

Presentation

Presentation from the 2009 World Water Week in Stockholm
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WORLD
in Stockholm,
August 16–22, 2009 **WATER**
WEEK



Priority Substances in urban wastewater: screening & management strategies

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OUTLINE

- A. Urban waste water treatment plants were not designed to treat Priority Substances
- B. However PS are found in the wastewater collection system & UWWTPs abatements rates are highly variable
- C. If management strategies are emerging, source control remains the only sustainable option

PS in UWW :
screening &
management
strategies

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A. Urban waste water treatment plants were not designed to treat Priority Substances

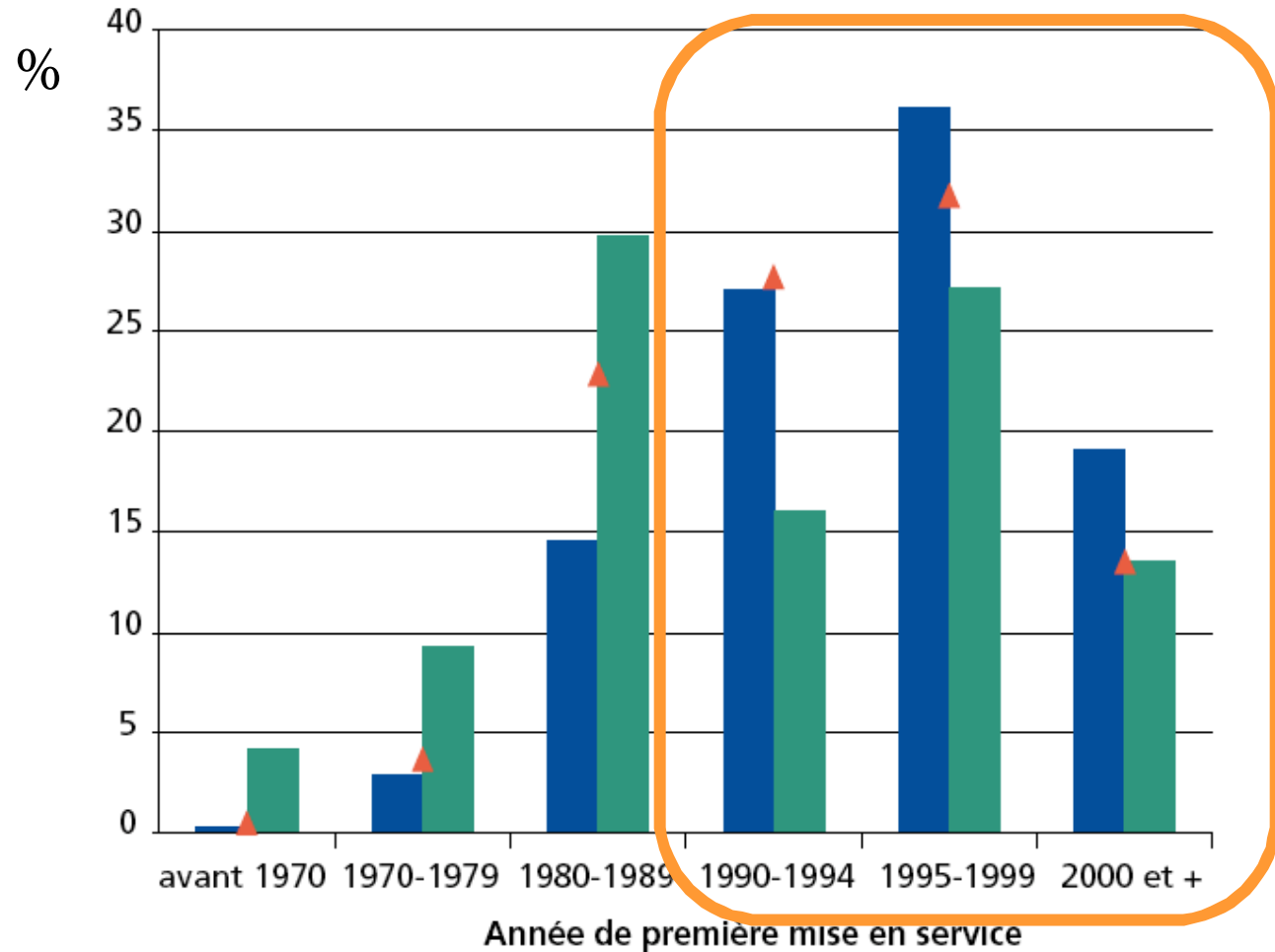
Wastewater treatment in France (2004) in figures

- ✓ Wastewater treated for 95% of the population
 - 5M dwellings: private sewerage systems
 - 80% in collective WWTPs (~ European mean)

- ✓ 17 300 WWTPs total capacity = 89 Mpe
- ✓ Largest 2% = 57% total capacity
- ✓ Operated privately (55%) or publicly (45%)



✓ 3/4 of UWWTPs operate since 1990



- Stations de moins de 500 EH
- Stations de 50 000 EH ou plus
- ▲ Ensemble des stations

Source : Ifen-Scees, Enquête Eau 2004.

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- **PS** = *substances presenting a significant risk to or via the aquatic environment (WFD art 16.2)*

- **UWWTPs designed to treat N, P**
 - ✓ Most common process = activated sludge
 - ✓ Total conformity with UWW Directive to be met by 2011

- **Priority Substances not addressed, to be found in:**
 - ✓ Treated waters
 - ✓ Sludge
 - ✓ Atmosphere

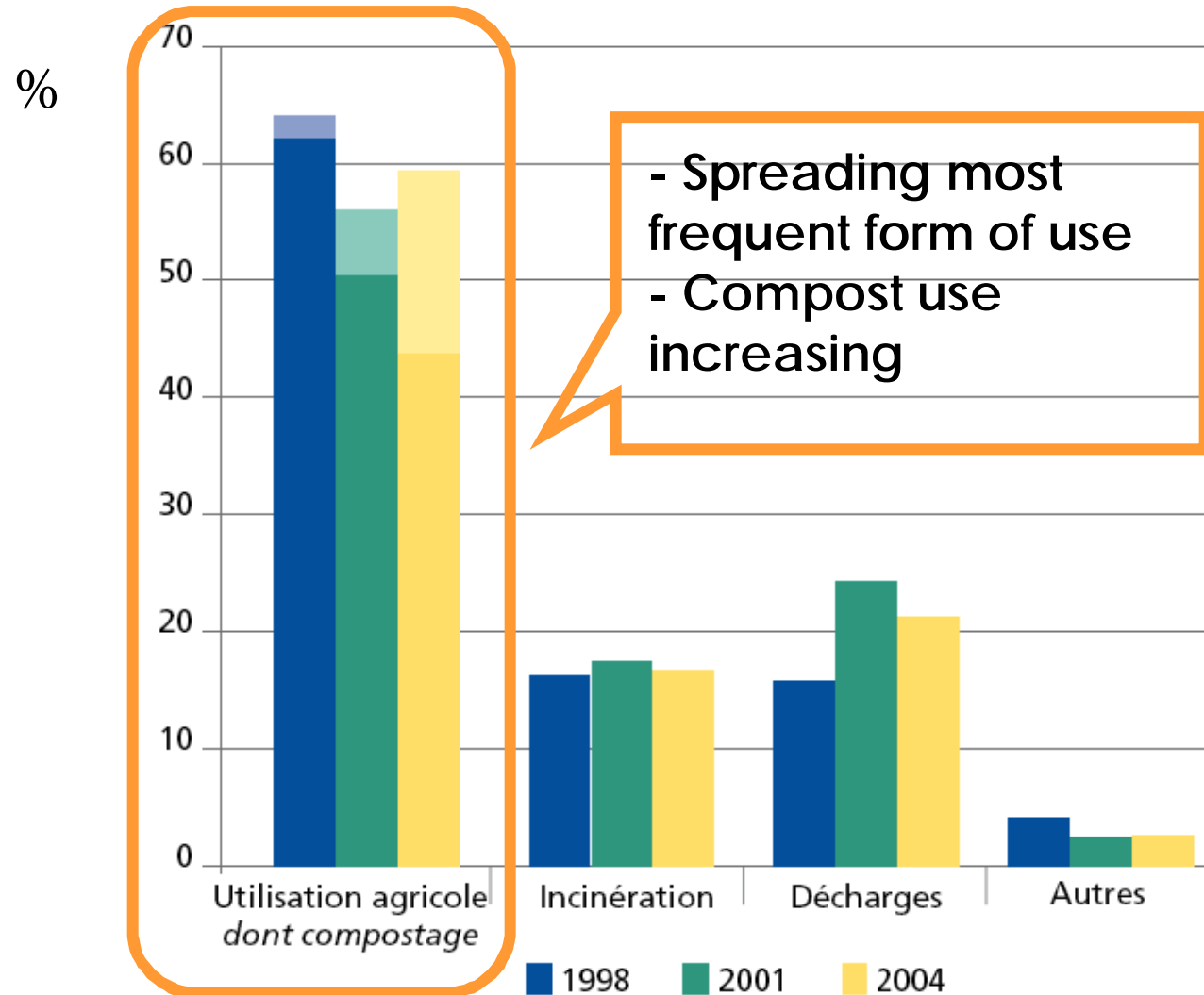
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✓ 1Mt dry sludge removed from UWWTPs in 2004



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B. However PS have been found in wastewater collection systems & UWWTPs abatement rates are highly variable

- No systematic monitoring of PS in UWW, only research projects and exploratory monitoring:

- ✓ National inventory of substances in discharge waters including some WWTPs: "RSDE" ([final report](#))

- ✓ Research projects:

- Abatement rates: [AMPERES](#) (National Research Agency - AXELERA)
- Treatment strategies: [NEPTUNE](#) (EC funded)
- Drugs (cancer treatment): AFSSET report
- Endocrine disruptors: SUEZ-VEOLIA study

- Analytical problems remain especially in sludge but also waters for some PS (LoQ)



RSDE : National Screening and Reduction Action of Hazardous Substances in Waters (<http://rsde.ineris.fr>)

➤ Sample

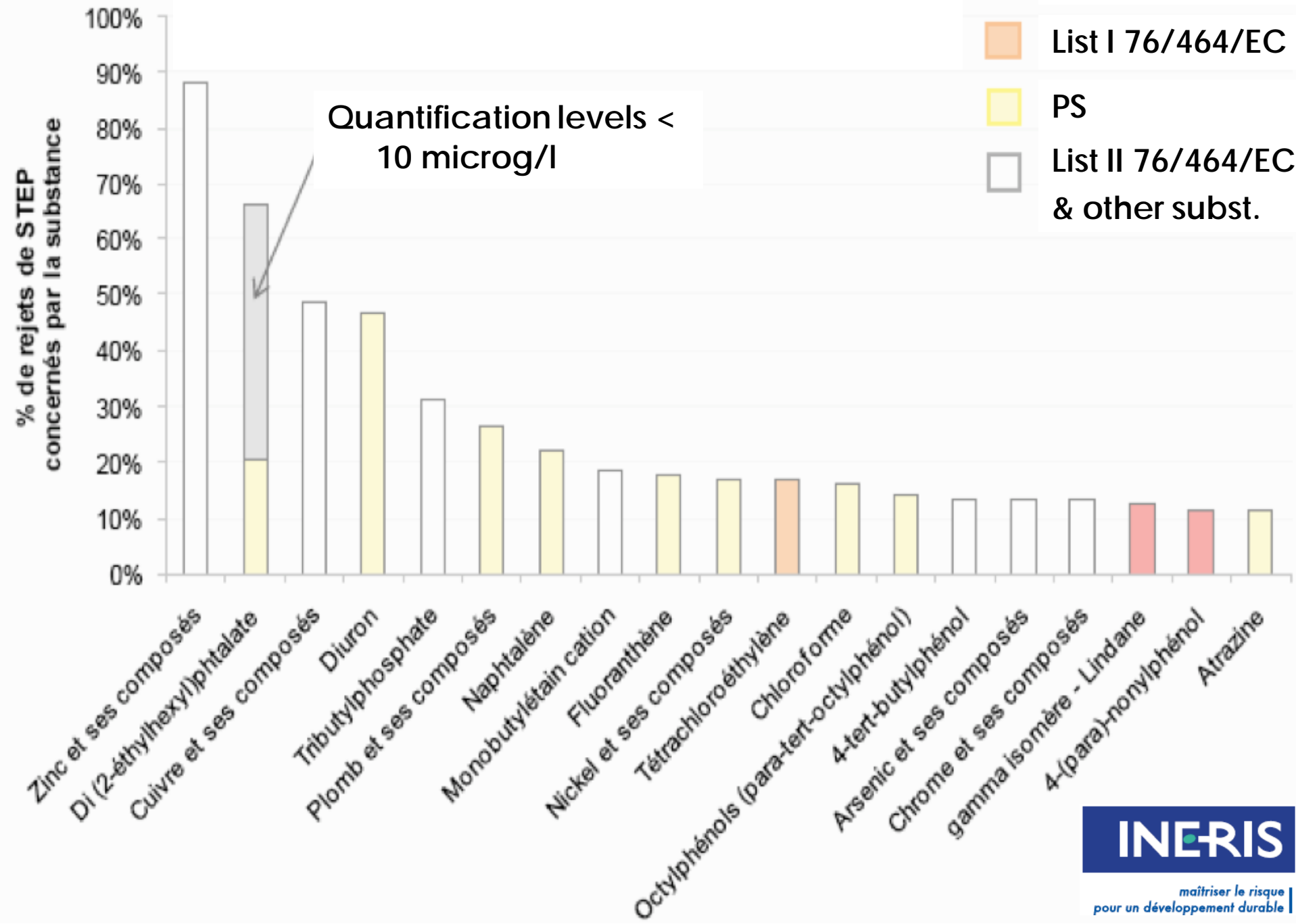
- ✓ 106 substances looked for { P(H)S ; list I&II
76/464/EC ; others }
- ✓ Results on 113 UWWTPs

➤ Results

- ✓ 75 of the 106 substances were found
- ✓ [1-21] found per discharge
- ✓ 7 on average

RSDE - UWWTPs most quantified substances

- PHS
- List I 76/464/EC
- PS
- List II 76/464/EC & other subst.





➤ AMPERE - Results on 7 UWWTPs - activated sludge

Family		Substance	Abatement rate
HAP		Naphtalène	74 ± 16
COHV	☆	Dichlorométhane	59 ± 34
chlorophénols	☆	Pentachlorophénol	29 (1 donnée)
PBDE		Pentabromodiphénylether	85 ± 18
phtalates		DEHP	89 ± 9
métaux		Chrome	74 ± 23
métaux		Cuivre	82 ± 13
métaux		Cadmium	63 ± 21
métaux		Plomb	59 ± 40
AKP		4-NP (Nonylphénol)	87 ± 21
AKP		4-t-OP (Octylphénol)	81 ± 13
AKP		4-NP1EO	80 ± 34
herbicide	☆	Atrazine	14 ± 23
herbicide	☆	Diuron	25 ± 24



- **UWWTPs Abatement rates are variable**
 - ✓ UWWTPs designed to address global pollution indicators
 - ✓ Builders have no commitment on installations' performances

- **Biodegradable substances [15%-95%] abatement depending on :**
 - ✓ Technologies used (digestion for instance)
 - ✓ Degree of denitrification
 - ✓ Temperatures
 - ✓ Number of operating cycles etc...

- **Non-biodegradable substances : no *a priori* efficiency except if membranes are used, will be present:**
 - ✓ In water if polar
 - ✓ In sludge (or atmosphere) if not



C. If management strategies are emerging, source control remain the only sustainable option

- **Future WWTPs = maximize waste recovery (energy, biopolymers...) handicapped by PS**
- **Technical solutions are emerging (NEPTUNE)**
 - ✓ **Combine OXIDATION (oxidizing reactants/heat) with ADSORPTION/FILTRATION**
 - ✓ **Difficulties :**
 - **Harmful oxidation products might be found in discharge if not correctly adsorbed/filtered**
 - **What to do with adsorption matrices ?**



- Technical solutions not yet ready to be largely implemented (research level)
- Cost and technical feasibility
 - ✓ Probably unsustainable for small UWWTPs
 - ✓ Might be possible for the biggest UWWTPs
 - ✓ Comparison : upgrading UWWTPs to the UWW directive standards = 8 b€ for 2010-11 in France
- Oxidizing treatments might be counterproductive if waste recovery is the main objective : loss of value materials



- **Only immediate and efficient action = source pollution control**
 - ✓ Targeting first major sources (industries)
 - ✓ Then diffuse and domestic emissions

- **Existing & future measures in France**
 - ✓ IPPC directive implementation
 - ✓ Extensive discharge surveillance of biggest installations (based on RSDE results) just implemented
 - ✓ Surveillance of UWWTPs discharge planned for 2010
 - ✓ “Loi sur l’eau” (Water law) prohibits discharge in waste water collection system when water body status is at risk (not fully implemented yet)
 - ✓ “enlarged liability” (finance law 2009) oblige industries to design waste recovery procedures including domestic wastes
 - ✓ Build Water Emission factor database

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Thank you for your attention

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