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# Sectoral Impact Assessment Regulatory Impact Assessment

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# Sectoral Impact Assessment





# SIA objectives and approach

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**Objectives** of the Sectoral Impact Assessment (SIA): to identify sectors expected to be affected by the By-Law on POPs and describe expected impacts

Approach to SIA (developed in 2014) using:

- **desk research** (national statistics, sectoral reports, existing SIA/ RIA reports)
- **field research**
  - questionnaires to companies and sectoral experts
  - site visits
  - face-to-face interviews with companies and trade associations





# SIA: sectors covered

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## **Sectors affected** by By-Law on POPs:

1. Agriculture, fisheries and food processing
2. Metallurgy
3. Cement industry
4. Chemical industry
5. Textile industry
6. Power production and distribution
7. Waste management





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# SIA: results – Agriculture, fisheries and food processing

| Major POP chemicals involved                                 | Major stakeholders   | Costs  |
|--|--|--|
| POP-pesticides (residues, stockpiles and contaminated areas) | <p>Agricultural firms</p> <p>Food processing companies</p> | <p>Intentional use of pesticides:</p> <ul style="list-style-type: none"> <li>• no additional cost impacts since all POP-pesticides are already banned in Turkey</li> </ul> <p>Historic use of pesticides:</p> <ul style="list-style-type: none"> <li>• POPs stockpiles and contaminated areas</li> </ul> |
| Dioxins, furans, PCBs and pesticide residues in food supply  | <p>Fish farms</p> <p>Consumers</p>                         | <p>Food safety:</p> <ul style="list-style-type: none"> <li>• Improvement of food safety laboratory capacities and monitoring of food supply for POPs residues</li> </ul>   |







# SIA: results – uPOPs

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| Major POP chemicals involved         | Sectors affected                                 | Costs   |
|--------------------------------------|--|---|
| Dioxins/ furans and PCB like dioxins | Agriculture                                      | Cost of minimising open burning of agricultural waste   |
|                                      | Metallurgy (55% of uPOPs – thermal processes)    | <p>Significant abatement costs (BAT) under IPPC (~1,200 installations).</p> <p>Major cost items: control of raw materials, fume and gas collection, recirculation of waste gases, installing afterburners and quenching, introducing high efficiency dust removal</p>   |
|                                      | Cement manufacturing (waste co-incineration, 1%) | <p>Sector is fully compliant with By-Law on Waste Incineration and By-Law on Control of Industrial Air Pollution (FGD/air pollution)</p> <p>BAT of waste co-incineration under IPPC: control and pre-treatment of input material, operational conditions for complete destruction of organics, efficient flue gas treatment systems.</p> <p>No need to invest into further POP reduction techniques – no additional costs</p> |





# SIA: results – uPOPs

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| Major POP chemicals involved         | Sectors affected                                   | Costs   |
|--------------------------------------|--|---|
| Dioxins/ furans and PCB like dioxins | Power production (7% of uPOPs – thermal processes) | Subject to IPPC/(BAT), LCP, NECD, PCB Reg, Waste Incineration legislation. LCP (117) invest into pollution abatement with POPs pollution reduced as a side effect (e.g. dust removal measures)            |
|                                      | Waste management                                   | Waste incineration – subject to current controls and dioxin limit/ BAT  |
|                                      | Chemical industry                                  | Dioxin/ furans emitted by chemical processes, e.g. PVC production (8%).<br>Implementation of BAT for chemical industry to reduce uPOP emissions (dioxin, furan, PAHs, etc.) of certain chemical processes |
|                                      | Textiles industry                                  | Dioxin and furan unintentionally contained in textile raw materials, dyes, fungicides<br>Sector is subject to IPPC (BAT) including source-control and end-of-pipe treatment (advanced WWT)                |





# SIA: results – PCBs

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| Major POP chemicals involved | Sectors affected | Costs  |
|------------------------------|------------------|--|
| PCBs                         | Power production | Power plants and electricity transmission and distribution companies<br>Collecting and destroying PCB containing equipment |
|                              | Waste management | Municipalities and public/ private waste management companies<br>Collecting and destroying PCB containing equipment        |
|                              | Metallurgy       | Ferrous and non-ferrous metallurgy companies<br>Collecting and destroying PCB containing equipment                         |







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# SIA: results – industrial chemicals (BDEs and PFOS)

| Major POP chemicals involved                        | Sectors affected  | Costs  |
|---|-------------------|--|
| Brominated flame retardants (pBDEs, HBCDD) and PFOS | Textiles industry | Flame retardants (pBDE, HBCDD, PFOS) for fire safety of textile products (carpets, upholstery)<br>Substitution of POPs flame retardants with less harmful substances (90% of PFOS used in carpets; ~10 tonnes per year of penta/ tetra BDE imported) |
|   | Chemical industry | Companies producing and using BDEs, PFOS and their alternatives<br>Substitution of industrial chemicals (e.g. BDEs and PFOS) by POPs-free compounds and by non-chemical solutions  |
|   | Waste management  | Brominated flame retardants containing WEEE and ELV<br>Collecting and destroying POPs contaminated wastes e.g. flame retardants in municipal waste, WEEE, ELV, C&DW.   |
|   | Metallurgy        | Companies using PFOS (metal plating).<br>Substitution of PFOS or process changes   |





# SIA: Benefits

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| Agriculture   | Metallurgy  | Chemical industry   | Textiles | Power sector | Waste management   | Cement industry   |
|---|---|---|----------|--------------|--|---|
| <p>Lower levels of pesticides in fish species, human blood, human milk and human fat of the Turkish population</p> <p>Health and environment related benefits in the food chains</p> <p>Improved image of Turkey's agricultural products/ avoided costs</p> | <p>Improved relations with authorities, improved prestige among immediate neighbors of plants and the general public due to health and environmental benefits</p> |   |          |              |  | <p>No additional costs or benefits (FGD introduced)</p> |
|   |   | <p>Additional income due to research, development and sales of alternative, POPs-free chemicals by innovative companies</p> |          |              | <p>Business growth in the environmental protection sector (waste management)</p> |   |





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# Regulatory Impact Assessment



**NIRAS**





# Approach to RIA

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- 1. Problem definition**
- 2. Definition of Policy Options**
- 3. Identification and assessment of costs and benefits**
  - **Administrative costs**
    - Public authorities
    - Private sector
  - **Monitoring costs**
    - Surface water, air and soil
  - **Compliance costs**
    - Public authorities (control of placement on the market; CL; landfills/dumpsites)
    - Private sector (source control and end-of-pipe; CL)
  - **Benefits**
    - Environmental
    - Human health
    - Commercial





# Problem definition

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## Persistent Organic Pollutants in Turkey:

- Evidence of presence of POPs in environment and humans (e.g. milk, fat tissues etc.) resulting in exposure to elevated concentrations (some substances/ locations)
- Past instances of POPs related fatalities
- Lack of / fragmented regulatory instruments leading to sub-optimal levels of pollution
- Insufficient knowledge base







# Policy Options

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- **Policy Option 1** – Implementation of existing and committed legislation (including transposed):
  - Industrial and air pollution control - IPPC/ IED, LCPD, NECD, VOC, SEVESO etc.
  - Waste sector legislation – incineration, hazardous wastes, WEEE, ELV
  - Water Framework Directive/ EQSD
  - REACH
  - PCB legislation
  - Contaminated land legislation
- **Policy Option 2** – Implementation of proposed By-Law (SC)
- **Policy Option 3** – Implementation of proposed By-Law (SC plus Protocol (PAH, SCCPs, PCNs, HCBD))





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# Administrative and monitoring costs: approach

## Administrative costs (public authorities and private sector)

- legal provisions of the By-Law (data gathering, authorisation, reporting)
- interviews with the relevant institutions and questionnaires returned
- EU Standard Cost model for assessing administrative burden

## Monitoring costs

- List of substances
- Number of monitoring points and samples per point
- Frequency
- Sampling and analysing unit costs





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# Administrative and monitoring costs: results

| Million TL per year             | <b>Policy Option 1</b> | <b>Policy Option 2</b> | <b>Policy Option 3</b> |
|---------------------------------|------------------------|------------------------|------------------------|
| Administrative (public)         | 0                      | 0.7                    | 0.7                    |
| Administrative (private)        | 0                      | 1.5                    | 1.5                    |
| Monitoring (system development) | 0.3                    | 0                      | 0                      |
| Monitoring (water)              | 45-68                  | 0                      | 0                      |
| Monitoring (air)                | 0                      | 15-197                 | 17-218                 |
| Monitoring (soil)               | 0                      | 4-52                   | 5-61                   |
| <b>Total costs</b>              | <b>45-68</b>           | <b>21-252</b>          | <b>25-281</b>          |



# Compliance costs: approach

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Key **elements** of the approach:

- covers public authorities and private sector (Articles 5,6,7,8 and 9)
- relies on inventory data (uPOPs, BDEs, PFOS)
- builds on SIA to identify key affected sectors
- uses desk research & interviews for potential measures, application rates and unit costs
- covers primary (manufacturing, use) and secondary (contaminated land, landfills, UWWTPs) release sources
- considers source control (e.g. substitution) and end-of-pipe (e.g. abatement of emissions, treatment of landfill leachate, remediation of contaminated land) measures





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# Compliance costs results: pesticides and uPOPs – Policy Option 1

| Million TL per year           | Pesticides       | uPOPs        | PAH               | PCBs              |
|-------------------------------|------------------|--------------|-------------------|-------------------|
| Manufacturing                 | 0                | 0            | 0                 | 0                 |
| Use (substitution)            | 0                | 0            | 0                 | 0                 |
| Releases                      | 0                | 6,000-12,000 | Captured by uPOPs | Captured by uPOPs |
| Diffuse sources               | 0                | 0            | 0                 | 0                 |
| Stockpiles                    | 1.7 <sup>1</sup> | 0            | 0                 | 0                 |
| Waste collection and disposal | 0                | 0            | 0                 | 0                 |







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# Compliance costs results: industrial POPs– Policy Option 1

| Million TL per year           | PCBs  | PFOS | HBCDD                  | BDEs                          | SCCPs                                       |
|-------------------------------|-------|------|------------------------|-------------------------------|---|
| Manufacturing                 | 0     | 0    | Captured by REACH/ WFD | 0                             | 0   |
| Use (substitution)            | 0     | 0    | Captured by REACH/ WFD | Captured by WEEE <sup>3</sup> | Unknown, unit costs 270-8,400 TL per tonne  |
| Releases                      | 0     | 0    | Captured by REACH/ WFD | 0                             | Unknown. Unit costs 0.5-1.8m TL per company |
| Diffuse sources               | 0     | 0    | 0                      | 0                             | 0   |
| Stockpiles                    | 66-70 | 0    | Captured by REACH/ FD  | 0                             | 0   |
| Waste collection and disposal | 0     | 0    | 0                      | 148 (WEEE)                    | 0   |



# Compliance costs results: Contaminated land– Policy Option 1

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| Million TL per year | Contaminated land (assessment) | Contaminated land (remediation/ identified) | Contaminated land (remediation)                |
|---------------------|--------------------------------|---|--|
| <b>Pesticides</b>   | 3.1                            | 0.2   | Unknown unit costs of disposal 2,500-18,000 TL |
| <b>uPOPs</b>        | 11.3                           | 0   | Unknown unit costs of disposal 1,250 TL        |
| <b>PAH</b>          | 2.7                            | 0   | Unknown  |
| <b>PCBs</b>         | 2.7                            | 0   | Unknown unit costs of disposal 500-2,000 TL    |
| <b>PFOS</b>         | 1.1                            | 0   | Unknown unit costs of disposal 900-1,500 TL    |
| <b>HBCDD</b>        | 1.3                            | 0   | Unknown unit costs of disposal 900-1,500 TL    |
| <b>BDEs</b>         | 1.2                            | 0   | Unknown unit costs of disposal 900-1,500 TL    |
| <b>SCCPs</b>        | 2.2                            | 0   | Unknown unit costs of disposal 900-1,500 TL    |
| <b>Total</b>        | <b>25.6</b>                    | <b>0.2</b>                                  |  |



# Compliance costs results: Landfills & UWWTPs – Policy Option 1

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| Million TL per year               | Pesticides                          | uPOPs   | PAH     | PCBs    | PFOS    | HBCDD   | BDEs    | SCCPs   |
|-----------------------------------|-------------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Wastewater treatment - assessment | 0.2-1.5                             | 1.3-4.3 | 0.2-0.8 | 0.2-0.8 | 0.1-0.3 | 0.1-0.3 | 0.1-0.3 | 0.2-0.6 |
| Wastewater treatment              | <b>19-8,620 (GAC at all UWWTPs)</b> |         |         |         |         |         |         |         |
| Landfill leachate - assessment    | 0.07-0.14                           | 0.4     | 0.07    | 0.07    | 0.03    | 0.03    | 0.03    | 0.06    |
| Landfill leachate - treatment     | <b>9-98 (GAC at all landfills)</b>  |         |         |         |         |         |         |         |





# Compliance costs results: pesticides and uPOPs – Policy Options 2 and 3

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| Million TL per year           | Pesticides | uPOPs   | PAH               | PCBs |
|-------------------------------|------------|---------|-------------------|------|
| Manufacturing                 | 0          | 0       | 0                 | 0    |
| Use (substitution)            | 0          | 0       | 0                 | 0    |
| Releases                      | 0          | 260-318 | Captured by uPOPs | 0    |
| Diffuse sources               | 0          | 1,000   | Captured by uPOPs | 0    |
| Stockpiles                    | 0          | 0       | 0                 | 0    |
| Waste collection and disposal | 0          | 0       | 0                 | 0    |



# Compliance costs results: industrial POPs–Policy Options 2 and 3

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| Million TL per year           | PCBs | PFOS                                   | HBCDD                | BDEs                | SCCPs                                      |
|-------------------------------|------|--|----------------------|---------------------|--|
| Manufacturing                 | 0    | 0                                      | 0                    | 0                   | 0  |
| Use (substitution)            | 0    | 0.15                                   | 134-203<br>(XPS/EPS) | Unknown             | Unknown, unit costs 270-8,400 TL per tonne |
| Releases                      | 0    | 3.5 (ventilation)<br>OR<br>39-88 (GAC) | 10-14 (GAC)          | 0                   | Unknown. Unit costs 0.5-1.8 TL per company |
| Diffuse sources               | 0    | 0                                      | 0                    | 0                   | 0  |
| Stockpiles                    | 0    |  | 0.24                 |                     | 0  |
| Waste collection and disposal | 0    | Unknown                                | 701-754<br>(C&DW)    | 18-32<br>(ELV, CRT) | 0  |







# Compliance costs results: Public sector – Policy Options 2 and 3

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Million TL per year

All POPs substances

Uncontrolled landfill remediation

65-718 (remediation of dumpsites)

Compliance costs (public authorities)

15 (control on manufacturing, placement on the market and use)





# Administrative, monitoring and compliance costs: Policy Options 1 - 3

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| Million TL per year    | All POPs substances - compliance | Administrative and monitoring |
|------------------------|----------------------------------|-------------------------------|
| <b>Policy Option 1</b> | <b>6,200-21,000</b>              | <b>45-68</b>                  |
| <b>Policy Option 2</b> | <b>2,210-3,140</b>               | <b>21-252</b>                 |
| <b>Policy Option 3</b> | <b>2,210-3,140</b>               | <b>25-281</b>                 |





# Benefits

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- Reduced **human exposure** to elevated levels of POPs
- Reduced **environmental exposure** to harmful levels of POPs
- **Commercial benefits** to food manufacturing
- Benefits to manufacturers of alternatives, R&D companies, waste management and contaminated land remediation sector





# Conclusions

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## Implementation of **Policy Option 1** (6.2-21 bn TL per year):

- For pesticides – no additional significant action (and costs)
- For uPOPs - implementation of IPPC in Turkey is single largest cost item (6-12 bn TL per year) with significant benefits of uPOPs reduction
- For industrial POPs - partial coverage due to PS/PHS status and waste legislation
- Secondary releases – potential significant costs, but first assessment of CL, UWWTPs and landfills required to determine and prioritise sites.

## Implementation of **Policy Options 2 and 3** (2.2 to 3.1 bn TL per year):

- For pesticides – no additional costs
- For uPOPs - 1 billion TL for open burning
- For industrial POPs – substitution cost up to 200 million TL per year
- Remediating all dumpsites and developing waste collection systems for C&DW and domestic articles - 0.8 to 1.5 billion TL per year, but:
  - only based on site specific assessment to establish the need to remediate
  - installing advanced leachate collection and treatment system as an alternative to new waste collection system





# Conclusions

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## Additional impacts of **Policy Option 3**:

- additional monitoring costs for PAH, SCCPs, PCNs and HCBD
- for PAH - measures aimed to tackle uPOPs will tackle emissions of PAH except for in the transport sector
- for SCCPs – no additional costs could be estimated due to lack of inventory data
- for PCNs and HCBD - historic use with releases likely to be addressed indirectly under the Policy Option 1
- inclusion of the POPs Protocol substances within the scope of the By-Law is not anticipated to result in significantly higher costs (largely due to PAH)







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# Teşekkür Ederim

