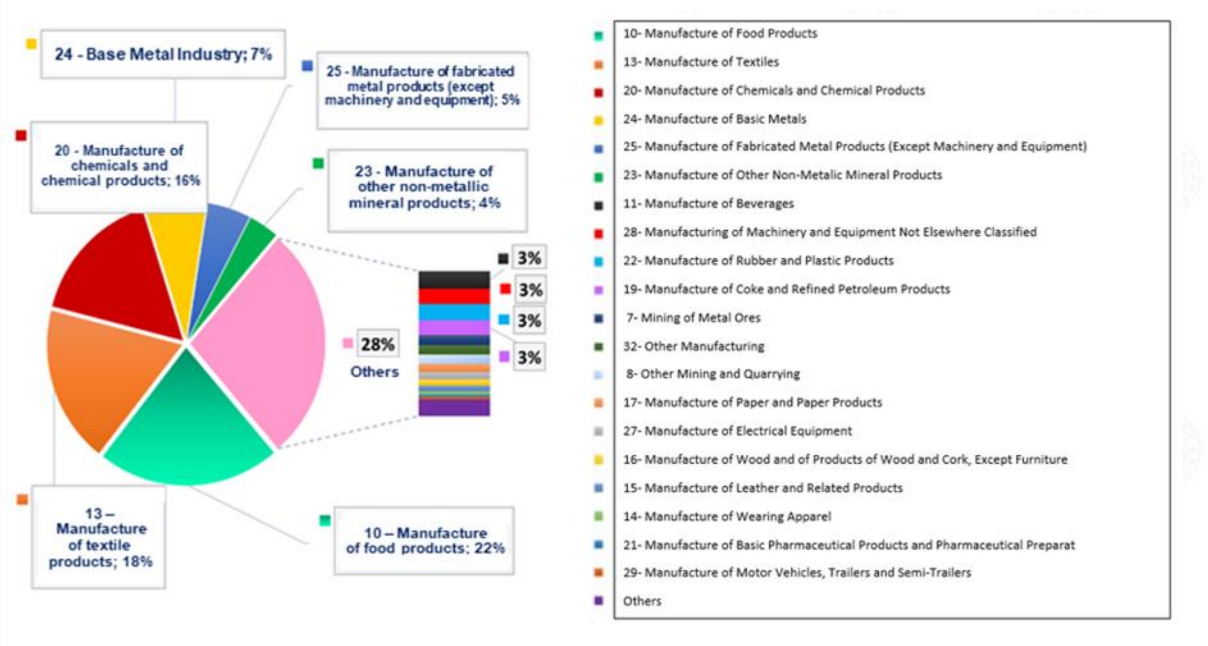
Within the framework of the European Green Deal, which member countries have agreed upon with goals such as achieving a carbon-neutral target, implementing a clean and circular economy model, promoting efficient resource use, and reducing environmental impacts, our country's European Green Deal Action Plan outlines actions emphasizing water and resource efficiency in production and consumption, particularly in the industrial sector and various other areas.

“The Industrial Emissions Directive (IED)”, one of the most critical components of European Union environmental legislation for industry, includes measures to control, prevent, or reduce emissions and discharges into air, water, and soil from industrial activities through an integrated approach. The Directive introduces Best Available Techniques (BAT) to systematize the applicability of clean production processes and address implementation challenges. BAT represents the most effective techniques for ensuring a high level of environmental protection, taking into account both costs and benefits. In compliance with the Directive, Reference Documents (BAT-BREF) have been prepared for each sector, detailing BATs. These BREF documents present BATs within a general framework that includes best management practices, general preventive techniques, chemical use and management, techniques for various production processes, wastewater management, emission management, and waste management.

The Ministry of Agriculture and Forestry, General Directorate of Water Management carries out activities aimed at disseminating efficient practices in urban, agricultural, industrial and individual water use and raising social awareness. Water efficiency action plans addressing all sectors and stakeholders were prepared within the scope of ***the "Water Efficiency Strategy Document and Action Plan (2023-2033) within the Framework of Adaptation to a Changing Climate***", which entered into force with the Presidential Circular No. 2023/9. In the Industrial Water Efficiency Action Plan, a total of 12 actions have been determined for the period 2023-2033 and responsible and relevant institutions have been assigned for these actions. Within the scope of the Action Plan, the General Directorate of Water Management is responsible for carrying out studies to determine specific water use ranges and quality requirements on the basis of sub-sectors in industry, organising technical training programmes and workshops on sectoral basis and preparing water efficiency guidance documents.

On the other hand, with the ***"Industrial Water Use Efficiency Project by NACE Codes"*** carried out by the General Directorate of Water Management of the Ministry of Agriculture and Forestry, the best sectoral techniques specific to our country were determined within the scope of studies on improving water efficiency in industry. As a result of the study, sectoral guidance documents and action plans categorised by NACE codes, including the measures recommended for improving water use efficiency in sectors with high water consumption operating in our country, were prepared.

As in the world, the sectors with the highest share in water consumption in our country are food, textile, chemical and basic metal sectors. Within the scope of the studies, field visits were carried out in enterprises representing 152 sub-sectors in 35 main sectors, mainly food, textile, chemical and basic metal industries, representing production areas with different capacities and diversity within the scope of NACE Codes operating in our country and with high water consumption, and data on water supply, sectoral water use, wastewater generation, recycling were obtained and information was provided on the best available techniques (BAT) and sectoral reference documents (BREF) published by the European Union, water efficiency, clean production, water footprint, etc.



Sectoral distribution of water use in industry in Türkiye

As a result of the studies, specific water consumption and potential saving rates for the processes of enterprises for 152 different 4-digit NACE codes with high water consumption were determined, and water efficiency guidance documents were prepared by taking into account the EU best available techniques (BAT) and other cleaner production techniques. Within the guidelines, 500 techniques (BAT) for water efficiency;
(i) Good Management Practices, (ii) General Water Efficiency BATs, (iii) Measures Related to Auxiliary Processes and (iv) Sector Specific Measures.

Within the scope of the project, environmental benefits, operational data, technical specifications-requirements and applicability criteria were taken into consideration during the determination of BATs for each sector. In the determination of BATs, not only BREF documents were not limited, but also different data sources such as current literature data on a global scale, real case analyses, innovative practices, reports of sector representatives were examined in detail and sectoral BAT lists were created. In order to evaluate the suitability of the BAT lists created for the local industrial infrastructure and capacity of our country, the BAT lists prepared specifically for each NACE code were prioritised by the enterprises by scoring them on the criteria of water saving, economic savings, environmental benefit, applicability, cross-media impact and the final BAT lists were determined using the scoring results. Water and wastewater data of the facilities visited within the scope of the project and the final BAT lists, which were prioritised by sectoral stakeholders and determined by taking into account the local dynamics specific to our country, were used to create sectoral water efficiency guides on the basis of NACE code.

2 Scope of the Study

Guidance documents prepared within the scope of water efficiency measures in industry cover the following main sectors:

- Crop and animal production and hunting and related service activities (including sub-production area represented by 6 four-digit NACE codes)
- Fisheries and aquaculture (including sub-production area represented by 1 four-digit NACE Code)
- Coal and lignite extraction (including sub-production area represented by 2 four-digit NACE codes)
- Service activities in support of mining (including sub-production area represented by 1 four-digit NACE Code)
- Metal ores mining (including the sub-production area represented by 2 four-digit NACE codes)
- Other mining and quarrying (including the sub-production area represented by 2 four-digit NACE codes)
- Manufacture of food products (including 22 sub-production areas represented by four-digit NACE codes)
- Manufacture of beverages (including the sub-production area represented by 4 four-digit NACE codes)
- Manufacture of tobacco products (including sub-production area represented by 1 four-digit NACE Code)
- Manufacture of textile products (including 9 sub-production areas represented by four-digit NACE codes)
- Manufacture of articles of clothing (including sub-production area represented by 1 four-digit NACE Code)
- Manufacture of leather and related products (including sub-production area represented by 3 four-digit NACE codes)
- Manufacture of wood, wood products and cork products (except furniture); manufacture of articles made of thatch, straw and similar materials (including sub-production area represented by 5 four-digit NACE Codes)
- Manufacture of paper and paper products (including sub-production area represented by 3 four-digit NACE codes)
- Manufacture of coke and refined petroleum products (including sub-production area represented by 1 four-digit NACE Code)
- Manufacture of chemicals and chemical products (including 13 sub-production areas represented by four-digit NACE codes)
- Manufacture of basic pharmaceutical products and pharmaceutical ingredients (including sub-production area represented by 1 four-digit NACE Code)
- Manufacture of rubber and plastic products (including sub-production area represented by 6 four-digit NACE codes)
- Manufacture of other non-metallic mineral products (including 12 sub-production areas represented by four-digit NACE codes)
- Basic metal industry (including 11 sub-production areas represented by four-digit NACE codes)
- Manufacture of fabricated metal products (except machinery and equipment) (including 12 sub-production areas represented by four-digit NACE codes)
- Manufacture of computers, electronic and optical products (including sub-production area represented by 2 four-digit NACE codes)
- Manufacture of electrical equipment (including sub-production area represented by 7 four-digit NACE codes)

- Manufacture of machinery and equipment not elsewhere classified (including sub-production area represented by 8 four-digit NACE codes)
- Manufacture of motor vehicles, trailers (semi-trailers) and semi-trailers (semi-trailers) (including sub-production area represented by 3 four-digit NACE codes)
- Manufacture of other transport equipment (including sub-production area represented by 2 four-digit NACE codes)
- Other manufacturing (including 2 sub-production areas represented by four-digit NACE codes)
- Installation and repair of machinery and equipment (including sub-production area represented by 2 four-digit NACE codes)
- Electricity, gas, steam and ventilation system production and distribution (including sub-production area represented by 2 four-digit NACE codes)
- Waste collection, reclamation and disposal activities; recovery of materials (including sub-production area represented by 1 four-digit NACE Code)
- Construction of non-building structures (including sub-production area represented by 1 four-digit NACE Code)
- Warehousing and supporting activities for transport (including sub-production area represented by 1 four-digit NACE Code)
- Accommodation (including sub-production area represented by 1 four-digit NACE Code)
- Educational Activities (Higher Education Campuses) (including sub-production area represented by 1 four-digit NACE Code)
- Sporting activities, leisure and recreation activities (including sub-production area represented by 1 four-digit NACE Code)

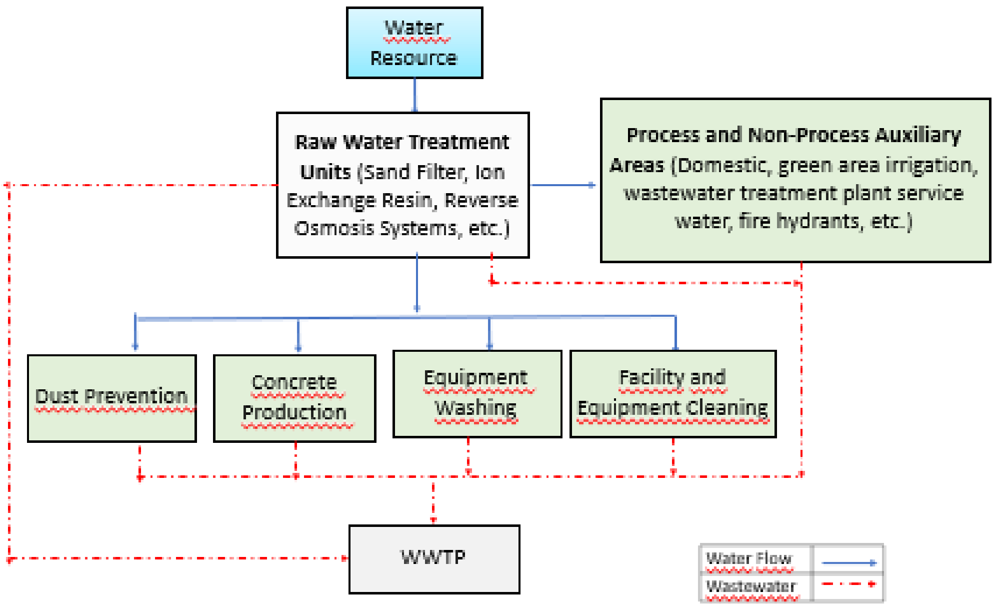
Construction of non-building structures

Under the construction of non-building structures sector, the sub-production branches for which guidance documents have been prepared are as follows

42.12	Construction of railways and subways

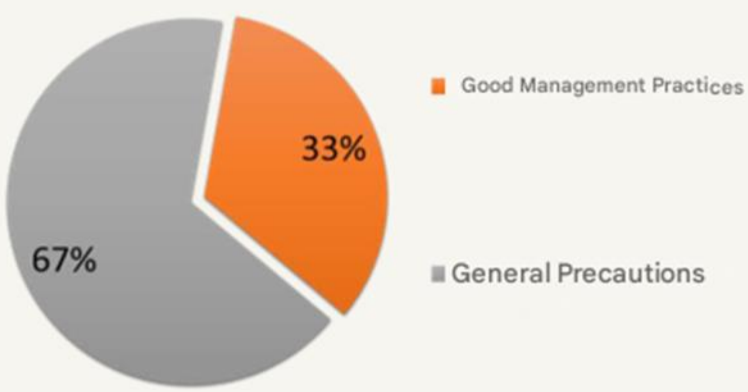
2.1 Construction of railways and subways (NACE 42.12)

Water Flow Diagram for the Construction Sector of Railways and Subways



	Minimum	Maximum
Specific Water Consumption of Facilities Visited Within the Project Scope (L/kWh)	0,7	
Reference Specific Water Consumption (L/kWh)	Reference Specific Water Consumption Value Not Available	

Percentage Distribution of Water Efficiency Practices



Railways consist of a road frame consisting of track rails and sleepers and ballast and sub-ballast sections under this section. In railway construction, ground selection is made first. In cases where the ground is insufficient, the ground layer called formation layer is placed. Frost protection layer is used to protect the infrastructure against frost heaves. Then, geotextiles are used to increase the bearing capacity of the protective layers added on the ground and to reduce stresses and deformations. Ballasts obtained by crushing rocks such as basalt, andesite, dolomite, granite, diorite are poured onto the railway. The ballast layer is used to distribute the load on the railway over a wide area, to prevent the formation of vegetation on the road, to protect the area from frost, to prevent slipping on the line and to protect the line geometry. Sleepers are placed between the rail and ballast for a better load distribution of the railway.

Water consumption is realised in the construction of railways and subways, ready-mixed concrete production and washing of mixers used for concrete production and dust prevention process. If there are raw water preparation units such as activated carbon filter, ion exchange resin, reverse osmosis in order to produce soft water to be used in production processes in the facility, significant water consumption is also realised for filter washing, resin regeneration and membrane cleaning processes.

There is no reference specific water consumption value in the construction of railways and subways sector. The specific water consumption of the production line analysed within the scope of the study is 0.7 L/kg. With the implementation of good management practices and general water efficiency BATs, it is possible to achieve water savings of 20 - 25 per cent in the sector.

42.12 Construction of Railways and Subways The priority water efficiency implementation techniques recommended under the NACE code are presented in the table below.

NACE Code	NACE Code Descriptio		Prioritised Sectoral Water Efficiency Techniques
42.12	Construction of railways and		**Good Management Practices**
		1.	Use integrated wastewater management and treatment strategy to reduce wastewater quantity and pollutant load
		2.	Preparation of water flow diagrams and mass balances for water
		3.	Preparing a water efficiency action plan to reduce water use and prevent water pollution
		4.	Providing technical trainings to personnel for the reduction and optimisation of water use
			General Water Efficiency BATs
		1.	Use of automatic hardware and equipment (sensors, smart hand washing systems, etc.) that will save water at water usage points such as showers/toilets etc.
		2.	Avoiding the use of drinking water in production lines
		3.	Identification and minimisation of water losses
		4.	Use of automatic control-close valves to optimise water use
		5.	Documented production procedures are kept and used by employees to prevent water and energy wastage
		6.	Construction of closed storage and impermeable waste/scrap sites to prevent the transport of toxic or hazardous chemicals for the aquatic environment
		7.	Preservation and storage of substances (such as oils, emulsions, binders) that pose a risk in the aquatic environment and prevention of their mixing with wastewater after use
		8.	Separate collection and treatment of grey water in the facility and its use in areas (green area irrigation, floor, floor washing, etc.) that do not require high water quality
		9.	Implementation of time optimisation in production and arrangement of all processes to be completed as soon as possible
		10.	Collecting rainwater and utilising it as an alternative water source in facility cleaning or in suitable areas

A total of 14 techniques have been proposed in this sector.

Construction of railways and subways for NACE Code;

(i) Good Management Practices,
(ii) General Water Efficiency BATs,
are given under separate headings.

2.1.1 Good Management Practices

- ***Use integrated wastewater management and treatment strategy to reduce wastewater quantity and pollutant load***

Wastewater management should be based on a holistic approach from wastewater generation to final disposal and includes functional elements such as composition, collection, treatment including sludge disposal and reuse. The selection of the appropriate treatment technology for industrial wastewater depends on integrated factors such as land availability, desired treated water quality and compliance with national and local regulations (Abbassi & Al Baz, 2008).

The reuse of treated wastewater not only improves the quality of water resources but also reduces the demand for freshwater. Therefore, it is crucial to identify appropriate treatment strategies for different reuse targets.

In integrated industrial wastewater treatment, different aspects such as wastewater collection system, treatment process and reuse target are evaluated together (Naghedi et al., 2020). For industrial wastewater recovery, methods such as SWOT method (strengths, weaknesses, opportunities and threats), PESTEL method (political, economic, social, technological, environmental and legal factors), decision tree can be combined with expert opinions to determine the integrated wastewater management framework (Naghedi et al., 2020). The integration of Analytic Hierarchy Process (AHP) and CoCoSo techniques can be used to determine priorities based on multiple criteria for industrial wastewater management processes (Adar et al., 2021). The implementation of integrated wastewater management strategies can lead to an average reduction of up to 25% in water consumption, wastewater quantity and pollution loads of wastewater. The potential payback period of the implementation varies between 1-10 years (MoAF, 2021).

http://www.asw-eg.com/en/images/products/116567Water-Sewage-Treatment-System-With-Plant-And-Facility.jpg

- ***Providing technical trainings to the staff for the reduction and optimisation of water use***

With these measures, water savings and water recovery can be achieved by increasing staff training and awareness, leading to reduced water consumption and costs while improving water efficiency. In industrial facilities, the lack of necessary technical knowledge among personnel can result in issues related to high water consumption and wastewater generation. For example, in industrial operations, it is crucial for cooling tower operators, who play a significant role in water consumption, to be properly trained and possess technical knowledge. It is also necessary for relevant personnel to have adequate technical knowledge in areas such as determining water quality requirements, measuring water and wastewater quantities in production processes (MAF, 2021).

Therefore, training personnel on policies for reducing, optimizing, and conserving water usage is essential. Involving staff in water conservation efforts, generating regular reports on water consumption before and after water efficiency initiatives, and sharing these reports with personnel supports engagement and motivation in the process. Training can yield technical, economic, and environmental benefits (TUBİTAK MAM, 2016; MAF, 2021).

- ***Preparing a water efficiency action plan to reduce water use and prevent water pollution***

It is important for water efficiency to prepare an action plan that includes short, medium and long term actions to be taken in order to reduce water-wastewater quantities and prevent water pollution in industrial facilities. At this point, determination of water needs throughout the facility and in production processes, determination of quality requirements at water use points, wastewater generation points and wastewater characterisation should be carried out (TOB, 2021). At the same time, it is necessary to determine the measures to be implemented to reduce water consumption, wastewater generation and pollution loads, to make their feasibility and to prepare action plans for the short-medium-long term. In this way, water efficiency and sustainable water use are ensured in the facilities (MAF, 2021).

- ***Preparation of water flow diagrams and mass balances for water***

Determination of water use and wastewater formation points in industrial plants, production processes and auxiliary processes other than production processes, water-wastewater balances

In general, the establishment of good governance is the basis of many good governance practices.

Establishing process profiles on a plant-wide and production process basis facilitates the identification of unnecessary water use points and high water use points, evaluation of water recovery opportunities, process modifications and determination of water losses (MAF, 2021).

2.1.2 General Water Efficiency BATS

- ***Identification and minimisation of water losses***

In industrial production processes, water losses occur in equipment, pumps, and pipelines. To prevent these, water losses must first be identified, and regular maintenance of equipment, pumps, and pipelines should be performed to keep them in good condition and prevent leaks (IPPC BREF, 2003). Maintenance procedures should be established with attention to the following points:

- Including pumps, valves, level switches, and pressure and flow regulators in the maintenance checklist.
- Conducting inspections not only on the water system but also on heat transfer and chemical distribution systems, focusing on broken and leaking pipes, barrels, pumps, and valves.
- Regularly cleaning filters and pipelines.
- Calibrating chemical measurement and distribution devices, thermometers, and other measurement equipment and monitoring them at routine intervals (IPPC BREF, 2003).

Effective maintenance, repair, cleaning, and loss control practices can result in water savings of 1-6% (Öztürk, 2014).

- ***Use of automatic control-close valves to optimise water use***

Monitoring and controlling water consumption using flow control devices, meters and computer-aided monitoring systems provide significant technical, environmental and economic advantages (Öztürk, 2014). Monitoring the amount of water consumed in the plant and in various processes prevents water losses (TUBITAK MAM, 2016). It is necessary to use flow meters and counters in the plant in general and in production processes in particular, to use automatic shut-off valves and valves in continuously operating machines, and to develop monitoring-control mechanisms according to water consumption and some determined quality parameters by using computer-aided systems (TUBITAK MAM, 2016). With this application, it is possible to save up to 20-30% of water consumption on process basis (DEPA, 2002; LCPC, 2010; IPPC BREF, 2003). By monitoring and controlling water consumption on a process basis, 3-5% savings can be achieved in process water consumption (Öztürk, 2014).

- ***Avoiding the use of drinking water in production lines***

  In different sub-sectors of the manufacturing industry, waters with different water quality can be used for production purposes. In industrial plants, raw water supplied from groundwater sources is generally used in production processes after treatment. However, in some cases, although it is costly in production processes, drinking water can be used directly or raw water is disinfected with chlorinated compounds and then used in production processes. These waters containing residual chlorine can react with organic compounds (natural organic substances (DOM)) in water in production processes and form disinfectant by-products harmful to living metabolisms (Özdemir & Toröz, 2010; Oğur et al.) The use of drinking water containing residual chlorine compounds or raw water disinfected with chlorinated compounds should be avoided as much as possible. Highly oxidising disinfection methods such as ultraviolet (UV), ultrasound (US) or ozone can be used instead of chlorine disinfection for disinfection of raw water. In order to increase the technical, economic and environmental benefits of the application, the determination and use of the water quality parameters required in each production process helps to reduce unnecessary water supply and treatment costs. With this application, it is possible to reduce water, energy and chemical costs (TUBITAK MAM, 2016).

- ***Collecting rainwater and utilising it as an alternative water source in facility cleaning or in suitable areas***

  Nowadays, when water resources are decreasing, rainwater harvesting is frequently preferred especially in regions with low rainfall. There are different technologies and systems for rainwater collection and distribution systems. Cistern systems, ground infiltration, surface collection and filter systems are used. Rainwater collected by special drainage systems can be used for production processes, garden irrigation, tank and equipment cleaning, surface cleaning, etc. if it meets the required quality requirements (Tanık et al., 2015).

  In various examples, roof rainwater collected in industrial facilities was stored and used inside the building and in landscape areas, resulting in 50% water saving in landscape irrigation (Yaman, 2009). Perforated stones and green areas can be preferred in order to increase the permeability of the ground and to allow rainwater to pass and absorb into the soil on the site (Yaman, 2009). Rainwater collected on building roofs can be used for car washing and garden irrigation. It is possible to recover and reuse 95% of the collected water by biological treatment after use (Şahin, 2010).

- ***Preservation and storage of substances (such as oils, emulsions, binders) that pose a risk in the aquatic environment and prevention of their mixing with wastewater after use***

  In industrial plants, water recovery is achieved by using dry cleaning techniques and preventing leaks to prevent the mixing of chemicals that pose a risk to the aquatic environment such as oils, emulsions and binders into wastewater streams (TUBITAK MAM, 2016).

- ***Construction of closed storage and impermeable waste/scrap sites to prevent the transport of toxic or hazardous chemicals for the aquatic environment***

  In industrial facilities, closed and impermeable waste/scrap storage sites can be constructed to prevent the transport of toxic or hazardous chemicals for the aquatic environment to receiving environments. This practice is already being implemented in our country within the scope of existing environmental regulations. Within the scope of the field studies carried out, a separate collection channel can be constructed in the storage areas of toxic or hazardous substances in industrial facilities and the leachate can be collected separately and prevented from mixing into natural water environments.

- ***Documented production procedures are kept and used by employees to prevent water and energy wastage***

  In order to ensure efficient production in an enterprise, effective procedures should be implemented to identify and evaluate potential problems and resources and to control production stages (Ayan, 2010). Determining and implementing appropriate procedures in production processes ensures more efficient use of resources (such as raw materials, water, energy, chemicals, personnel and time) and ensures reliability and quality in production processes (Ayan, 2010). The existence of documented production procedures in production processes contributes to the evaluation of business performance and the development of the ability to develop immediate reflexes to solve problems (TUBITAK MAM, 2016; TOB, 2021). Effective implementation and monitoring of the procedures created specifically for production processes is one of the most effective ways to ensure product quality, receive feedback and develop solutions (Ayan, 2010). Documentation, effective implementation and monitoring of production procedures is a good management practice and an effective tool in structuring and ensuring the continuity of the cleaner production approach and environmental management system. In addition to the potential benefits, the cost and economic gains of the application may vary from sector to sector or depending on the facility structure (TUBITAK MAM, 2016; TOB, 2021). Although establishing and monitoring production procedures is not costly, the payback period may be short considering the savings and benefits it will provide (TUBITAK MAM, 2016; MAF, 2021).

- ***Implementation of time optimisation in production and arrangement of all processes to be completed as soon as possible***

  In industrial production processes, planning the process from raw material to product by using the minimum number of processes is an effective practice for reducing labour costs, resource use costs and environmental impacts and ensuring efficiency. In this context, it may be necessary to revise the production processes so that the minimum number of process steps is used (TUBITAK MAM, 2016). In cases where the desired product quality cannot be achieved due to some inefficiencies, inefficiency and design errors in basic production processes, production processes may need to be renewed. Therefore, in this case, the resource utilisation and the amount of waste, emission and solid waste generated in the production of unit amount of product increases. Time optimisation in production processes is an effective application (TUBITAK MAM, 2016).

- ***Use of automatic hardware and equipment (sensors, smart hand washing systems, etc.) that will save water at water usage points such as showers/toilets etc.***

  Water is very important in many sectors of the manufacturing industry, both for production processes and for personnel to meet the necessary hygiene standards. Water consumption in the production processes of industrial facilities can be provided in various ways, as well as water consumption savings can be achieved by using equipment such as sensor faucets and smart hand washing systems in the water usage areas of the personnel. Smart hand washing systems provide resource efficiency in addition to water saving while adjusting the mixture of water, soap and air at the right rate.

- ***Separate collection and treatment of grey water in the facility and its use in areas that do not require high water quality (green area irrigation, floor washing, etc.)***

  Wastewater generated in industrial facilities includes not only industrial wastewater from production processes but also wastewater from showers, sinks, kitchens, and similar areas. This type of wastewater is referred to as greywater. By treating greywater through various treatment processes, it can be reused in areas that do not require high water quality, thereby achieving water savings.

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