EUROPEAN COMMISSION
DG Joint Research Centre
Directorate B – Growth and Innovation
Circular Economy and Industrial Leadership
European IPPC Bureau

REVIEW OF THE BEST AVAILABLE TECHNIQUES (BAT)

REFERENCE DOCUMENT FOR

THE SLAUGHTERHOUSES AND ANIMAL BY-PRODUCTS AND

EDIBLE CO-PRODUCTS INDUSTRIES (SA BREF)

EIPPCB remarks on SA data assessment accompanying Draft 1

(June 2021)

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1 INTRODUCTION

This document contains EIPPCB remarks on the data assessment for the SA BREF review. These remarks are intended to support TWG members to understand how the draft BAT-AE(P)Ls have been proposed in Draft 1 (D1) of the SA BREF review (June 2021).

For each of the proposed BAT-AE(P)Ls proposed in D1, this document indicates how to select data in Qlik, i.e. the sheet and the filters applied to select the data deemed relevant for the proposed BAT-AE(P)L.

For each of the proposed BAT-AE(P)Ls, all the graphs and tables contained in relevant Qlik sheets have been assessed. Data from other Qlik sheets than those indicated in this document have also been assessed when necessary.

The Qlik Sense application is accessible to all TWG members, after registration with the SA BREF Team, via the following link:

https://datam.jrc.ec.europa.eu/datam/mashup/SA_BREF_TWG

The data from graphs and tables can be downloaded from Qlik to an Excel file by clicking on the button 'Donwload data' located at their upper right corner  . The Excel file only contains the data currently shown on the graph/table when the download starts.

2 BAT-AEPLS FOR TOTAL SPECIFIC NET ENERGY CONSUMPTION

2.1 Slaughterhouses

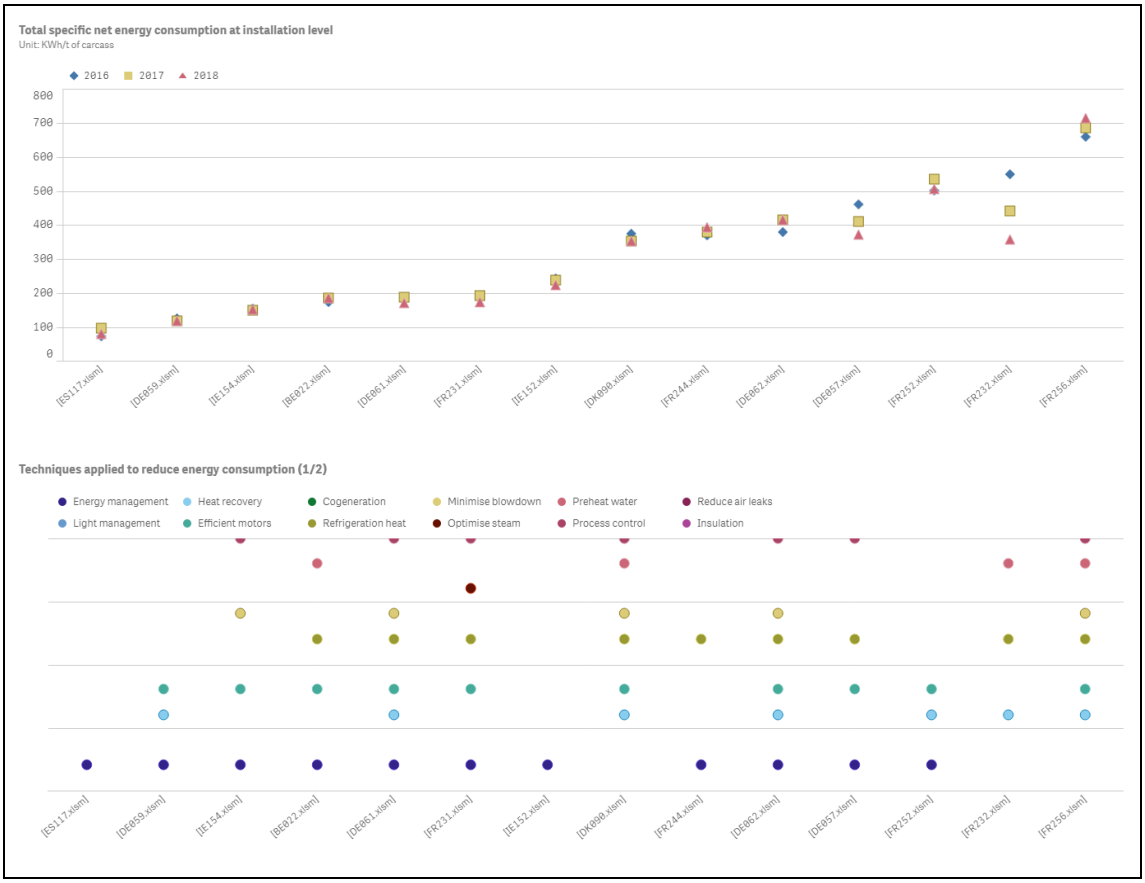
BAT-AEPLs are proposed for animal species for which a sufficient amount of data is available.

2.1.1 Cattle (including calves)

Data selection
Qlik sheet: Energy consumption of SLAUGHTERHOUSES at installation level
Filters applied:

1. Filter pane for Types of animal: Cattle (including calves)
2. Filter pane for Slaughtered animals_Proportion of the total number of animals_Large animals:
    a. Sort the installations by column 'Cattle 2016 (%)'
    b. Column 'Plant': select installations with %>99

In Figure 2.1 and Figure 2.2 are presented data for reported specific energy consumption in cattle slaugherhouses, as well as the applied related techniques.



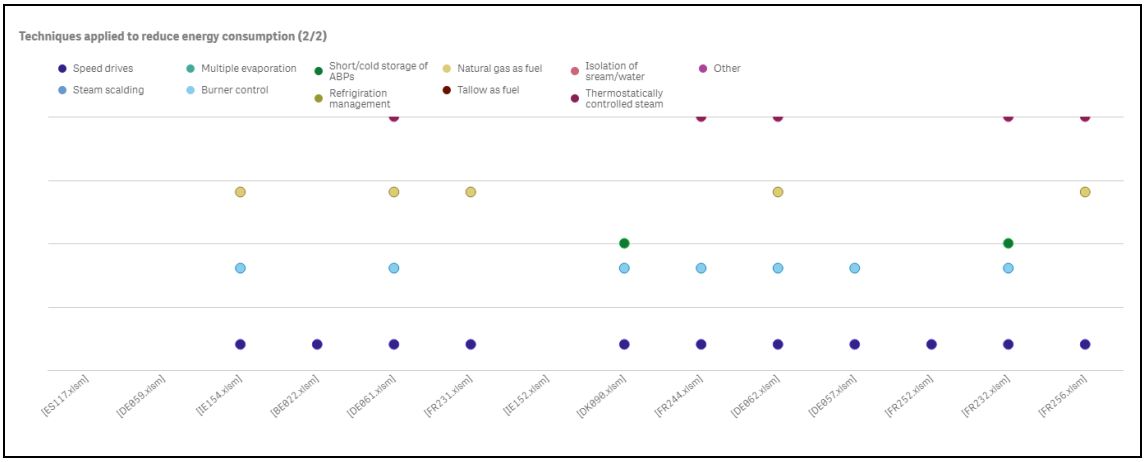


Figure 2.1*:* **Total energy consumption in cattle slaughterhouses and related techniques (kWh/t of carcass)**

Figure 2.2*:* **Total energy consumption in cattle slaughterhouses and related techniques (kWh/animal)**

2.1.2 Pigs

Data selection
Qlik sheet: Energy consumption of SLAUGHTERHOUSES at installation level
Filters applied:

3. Filter pane for Types of animal: Pigs
4. Filter pane for Slaughtered animals_Proportion of the total number of animals_Large animals:
    a. Sort the installations by column 'Pigs 2016 (%)'
    b. Column 'Plant': select installations with 100%

In Figure 2.3 and Figure 2.4Figure 2.2 are presented data for reported specific energy consumption in pig slaugherhouses, as well as the applied related techniques.

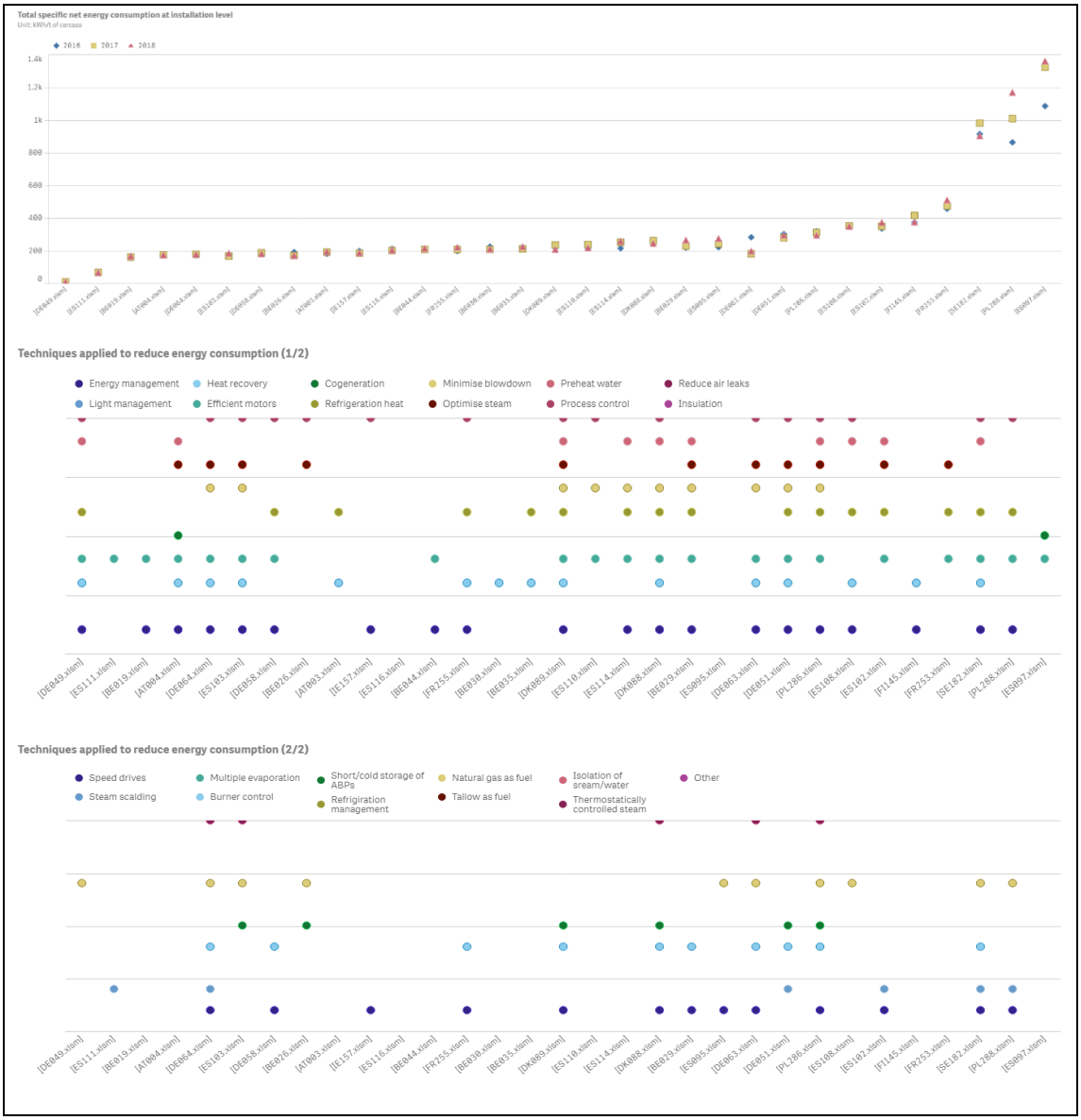


Figure 2.3: Total energy consumption in pig slaughterhouses and related techniques (kWh/t of carcass)

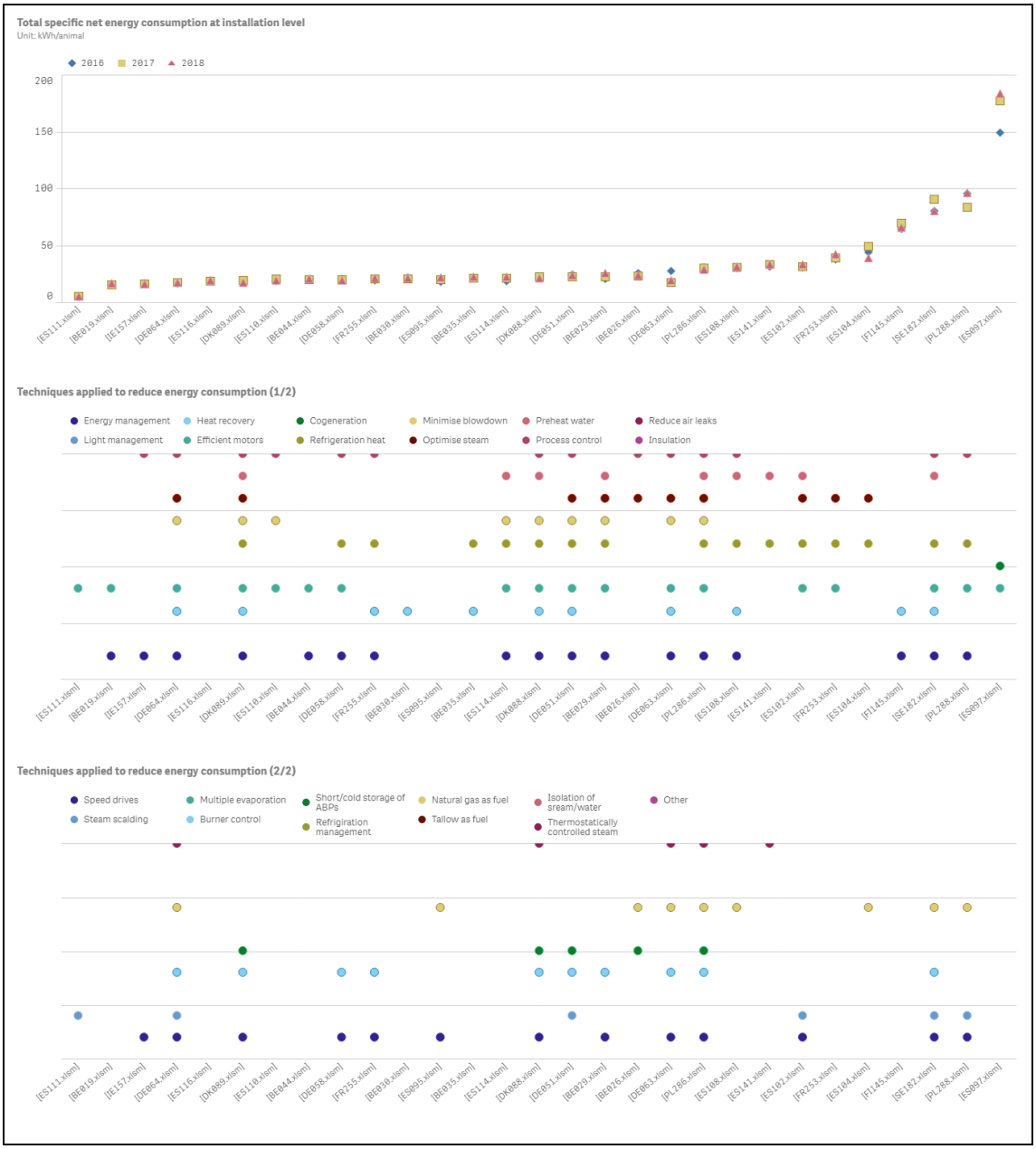


Figure 2.4*:* Total energy consumption in pig slaughterhouses and related techniques (kWh/animal)

2.1.3 Chickens

Data selection

Qlik sheet: Energy consumption of SLAUGHTERHOUSES at installation level

Filters applied:

4. Filter pane for Types of animal: chickens
5. Filter pane for Slaughtered animals_Proportion of the total number of animals_Poultry species:
    a. Sort the installations by column 'Chickens 2017 (%)'
    b. Column 'Plant': select installations with >98%

In Figure 2.5 and Figure 2.6 are presented data for reported specific energy consumption in chicken slaugherhouses, as well as the applied related techniques.

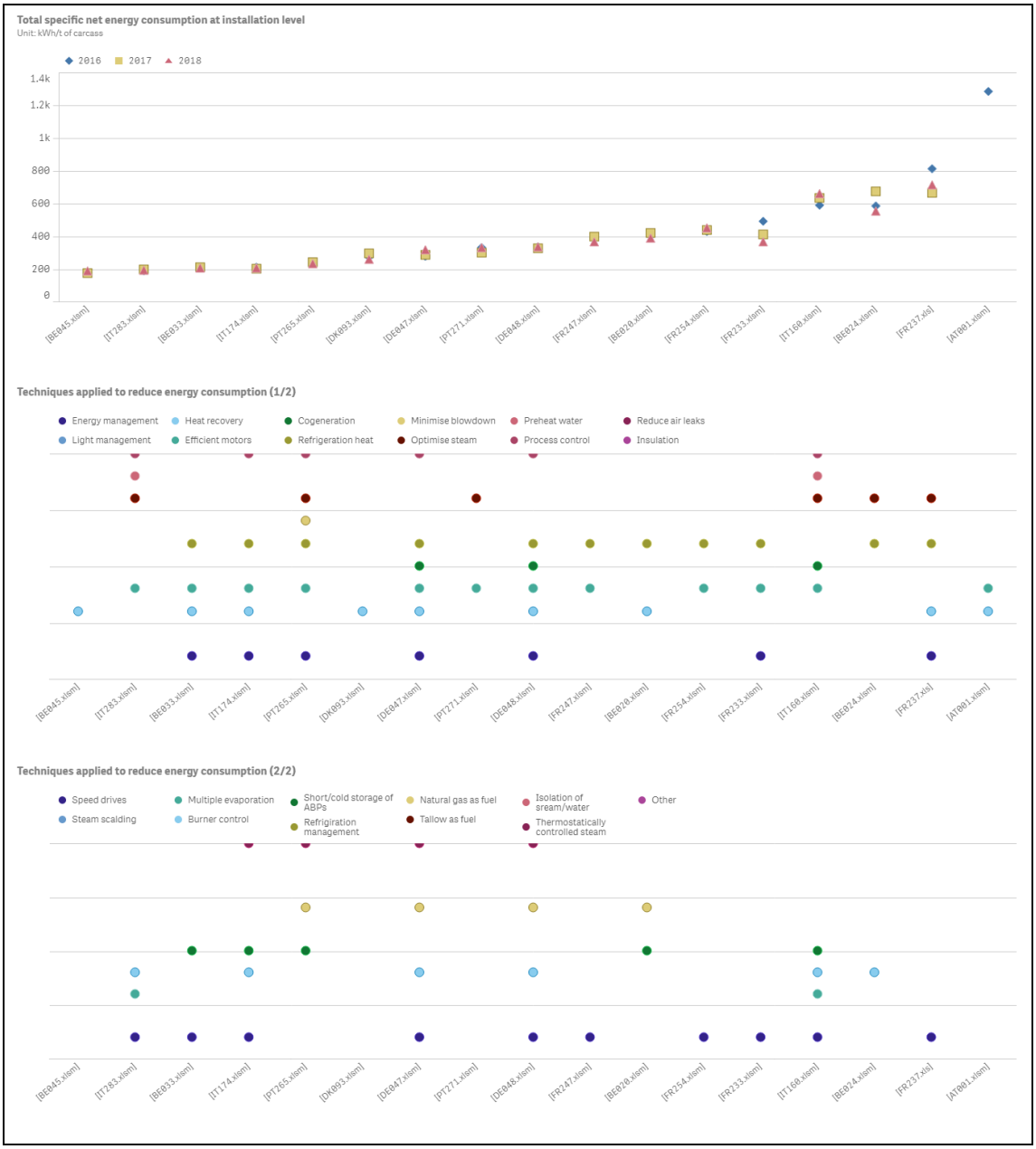
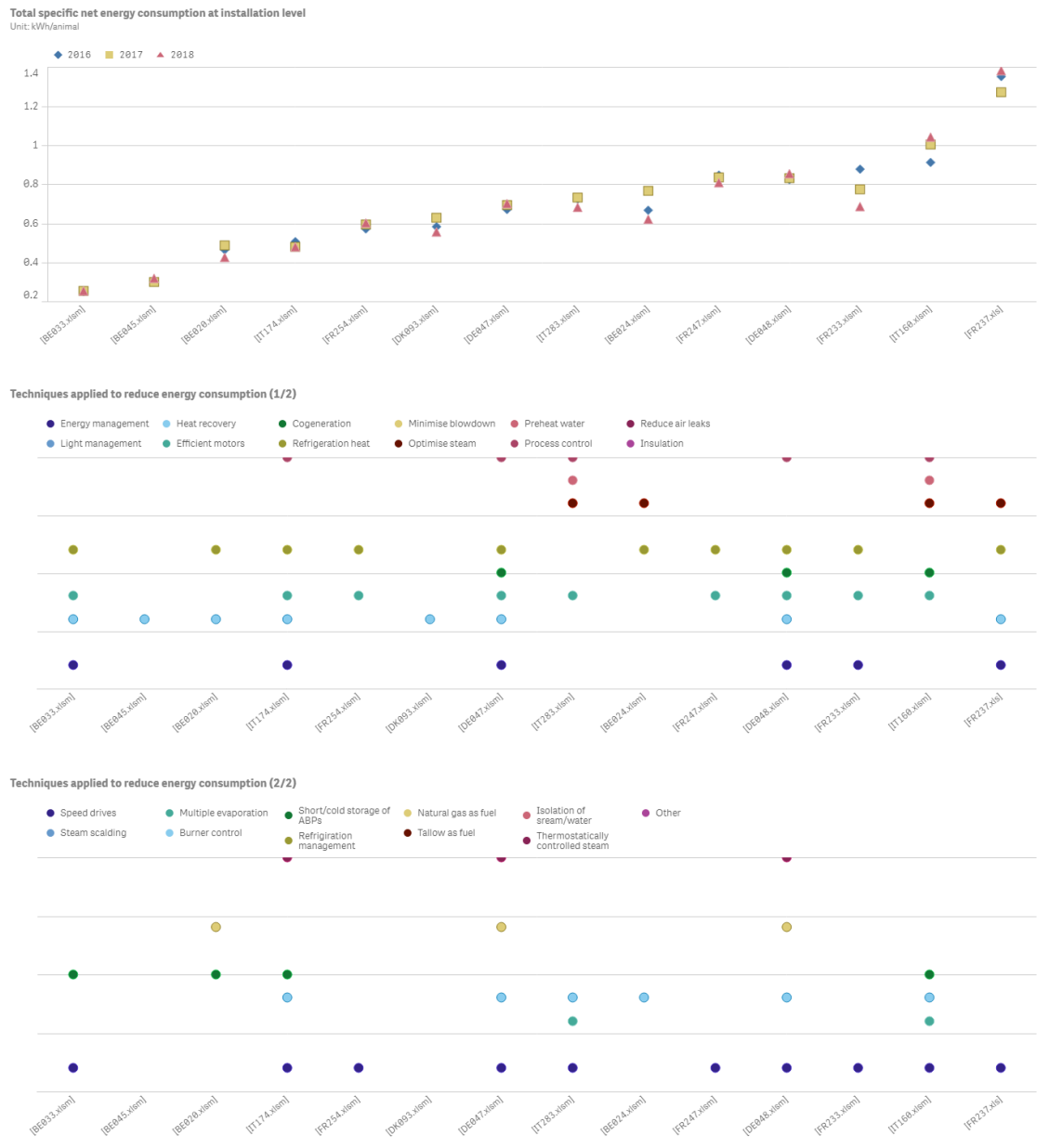


Figure 2.5: Total energy consumption in chicken slaughterhouses and related techniques (kWh/t of carcass)



NB: For a better visualisation the values of installation PT265 are not shown in the graph.

Figure 2.6*:* Total energy consumption in chicken slaughterhouses and related techniques (kWh/animal)

2.2 Installations processing animal by-products and/or edible co-products

BAT-AEPLs are proposed for the following three categories: rendering, fat melting, blood and/or feather processing; fishmeal and fish oil production; gelatine manufacturing.

2.2.1 Rendering, fat melting, blood and/or feather processing

BAT-AEPLs are proposed for two sub-categories: dry rendering and wet rendering.

2.2.1.1 Dry rendering

Data selection
Qlik sheet: Energy, electricity and heat consumption of NON-SLAUGHTER SA INSTALLATIONS at installation level

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins
2. Filter pane for Dry/wet process:
   - Dry rendering, , , , , , , , ,
   - Dry rendering, , Dry rendering, , , , , , ,
   - Dry rendering, Dry rendering, , , , , , , ,
   - Dry rendering, Dry rendering, Dry rendering, , , , , , ,
   - Dry rendering, Dry rendering, Dry rendering, Dry rendering, , , , , ,
   - Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering, , , , ,
   - Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering, Dry rendering,

In Figure 2.7 are presented data for reported specific energy consumption (kWh/t of raw material) for wet rendering, as well as the applied related techniques.

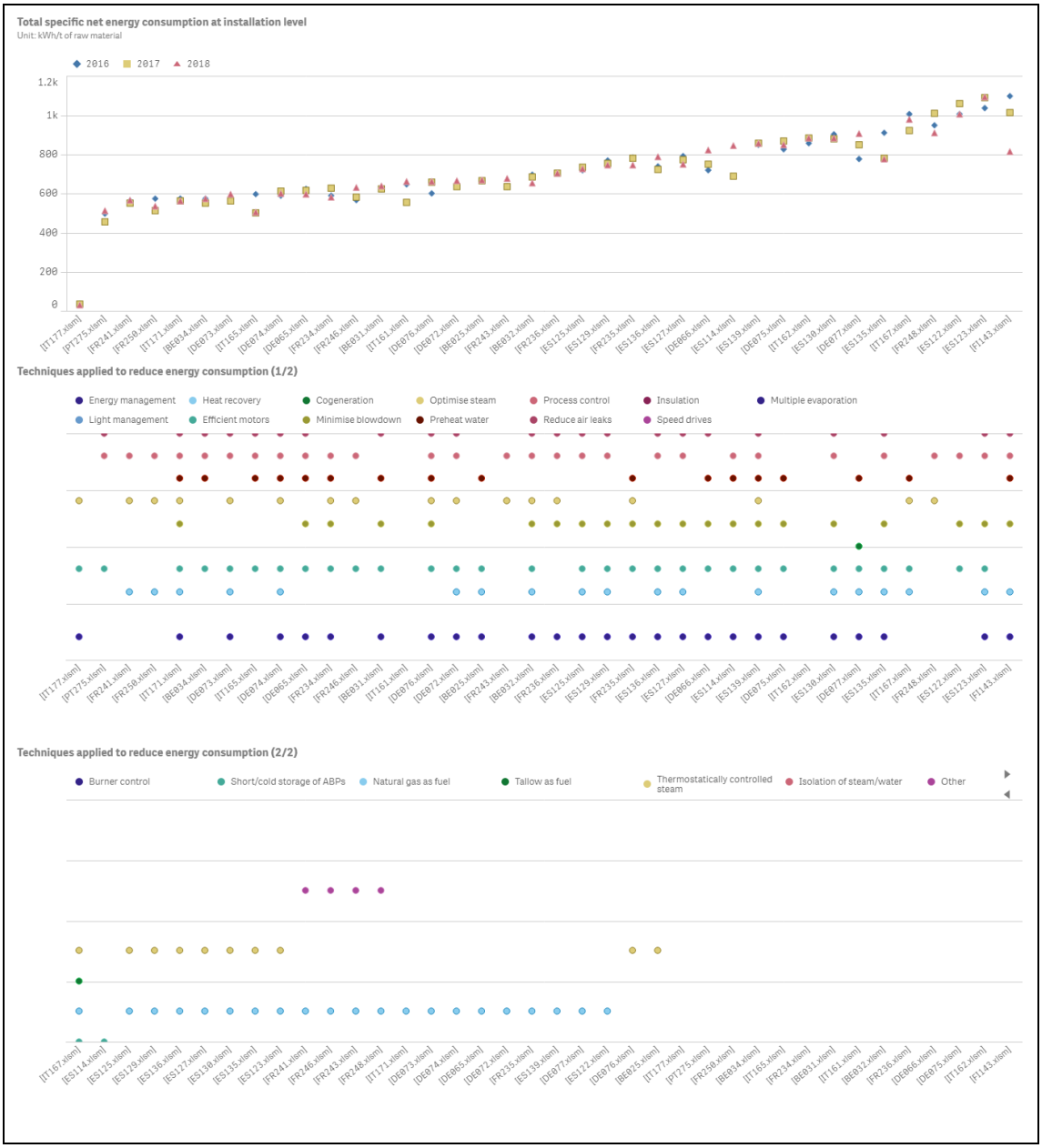


Figure 2.7: Total energy consumption for dry rendering and related techniques (kWh/t of raw material)

2.2.1.2 Wet rendering

Data selection

Qlik sheet: Energy, electricity and heat consumption of NON-SLAUGHTER SA INSTALLATIONS at installation level

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins
2. Filter pane for Dry/wet process:
   - Wet rendering, , , , , , , , ,
   - Wet rendering, Wet rendering, , , , , , , ,
   - Wet rendering, Wet rendering, Wet rendering, , , , , , ,
   - Wet rendering, Wet rendering, Wet rendering, Wet rendering, Wet rendering, , ,

In Figure 2.8 are presented data for reported energy consumption for wet rendering, as well as the applied related techniques.

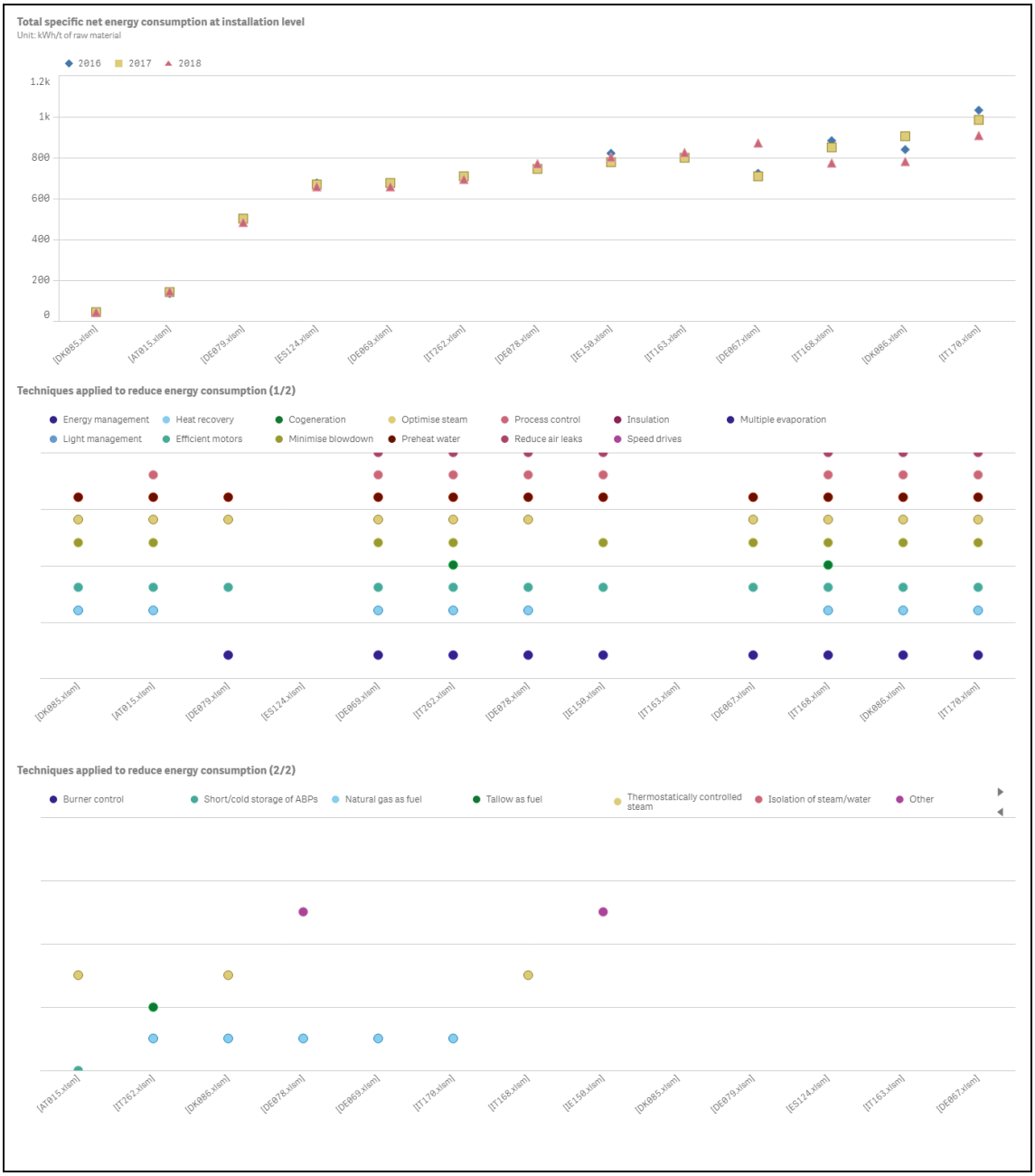


Figure 2.8*:* **Total energy consumption for wet rendering and related techniques (kWh/t of raw material)**

2.2.2 Fishmeal and fish oil production

Data selection

Qlik sheet: Energy, electricity and heat consumption of NON-SLAUGHTER SA INSTALLATIONS at installation level

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Fishmeal and fish oil production

In Figure 2.9 are presented data for reported specific energy consumption (kWh/t of raw material) in fishmean and fish oil installations, as well as the applied related techniques.

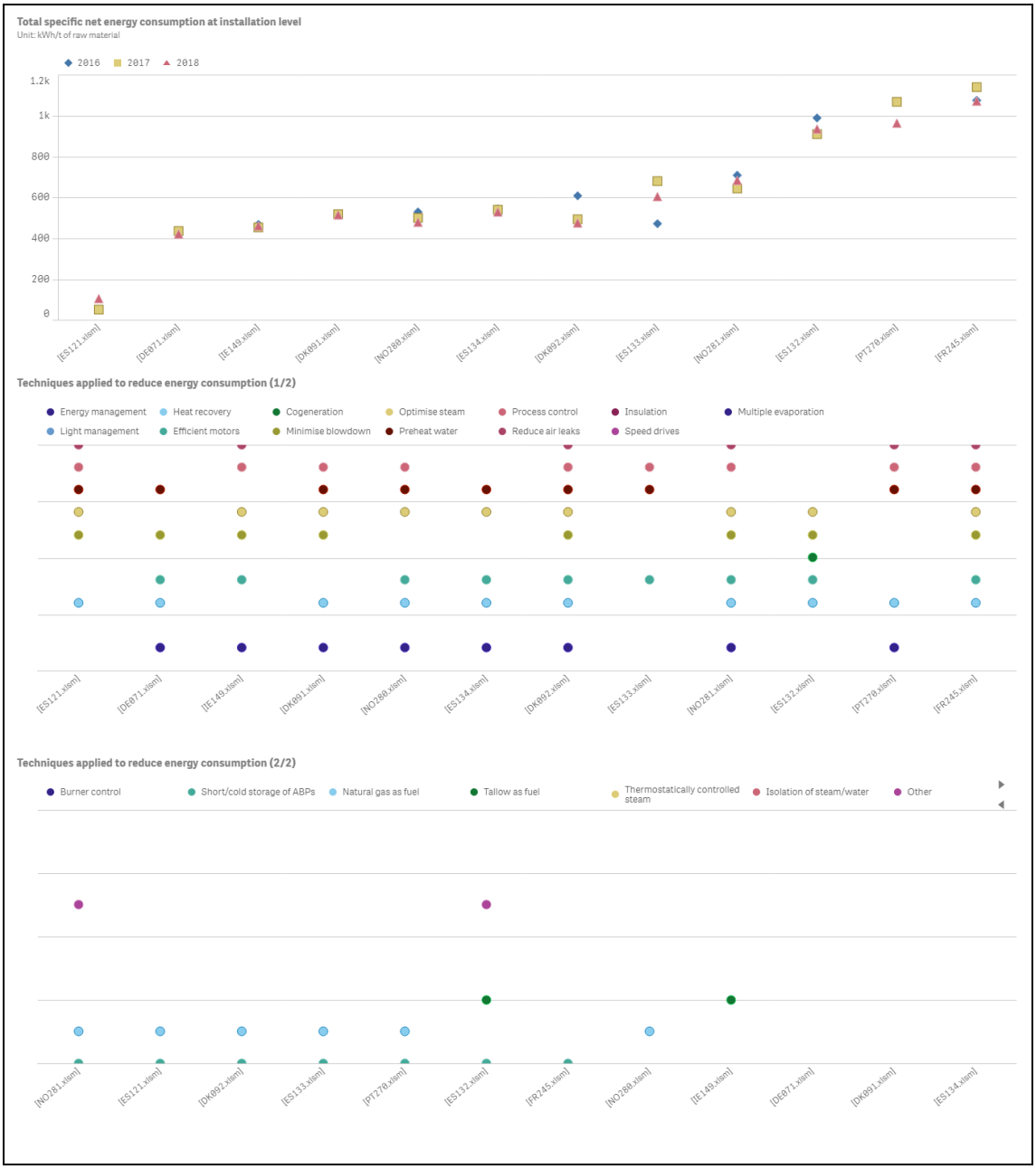


Figure 2.9*:* **Total energy consumption in fishmeal and fish oil installations and related techniques (kWh/t of raw material)**

2.2.3 Gelatine manufacturing

Data selection

Qlik sheet: Energy, electricity and heat consumption of NON-SLAUGHTER SA INSTALLATIONS at installation level

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Gelatine manufacturing

In Figure 2.10 are presented data for reported specific energy consumption (kWh/t of raw material) in gelatine manufacturing, as well as the applied related techniques.

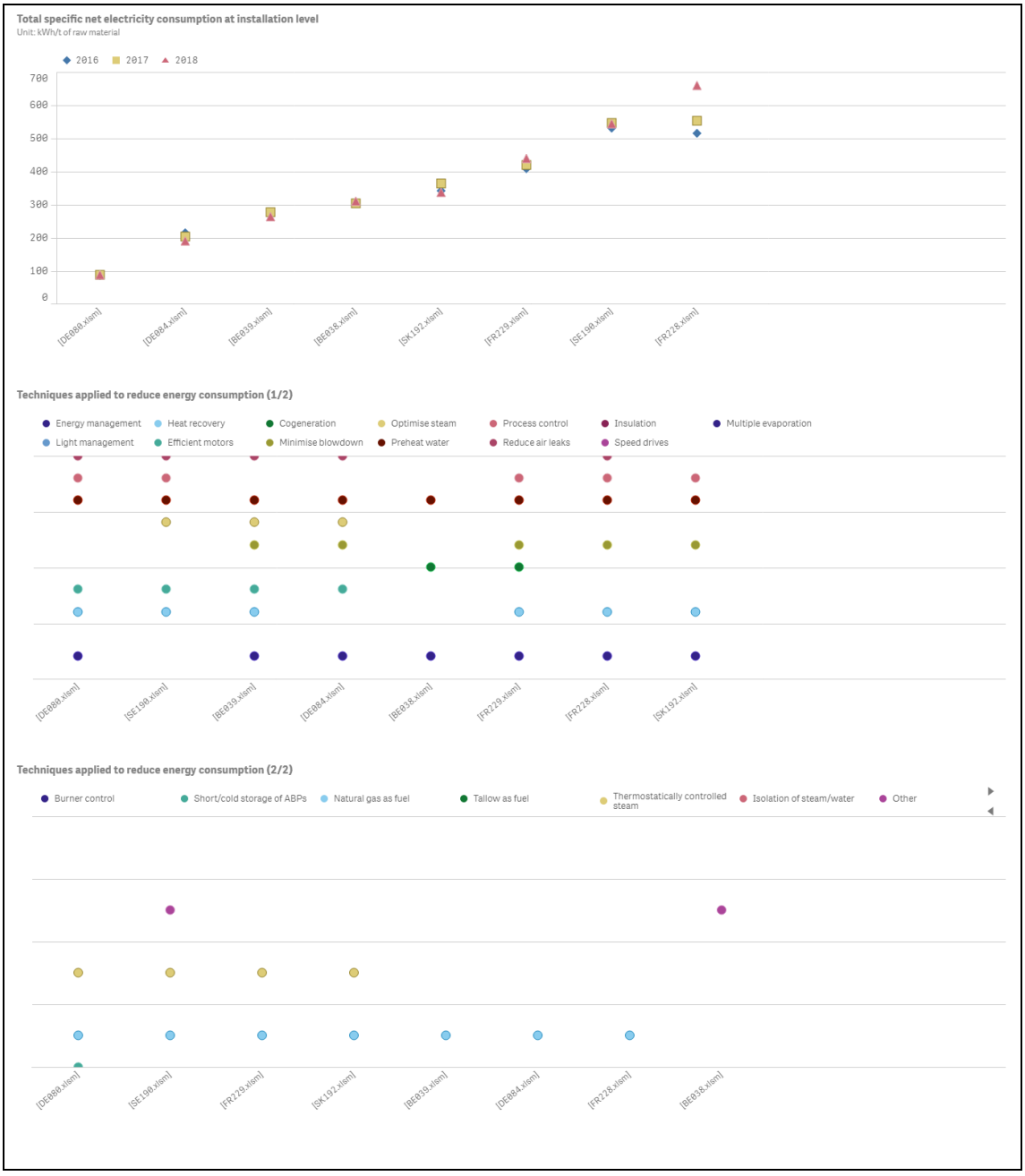


Figure 2.10: Total energy consumption in gelatine manufacturing and related techniques (kWh/t of raw material)

3 BAT-AEPLS FOR WASTE WATER DISCHARGE

BAT-AEPLs are proposed for waste water discharge. This category was considered more reliable than water consumption, due to less uncertainty in the data assessment (related to monitoring of recycled water, calculation of water consumption, etc.).

3.1 Slaughterhouses

BAT-AEPLs are proposed for animal species for which a sufficient amount of data is available.

3.1.1 Cattle

Data selection
Qlik sheet: Water consumption at installation level and waste water discharge of SLAUGHTERHOUSES

Filters applied:

1. Filter pane for Types of animal: Cattle (including calves)
2. Filter pane for Slaughtered animals_Proportion of the total number of animals_Large animals:
    a. Sort the installations by column 'Cattle 2016 (%)'
    b. Column 'Plant': select installations with %>99

In Figure 3.1 and Figure 3.2 are presented data for reported specific waste water discharge from cattle slaughterhouses (for all types of discharge), as well as the applied techniques for reducing water consumption.

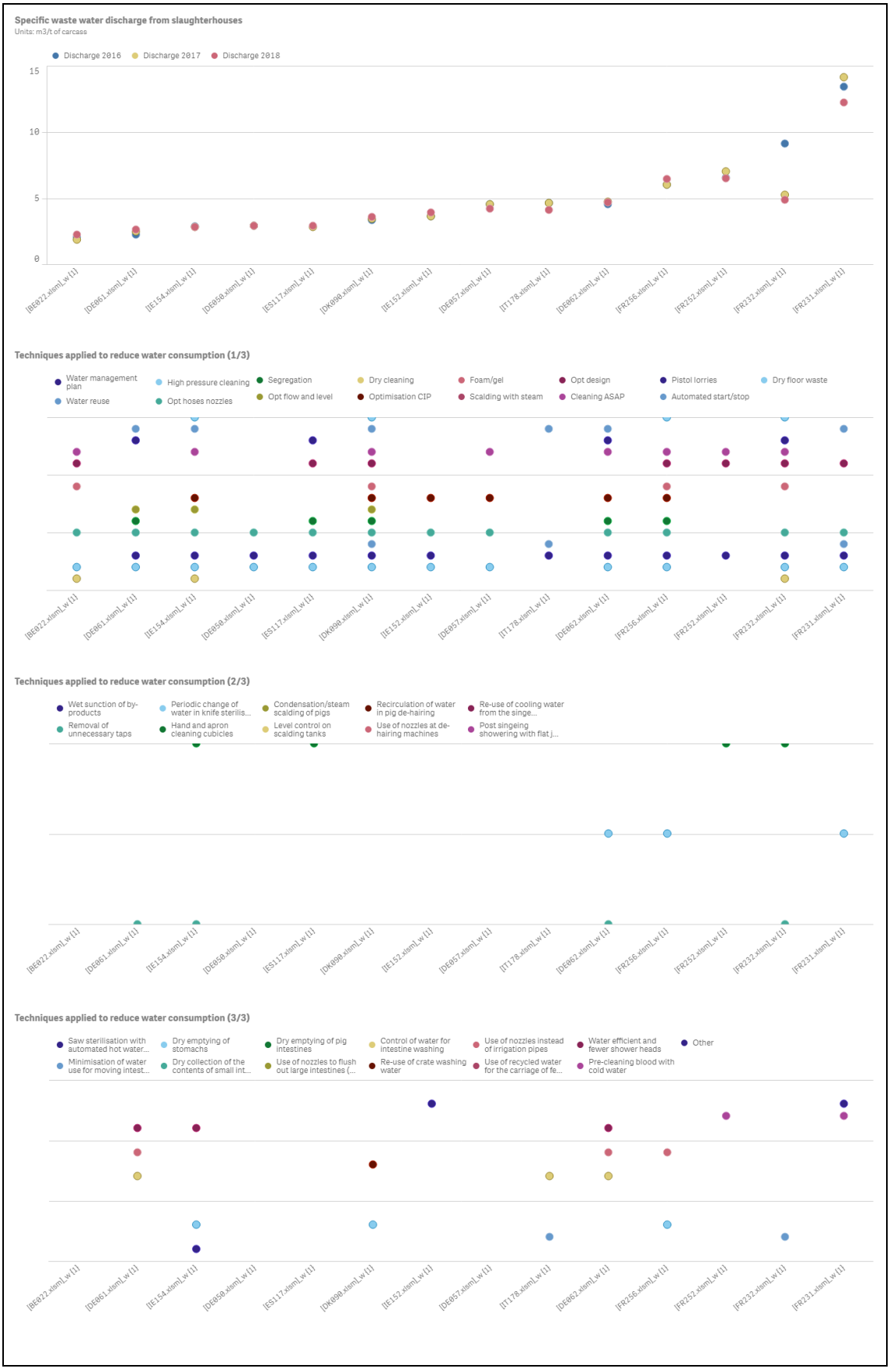


Figure 3.1: Waste water discharge (m^3/t of carcass) from cattle slaughterhouses and techniques for reducing water consumption

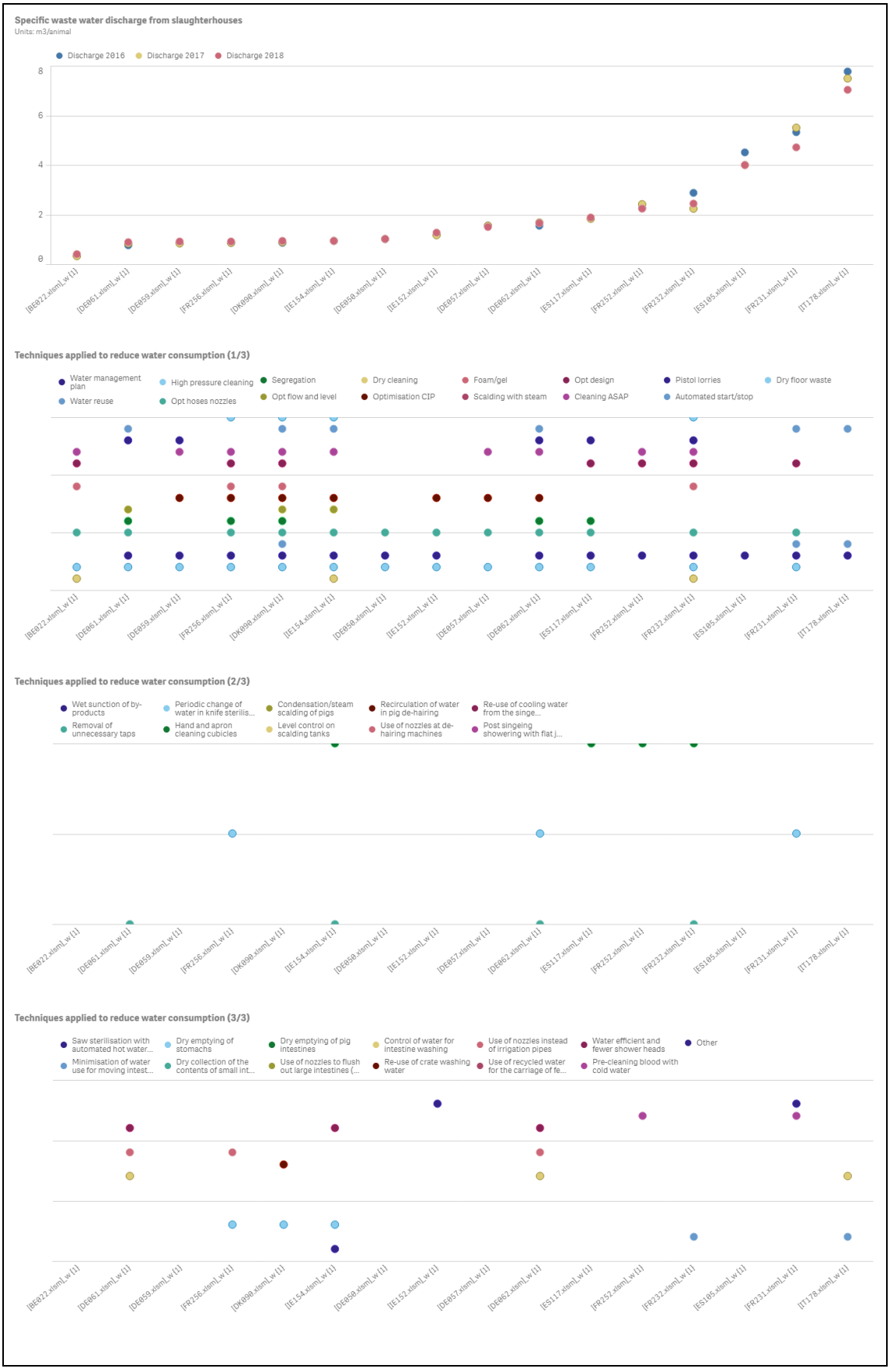


Figure 3.2: Waste water discharge (m^3/animal) from cattle slaughterhouses and techniques for reducing water consumption

3.1.2 Pigs

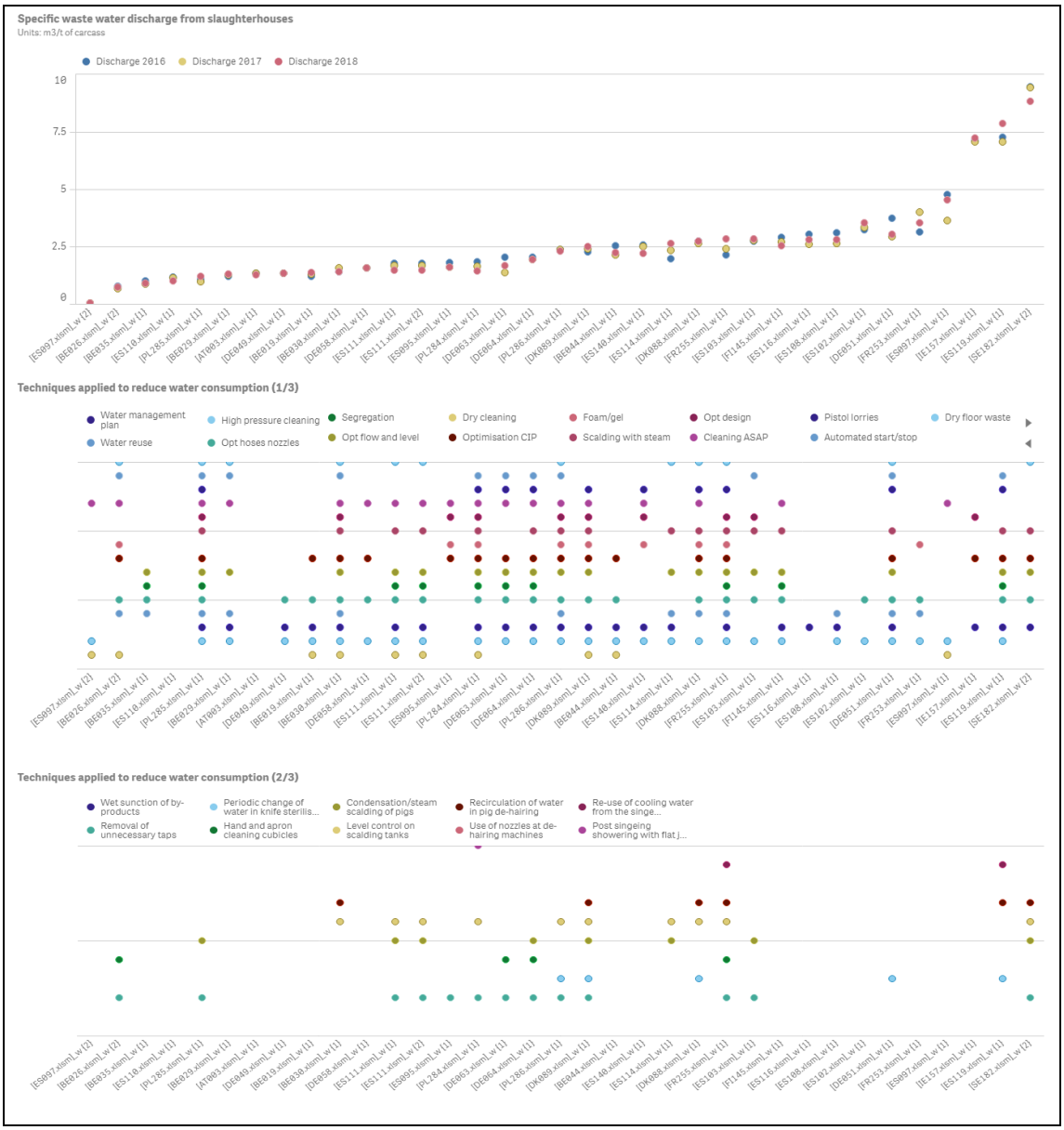
Data selection

Qlik sheet: Water consumption at installation level and waste water discharge of SLAUGHTERHOUSES

Filters applied:

1. Filter pane for Types of animal: Pigs
2. Filter pane for Slaughtered animals_Proportion of the total number of animals_Large animals:
    a. Sort the installations by column 'Pigs 2016 (%)'
    b. Column 'Plant': select installations with 100%

In Figure 3.3 and Figure 3.4 are presented data for reported specific waste water discharge from pigs slaughterhouses (for all types of discharge), as well as the applied techniques for reducing water consumption.



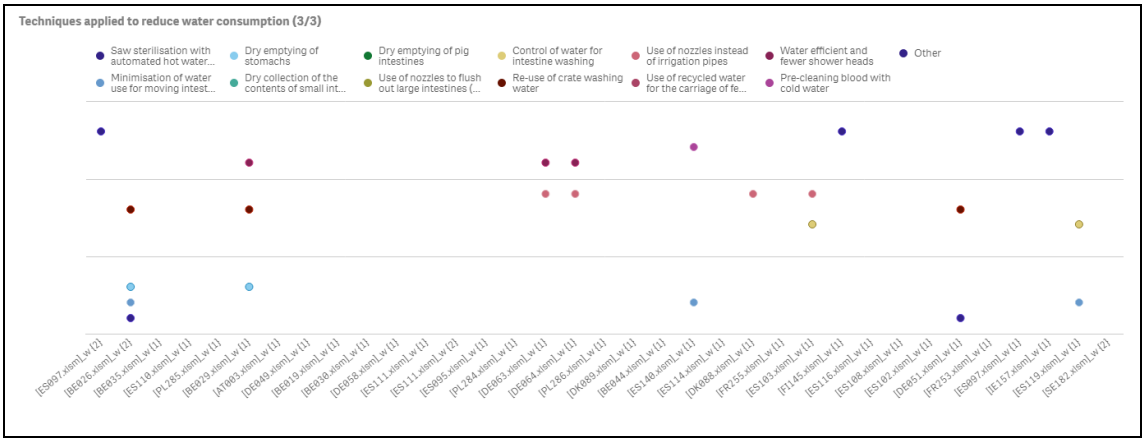
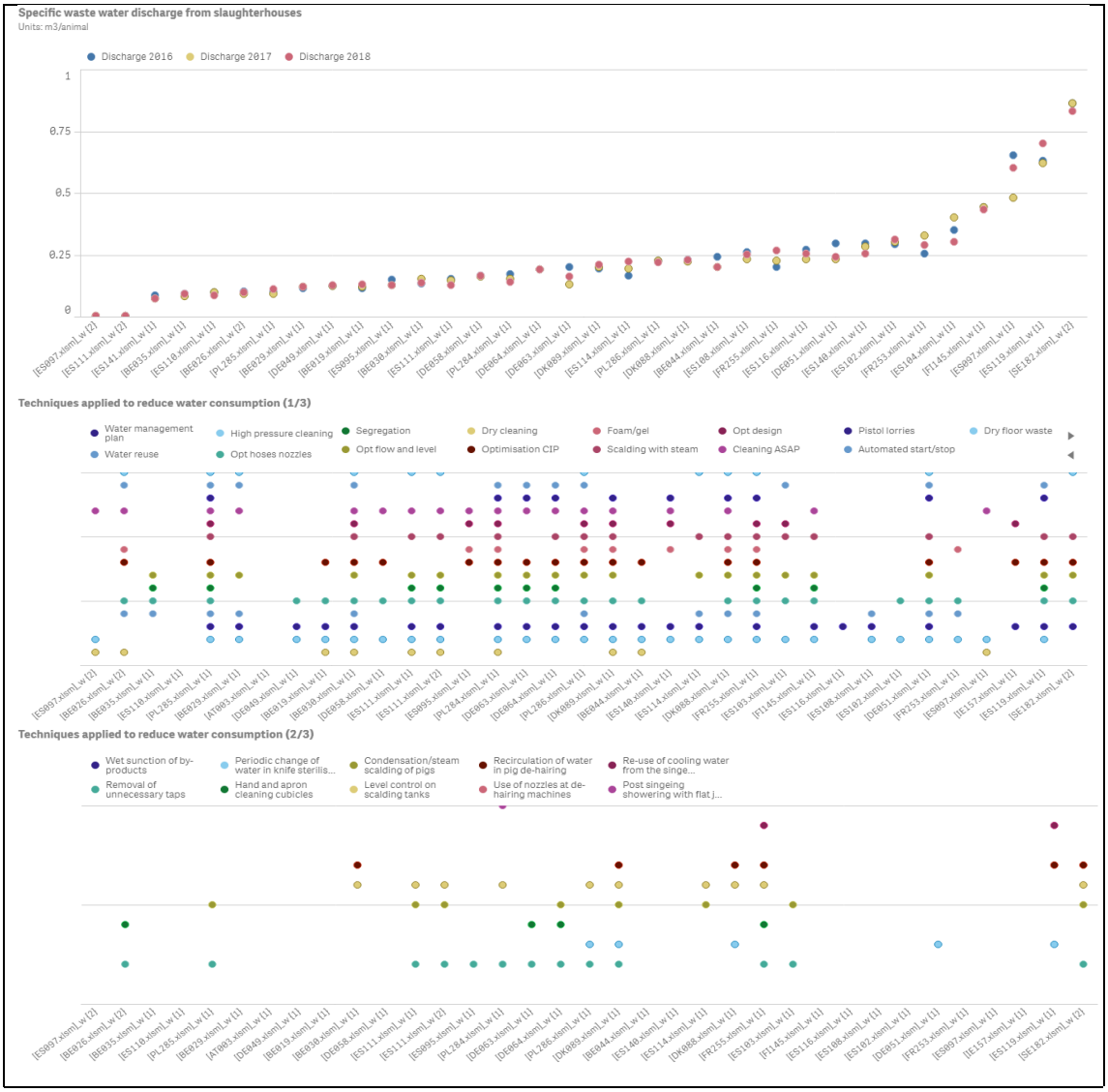


Figure 3.3: Waste water discharge (m^3/t of carcass) from pig slaughterhouses and techniques for reducing water consumption



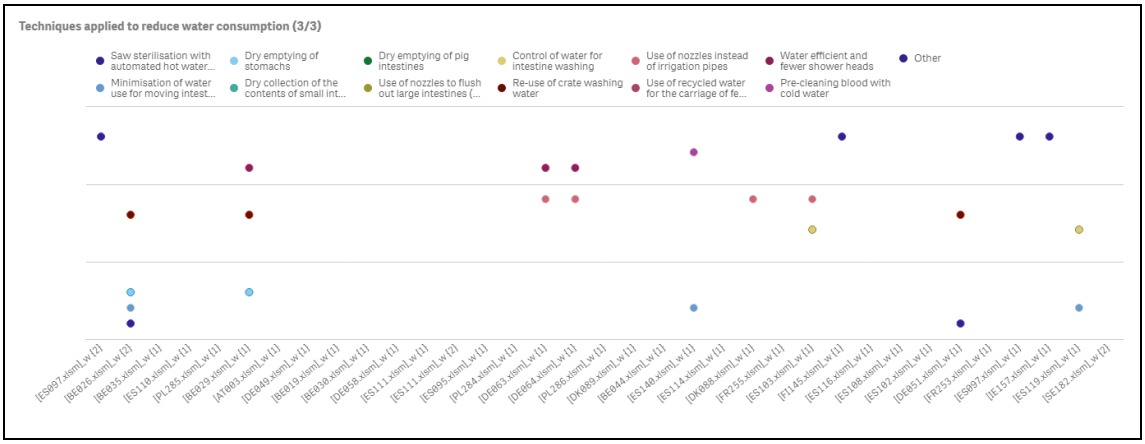


Figure 3.4*:* **Waste water discharge (m^3/animal) from pig slaughterhouses and techniques for reducing water consumption**

3.1.3 Chickens

Data selection

Qlik sheet: Water consumption at installation level and waste water discharge of SLAUGHTERHOUSES

Filters applied:

1. Filter pane for Types of animal: chickens
2. Filter pane for Slaughtered animals_Proportion of the total number of animals_Poultry species:
    a. Sort the installations by column 'Chickens 2017 (%)'
    b. Column 'Plant': select installations with >98%

In Figure 3.5 and Figure 3.6 are presented data for reported specific waste water discharge from cattle slaughterhouses (for all types of discharge), as well as the applied techniques for reducing water consumption.

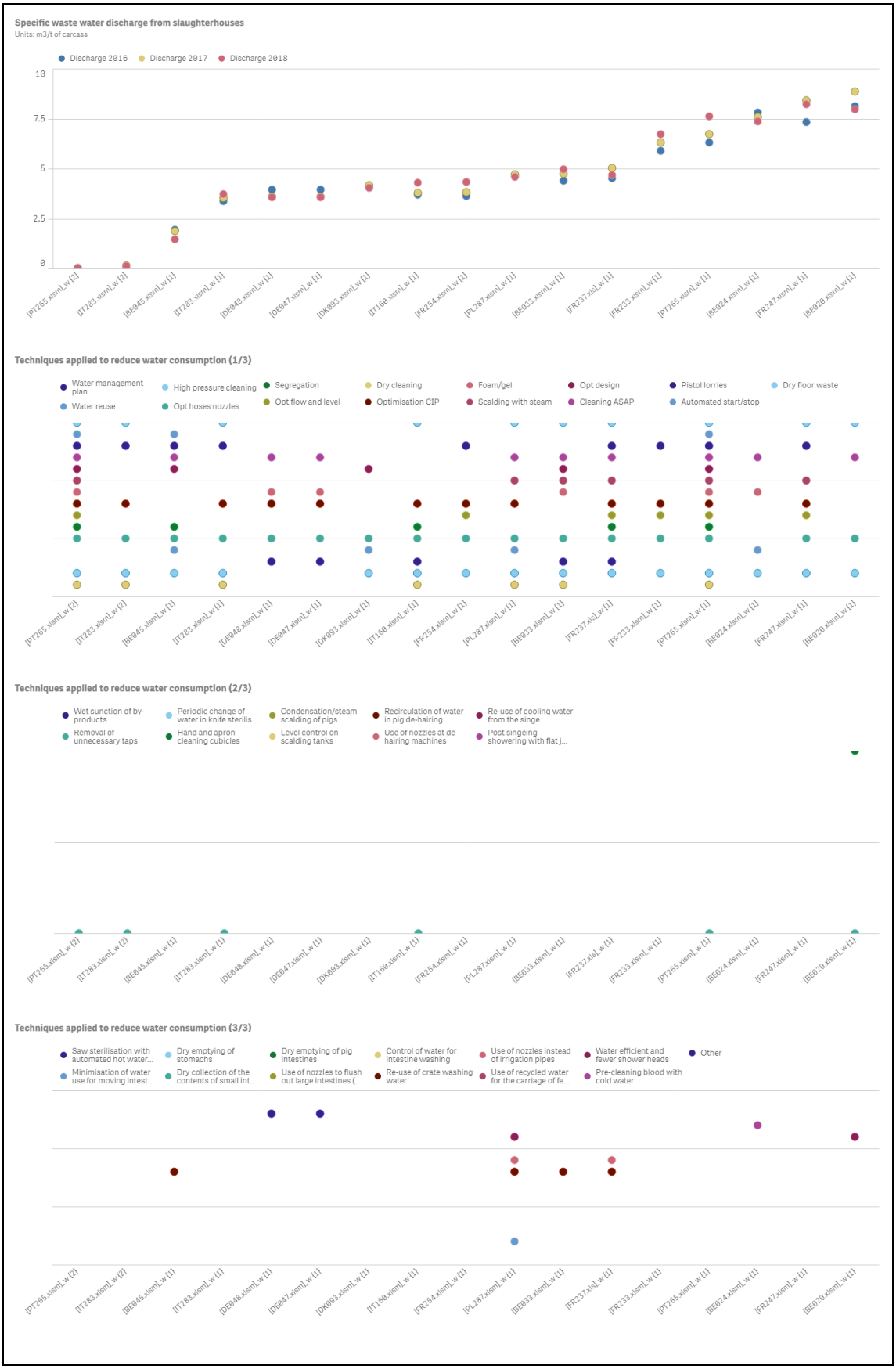
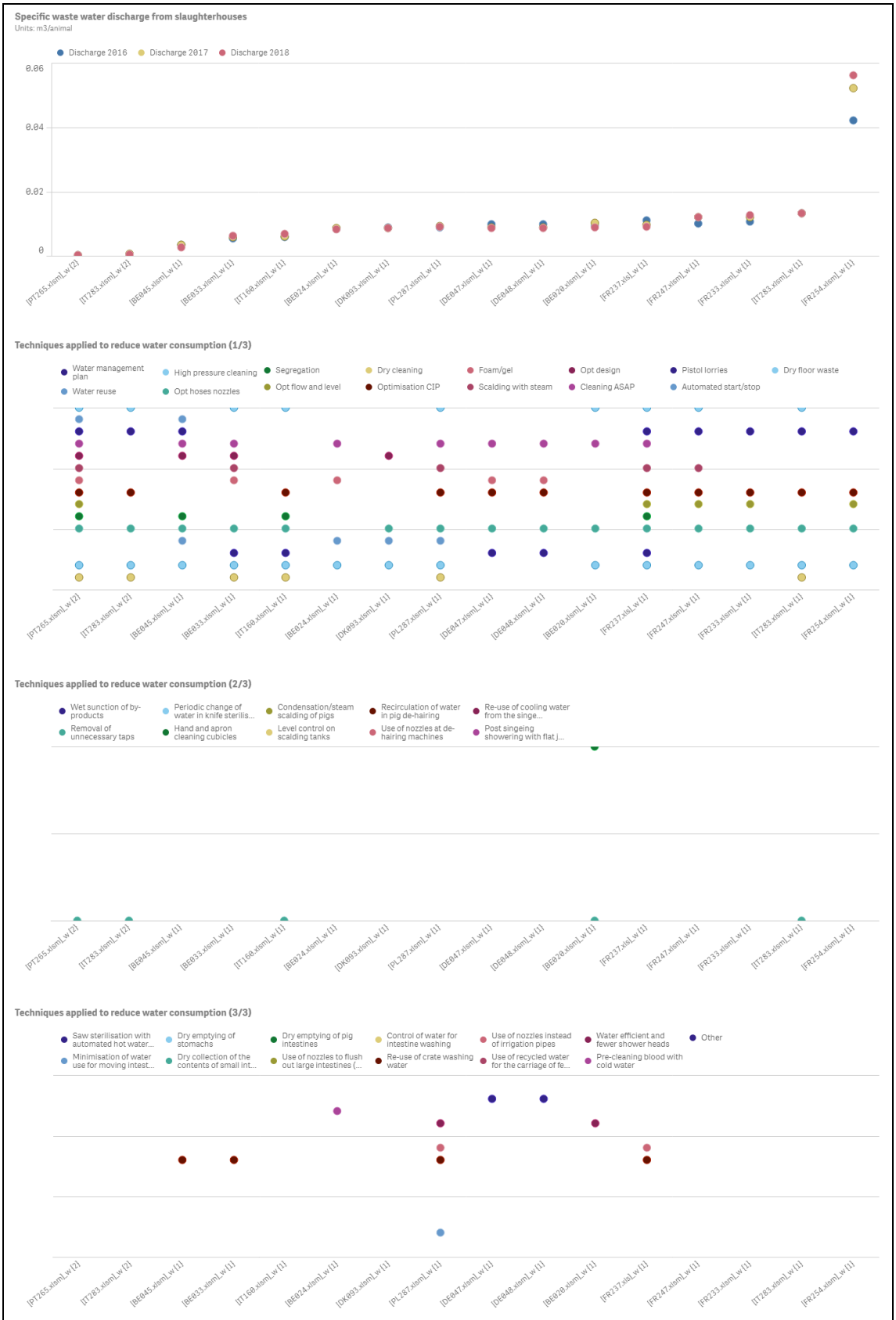


Figure 3.5: Waste water discharge (m^3/t of carcass) from chicken slaughterhouses and techniques for reducing water consumption



NB: For a better visualisation the values of EP [PT265.xlsm]_w{1} are not shown in the graph.

Figure 3.6: Waste water discharge (m^3/animal) from chicken slaughterhouses and techniques for reducing water consumption

3.2 Installations processing animal by-products and/or edible co-products

BAT-AEPLs are proposed for the following categories: rendering of animal by-products, fishmeal and fish oil production, gelatine manufacturing.

3.2.1 Rendering, fat melting, blood and/or feather processing

Data selection
Qlik sheet: Water consumption at installation level and waste water discharge of non-slaughter SA installations

Filters applied:

1. Filter pane for 'Type(s) of processes carried out': select processing of animal by-products + processing of edible co-products
2. Filter pane for 'Types of non-slaughter SA activities': select rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins

In Figure 3.7 and Figure 3.8 are presented data for reported specific waste water discharge (m^3/t of raw material) from rendering, fat melting, blood and/or feather processing installations (for all types of discharge), as well as the applied techniques for reducing water consumption.

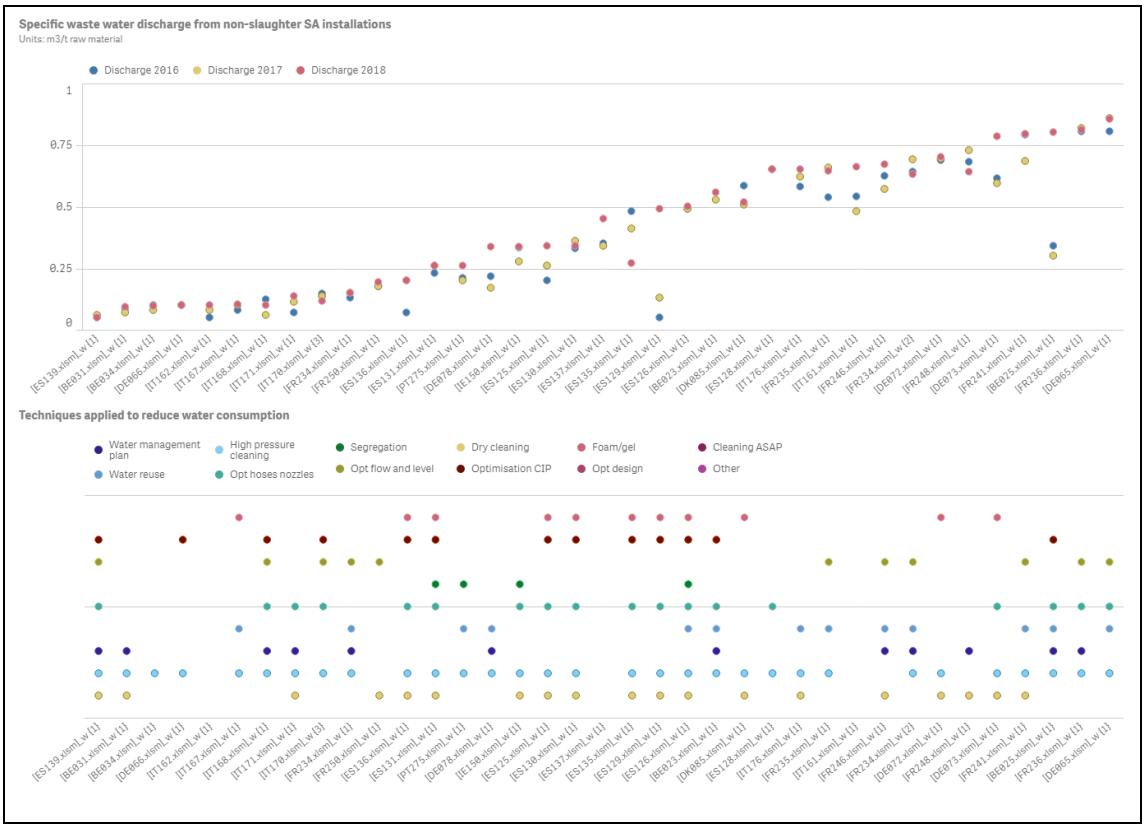
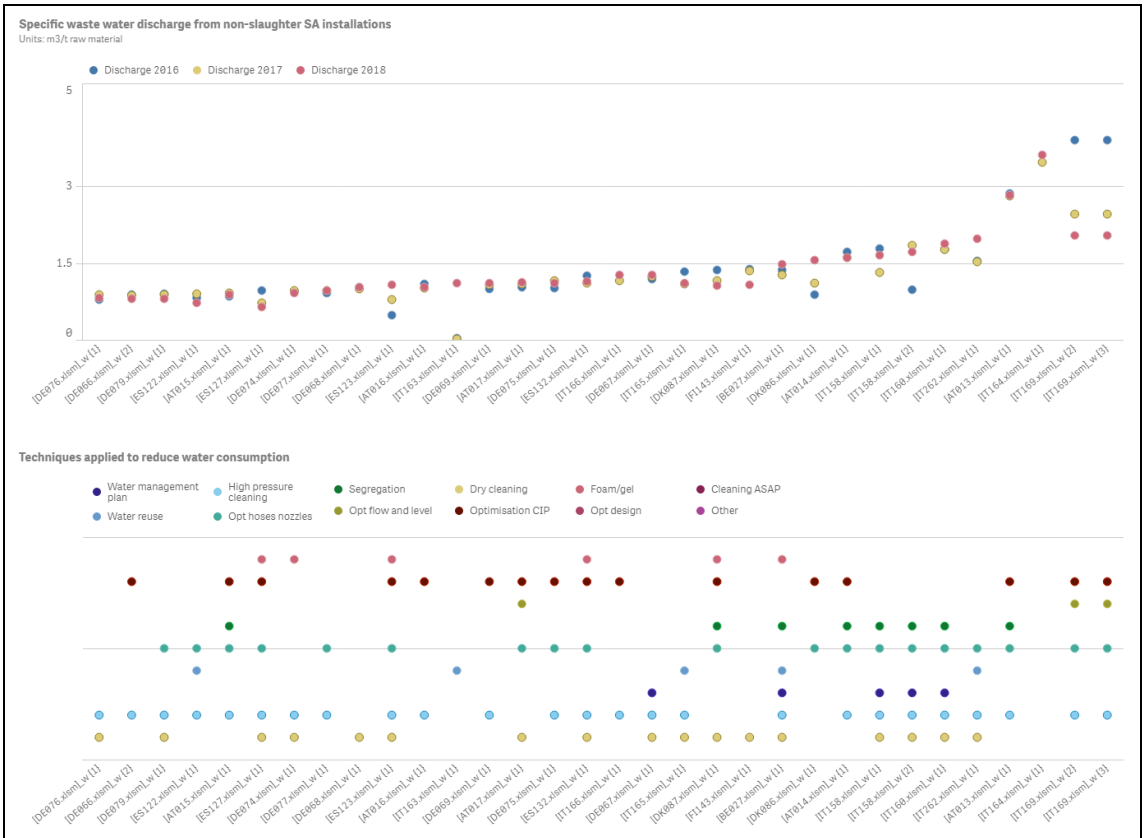


Figure 3.7: Waste water discharge (m^3/t of raw material) from rendering, fat melting, blood and/or feather processing installations and techniques for reducing water consumption (Part 1 of 2)



NB: For a better visualisation the values of EP [IT169.xlsm]_w{1} are not shown in the graph.

Figure 3.8*:* **Waste water discharge (m3/t of raw material) from rendering, fat melting, blood and/or feather processing installations and techniques for reducing water consumption (Part 2 of 2)**

3.2.2 Fishmeal and fish oil production

Data selection

Qlik sheet: Water consumption at installation level and waste water discharge of non-slaughter SA installations

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Fishmeal and fish oil production

InFigure 2.1 Figure 3.9 are presented data for reported specific waste water discharge (m^3/t of raw material) from fishmean and fish oil installations (for all types of discharge), as well as the applied techniques for reducing water consumption.

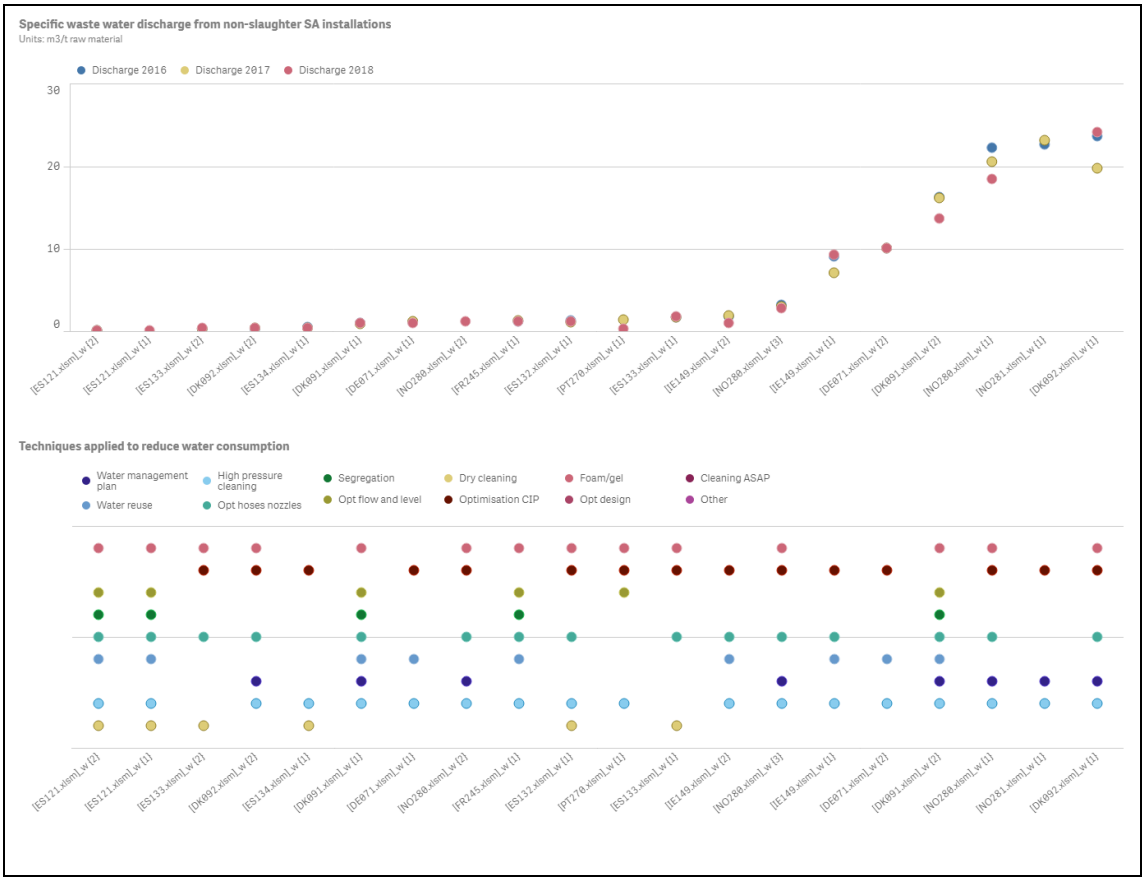


Figure 3.9*:* **Waste water discharge (m^3/t of raw material) from fishmeal and fish oil installations and techniques for reducing water consumption**

3.2.3 Gelatine manufacturing

Data selection

Qlik sheet: Water consumption at installation level and waste water discharge of non-slaughter SA installations

Filters applied:

1. Filter pane for Types of non-slaughter SA activities: Gelatine manufacturing

In Figure 3.10 are presented data for reported specific waste water discharge (m^3/t of raw material) from gelatine manufacturing (for all types of discharge), as well as the applied techniques for reducing water consumption.

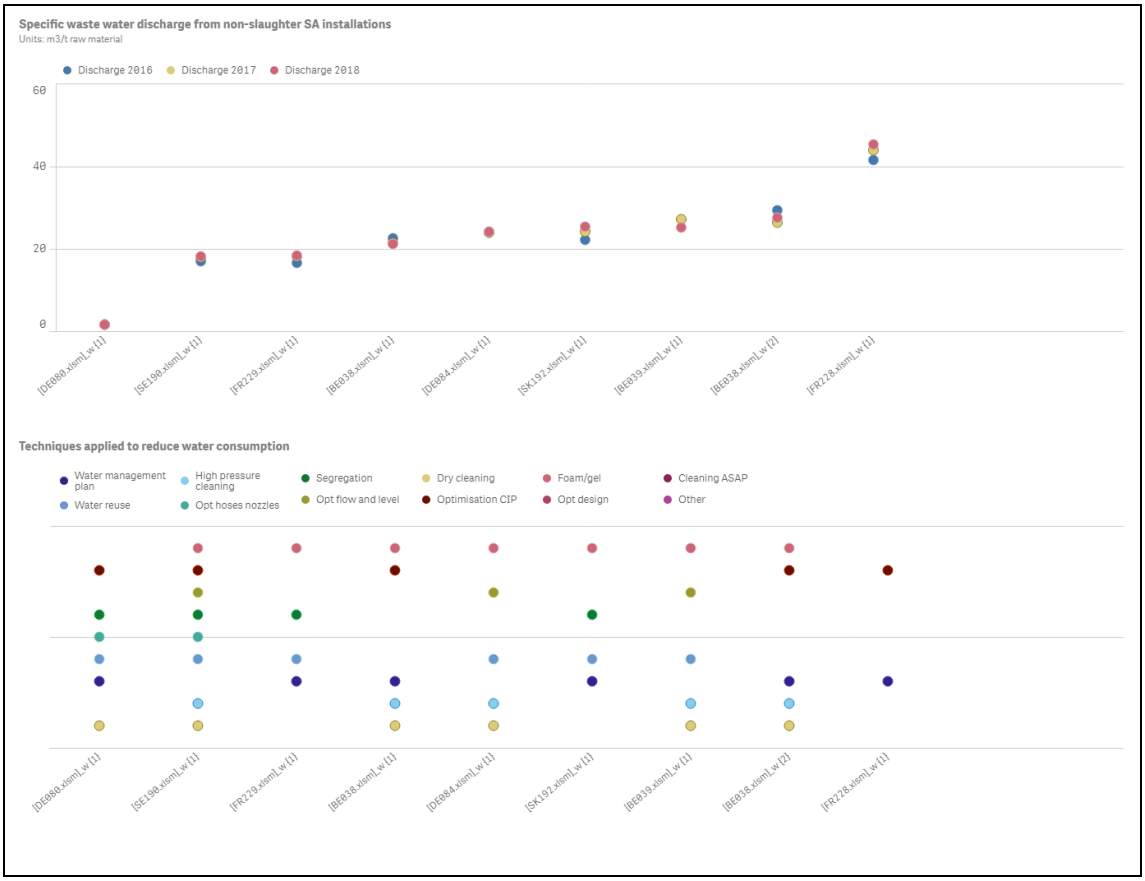


Figure 3.10*:* Waste water discharge (m^3/t of raw material) from gelatine manufacturing and techniques for reducing water consumption

4 BAT-AELS FOR EMISSIONS TO WATER

The Qlik sheet 'Emissions to water_General' contains a table named 'Maximum and 95th percentile values for emissions to water'. This table highlights in red colour those emission levels above the upper end of the proposed BAT-AELs, in order to facilitate the data assessment between paramaters. For COD, a three-colour code has been applied: green for emission levels below 100 mg/l, blue for emission levels between 100 and 120 mg/l, and red for emission levels above 120 mg/l.

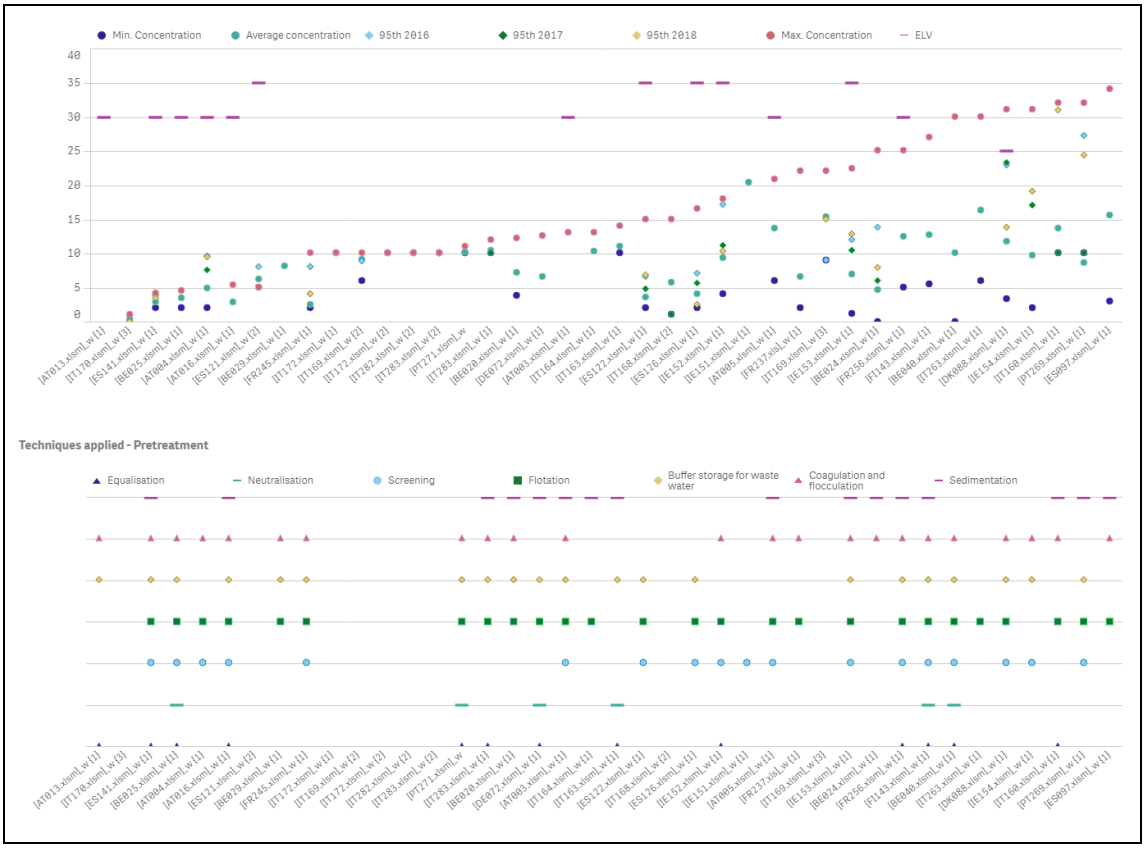
4.1.1 Total suspended solids (TSS)

Data selection
Qlik Sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: TSS
2. Filter pane for Type of discharge: Direct discharge to the environment

In Figure 4.1 and Figure 4.2 are presented the data for reported TSS emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.



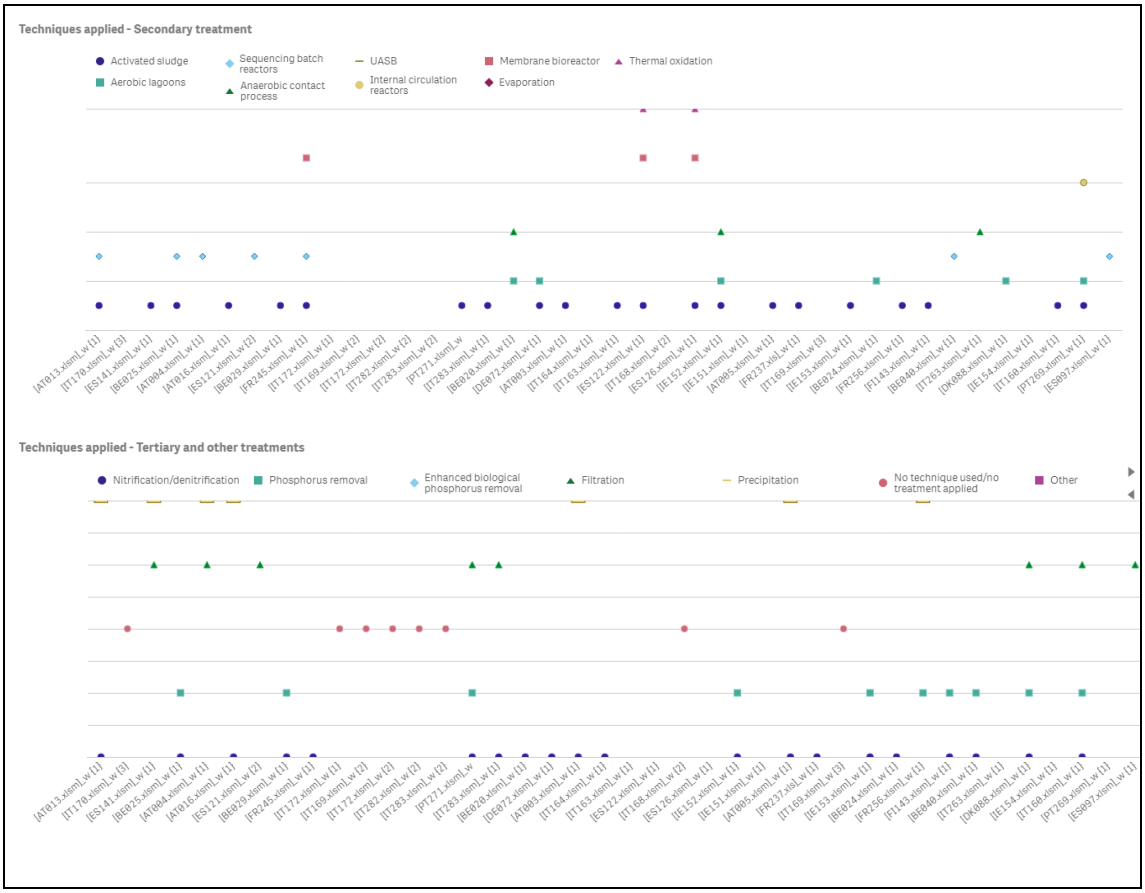
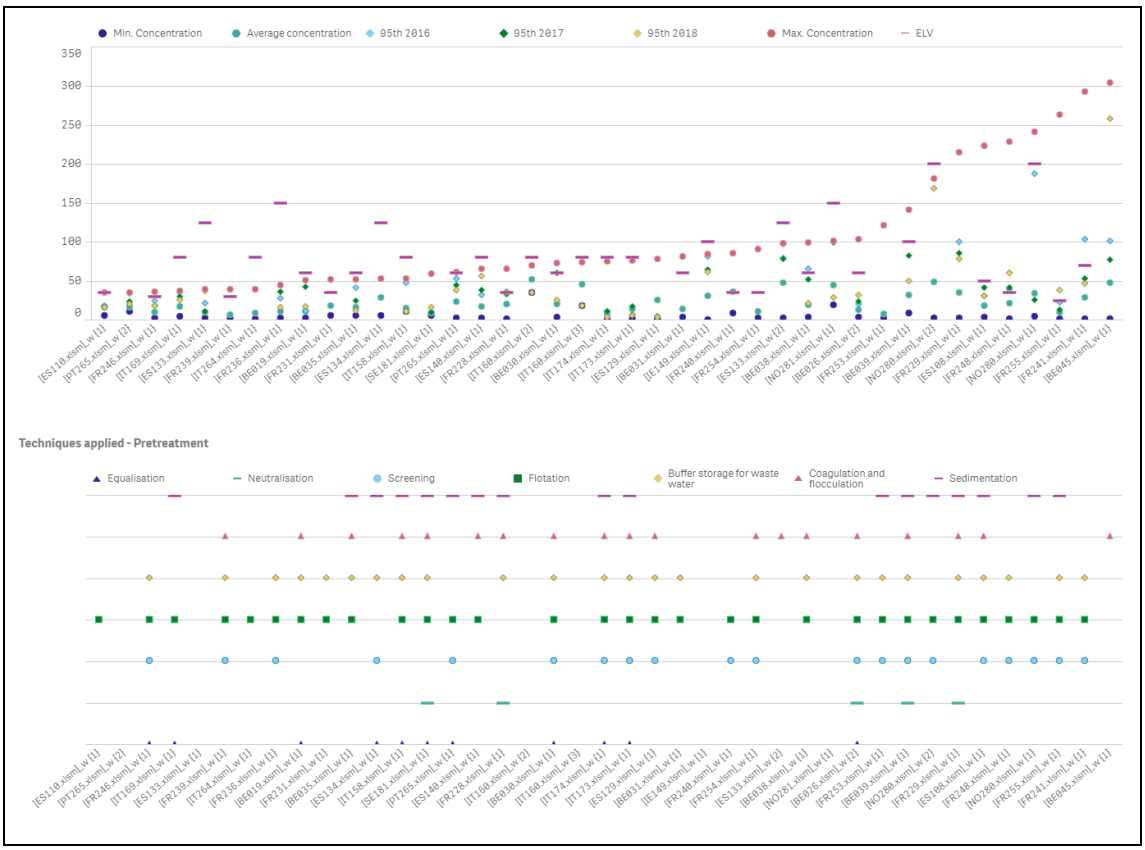


Figure 4.1: TSS emissions to water (mg/l) from SA installations (direct discharges) (Part 1 to 2)



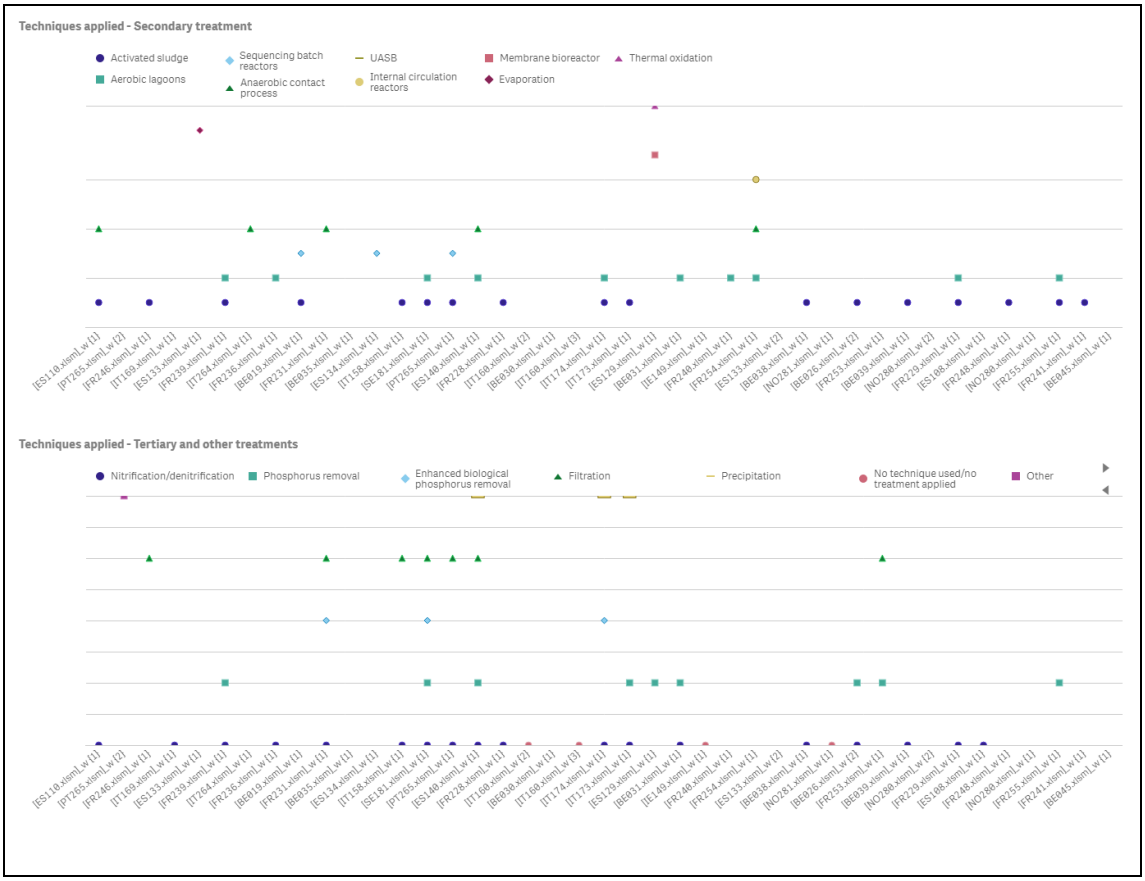


Figure 4.2*:* **TSS emissions to water (mg/l) from SA installations (direct discharges) (Part 2 to 2)**

4.1.2 Chemical oxygen demand (COD)

Data selection (Slaughterhouses)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: COD
2. Filter pane for Type of discharge: Direct discharge to the environment
3. Filter pane for Type(s) of processes carried out: Slaughterhouse

In Figure 4.3 and Figure 4.4 are presented the data for reported COD emissions to water from slaughterhouses for direct discharges, as well as the applied abatement techniques.

Figure 4.3*:* **COD emissions to water (mg/l) from slaughterhouses (direct discharges) (Part 1 to 2)**

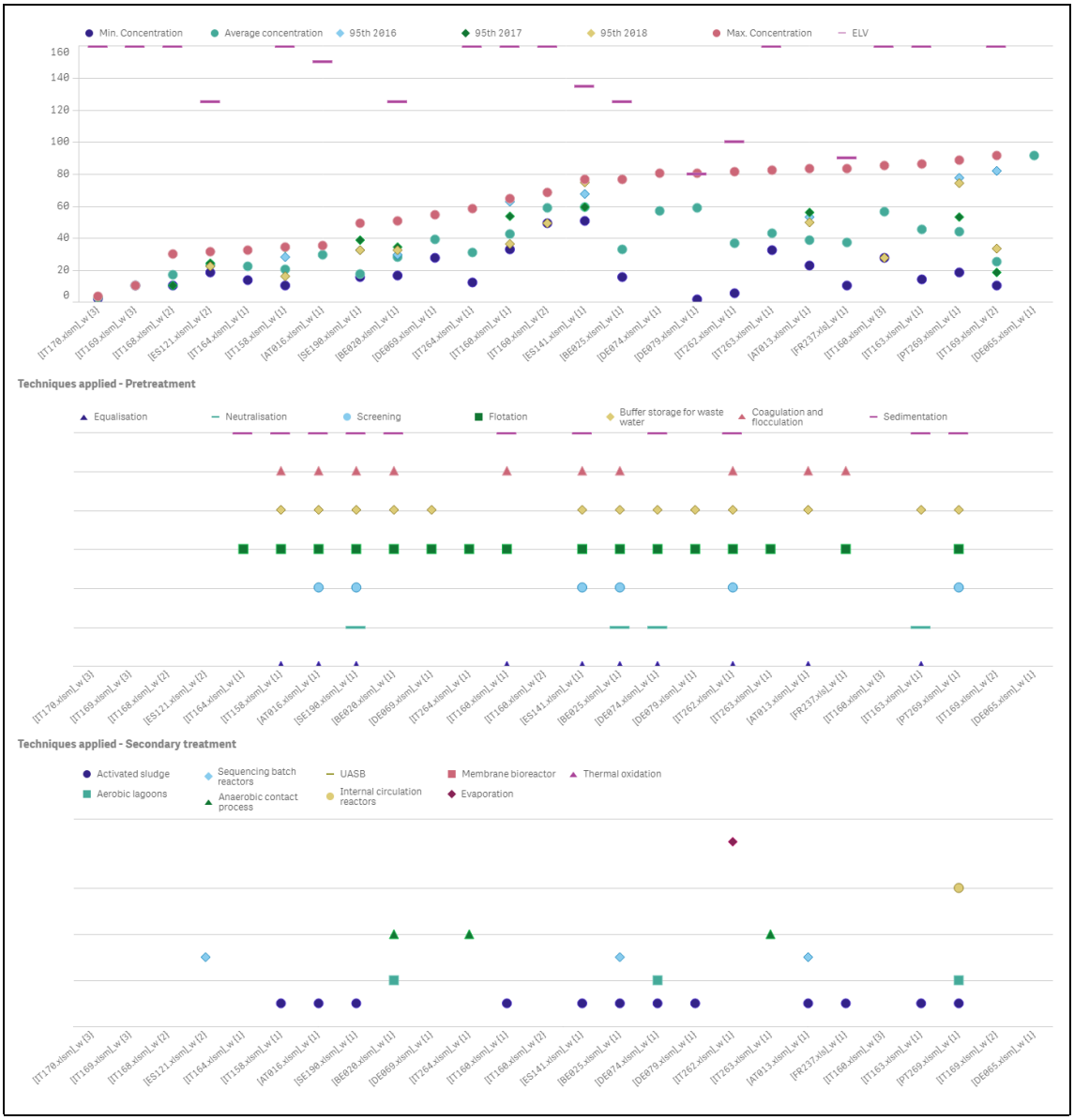
Figure 4.4*:* **COD emissions to water (mg/l) from slaughterhouses (direct discharges) (Part 2 to 2)**

Data selection (installations processing animal by-products and/or edible co-products)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: COD
2. Filter pane for Type of discharge: Direct discharge to the environment
3. Filter pane for Type(s) of processes carried out: Processing of animal by-products and Processing of edible co-products (or food-grade products)

In Figure 4.5 and Figure 4.6 are presented the data for reported COD emissions to water from installations processing animal by-products and/or edible co-products for direct discharges, as well as the applied abatement techniques.



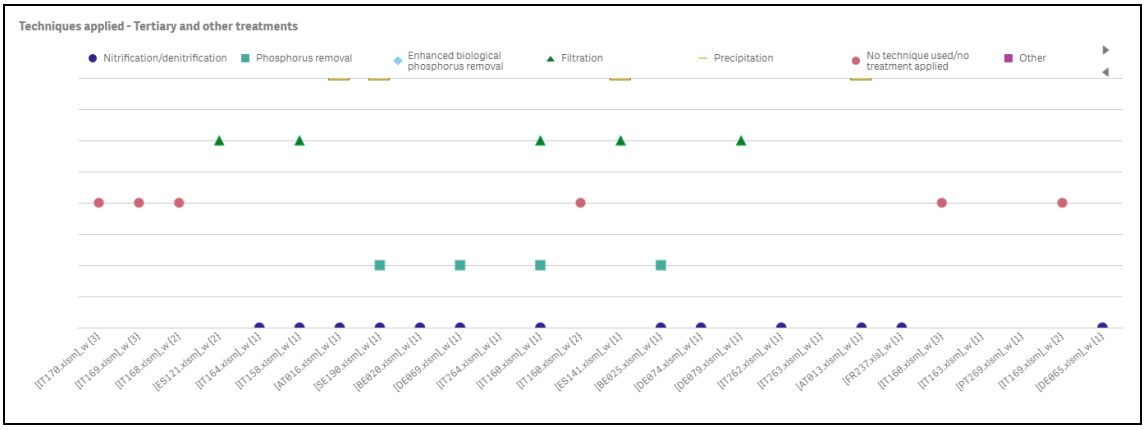
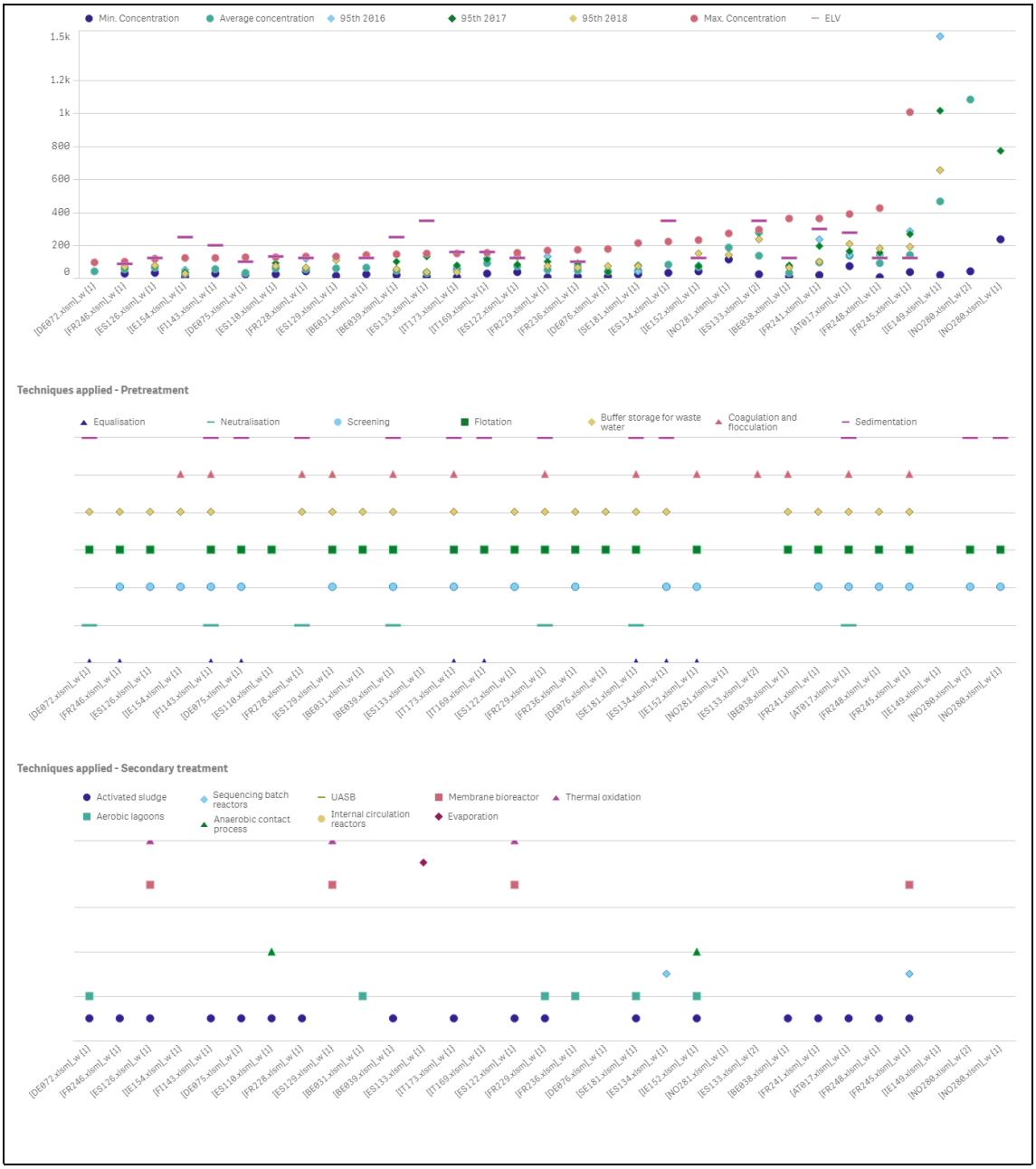
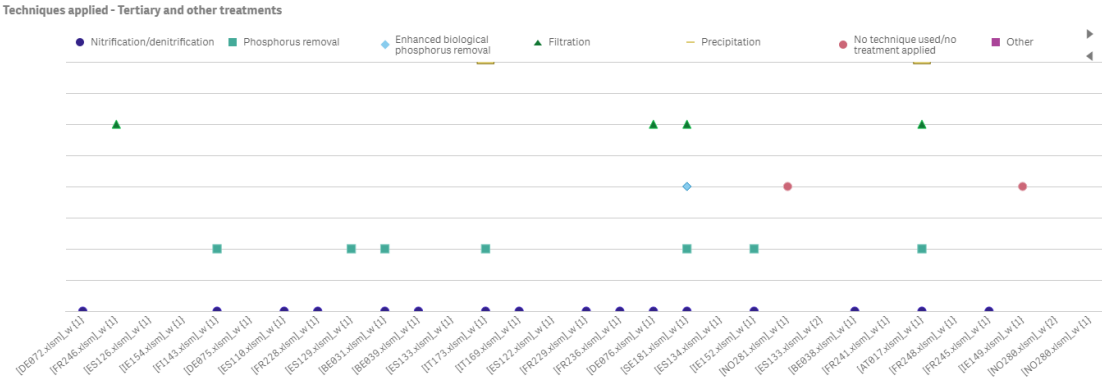


Figure 4.5*:* **COD emissions to water (mg/l) from installations processing animal by-products and/or edible co-products (direct discharges) (Part 1 to 2)**





NB: For a better visualisation ELVs greater than 1 500 mg/l are not shown in the graph.

Figure 4.6: COD emissions to water (mg/l) from installations processing animal by-products and/or edible co-products (direct discharges) (Part 2 to 2)

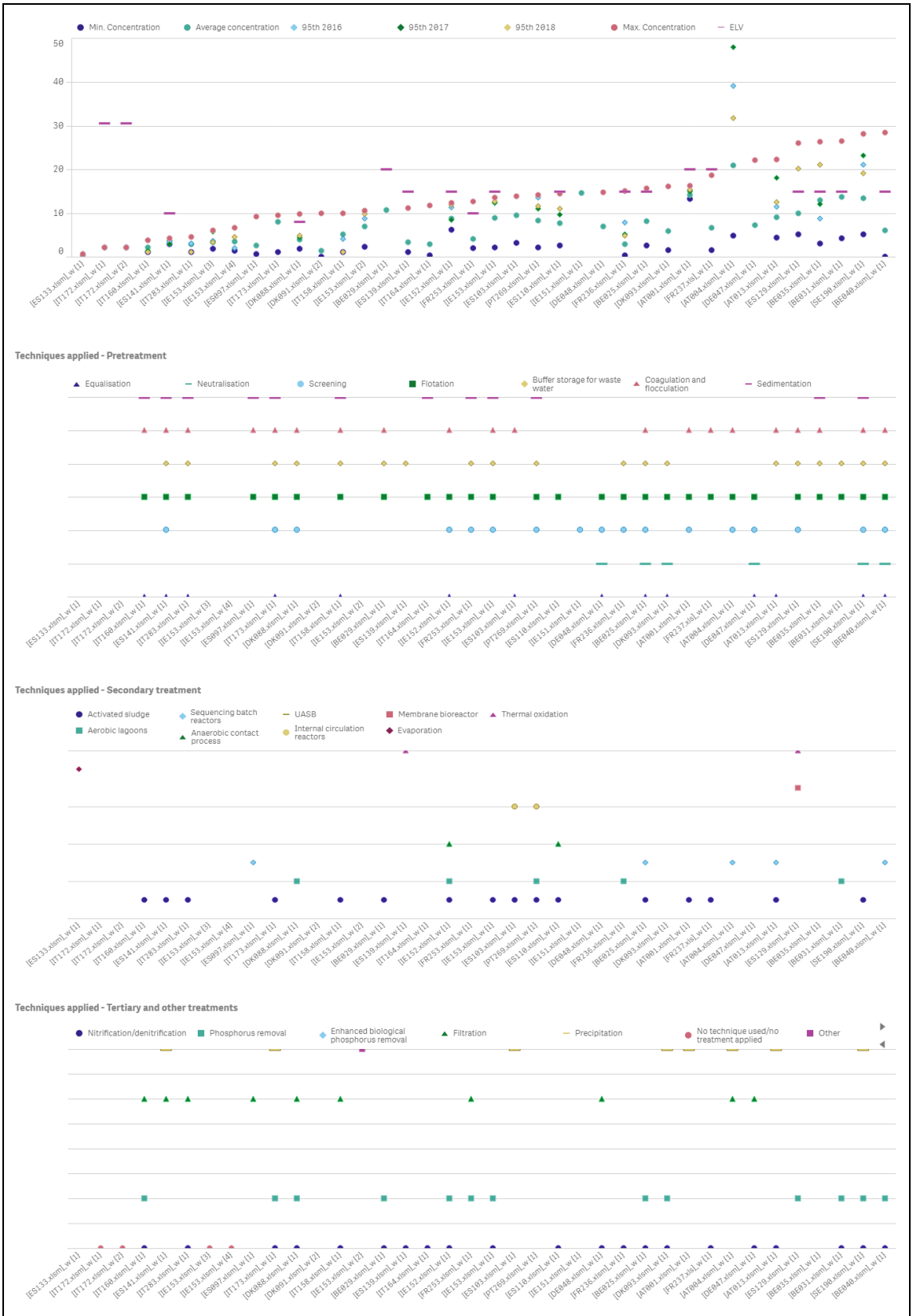
4.1.3 Total nitrogen (TN)

Data selection
Qlik Sheet: Emissions to water_General

Filters applied:

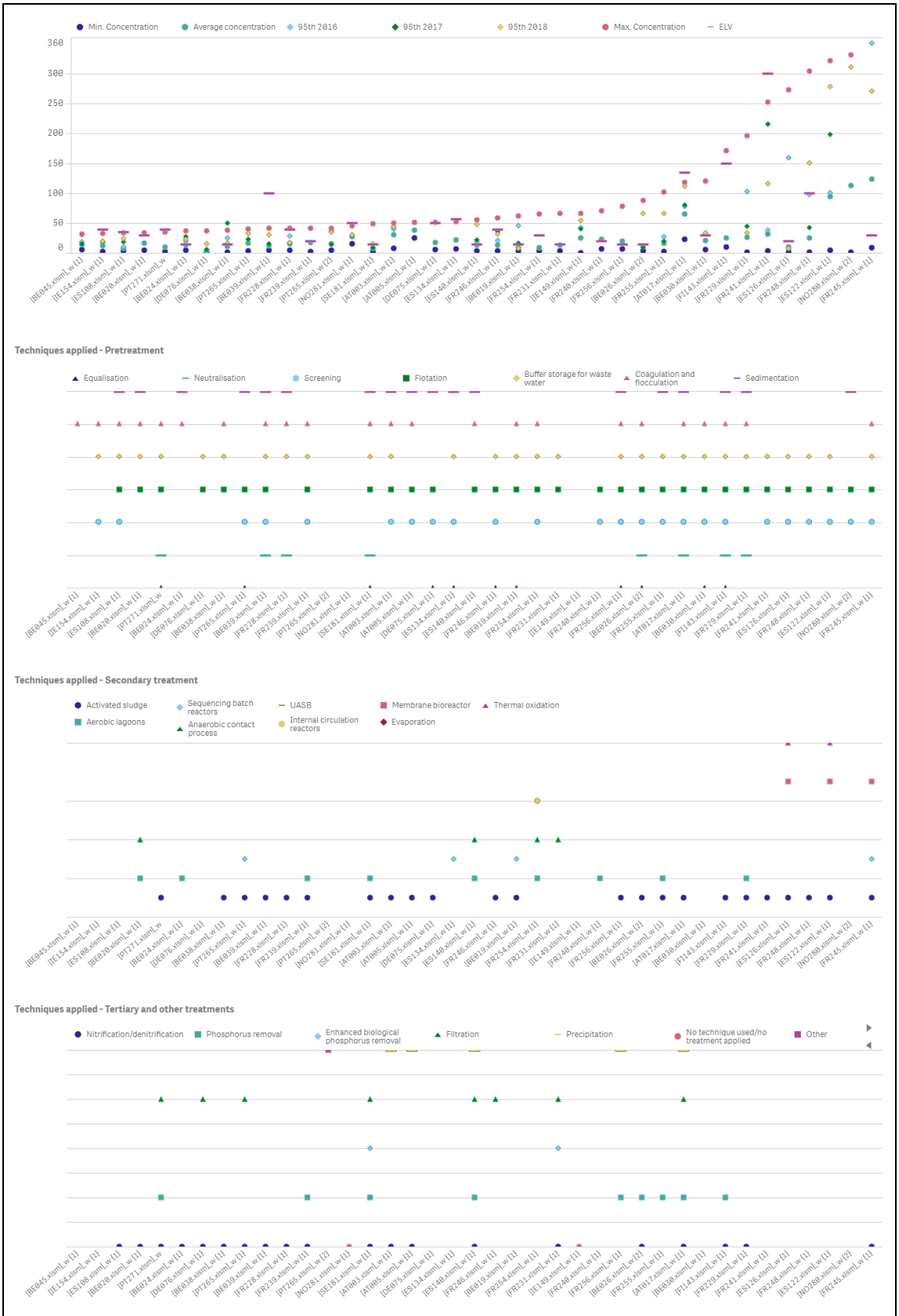
1. Filter pane for Parameter: Total N
2. Filter pane for Type of discharge: Direct discharge to the environment

In Figure 4.7 and Figure 4.8 are presented the data for reported TN emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.



NB: For a better visualisation ELVs greater than 50 mg/l are not shown in the graph.

Figure 4.7: TN emissions to water (mg/l) from SA installations (direct discharges) (Part 1 to 2)



NB: For a better visualisation values greater than 350 mg/l are not shown in the graph.

Figure 4.8: TN emissions to water (mg/l) from SA installations (direct discharges) (Part 2 to 2)

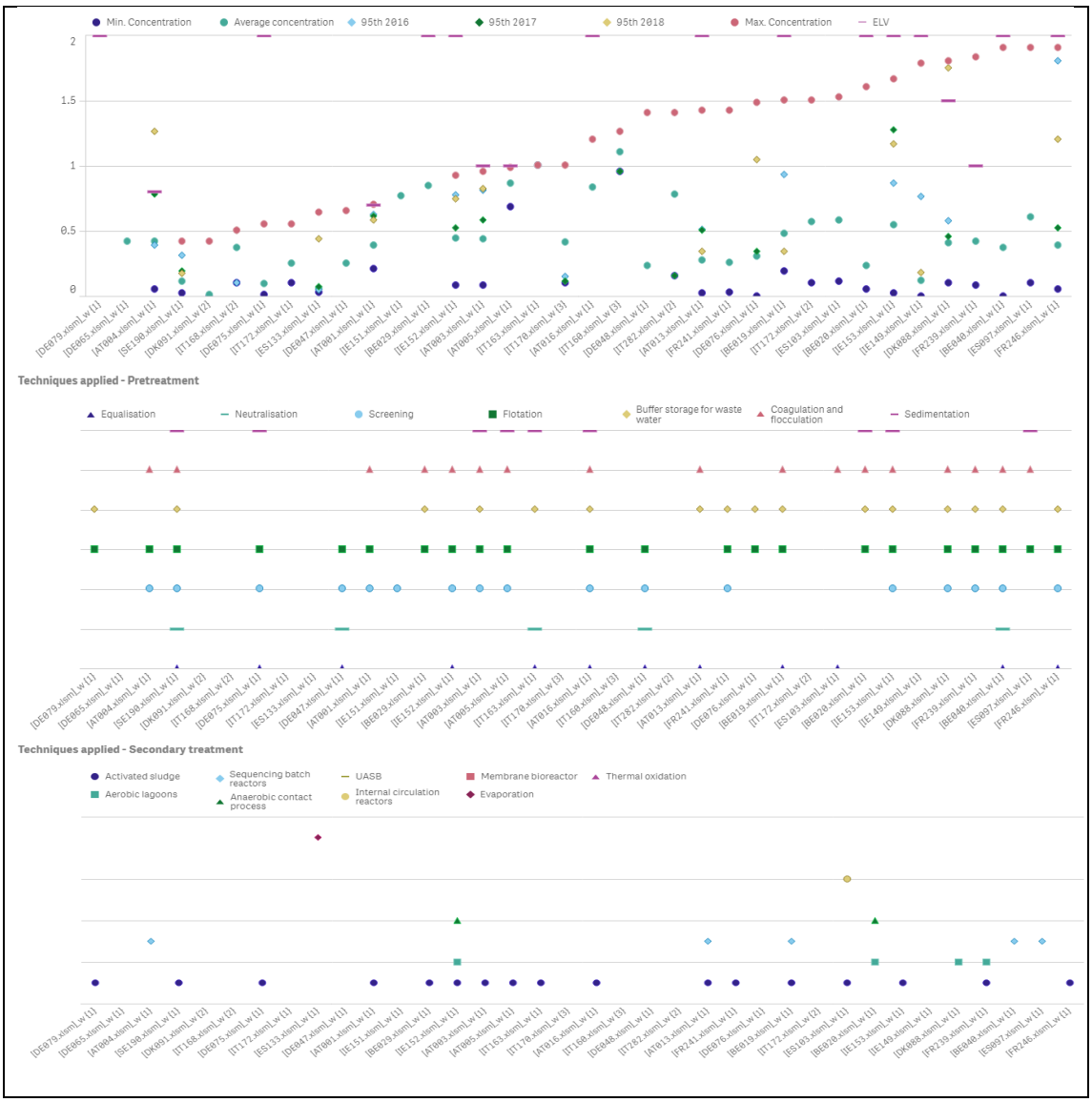
4.1.4 Total phosphorus (TP)

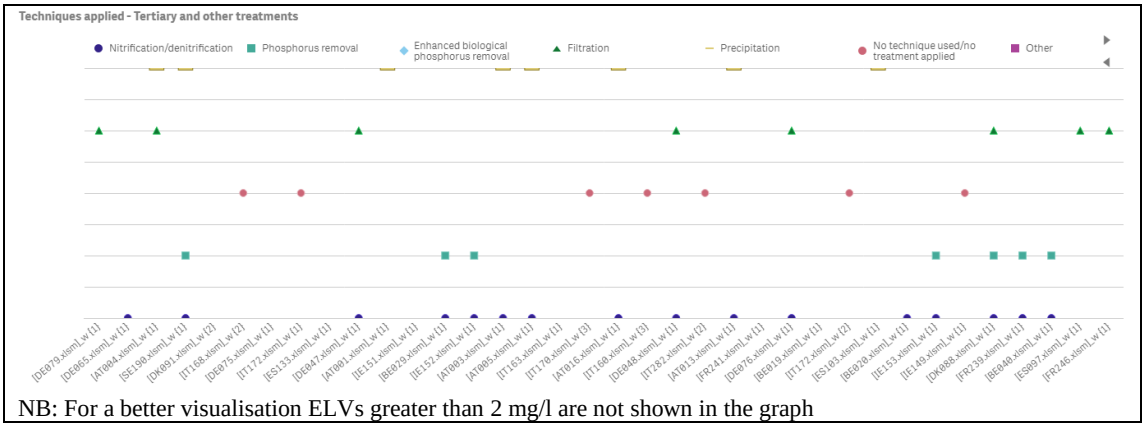
Data selection
Qlik Sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: Total P
2. Filter pane for Type of discharge: Direct discharge to the environment

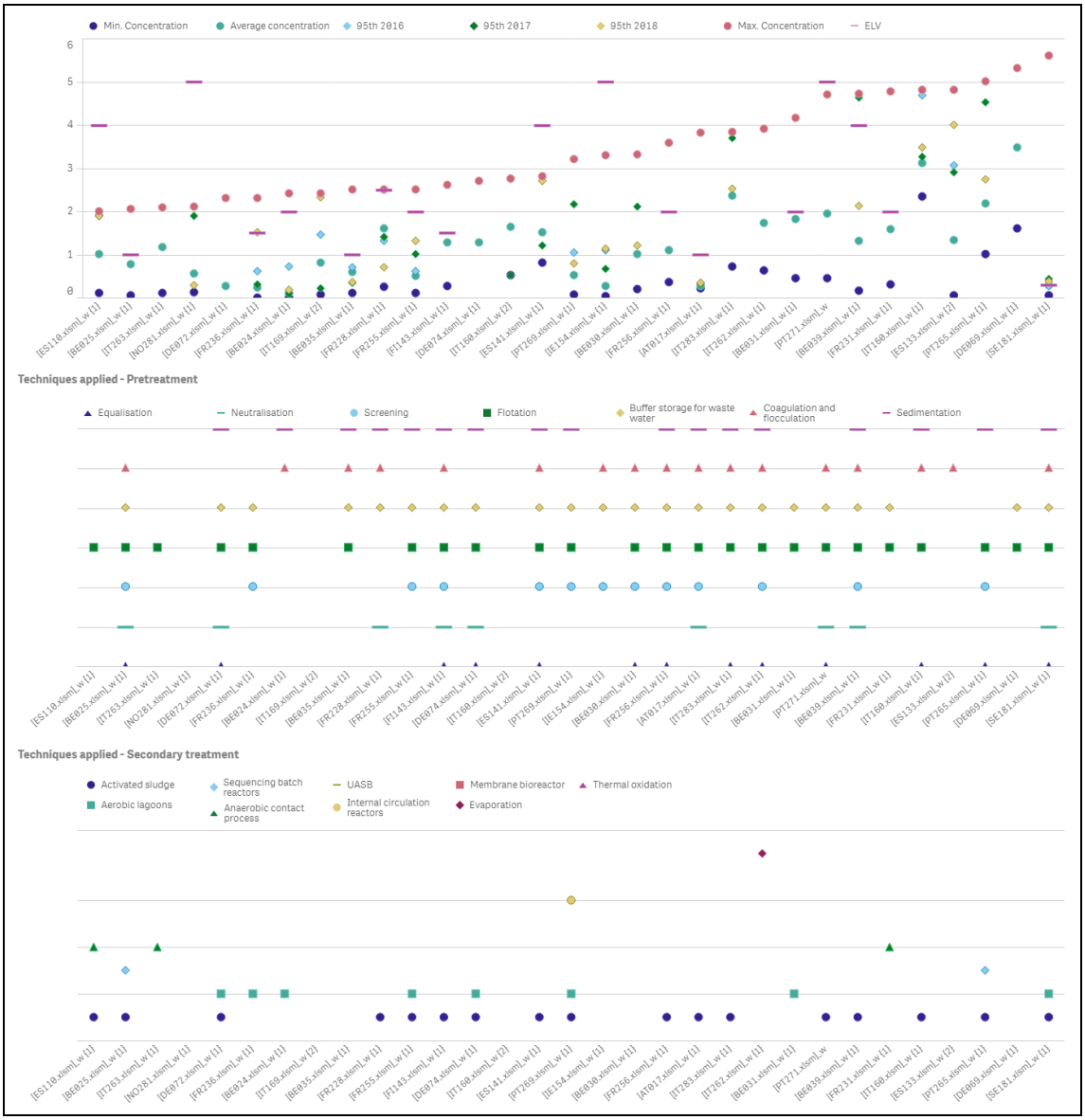
In Figure 4.9, Figure 4.10 and Figure 4.11 are presented the data for reported TP emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.

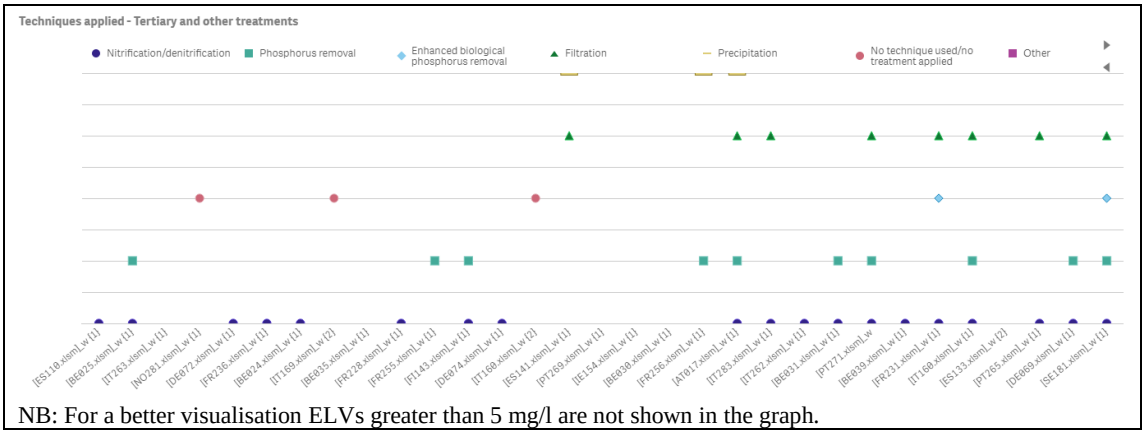




NB: For a better visualisation ELVs greater than 2 mg/l are not shown in the graph

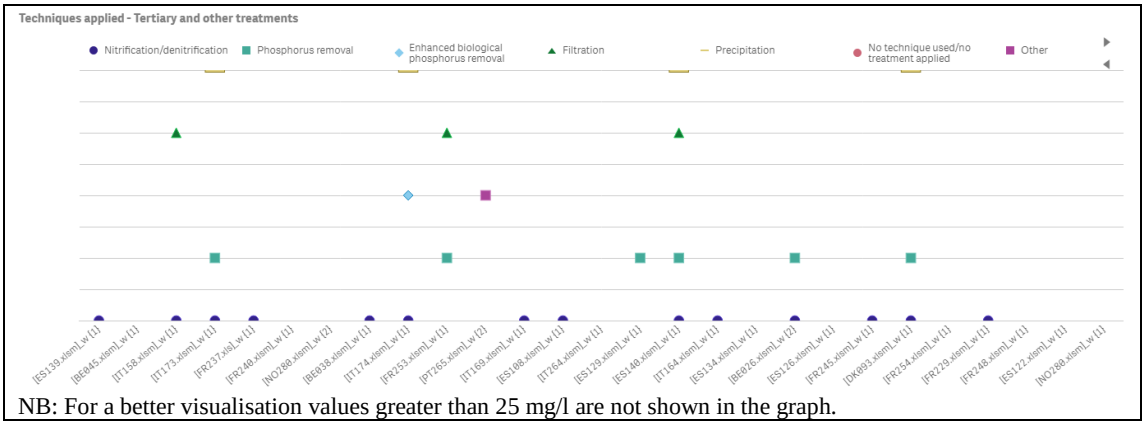
Figure 4.9: TP emissions to water (mg/l) from SA installations (direct discharges) (Part 1 to 3)





NB: For a better visualisation ELVs greater than 5 mg/l are not shown in the graph.

Figure 4.10: TP emissions to water (mg/l) from SA installations (direct discharges) (Part 2 to 3)



NB: For a better visualisation values greater than 25 mg/l are not shown in the graph.

Figure 4.11: TP emissions to water (mg/l) from SA installations (direct discharges) (Part 3 to 3)

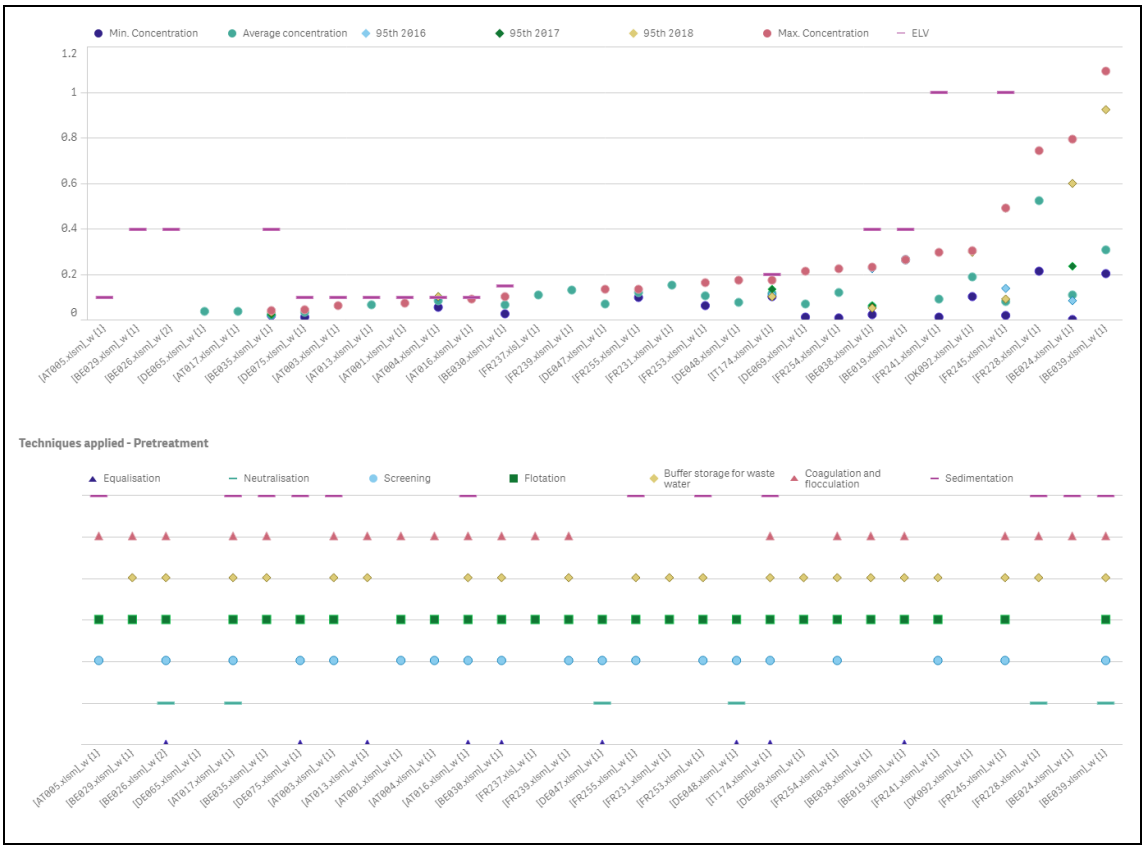
4.1.5 Adsorbable organically bound halogens (AOX)

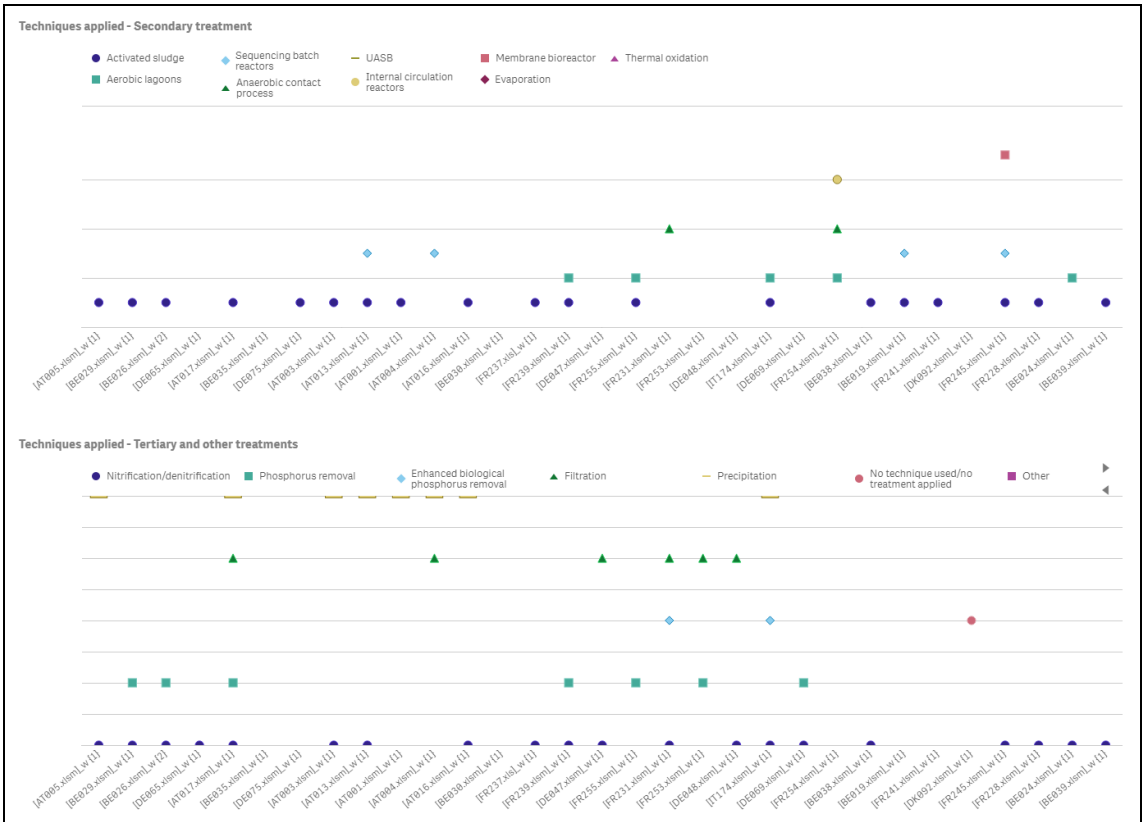
Data selection (Direct discharges)
Qlik Sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: AOX
2. Filter pane for Type of discharge: Direct discharge to the environment

In Figure 4.12 are presented the data for reported AOX emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.





NB: For a better visualisation ELVs greater than 1 mg/l are not shown in the graph.

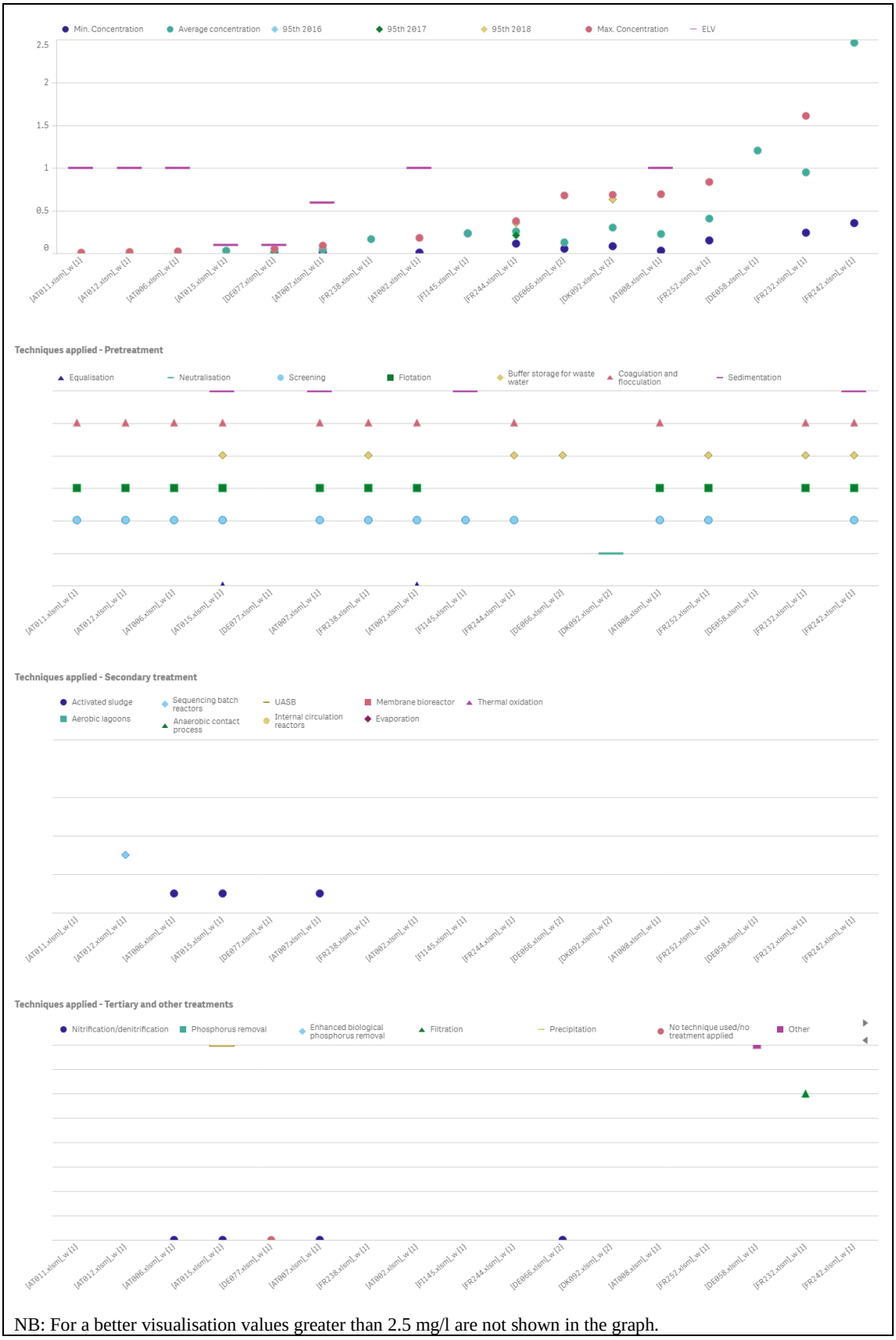
Figure 4.12: AOX emissions to water (mg/l) from SA installations (direct discharges)

Data selection (Indirect discharges)
Qlik Sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: AOX
2. Filter pane for Type of discharge: Indirect discharge to a downstream (off-site) WWTP

In Figure 4.13 are presented the data for reported AOX emissions from SA installations for indirect discharges, as well as the applied abatement techniques.



NB: For a better visualisation values greater than 2.5 mg/l are not shown in the graph.

Figure 4.13: AOX emissions to water (mg/l) from SA installations (indirect discharges)

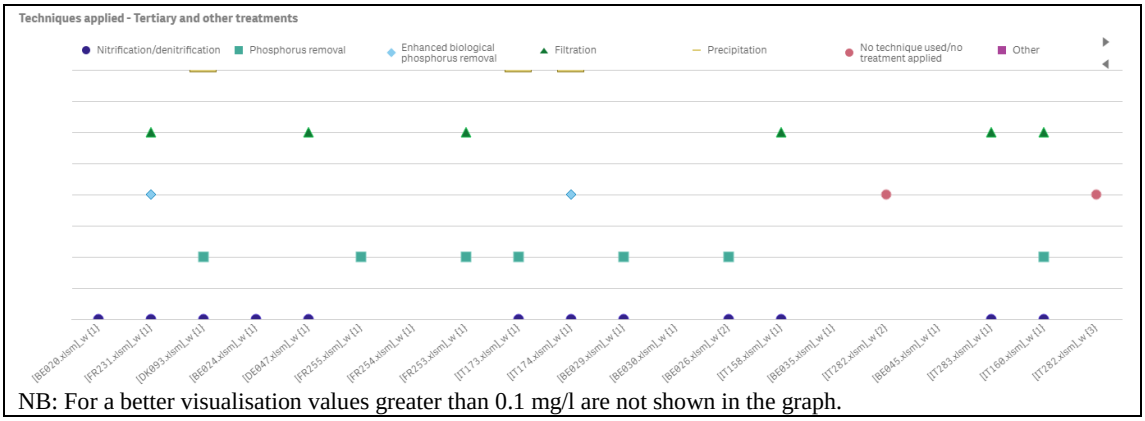
4.1.6 Cu (slaughterhouses)

Data selection (Direct discharges)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: Copper (Cu)
2. Filter pane for Type of discharge: Direct discharge to the environment
3. Filter pane for Type(s) of processes carried out: Slaughterhouse

In Figure 4.14 are presented the data for reported Cu emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.



NB: For a better visualisation values greater than 0.1 mg/l are not shown in the graph.

Figure 4.14: Cu emissions to water (mg/l) from slaughterhouses (direct discharges)

Data selection (Indirect discharges)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: Copper (Cu)
2. Filter pane for Type of discharge: Indirect discharge to a downstream (off-site) WWTP
3. Filter pane for Type(s) of processes carried out: Slaughterhouse

In Figure 4.15 are presented the data for reported Cu emissions from SA installations for indirect discharges, as well as the applied abatement techniques.

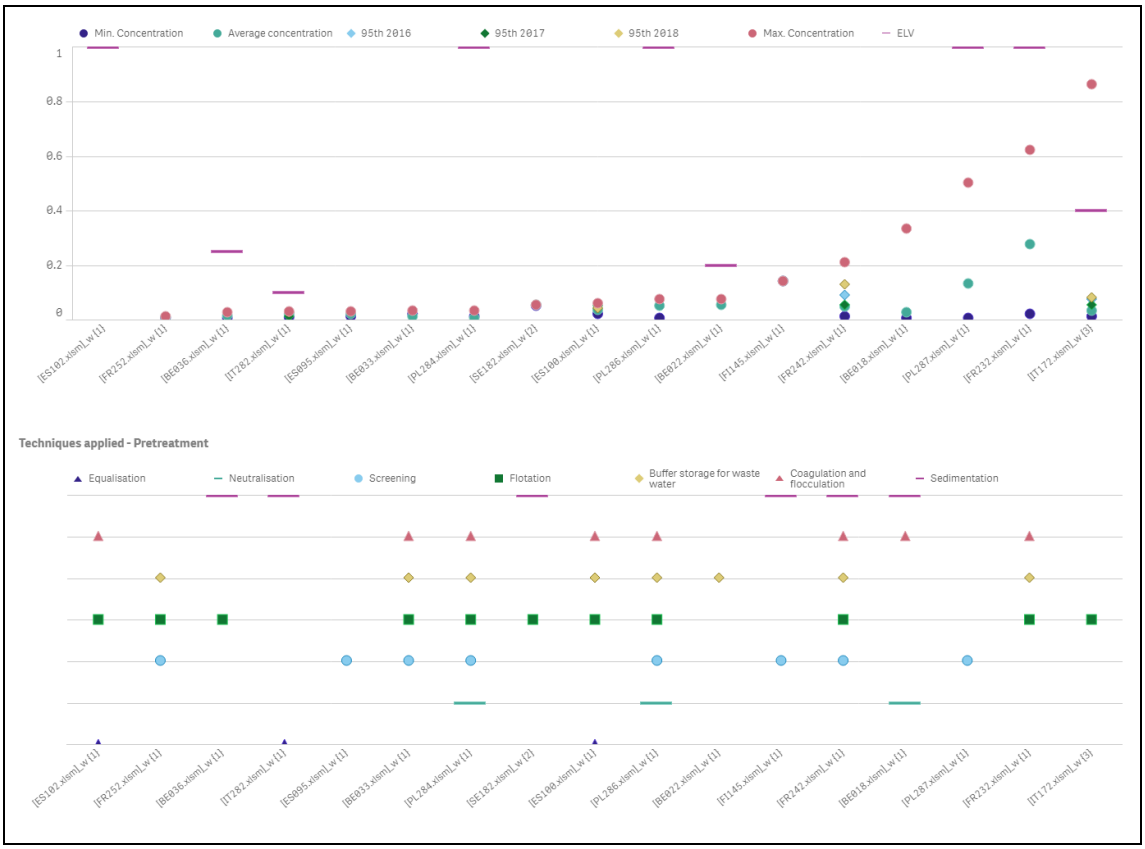


Figure 4.15: Cu emissions to water (mg/l) from slaughterhouses (indirect discharges)

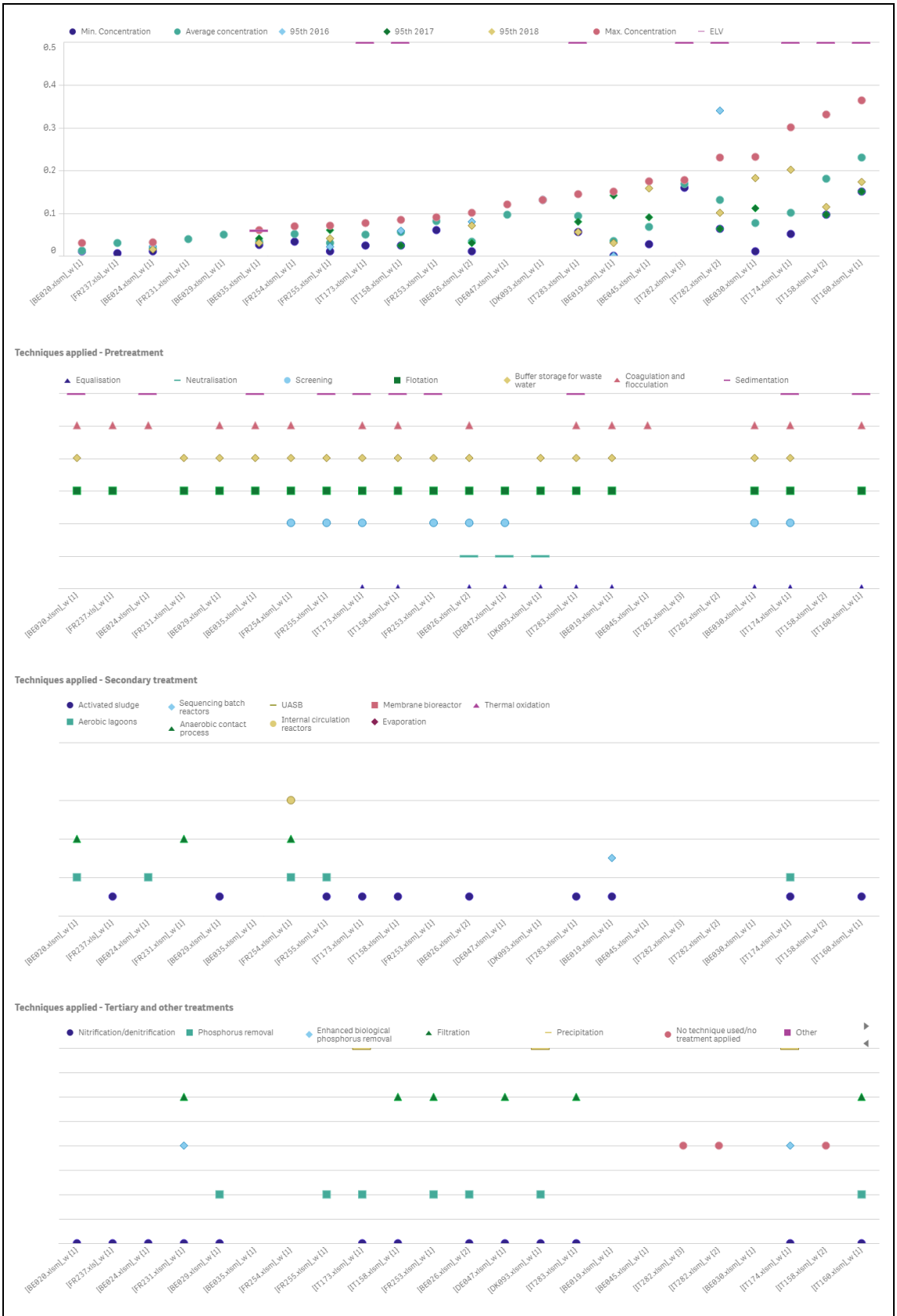
4.1.7 Zn (slaughterhouses)

Data selection (Direct discharges)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: Zinc (Zn)
2. Filter pane for Type of discharge: Direct discharge to the environment
3. Filter pane for Type(s) of processes carried out: Slaughterhouse

In Figure 4.16 are presented the data for reported Zn emissions to water from SA installations for direct discharges, as well as the applied abatement techniques.



NB: For a better visualisation ELVs greater than 0.5 mg/l are not shown in the graph.

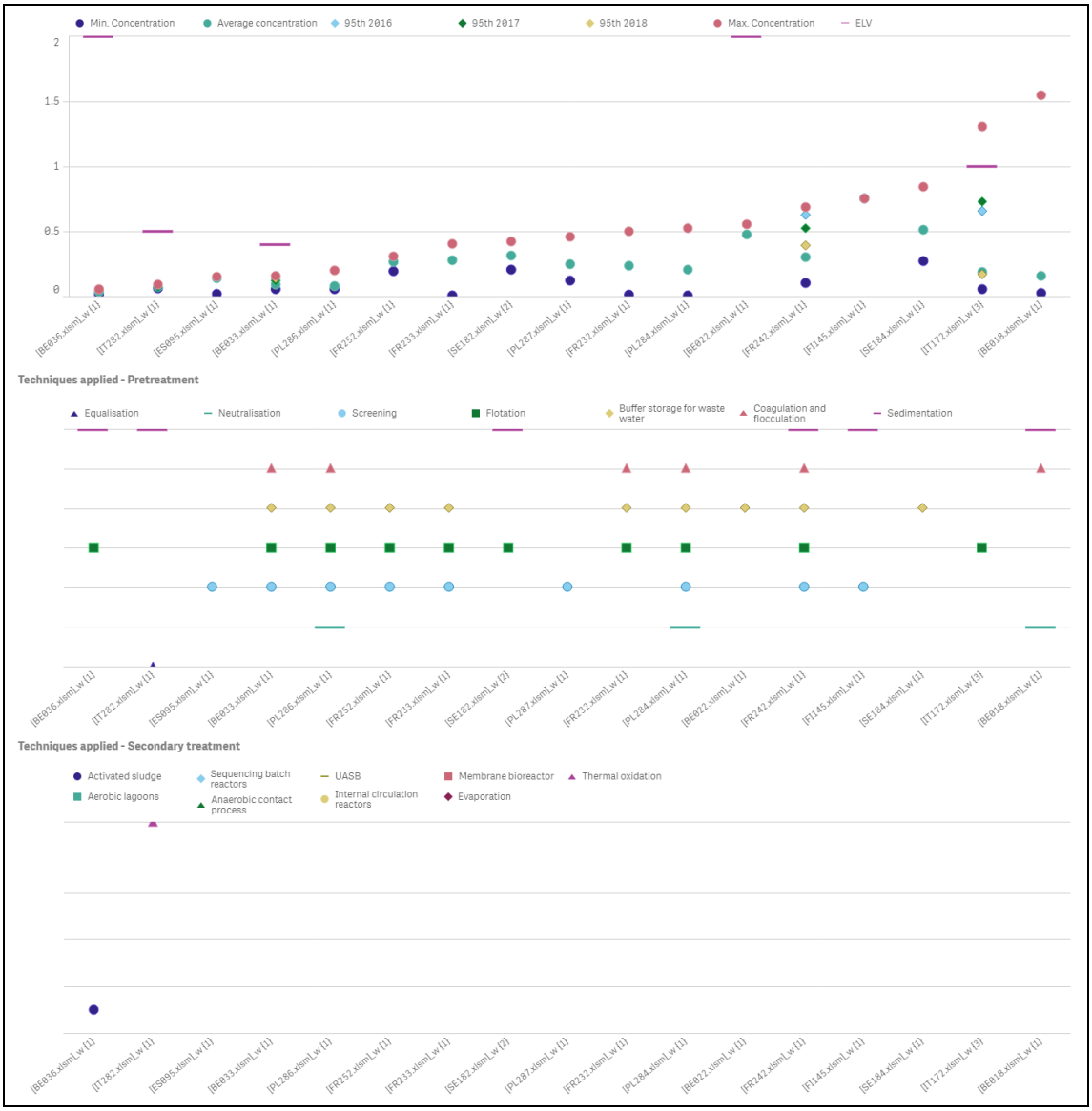
Figure 4.16: Zn emissions to water (mg/l) from slaughterhouses (direct discharges)

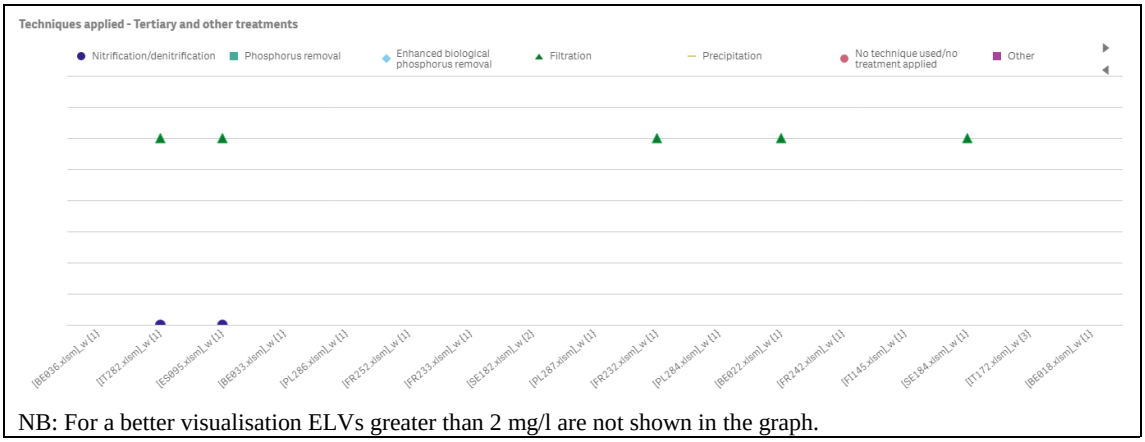
Data selection (Indirect discharges)
Qlik sheet: Emissions to water_General

Filters applied:

1. Filter pane for Parameter: Zinc (Zn)
2. Filter pane for Type of discharge: Indirect discharge to a downstream (off-site) WWTP
3. Filter pane for Type(s) of processes carried out: Slaughterhouse

In Figure 4.17 are presented the data for reported Zn emissions from SA installations for indirect discharges, as well as the applied abatement techniques.





NB: For a better visualisation ELVs greater than 2 mg/l are not shown in the graph.

Figure 4.17*:* Zn emissions to water (mg/l) from slaughterhouses (indirect discharges)

5 BAT-AELS FOR EMISSIONS TO AIR

5.1 Odour

5.1.1 Rendering, fat melting, blood and/or feather processing

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: Odour
2. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins

Figure 5.1 and Figure 5.2 present the data for odour emissions reported, including the associated techniques.

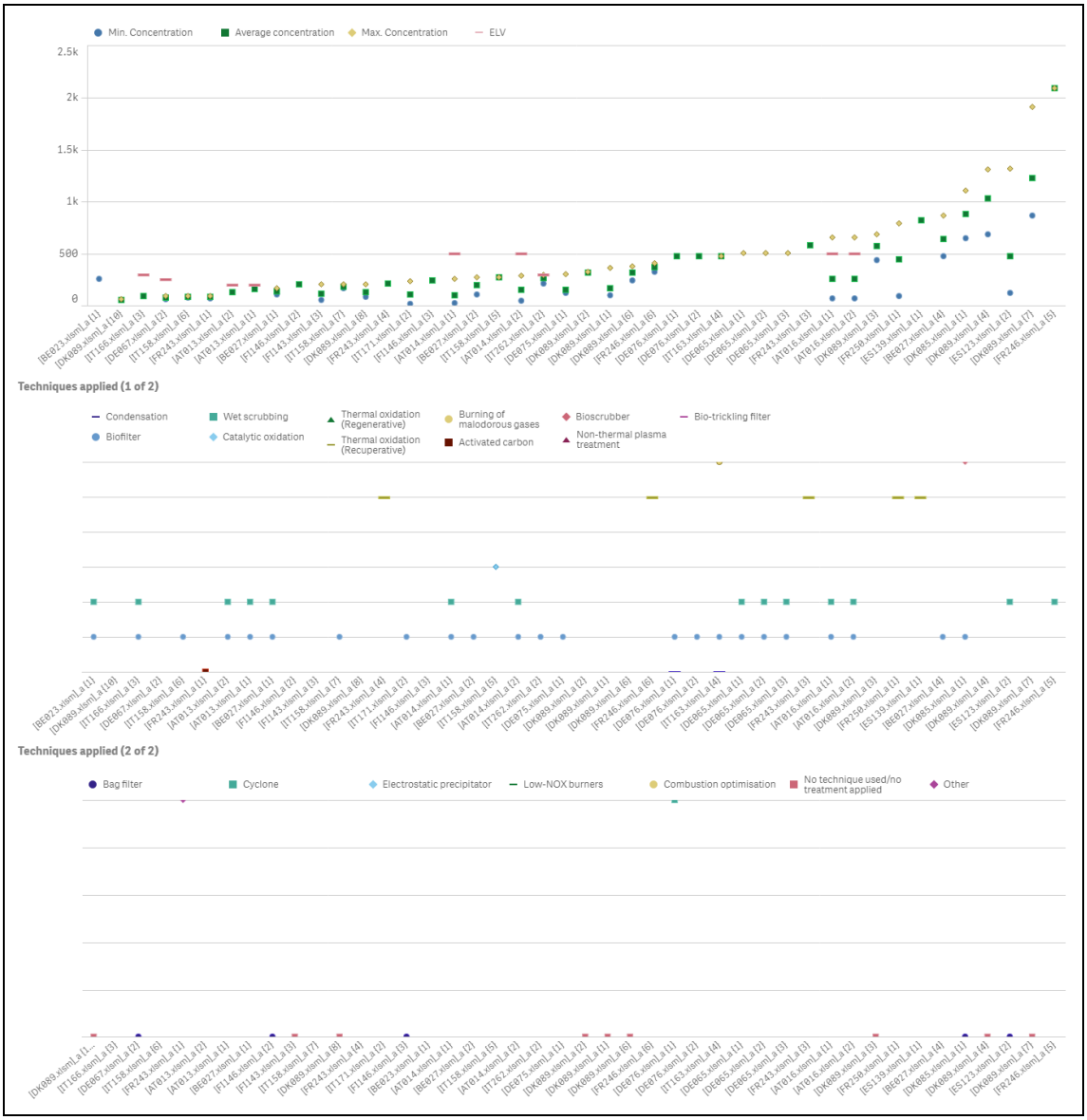
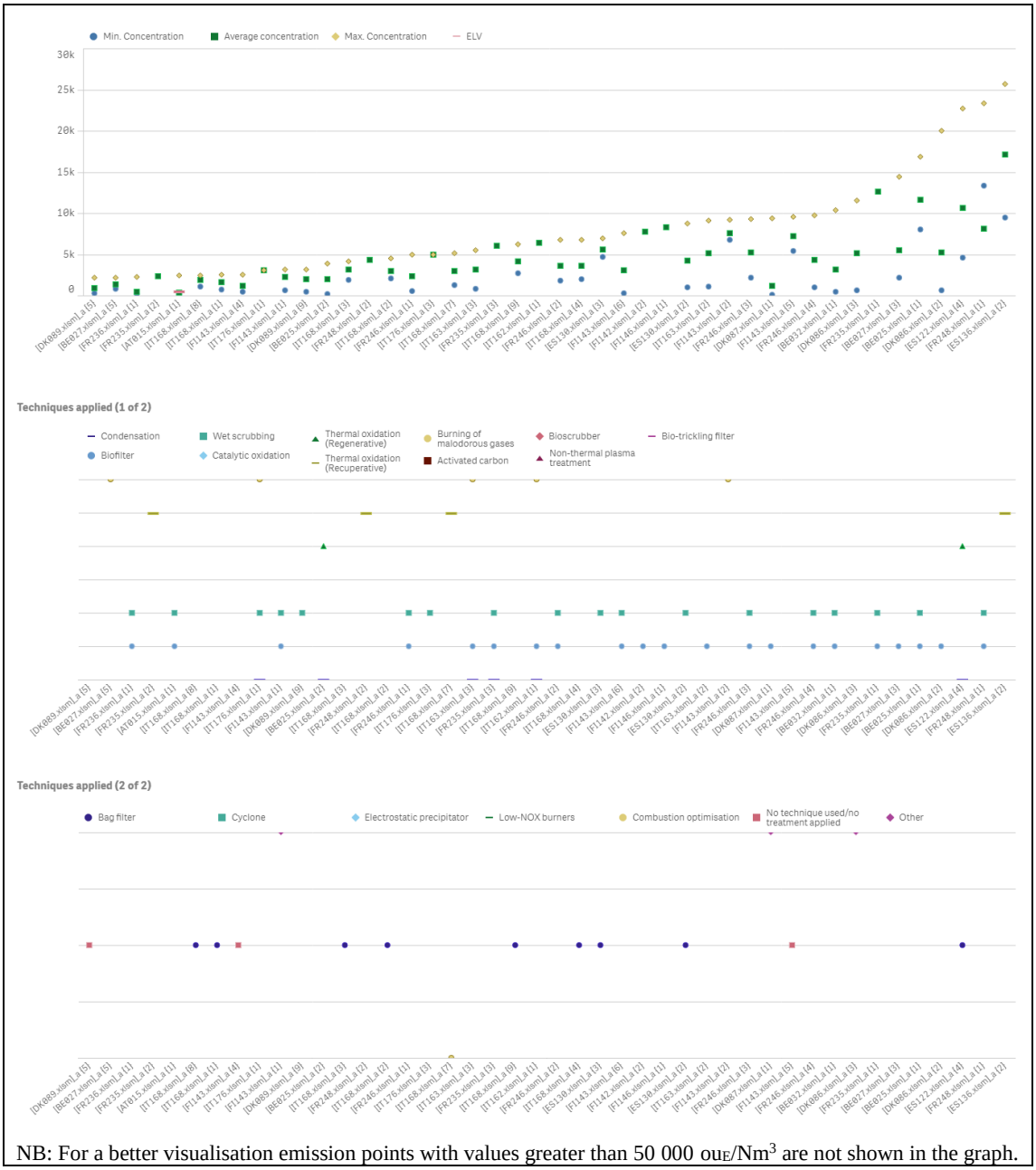


Figure 5.1: Odour emissions (ou_E/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 1 of 2)



NB: For a better visualisation emission points with values greater than 50 000 ou_E/Nm^3 are not shown in the graph.

Figure 5.2: Odour emissions (ou_E/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 2 of 2)

5.1.2 Fishmeal and fih oil production

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: Odour
2. Filter pane for Types of non-slaughter SA activities: Fishmeal and fish oil production

Figure 5.3 and Figure 5.4 present the data for odour emissions reported, including the associated techniques.

Figure 5.3: Odour emissions (ou_E/Nm^3) and abatement techniques from fishmeal and fish oil production (Part 1 of 2)

Figure 5.4: Odour emissions (ou_E/Nm^3) and abatement techniques from fishmeal and fish oil production (Part 2 of 2)

5.1.3 Gelatine manufacturing

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: Odour
2. Filter pane for Types of non-slaughter SA activities: Gelatine manufacturing

Data for odour emissions to air from only 2 points of release have been reported. The maximum concentrations reported were 70 (using biofilter) and 5 990 ou_E/Nm^3 (no abatement technique used) respectively.

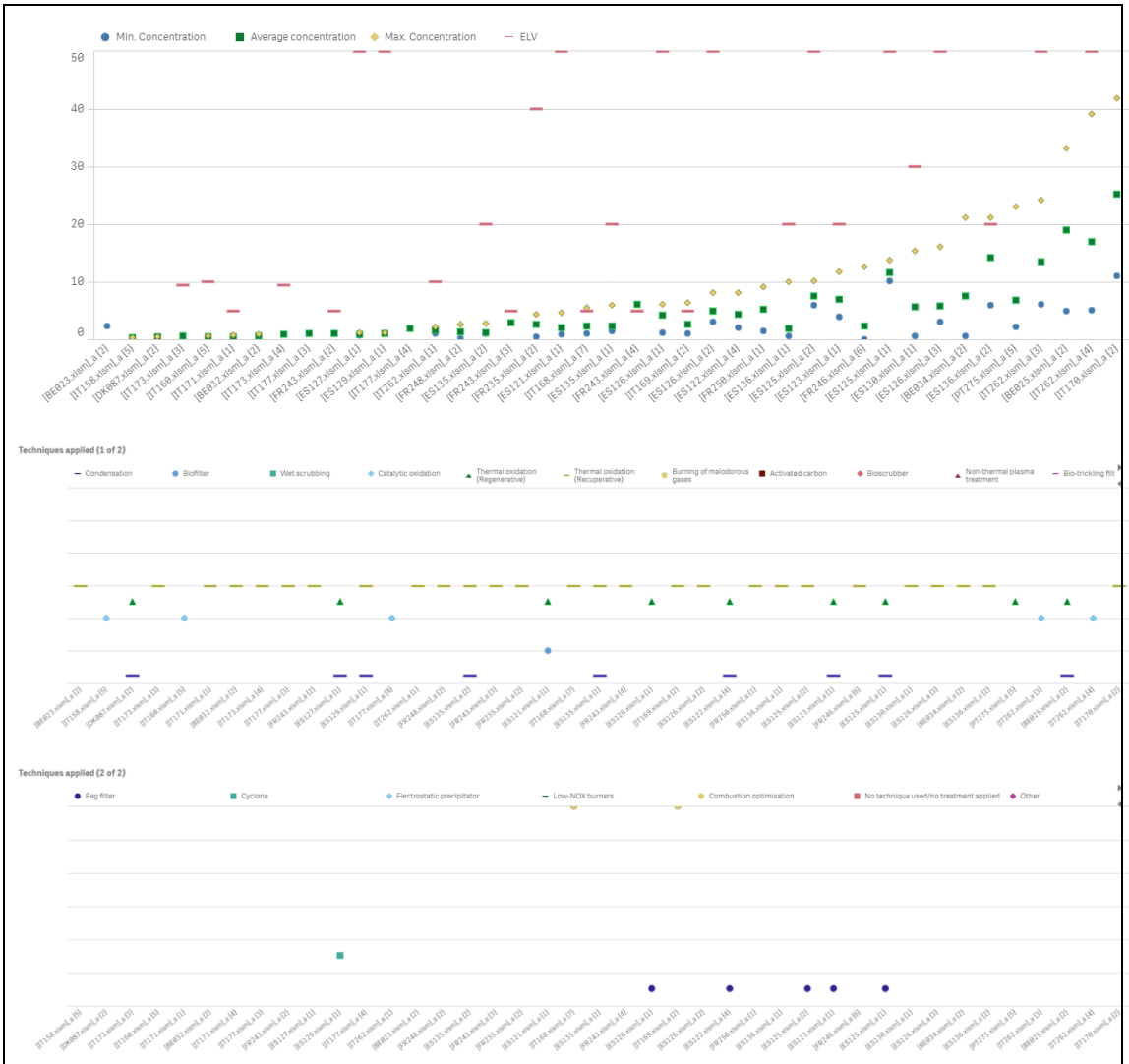
5.2 Dust

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

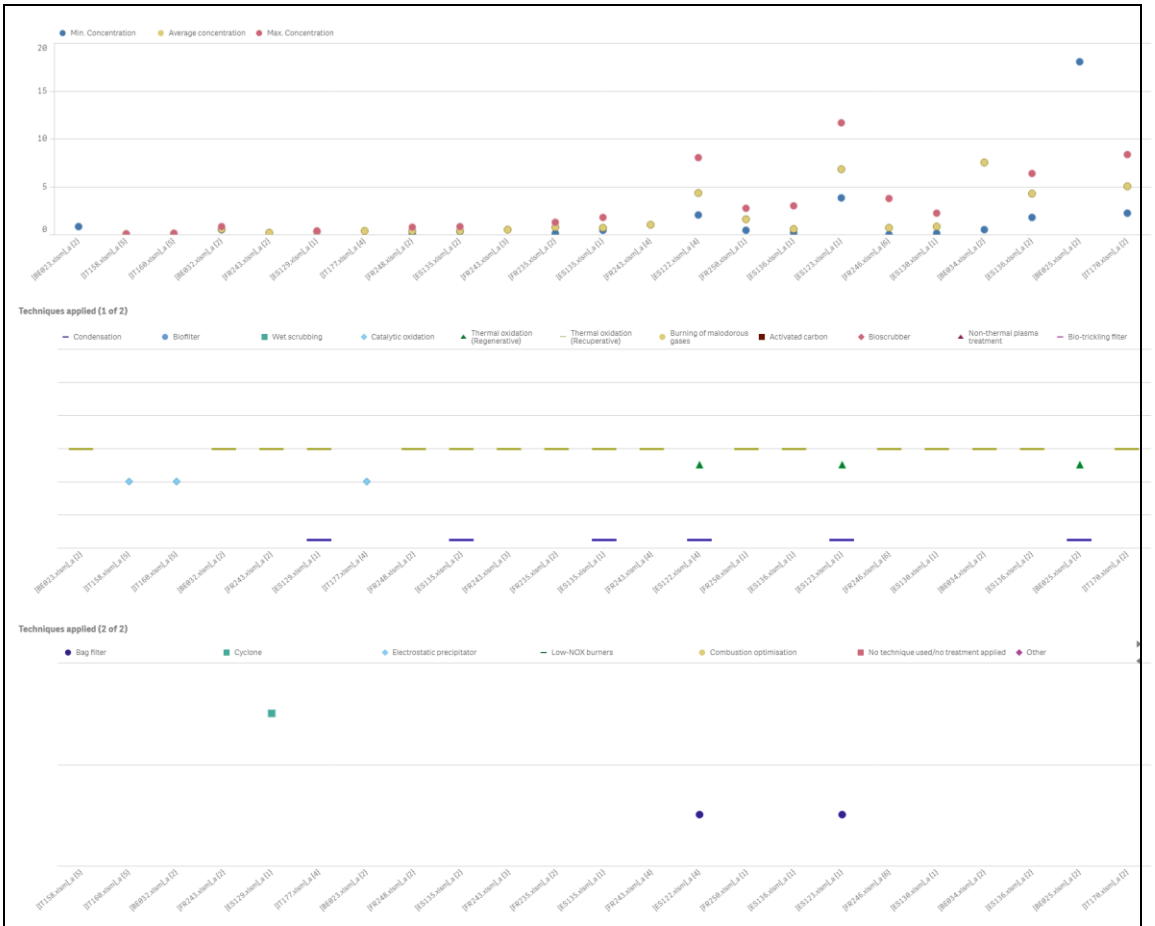
1. Filter pane for Parameter: Dust
2. Filter pane for waste gas treatment techniques applied: thermal oxidation (recuperative) + thermal oxidation (regenerative) + catalytic oxidation

Figure 5.5 and Figure 5.6 present the data for dust emissions reported, including the associated techniques.



NB: For a better visualisation values greater than 50 mg/Nm^3 are not shown in the graph.

Figure 5.5*:* **Dust emissions (mg/Nm^3) and abatement techniques from thermal oxidation**



NB: For a better visualisation values greater than 20 mg/Nm^3 are not shown in the graph.

Figure 5.6: Dust emissions (mg/Nm^3) and abatement techniques from thermal oxidation (values corrected to 18% O_2)

5.3 NO_X

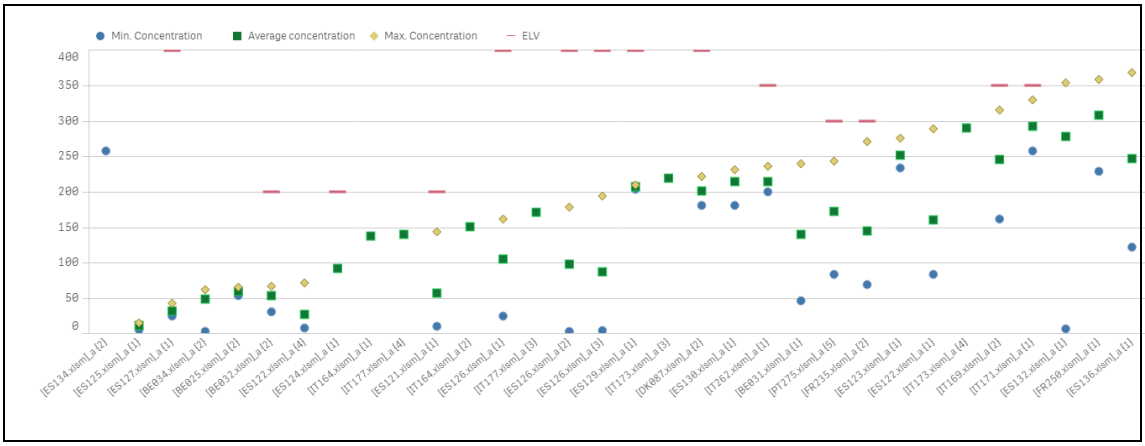
Data selection
Qlik Sheet: Emissions to air_General

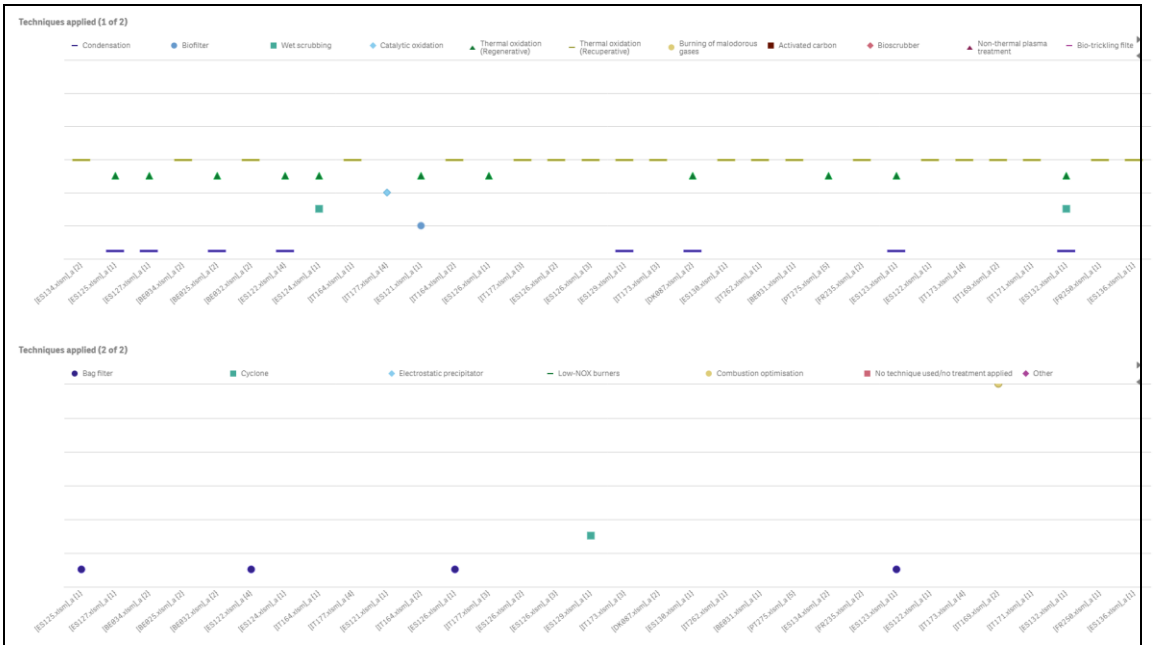
Filters applied:

1. Filter pane for Parameter: NO_X
2. Filter pane for waste gas treatment techniques applied: thermal oxidation (recuperative) + thermal oxidation (regenerative) + catalytic oxidation

NB: For a better visualisation ELVs greater than 400 mg/Nm^3 are not shown in the graph.

Figure 5.7, Figure 5.8 and Figure 5.9 present the data for NO_X emissions reported, including the associated techniques.





NB: For a better visualisation ELVs greater than 400 mg/Nm^3 are not shown in the graph.

Figure 5.7: NO_X emissions (mg/Nm^3) and abatement techniques from thermal oxidation (Part 1 of 2)

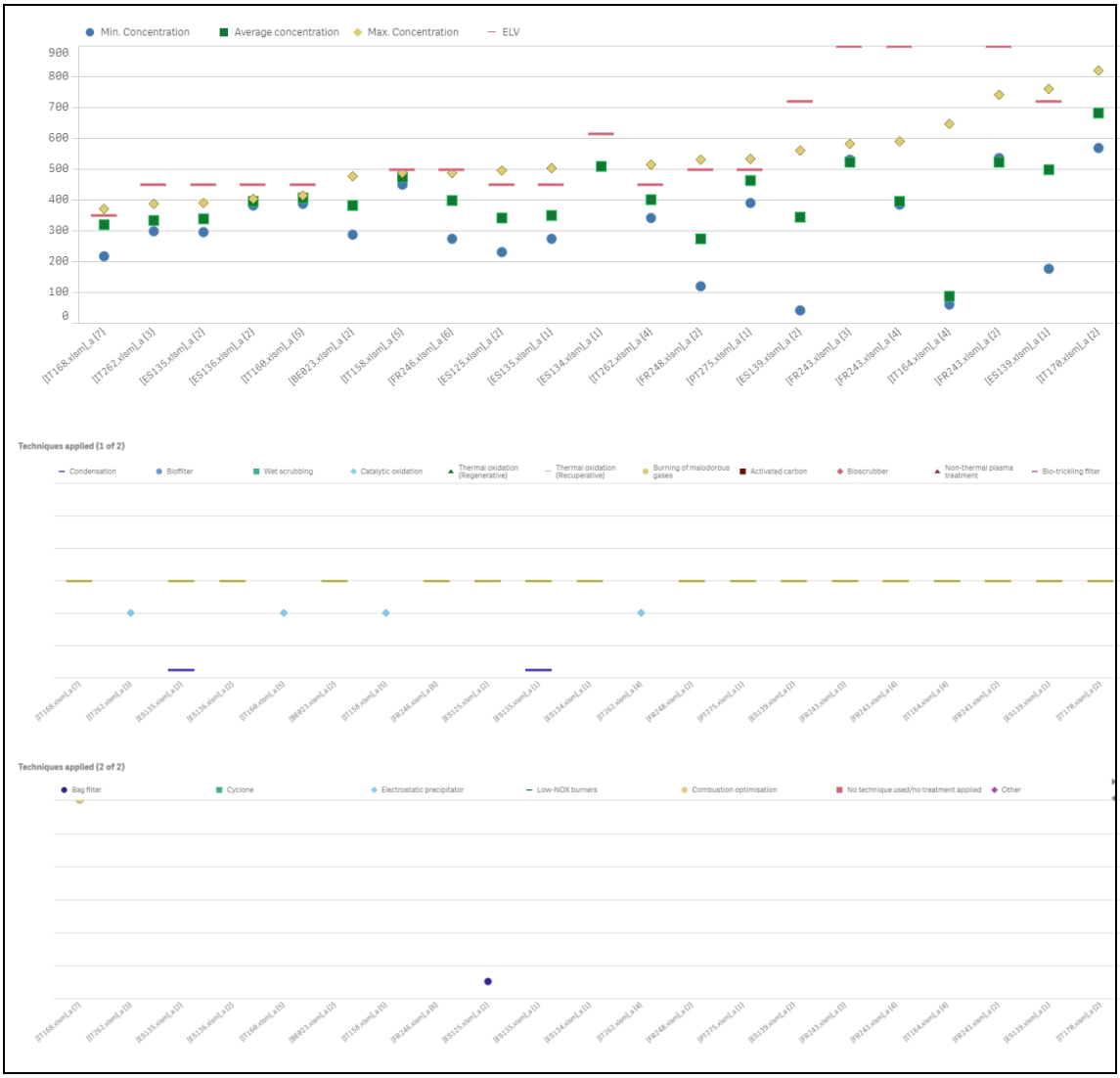


Figure 5.8: NO_X emissions (mg/Nm^3) and abatement techniques from thermal oxidation (Part 2 of 2)

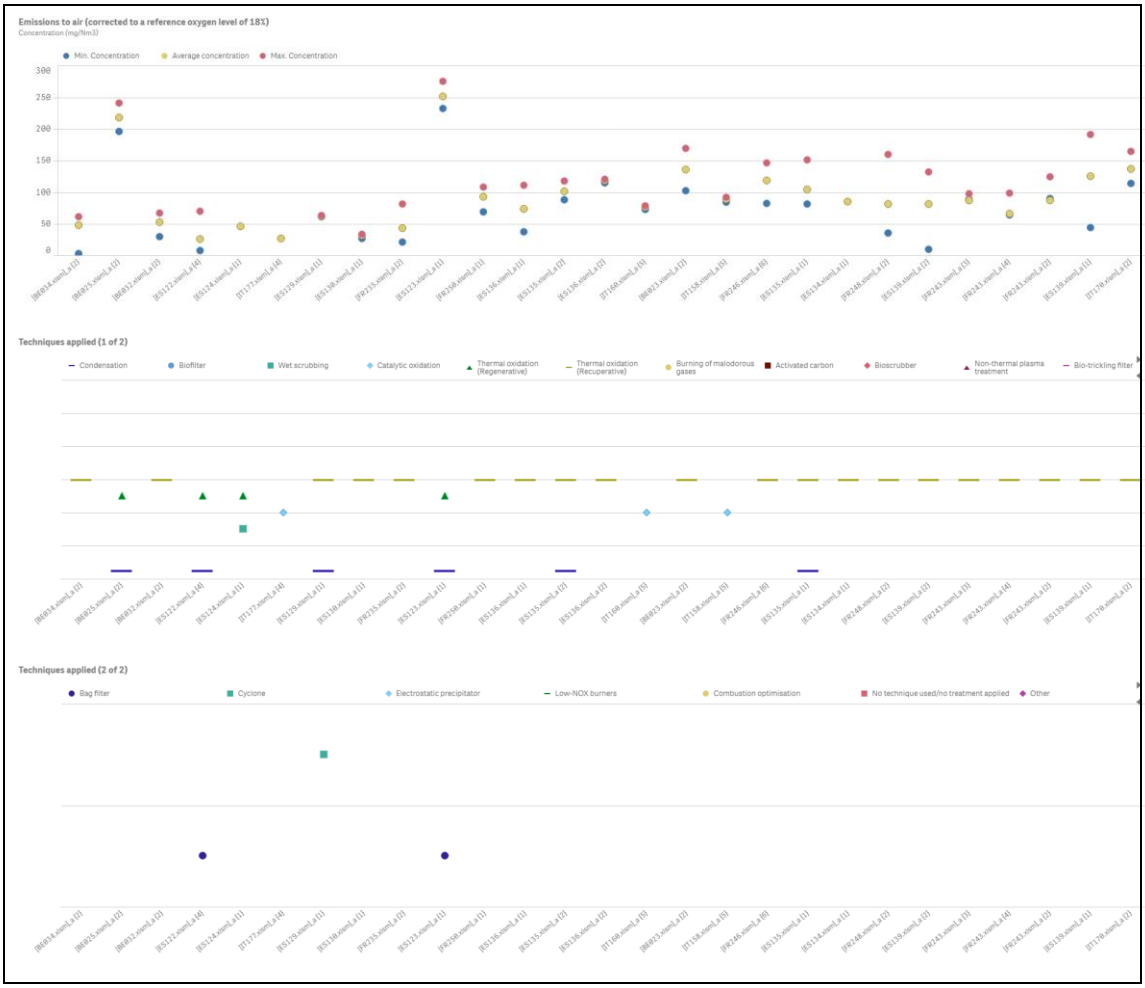


Figure 5.9: NO_X emissions (mg/Nm^3) and abatement techniques from thermal oxidation (values corrected to 18% O_2)

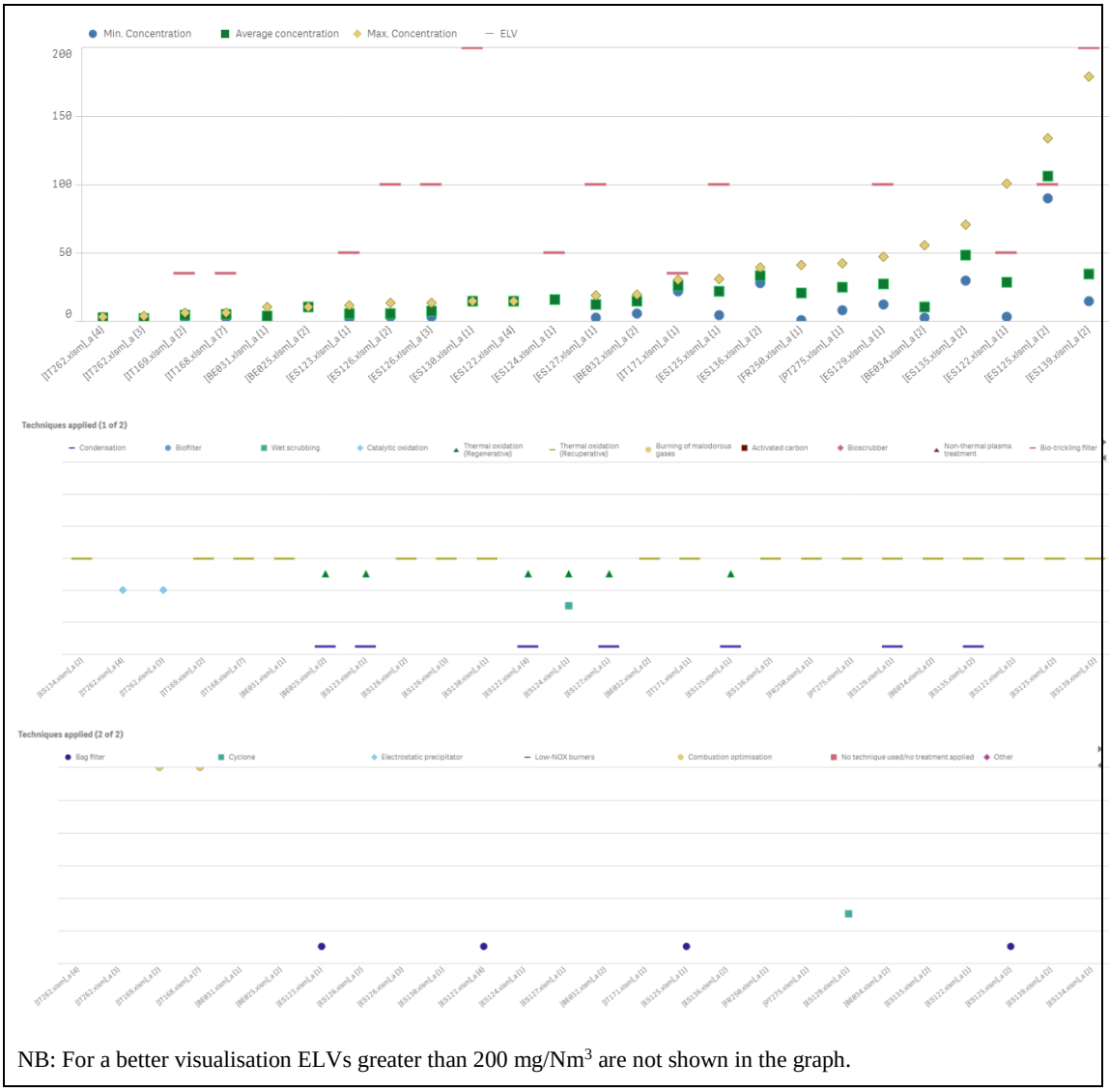
5.4 SO_X

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: SO_X
2. Filter pane for waste gas treatment techniques applied: thermal oxidation (recuperative) + thermal oxidation (regenerative) + catalytic oxidation

Figure 5.10, Figure 5.11 and Figure 5.12 present the data for SO_X emissions reported, including the associated techniques.



NB: For a better visualisation ELVs greater than 200 mg/Nm^3 are not shown in the graph.

Figure 5.10: SO_X emissions (mg/Nm^3) and techniques from thermal oxidation (Part 1 of 2)

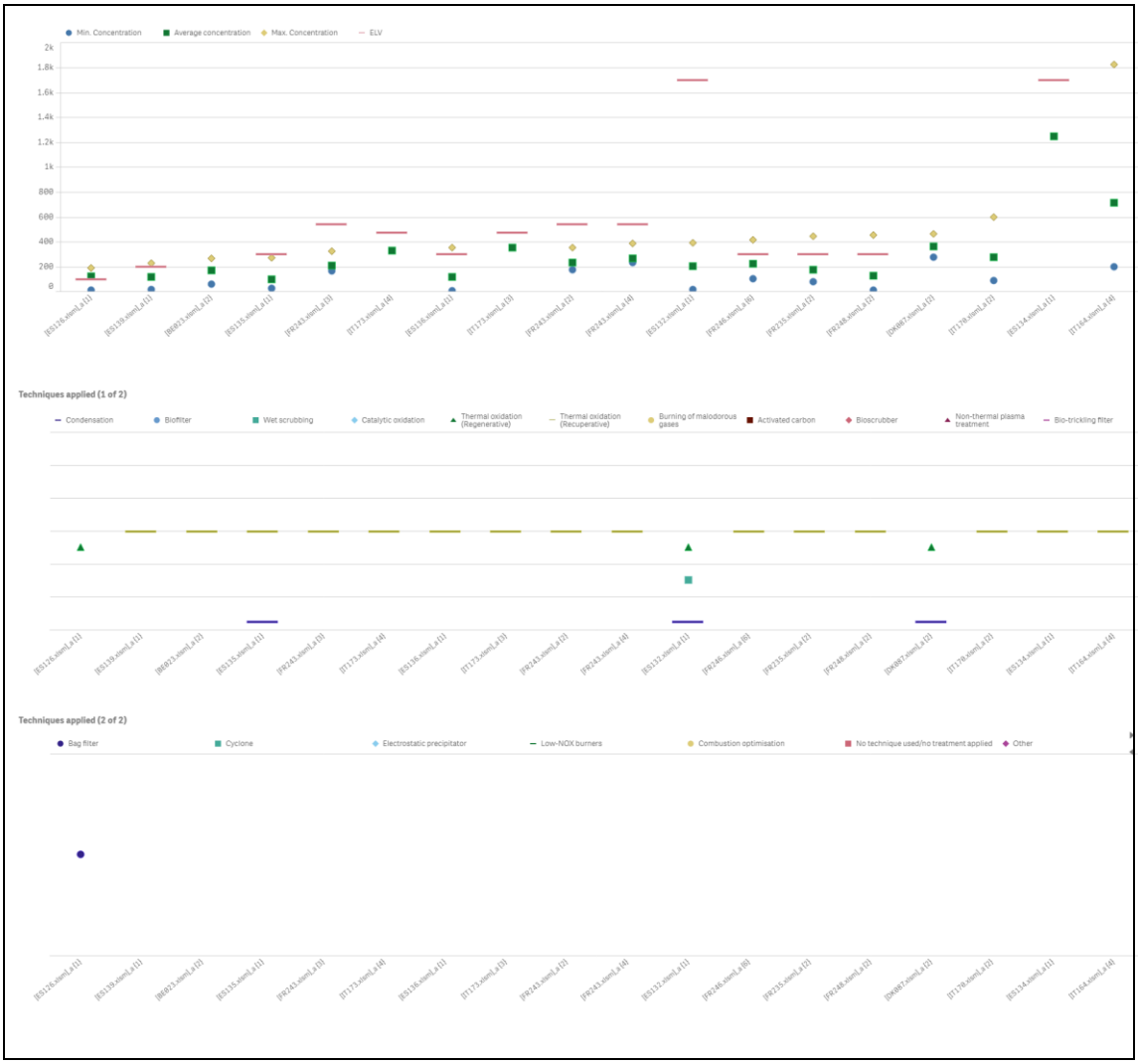


Figure 5.11: SO_X emissions (mg/Nm^3) and techniques from thermal oxidation (Part 2 of 2)

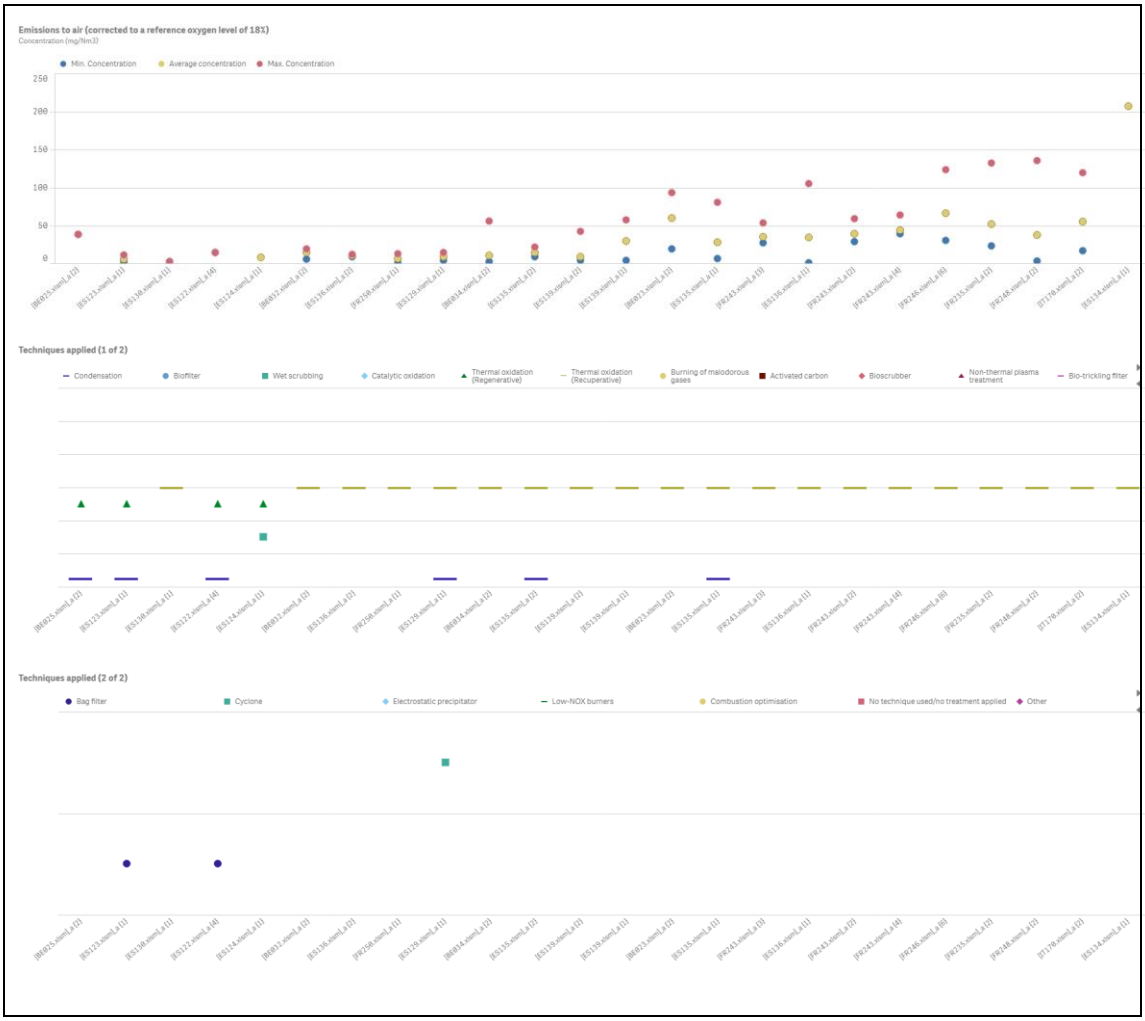


Figure 5.12: SO_X emissions (mg/Nm^3) and techniques from thermal oxidation (values corrected to 18% O_2)

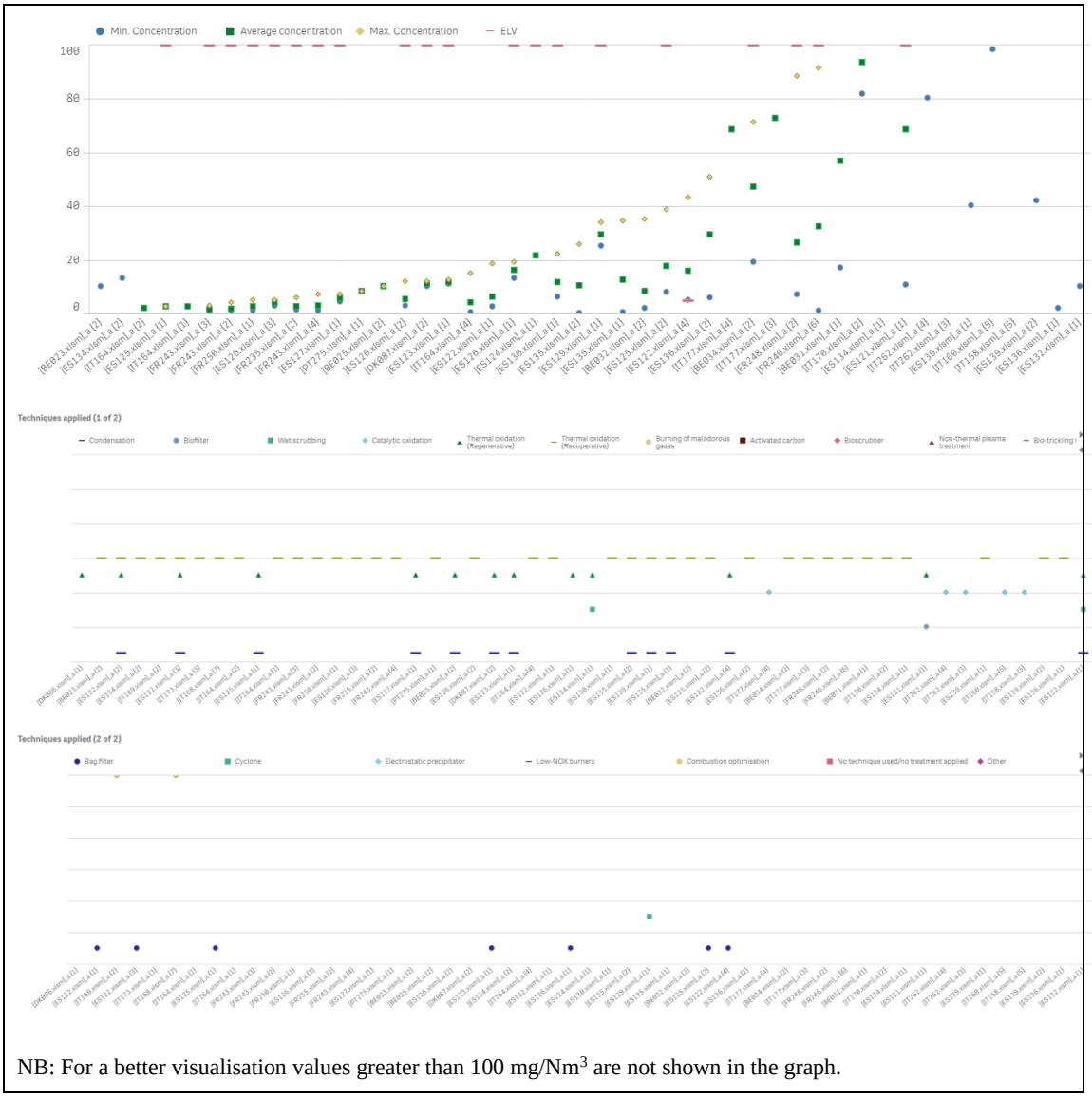
5.5 CO

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

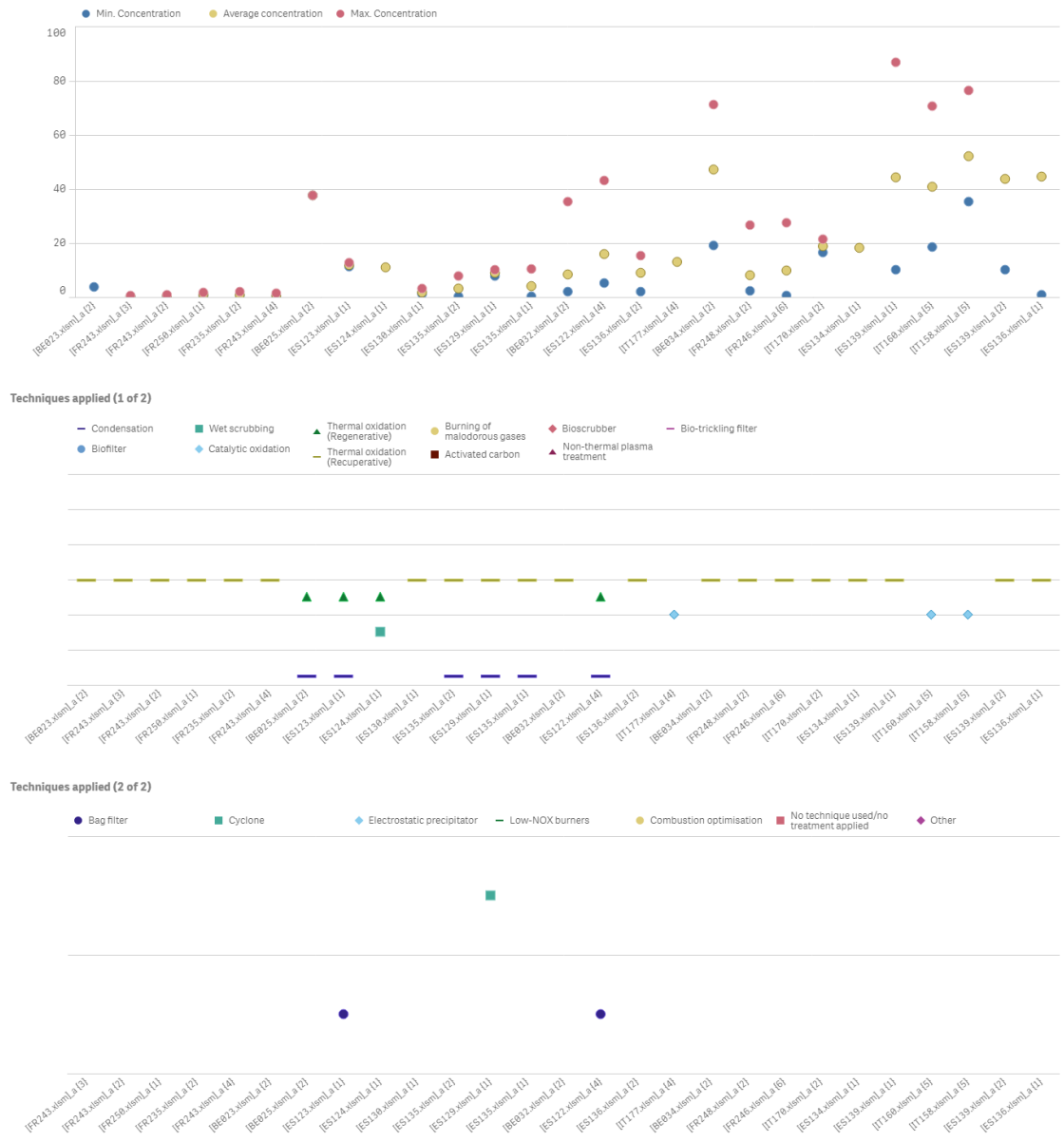
1. Filter pane for Parameter: CO
2. Filter pane for waste gas treatment techniques applied: thermal oxidation (recuperative) + thermal oxidation (regenerative) + + catalytic oxidation

Figure 5.13 and Figure 5.14 present the data for CO emissions reported, including the associated techniques.



NB: For a better visualisation values greater than 100 mg/Nm^3 are not shown in the graph.

Figure 5.13*:* CO emissions (mg/Nm^3) and techniques from thermal oxidation



NB: For a better visualisation values greater than 100 mg/Nm^3 are not shown in the graph.

Figure 5.14: CO emissions (mg/Nm^3) and techniques from thermal oxidation (values corrected to 18% O_2)

5.6 NH_3

5.6.1 Rendering, fat melting, blood and/or feather processing

Data selection
Qlik Sheet: Emissions to air_General

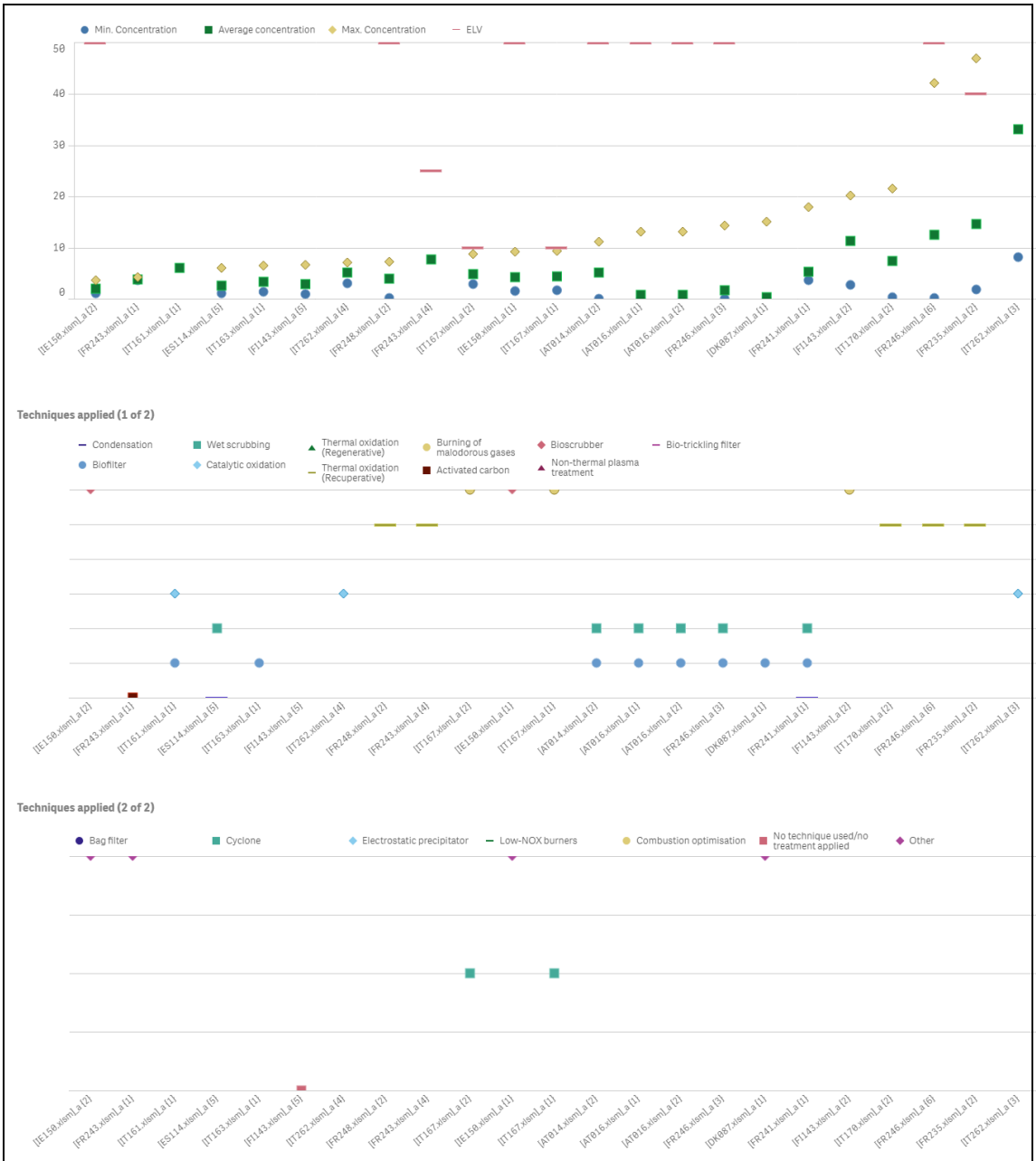
Filters applied:

1. Filter pane for Parameter: NH_3
2. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins

Figure 5.15 and Figure 5.16 present the data for NH_3 emissions reported, including the associated techniques.

NB: For a better visualisation ELVs greater than 5 mg/Nm^3 are not shown in the graph.

Figure 5.15: NH_3 emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 1 of 2)



NB: For a better visualisation emission points with values greater than 50 mg/Nm^3 are not shown in the graph.

Figure 5.16: NH_3 emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 2 of 2)

5.6.2 Fishmeal and fih oil production

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: NH_3
2. Filter pane for Types of non-slaughter SA activities: Fishmeal and fish oil production

Figure 5.17 presents the data for NH_3 emissions reported, including the associated techniques.

NB: For a better visualisation ELVs (thav can be as high as 500 mg/Nm^3) are not shown in the graph.

Figure 5.17: NH_3 emissions (mg/Nm^3) and abatement techniques from fishmeal and fish oil production

5.6.3 Gelatine manufacturing

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: NH_3
2. Filter pane for Types of non-slaughter SA activities: Gelatine manufacturing

No data have been reported.

5.7 TVOC

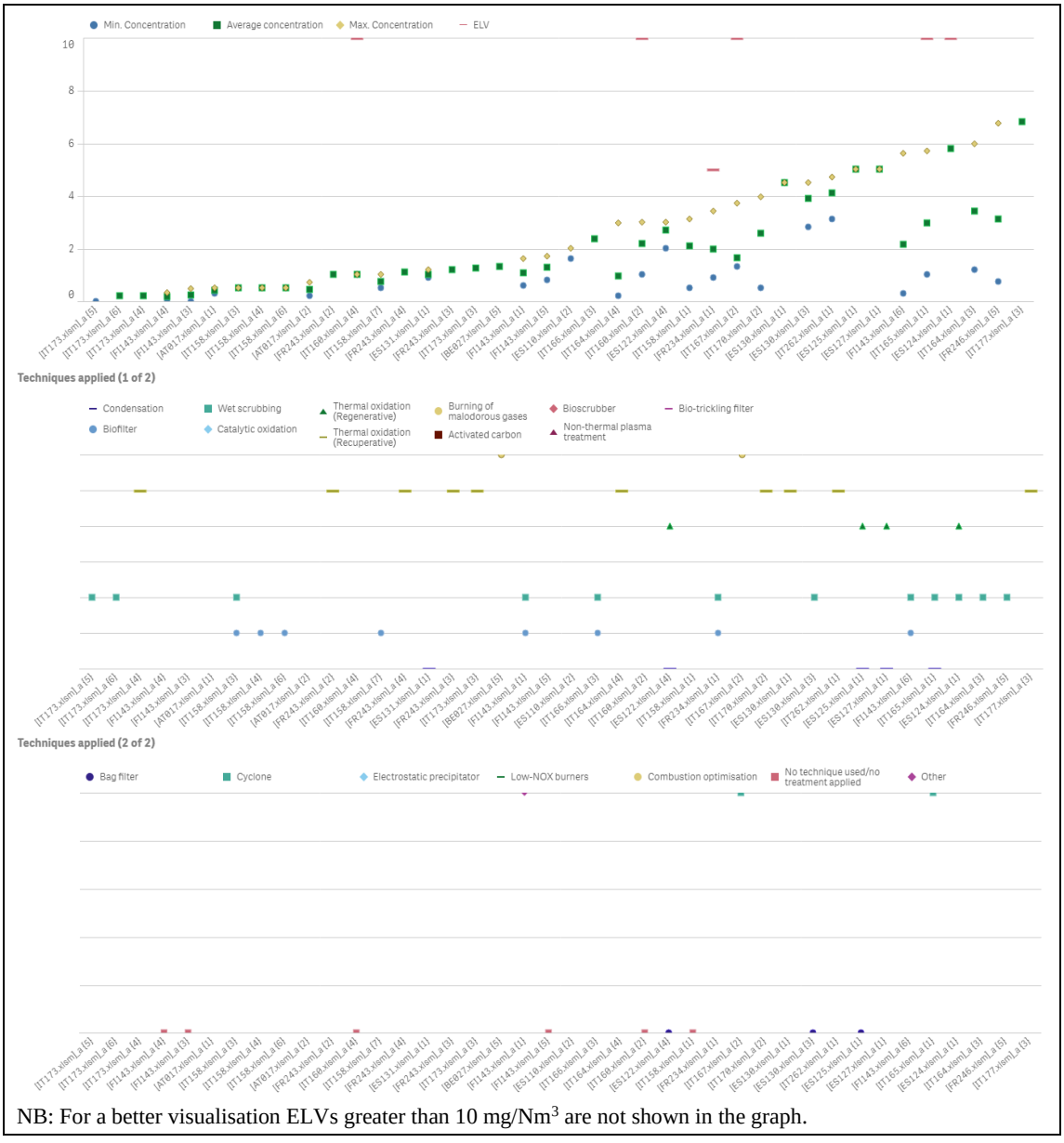
5.7.1 Rendering, fat melting, blood and/or feather processing

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

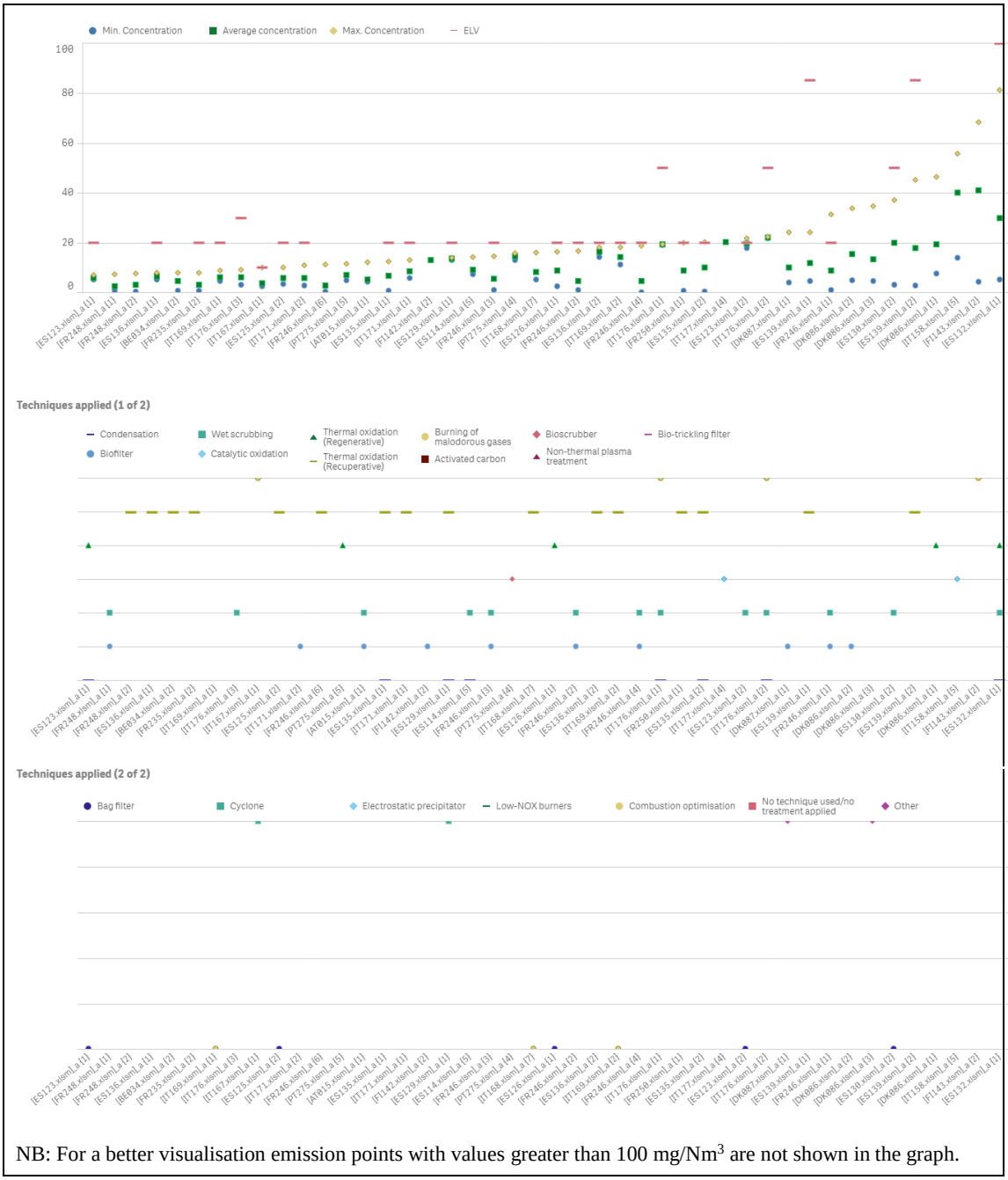
1. Filter pane for Parameter: TVOC
2. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins

Figure 5.18 and Figure 5.19 present the data for TVOC emissions reported, including the associated techniques.



NB: For a better visualisation ELVs greater than 10 mg/Nm^3 are not shown in the graph.

Figure 5.18: TVOC emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 1 of 2)



NB: For a better visualisation emission points with values greater than 100 mg/Nm^3 are not shown in the graph.

Figure 5.19: TVOC emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 2 of 2)

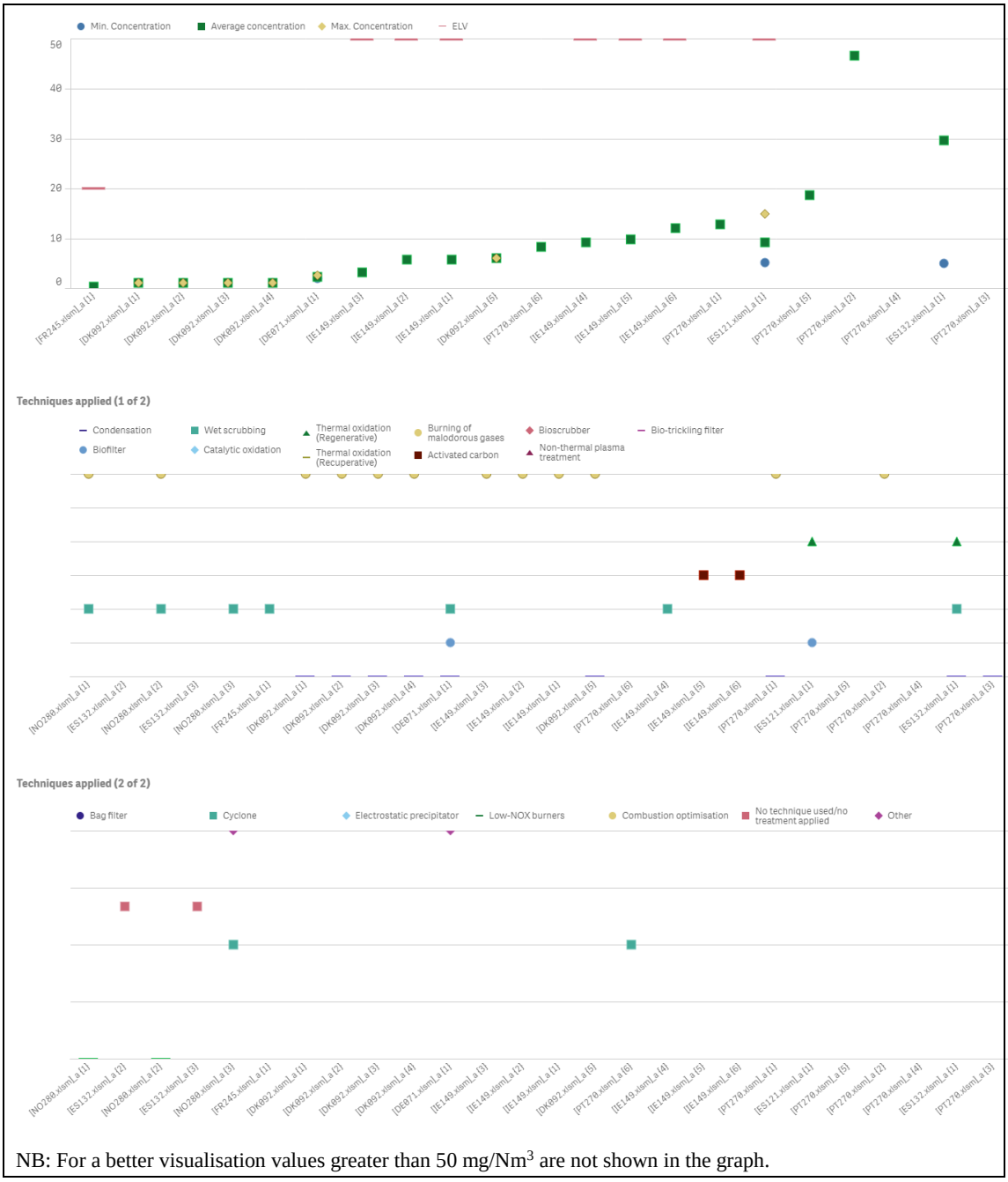
5.7.2 Fishmeal and fih oil production

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: TVOC
2. Filter pane for Types of non-slaughter SA activities: Fishmeal and fish oil production

Figure 5.20 presents the data for TVOC emissions reported, including the associated techniques.



NB: For a better visualisation values greater than 50 mg/Nm^3 are not shown in the graph.

Figure 5.20: TVOC emissions (mg/Nm^3) and abatement techniques from fishmeal and fish oil production

5.7.3 Gelatine manufacturing

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: TVOC
2. Filter pane for Types of non-slaughter SA activities: Gelatine manufacturing

No data have been reported.

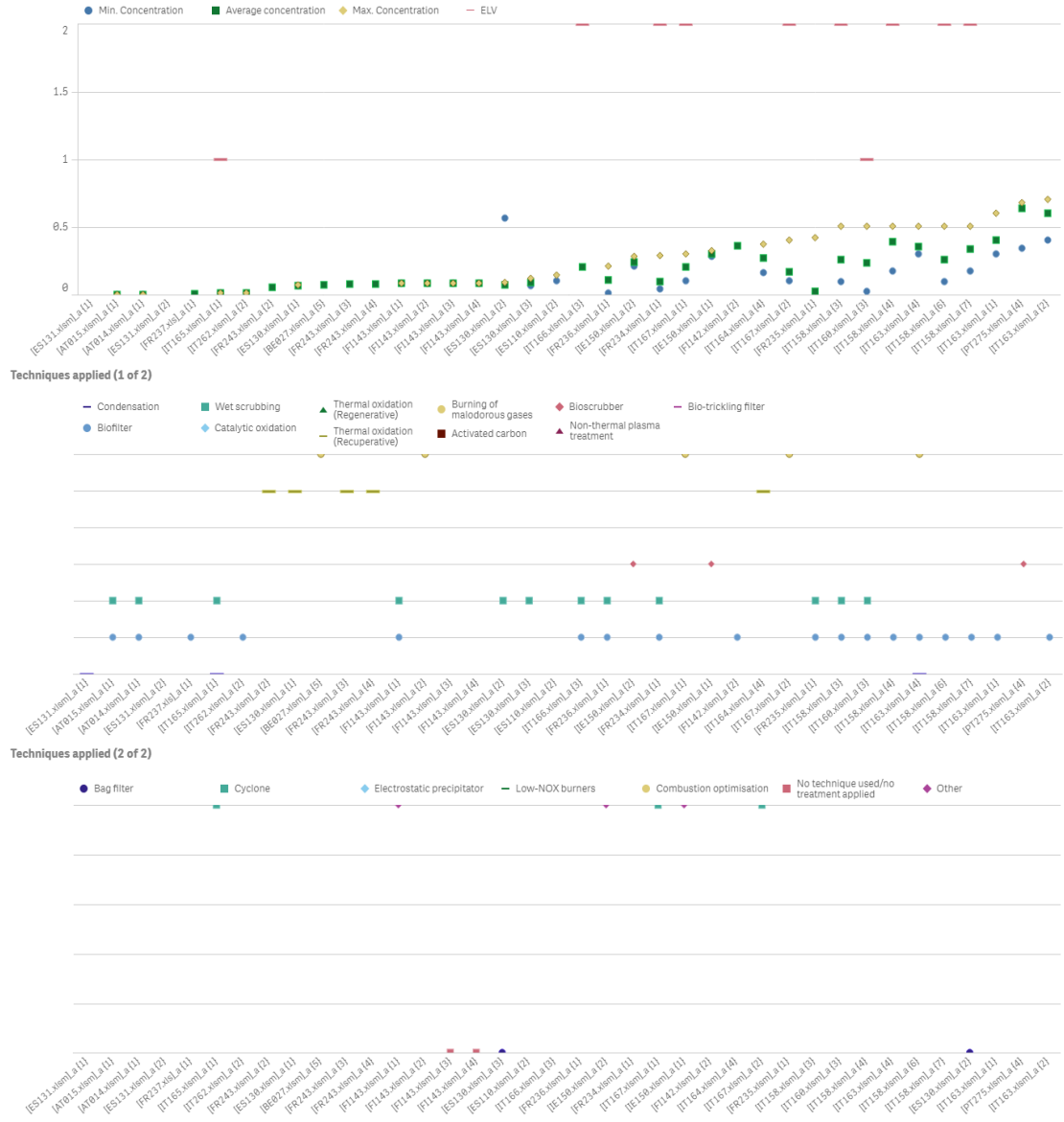
5.8 H_2S

Data selection
Qlik Sheet: Emissions to air_General

Filters applied:

1. Filter pane for Parameter: H_2S
2. Filter pane for Types of non-slaughter SA activities: Rendering (feather processing included) + fat melting + blood processing + preservation of hides and skins

Figure 5.21 and Figure 5.22 present the data for H_2S emissions reported, including the associated techniques.



NB: For a better visualisation ELVs greater than 2 mg/Nm^3 are not shown in the graph.

Figure 5.21: H_2S emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 1 of 2)

NB: For a better visualisation emission points with values greater than 15 mg/Nm^3 are not shown in the graph.

Figure 5.22: H_2S emissions (mg/Nm^3) and abatement techniques from rendering, fat melting, blood and/or feather processing (Part 2 of 2)