

H2020/NAP indicator factsheet

Industrial Emissions

Jordan

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Date: 28/07/2020

Organisation: EEA

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*Implementation of the Shared Environmental Information System (SEIS) principles and practices
in the ENP South region – SEIS Support Mechanism (ENI SEIS II South)*

| Version | Date | Author | Status and description | Distribution |
|---------|------------|--|--|--------------|
| V1 | 12/07/2020 | Mr Ali Almashni, Focal Point Mrs Enas Arabyat, Focal Point Mr Majed Aladwan, Team member Mr Sayyed Saleh, Team member Mr Faraj Altaleb, Former Focal Point | Industrial emissions indicators factsheets | SEIS NFPs |
| V2 | 17/7/2020 | Sabah Nait | Comments and suggestions | Menouer |



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| H2020 / NAPs Indicators | |
| Thematic Area Industrial Emissions | Date : 28/07/2020 Authors: Ali Almashni, Enas Arabyat, Mr Majed Aladwan, Sayyed Saleh, Faraj Altaleb |
| Policy theme 6.1 Release of nutrients from industrial sectors | |
| Indicators 6.1.1) Total BOD load discharged. 6.1.2) Total Nitrogen load discharged. 6.1.3) Total Phosphorus load discharged. | |
| Key policy question: What is the trend of pollution loads <i>releases from industrial sectors in Jordan?</i> | |

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| Key messages |
| <ul style="list-style-type: none"> - Pollutant emissions from industrial installations in Jordan are generally slightly decreasing during years 2018 and 2017 compared to previous years for overall sectors. - The decrease of pollution loads is due to the abatement processes installed in major industries to reduce air and liquid pollutions emissions at the source to meet the standards. Besides that, numerous industrial activities either shutdown or reduced their production leading to a less pollutant emission. - There is still a gap of regular and periodic data collection from all pollution monitoring units at the governorates level and compilation at the central level by the ministry of environment in a centralized pollution database. - Need of the establishment of a national information system including pollution loads and emissions from industrial activities supported by institutional framework, legal tools, and commitment of all levels of stakeholders to cover all Jordanian governates with Aqaba Special Economic Zone . |



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Key figures/tables

Figure 1 : The annual average of (BOD₅ mg/l) in the Industrial Estates Central Treatment Plants (2014 – 2018).

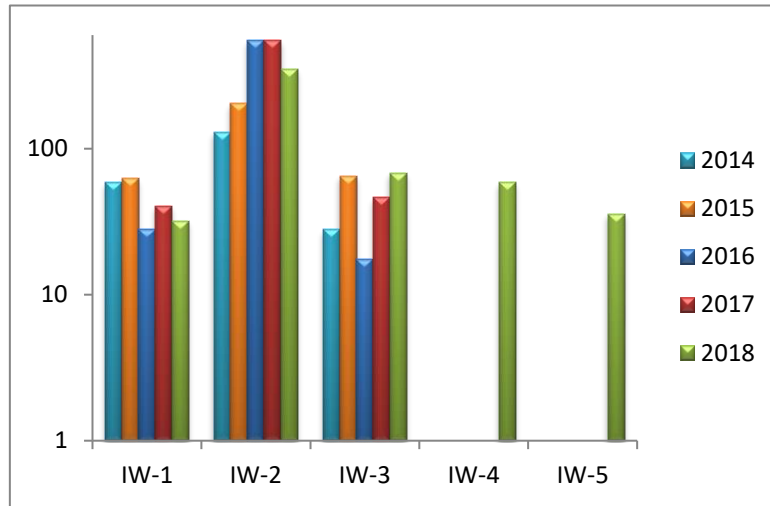
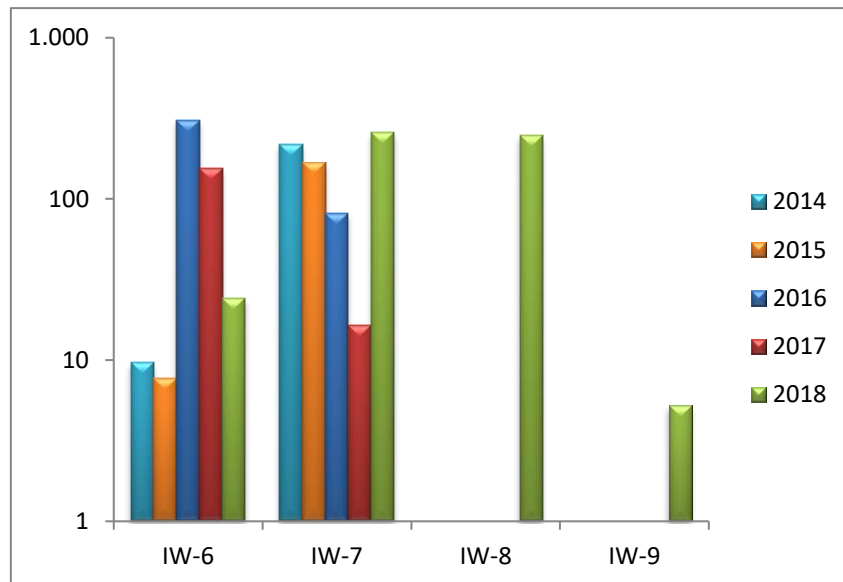


Figure 2 : The annual average of (BOD₅ mg/l) in the pharmaceutical industries sector (2014 – 2018)



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Fig. 3 The annual average of (BOD₅ mg/l) in petroleum industries (2014 – 2018)

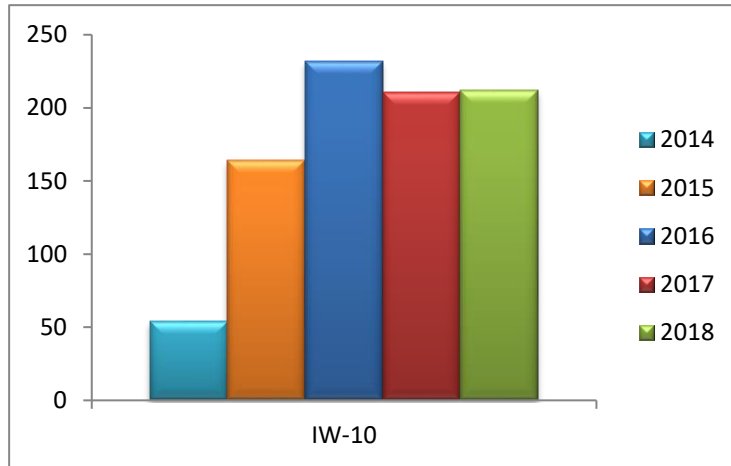
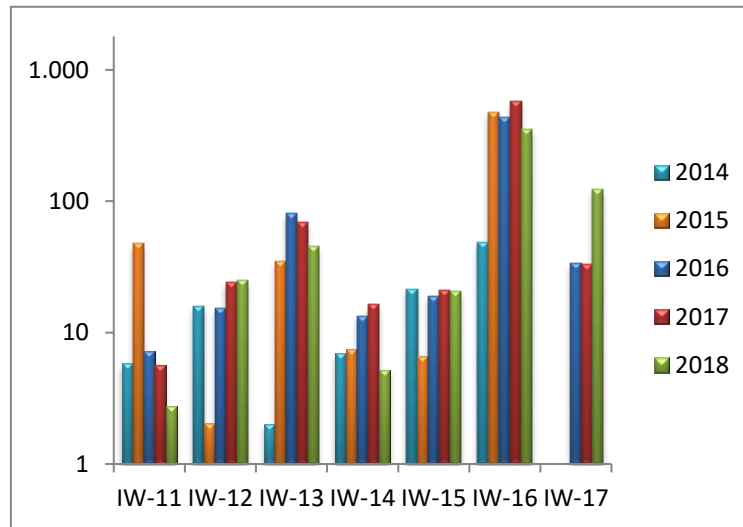


Fig. 4 The annual average of (BOD₅ mg/l) in Slaughterhouses (2014 – 2018)



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Figure 5 : The annual average of (T-N mg/l) in the Industrial Estates Central Treatment Plants (2014 – 2018).

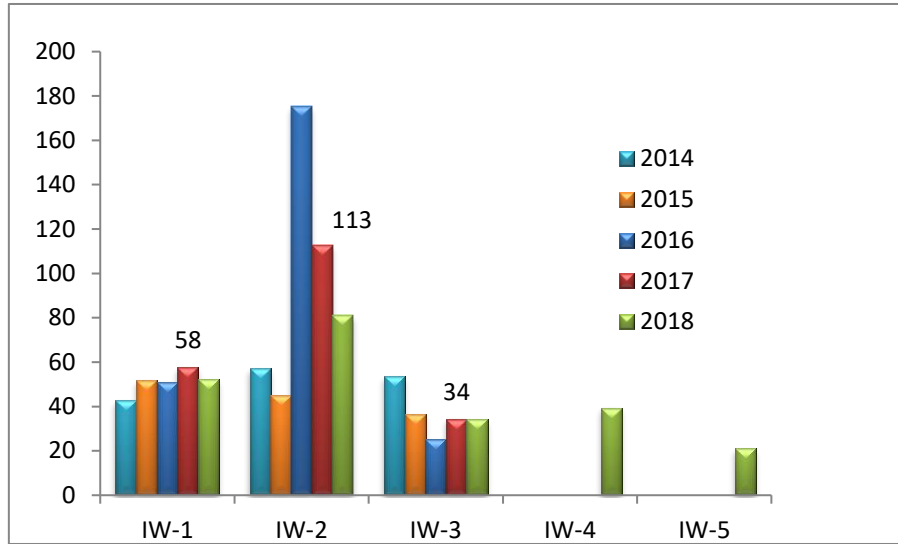
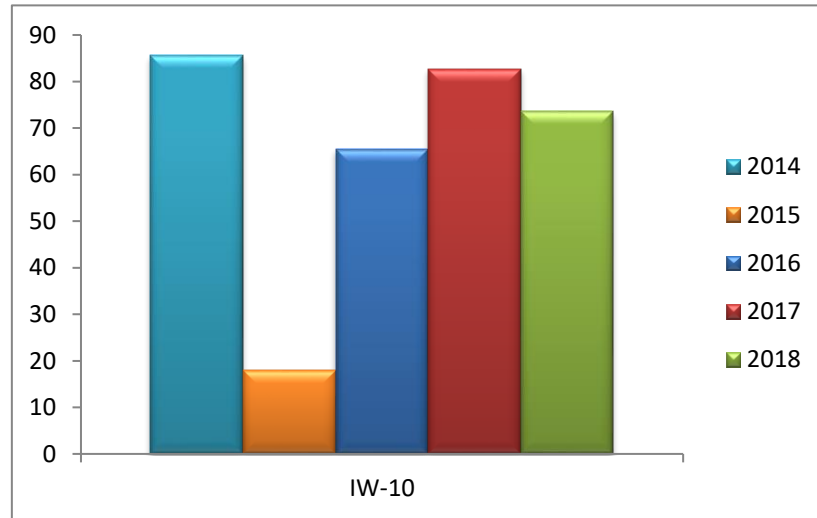


Fig. 6 The annual average of (T- N mg/l) in petroleum industries (2014 – 2018)



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Fig. 7 The annual average of (T-N mg/l) in Slaughterhouses (2014 – 2018)

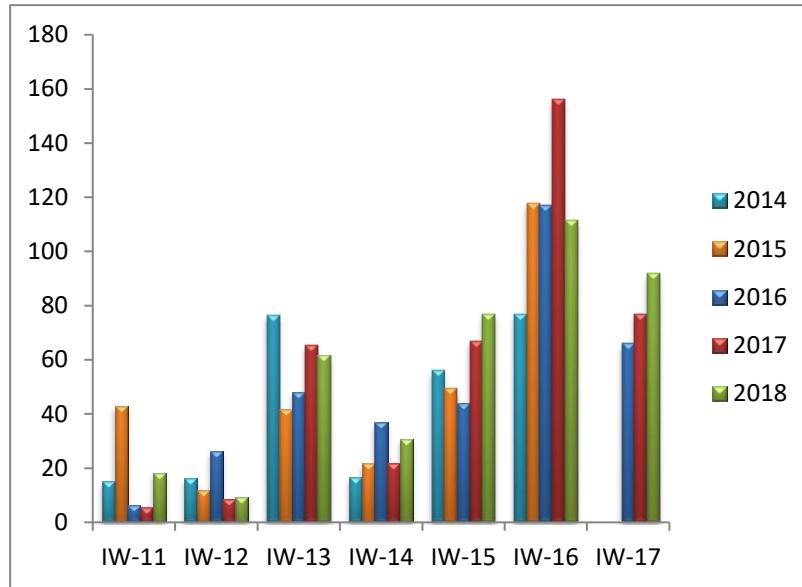
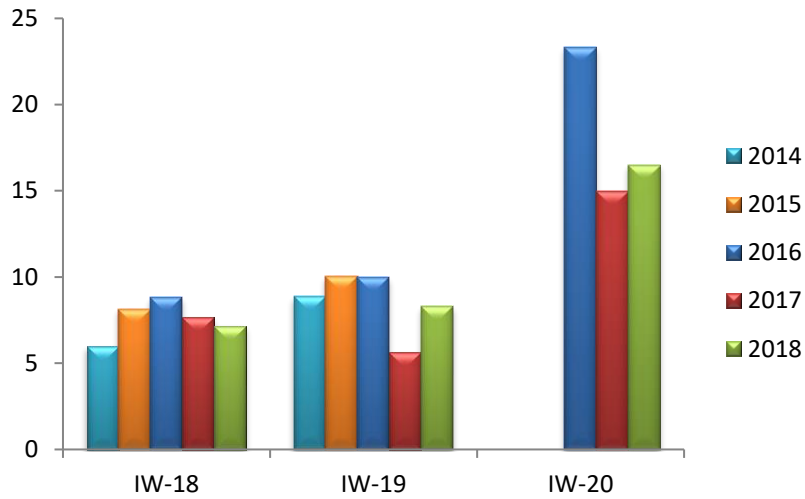


Fig. 8 The annual average of (T-N mg/l) in textile industry (2014 – 2018)



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Fig. 9 The annual average of (T-N mg/l) in chemical industry (2014 – 2018)

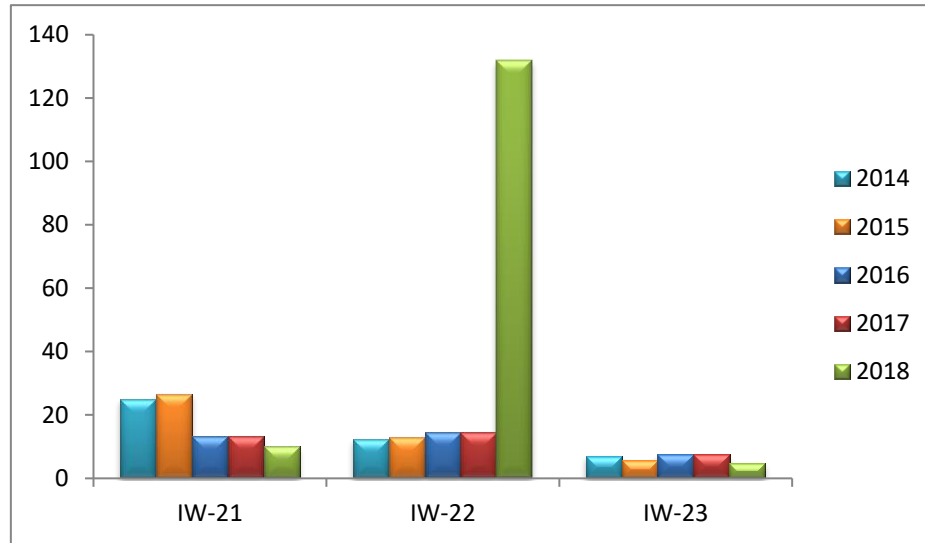
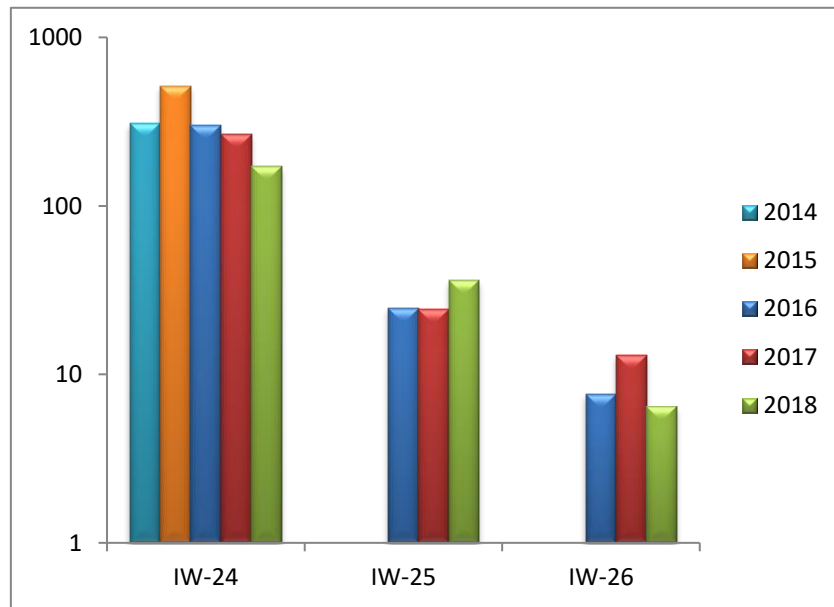


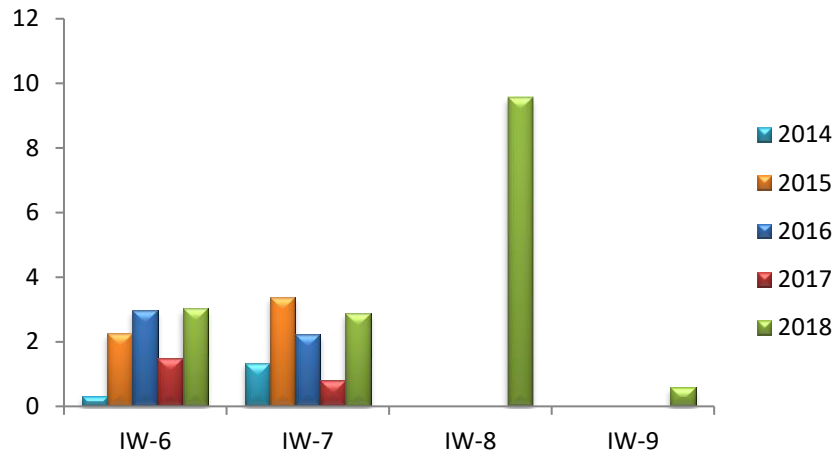
Fig. 10 The annual average of (T-N mg/l) in food industry (2014 – 2018)



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Fig. 11 The annual average of (T-P mg/l) in the pharmaceutical industries sector (2014 – 2018)



Key assessment text

Wastewater treatment is regulated in Jordan where it is mandatory for both private industrials and industrial estates to build and operate wastewater treatment plants.

Pollutant releases are regulated in Jordan and emissions are monitored for all types of industries by the government and the ministry of Environment to implement the Jordanian Standard JS 2002:2007 including the limits of all pollutant releases from industrial activities.

Jordan's adopted a National Water Strategy 2016-2025 specifically focuses on wastewater treatment and reuse aspects which ensures that treated effluent complies with Reclaimed Industrial Wastewater Standards (JS202-2007) where all treatment units meet the required quality as appropriate for reuse in agricultures and other non-domestic purposes including groundwater recharge.

Among all industrial enterprises surveyed by DOS/MoEnv, less than 50% of these provide totally or partially requested data for the H2020 indicators. The rest might have either data included in the data provided by industrial estates central treatment plants or have no appropriate data.

Figures show the annual average concentrations of most nutrients emissions for all industrial sectors (pharmaceutical industries, petroleum industry, chemical industries, slaughterhouses, textile and food industries) in central industrial estates treatment plants. Food production and chemical industries are found to have the highest percentages of nutrients emissions while the highest percentage of heavy metals emissions are from chemical industries.

References in key assessment text

- Report of the National Water Quality Monitoring Project (NWQMP), MoEnv, 2018



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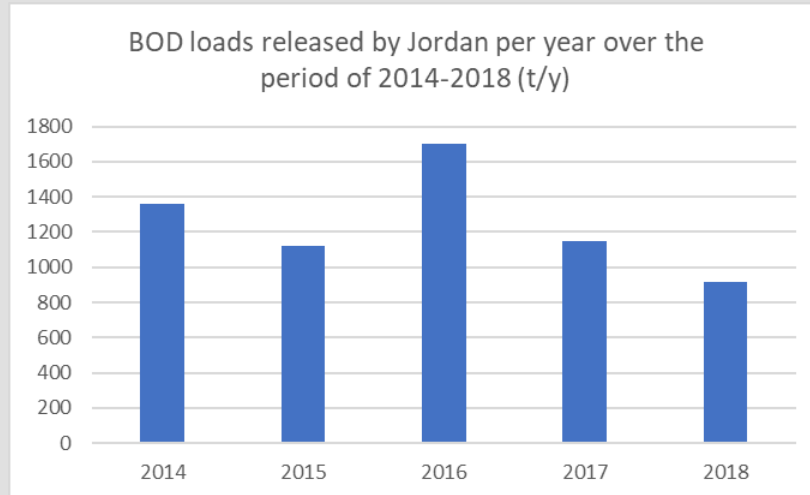


Specific policy questions:

What is the progress made to control the total BOD load discharge from industries in Jordan ?

Specific figure(s)

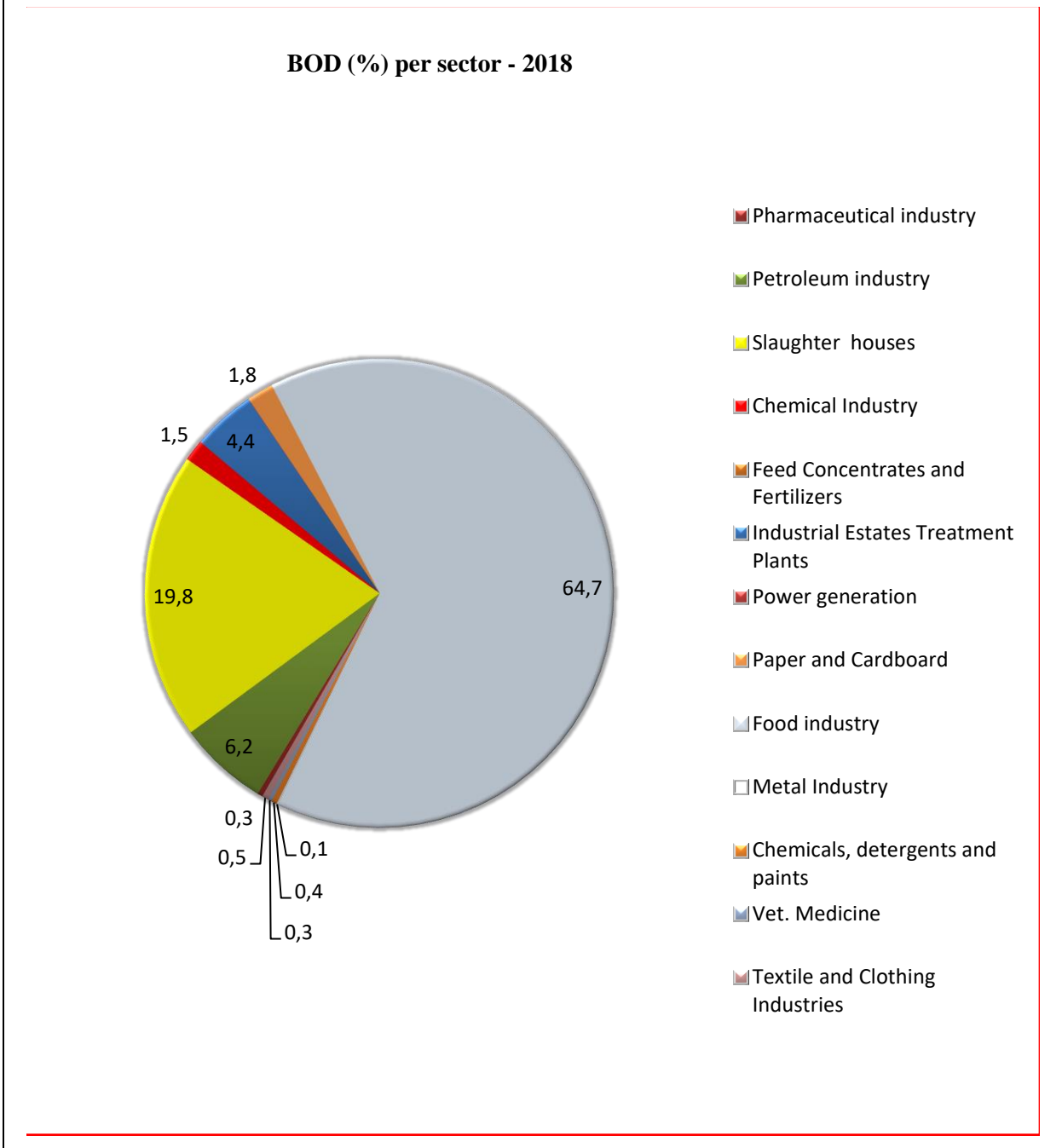
Figure 12: Emissions of BOD per year over the period 2014 – 2018



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Figure 13: Percentage of BOD loads releases from industries per sectors in year 2018



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Specific assessment text

Fig. 12 shows the trend of BOD emissions over the period 2014 – 2018. It reflects the decreasing BOD loads released each year and the availability of data that have been collected during the corresponding period.

BOD quantities based on actual data are covering all industrial sectors except those quantities emitted from olive oil mills.

Fig. 13 shows the percentage of BOD emitted from different sectors in 2018. About 65% of BOD emissions is from food sector and 20% from slaughterhouses. This makes food manufacturing responsible of around 85% of BOD emission due to the level of production to respond to the increasing food product demand of the population.

References in key assessment text

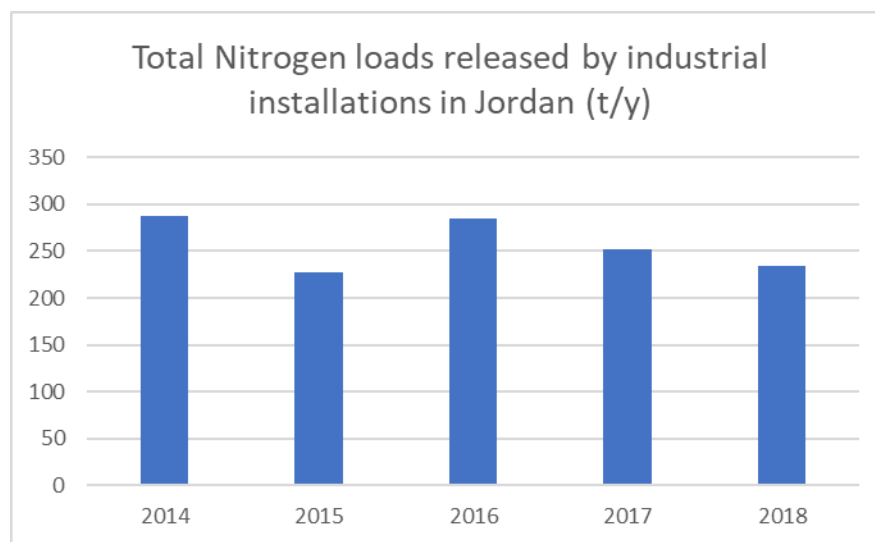
- MoEnv, NWQMP, 2014-2018
- MWI
- JEEC Survey, 2020

Specific policy questions:

What is the progress made to control the total Nitrogen load discharge from industries in Jordan?

Specific figure(s)

Figure 14: Emissions of Total Nitrogen per year over the period 2014 - 2018

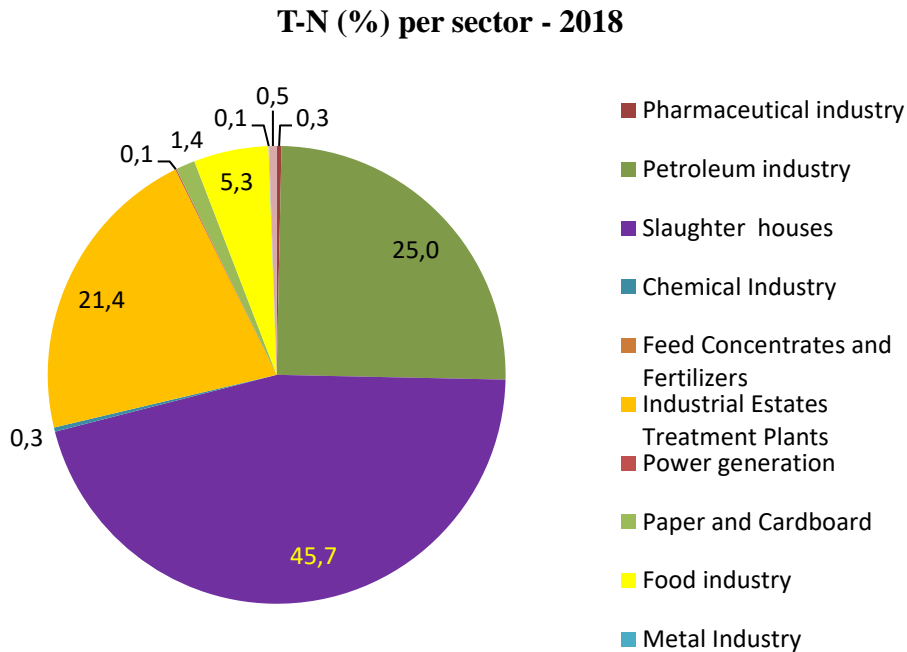


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Specific policy questions:

Figure 15: Percentage of Total Nitrogen emissions from industries per sectors in 2018.



Specific assessment text

Fig. 14 shows the trend of Total Nitrogen emissions over the period 2014 – 2018. There is a slight decrease over time where there is a net decrease during the last three years. This shows also the monitoring conducted and the availability of data from all emissions sources in each year to estimate loads emissions.

Fig. 15 shows the percentage of Total Nitrogen emitted from different sectors in 2018. About 46 %, 25% and 21% of Total Nitrogen emissions are respectively from slaughterhouses, petroleum industry, and industrial estates treatment plants. These three sources represent around 92% of total nitrogen emissions on which future improvement should be focused on.

References in key assessment text

- MoEnv, NWQMP, 2014-2018
- MWI
- JEEC Survey, 2020



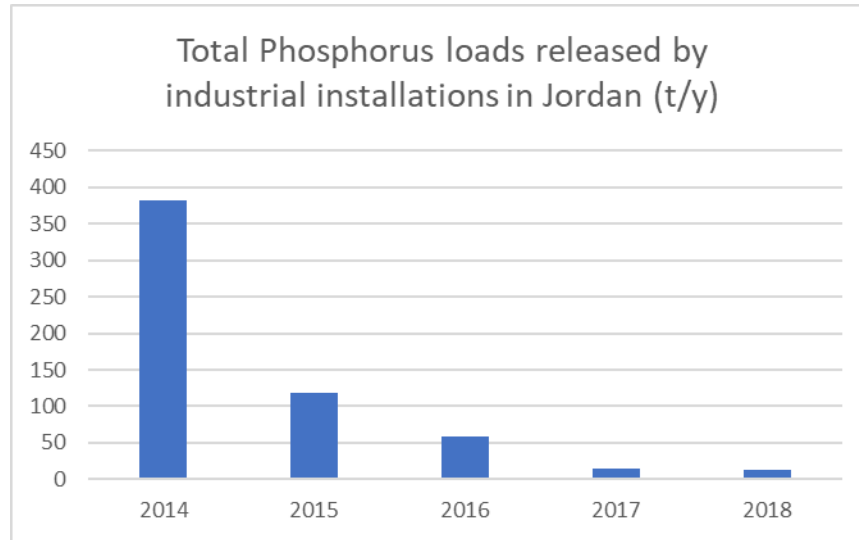
European Environment Agency



What is the progress made to control the total Phosphorus load discharge from industries in Jordan?

Specific figure(s)

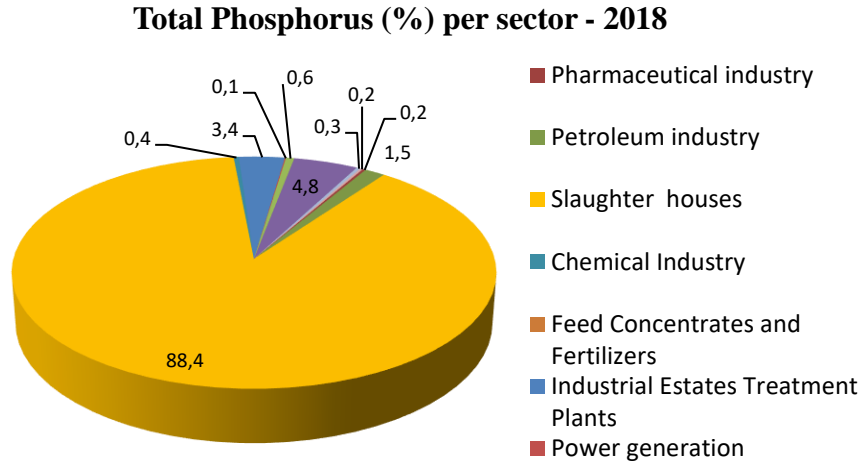
Figure 16: Emissions of Total Phosphorus per year over the period 2014 - 2018



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Figure 17: Percentage of Total Phosphorus emissions from industries per sectors in 2018.



Specific assessment text

In (JS202-2007) Total Phosphorus concentration emission limit value is 30 mg/l for all uses except for discharging to valleys where the limit value is 15 mg/l.

Fig. 16 shows the actual T-P emission trend over the period 2014 – 2018. The high values of T-P in 2014 and 2015 quantities are attributed to the large quantities of wastewater discharged from the slaughterhouses in those two years. There is a high net decrease of total phosphorus loads discharged in Jordan following the treatment installed equipment installed, the investments made and the decrease of industrial activities.

Fig. 17 shows the percentage of T-P emitted from different sectors in 2018. Even the quantity of T-P emissions is low compared with those of years 2014 and 2015, the majority of the emissions (88.4%) are from slaughter houses activities.

References in key assessment text

- MoEnv, NWQMP, 2014-2018
- MWI
- JEEC Survey, 2020



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Methodology for indicator calculation

The methodology to calculate nutrient loads is based on the use of the emission factors and the field measurements which is in line with the methodology followed for indicator calculation as described in the H2020 indicator specification sheets:

<https://eni-seis.eionet.europa.eu/south/areas-of-work/indicators-and-assessment>

Data issues

Data of nutrients concentrations and wastewater flows are coming from all industrial wastewater treatment plants and from industrial plants reporting on their loads.
Data are missing from the industrial installations discharging low pollution into the domestic wastewater plants and those not reporting on their pollutant's loads released.



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| H2020 / NAPs Indicators | |
| Thematic area Industrial emissions | Date : 28/07/2020 Authors: Ali Almashni, Enas Arabyat, Mr Majed Aladwan, Sayyed Saleh, Faraj Altaieb |
| Policy theme 6.2. Release of toxic substances from industrial sectors | |
| Indicators: 6.2.1) Total heavy metals load discharged 6.2.2) Furans and dioxins load discharged 6.2.3) Polycyclic aromatic hydrocarbons (PAH) load discharged 6.2.4) Volatile organic compounds (VOC) load discharged | |

Key policy question: *How are releases of toxic substances from industrial sectors evolving in Jordan?*

Key messages

- Total heavy metals releases from all types of industries in Jordan are declining year after year since year 2014 to meet the national standards and regulations in Jordan.
- Major polluting industries are monitoring their emissions and invested in abatement technologies to reduce air pollutant emissions such as chemical industries and petroleum industries implementing the national policy of the environmental protection.
- The Aqaba is a Special Economic Zone (ASEZ) with an autonomous status for the management and control of the environment where many industrial activities are occurring. Strong coordination is needed with the ministry of Environment is needed to ensure entire coverage of industrial activities emissions estimation.



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Key figures/tables

Figure 18: Percentage of Heavy Metals emissions from industries per sector in year 2018

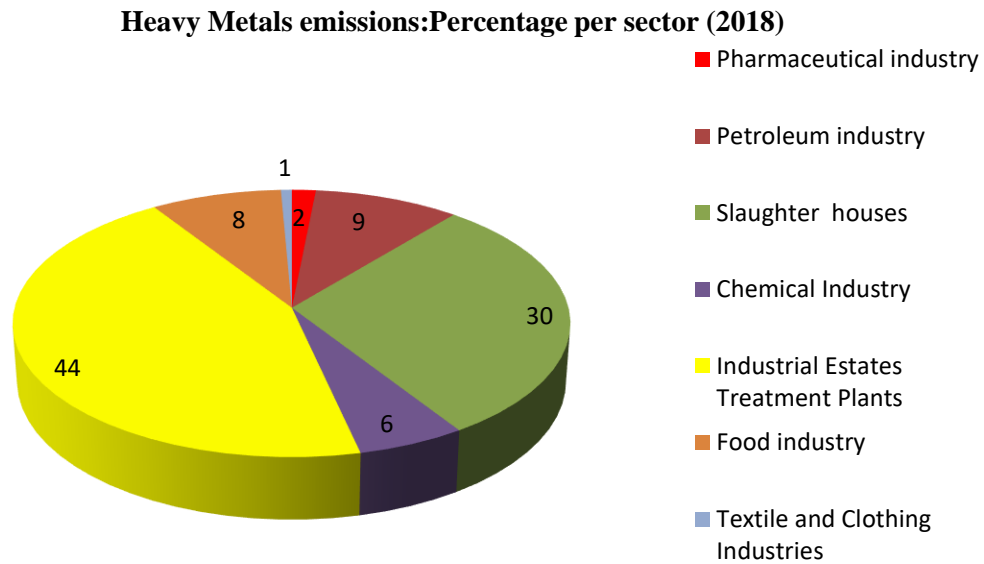
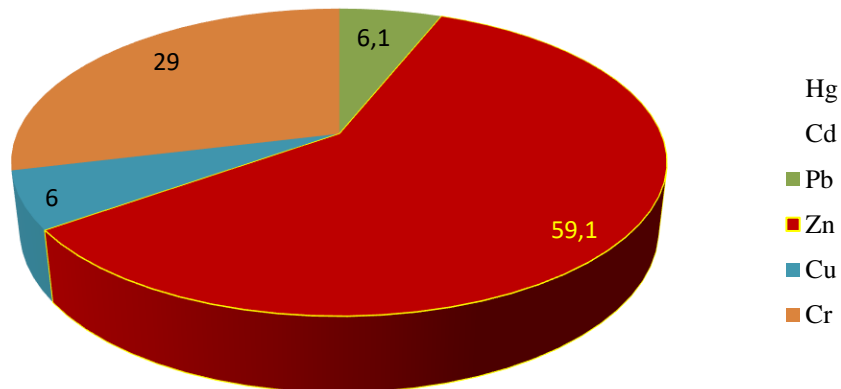


Figure 19: Percentage of Heavy Metal emissions from industries per chemical type in year 2014

Heavy Metal emissions: percentage per chemical (2014)



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Key assessment text

- All emission loads calculation of toxics is based on the heavy metals concentrations measured in wastewater treatment plants and from industrial treatment plants outputs but atmospheric emissions are not included yet. Data measurements of pollutants and activity data for most industrial activities are available but toxics released are not yet estimated.
- All heavy metals and toxics releases are regulated and monitored in Jordan for all industrial activities whereas dioxins are not regulated nor monitored.
- Emission loads of heavy metals are calculated based on the concentration released at industrial sources and at the industrial Estates treatment plants.

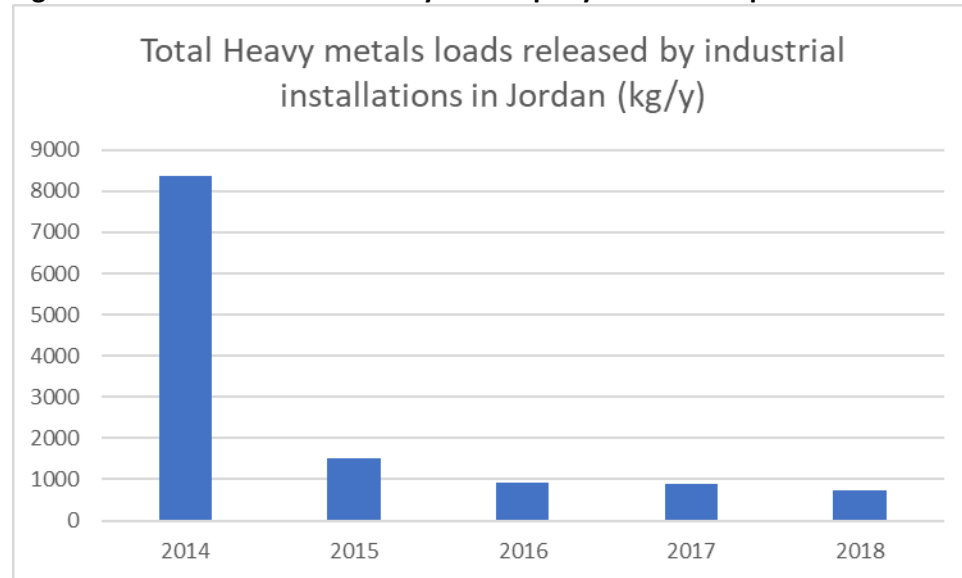
References in key assessment text

- MoEnv, 2020

Specific policy questions: *What is the progress made to control the total heavy metals load discharged from industries in Jordan ?*

Specific figure(s)

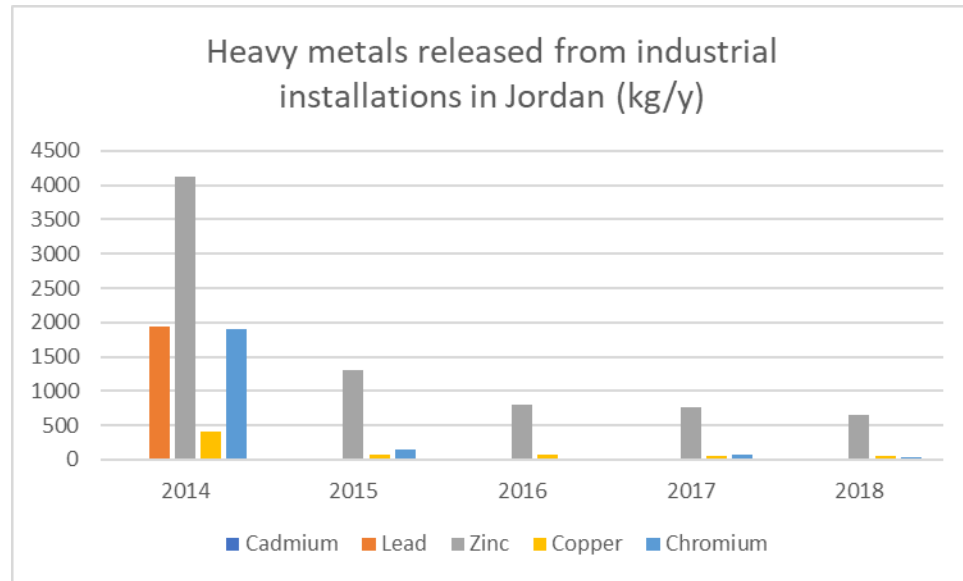
Figure 20: Emissions of total Heavy Metals per year over the period 2014 - 2018



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Fig 21: Emissions of Heavy Metals over the period 2014-2018



Specific assessment text

Fig. 20 shows the total Heavy Metals emissions over the period 2014 – 2018. The high values of Heavy Metals in 2014 quantities is attributed to the large quantities of wastewater discharged from Slaughterhouses in that year. Heavy metals loads decreased drastically from year 2014 to year 2018 where the load is less than 900 t/y.

Fig. 21 shows the trend of five heavy metals loads which are decreasing each year up to year 2018. The largest portion of emissions refers to industrial estates treatment plants. The Zinc and Chromium are the major heavy metals emissions responsible for the total high values, especially in year 2014, the year of the highest heavy metals emissions

Although heavy metals concentrations are based on measurements, very low concentrations of heavy metals such as Mercury and Cadmium are not considered to calculate heavy metals loads as they are below the detection limit of the measurement instruments.

This indicates the need for procurement of measurement devices with high accuracy for low ranges.

References in specific assessment text

- MoEnv, NWQMP, 2014-2018
- JEEC Survey, 2020



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| Specific policy questions: <i>What is the progress made to control the furans and dioxins load discharged from industries in Jordan ?</i> |
| Specific figure(s) |
| There is no time series measurements or calculations of furans and dioxins loads in Jordan. |
| Specific assessment text |
| <p>The only one calculation made of PCDD/ PCDF emission is that for cement plants using a default emission factor and the total production for one year. There is no measurement nor regular calculation of such furans and dioxins loads to the atmosphere in Jordan for all industrial sector due to lack of specific emission factor which applies to the existing industrial processes (such as for petroleum refinery) besides lack of activity data per each process.</p> <p>The quantity of PCDD/ PCDF released from cement production sector is estimated to 0.047 g/year. There is no estimation for PAH and VOC emissions since activity data and representative emission factors needed for such calculation are not available in Jordan.</p> |
| References in specific assessment text |
| - MoEnv, 2020 |

Methodology for indicator calculation

The methodology to calculate heavy metals loads is based on the use of the emission factors and the field measurements which is in line with the methodology followed for indicator calculation as described in the H2020 indicator specification sheets:

<https://eni-seis.eionet.europa.eu/south/areas-of-work/indicators-and-assessment>

Furans and dioxins loads released from the cement sector is estimated using the default emission factor and the total activity data (cement production) in line with H2020 indicator specification sheet.

Data issues

Institutional arrangements and capacity building are foreseen to collect activity data and information to estimate and therefore monitor all toxics released in the atmosphere and wastewater from all industrial activities in Jordan and to ensure total national coverage.

Data used (heavy metals concentration, wastewater flow rates and duration) are coming from Estate industrial wastewater treatment plants and from industrial installations to calculate heavy metal loads released. These data do not cover the total existing industries in Jordan.

Data to calculate heavy metals emitted by industrial installations to the atmosphere are not available and loads are not estimated.

Activity data from industries are not available to estimate PAH, VOC, Furans and Dioxins emissions to the atmosphere. There is only a single estimation of furans and dioxins from the cement sector for one year.



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Indicator Assessment

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| H2020 / NAPs Indicators | |
| Thematic area Industrial emissions | Date : 28/07/2020 Authors: Ali Almashni, Enas Arabyat, Mr Majed Aladwan, Sayyed Saleh, Faraj Altaleb |
| Policy theme IND 6.3. Industrial hazardous waste disposed in environmentally sound manner | |
| Indicators: 6.3.1) Total quantity of generated hazardous waste 6.3.2) Quantity of industrial hazardous waste disposed | |

Key policy question: *What is the trend of hazardous waste generation by industries in Jordan ?*

Key messages

- The total hazardous waste quantity generated in Jordan is increasing each year since year 2014 and reached more than 7000 cubic meter in 2018.
- The quantity stockpiled in the one designated site in Jordan for handling hazardous waste located in Swaqa where all hazardous wastes stockpiled are increasing in the past three years.
- There is a specific law covering hazardous industrial waste management in Jordan as some progress has been made with the new regulation related to the management and handling of hazardous waste adopted in year 2019.
- The MoEnv is reinforcing the legislation to improve the management of hazardous and medical wastes; and developing national programmes to implement the international conventions relate to hazardous and medical wastes.
- The government enhances industries to reduce, sort and report on their hazardous wastes.

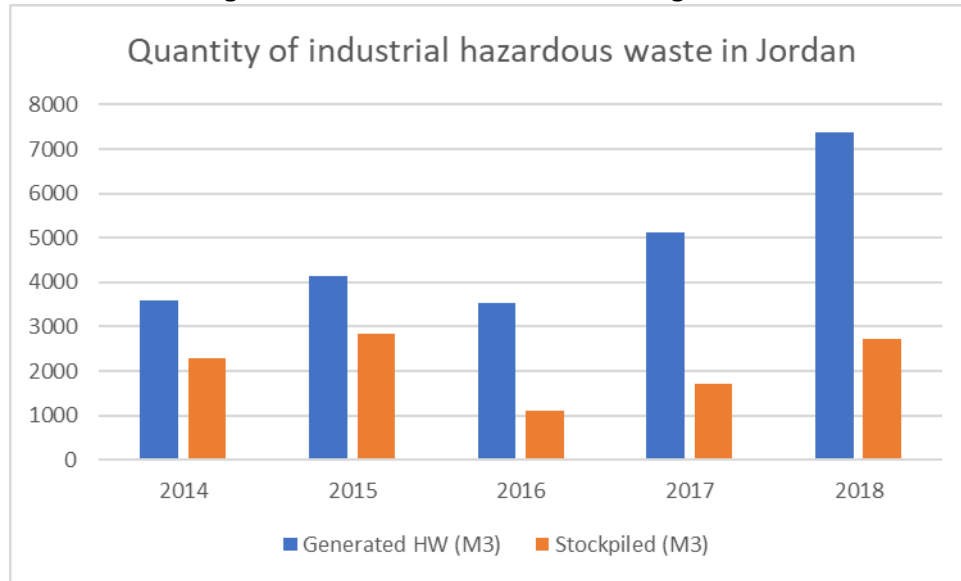


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Key figures/tables

Figure 22 : Industrial hazardous waste generated in Jordan



Key assessment text

The ministry of Environment governs hazardous waste through current laws such as the environment protection Law No 6/2017, where in its Directives addresses management, transportation and handling of harmful and hazardous substances and hazardous wastes management instructions. The recent regulation of MoEnv "Instructions for management and handling of hazardous wastes for the year 2019" stipulates that the hazardous waste producer should identify the quality and quantity of the waste. The instructions establish the responsibilities and activities of reduction, sorting, packaging, labeling, recording, storage, transporting, delivery, treatment of all hazardous wastes.

The ministry of Environment undertakes many actions to implement hazardous waste management, recycling and treatment plans, besides the enforcement of documentation and information system on hazardous solid waste.

The management of hazardous waste is mainly performed by the MoEnv who is operating the hazardous waste treatment site and is in the process of upgrading the site to be hazardous waste treatment facility. The unique existing site is that of Swaqa which receives different types of hazardous wastes, industrial, medical, electronic wastes, used oil, used batteries, etc.

References in key assessment text

- MoEnv, Waste and Hazardous Substances Directorate.2019



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Methodology for indicator calculation

The methodology used based on the summation of all the amounts of generated hazardous waste from individual industrial installations cubic meter per year not in metric tons per year.

Data issues

Many industries are not reporting, except big companies, on hazardous waste generated leading to an underestimation of waste generated from all industries at the national level.



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Indicator Assessment

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| H2020 / NAPs Indicators | |
| Thematic area Industrial Emissions | Date : 28/07/2020 Authors: Ali Almashni, Enas Arabyat, Mr Majed Aladwan, Sayyed Saleh, Faraj Altaleb |
| Policy theme 6.4 Compliance measures aiming at the reduction and/or elimination of pollutants generated by industrial sectors | |
| Indicators: 6.4.1) Number of industrial installations reporting periodically loads of pollutants discharged to the marine and coastal environments relative to the total number of industrial installations. 6.4.2) Number of environmental inspections carried out by enforcement authorities in which industrial installations were found to be in breach of laws and regulations relative to the total number of executed inspections. 6.4.3) Number of eliminated hotspots identified in the updated NAPs relative to the 2001 and 2015 baselines | |

Key policy question: *How is enforcement of regulations and standards ensured for industrial pollution releases in Jordan ?*

Key messages

- The Ministry of Environment conducts environmental inspections on a periodic but selective basis to a limited number of major industries yearly. The environmental departments at the governorate level are also conducting in parallel control and inspections of industries regularly.
- Reporting of pollutant discharges by industries is mandatory in Jordan but the regulation are not fully implemented and reporting is subject to Environmental Impact Assessment (EIA) and remains on request from governmental bodies which limits the coverage and times series consistency of data collection.
- Reporting from industries is quite constant while the number of industries required to report is increasing which reveals the need to strengthen the departments in charge of environmental inspections for better control of pollution releases.
- The number of inspections is slightly decreasing while the number of regulation breaches is rapidly decreasing due to the decrease of pollution releases from industries which are improving WW treatment and abatement of pollution.
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Key figures/tables

Figure 23: Reporting from industrial sector in Jordan

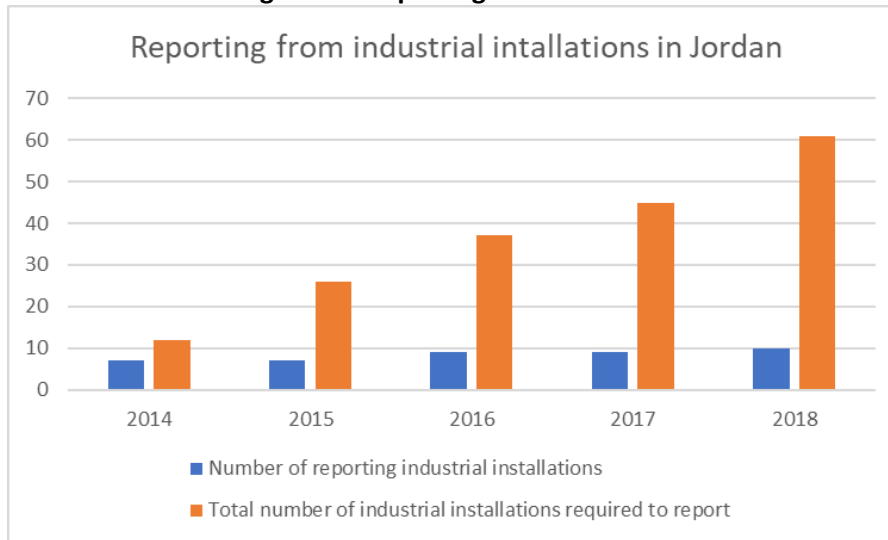
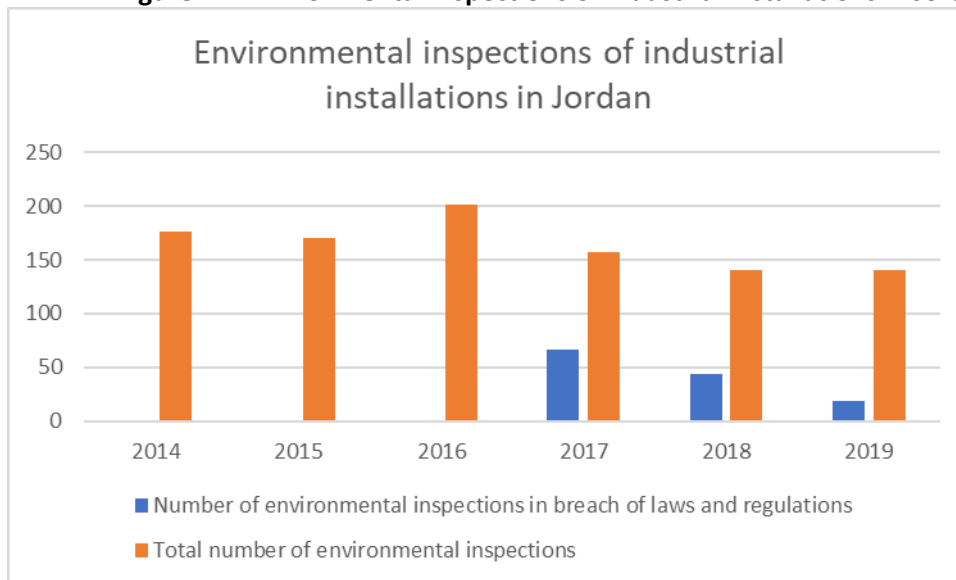


Figure 24: Environmental inspections of industrial installations in Jordan



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Key assessment text

- The total industrial installations required to report is increasing yearly but the number of reporting industries is relatively constant as reporting is not mandatory and made on request by the ministry of environment.
- There are many other institutions involved in data collection of pollutants discharged to environment such as MWI, WAJ, MOH, DOS, Chamber of Industry and others but there is no regulated procedure for QA-QC and data checks. Data are shared among different institutions and agencies but need to be enhanced by regulated procedures within a national system for better data compilation among all authorities.
- According to Ministry of Industry and Trade (MIT) and other industry related institutions more than 30,000 industries, where most of them are small industrial facilities, with different size are currently operating in the country. The attempt has been made to survey about 200 industries where less than 70 industries including main industries have periodic records on their loads of pollutants.
- Out of thousands of industries located within the Industrial Estate boundaries, almost all of them are discharging their pollutants loads to the central treatment plants belonging to the Industrial Estates. However, they are not reporting on their discharges on a regular basis but some keep records of it.
- The Inspection Department of the ministry of environment is carrying out different types of inspection including periodic, selective and complains response inspections according to the legal text "Regulation of Environmental Inspection and Control, No 65 / 2009".
- Fig. 24 shows the number of inspection and the cases of law and regulation breaching. Breaching results could be warning, closure, or send to court. The number of inspections reported is mainly carried out by MoEnv and does not include the inspections conducted by the governates environmental departments. Therefore, the results do not give the trend of the total number of inspections and breach of laws by industries conducted annually for all the country.

References in key assessment text

- MoEnv, NWQMP, 2014 – 2018
- MIT
- JEECC Survey, 2020
- MoEnv. Inspection and Environmental Control Directorate, 2020



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Methodology for indicator calculation

The total number as recorded by the Ministry of Environment, department of inspections.

Data issues

There are many different institutions collecting separately pollutant loads discharged by industries which are not compiled in one data base due to lack of infrastructure needed to data exchange among all institutions.

These reports contain reliable data and information collected on site but do not replace regular reporting from industries on a regular basis with consistent activity data and pollutant releases to water, air and waste.

There are many difficulties faced by Ministry of Environment to collect pollutants releases and hazardous waste data from industries such as:

- limited coverage of industrial installations reporting discharges and emissions released.
- Reluctance of industries to report actual amounts of generated industrial waste and information on stockpiles of chemicals and wastes maintained on- or off-site.
- Lack of regular updating of data in national inventories.

Hotspots are monitored on a regular and continuous basis but there are data gaps in time series.



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