EU Interreg IV B project

noPILLS

Final conference, Mai 27th and 28th 2015

Kirsten Adamczak
noPILLS Lead Partner

Consequences of drug residues in waters?

http://www.drugsnews.org/?p=1235

http://bmjopen.bmj.com/content/1/2/e000311.full

Downloaded from bmjopen.bmj.com on November 21, 2011 - Published by group.bmj.com

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PRESS RELEASE

To cite: Margel D, Fleshner NE. Oral contraceptive use is associated with prostate cancer: an ecological study. *BMJ Open* 2011;**1**:e000311. doi:10.1136/bmjopen-2011-000311

► Prepublication history for this paper is available online.

Oral contraceptive use is associated with prostate cancer: an ecological study

David Margel, Neil E Fleshner

ABSTRACT

Background: Several recent studies have suggested that oestrogen exposure may increase the risk of prostate cancer (PCa).

Objectives: To examine associations between PCa incidence and mortality and population-based use of oral contraceptives (OCs). It was hypothesised that OC by-products may cause environmental contamination, leading to an increased low level oestrogen exposure

ARTICLE SUMMARY

Article focus

- Several recent studies have suggested that oestrogen exposure may increase the risk of prostate cancer (PCa).
- Associations between PCa incidence and mortality and population-based use of oral contraceptives (OCs) have been examined

Male Fish Turning Female Due to Pollution

Jake Richardson | August 9, 2010 | 7:03 am | 63 comments

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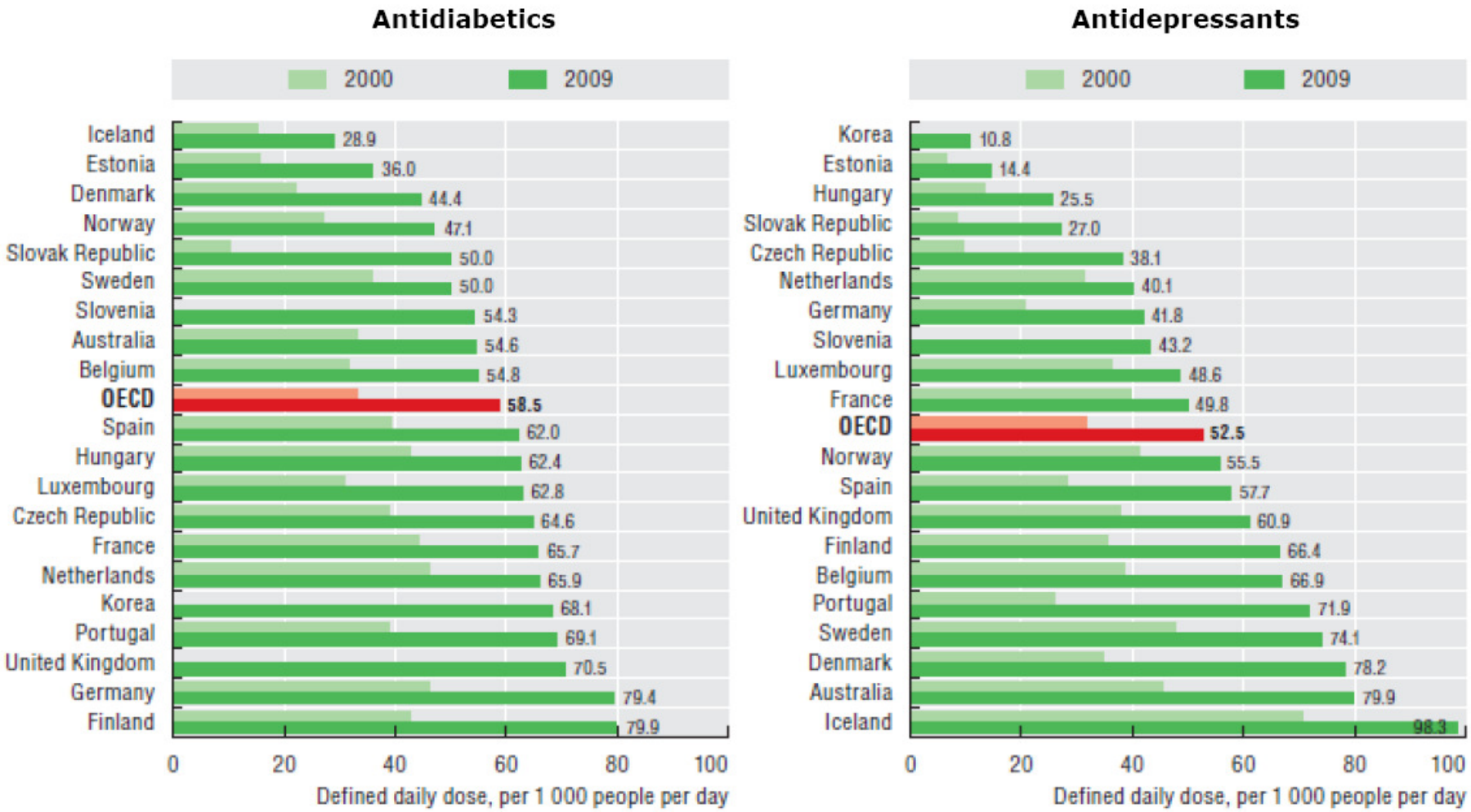
http://www.care2.com/greenliving/male-fish-turning-female-due-to-pollution.html

The consumption of pharmaceuticals is increasing across OECD countries



Source: OECD Health Data 2011, OECD (http://www.oecd.org/health/healthdata)

Priority substances in the field of water policy

- **Directive 2013/39/EU, Art. 8c: Specific provisions for pharmaceutical substances**
  the Commission shall…[until **September 2015**] **develop a strategic approach to pollution of water by pharmaceutical substances**. … shall, where appropriate, include proposals enabling, to the extent necessary, the environmental impacts of medicines to be taken into account more effectively in the procedure for placing medicinal products on the market. … the Commission shall, where appropriate, by 1**4 September 2017** **propose measures** to be taken at Union and/or Member State level, as appropriate, to address the possible environmental impacts of pharmaceutical substances […] **with a view to reducing discharges, emissions and losses of such substances into the aquatic environment**, taking into account public health needs and the cost-effectiveness of the measures proposed." .
- **COMMISSION IMPLEMENTING DECISION (EU) 2015/495**
  First watch list with pharmaceuticals and hormones:
  Diclofenac, 17-Alpha-ethinylestradiol, 17-Beta-estradiol, Estrone, Macrolide antibiotics (Erythromycin, Clarithromycin, Azithromycin)

Study on the environmental risks for medicinal products

Study on the environmental risks of medicinal products

FINAL REPORT

Executive Agency for Health and Consumers
12 December 2013

(mandated by the EU Commission)

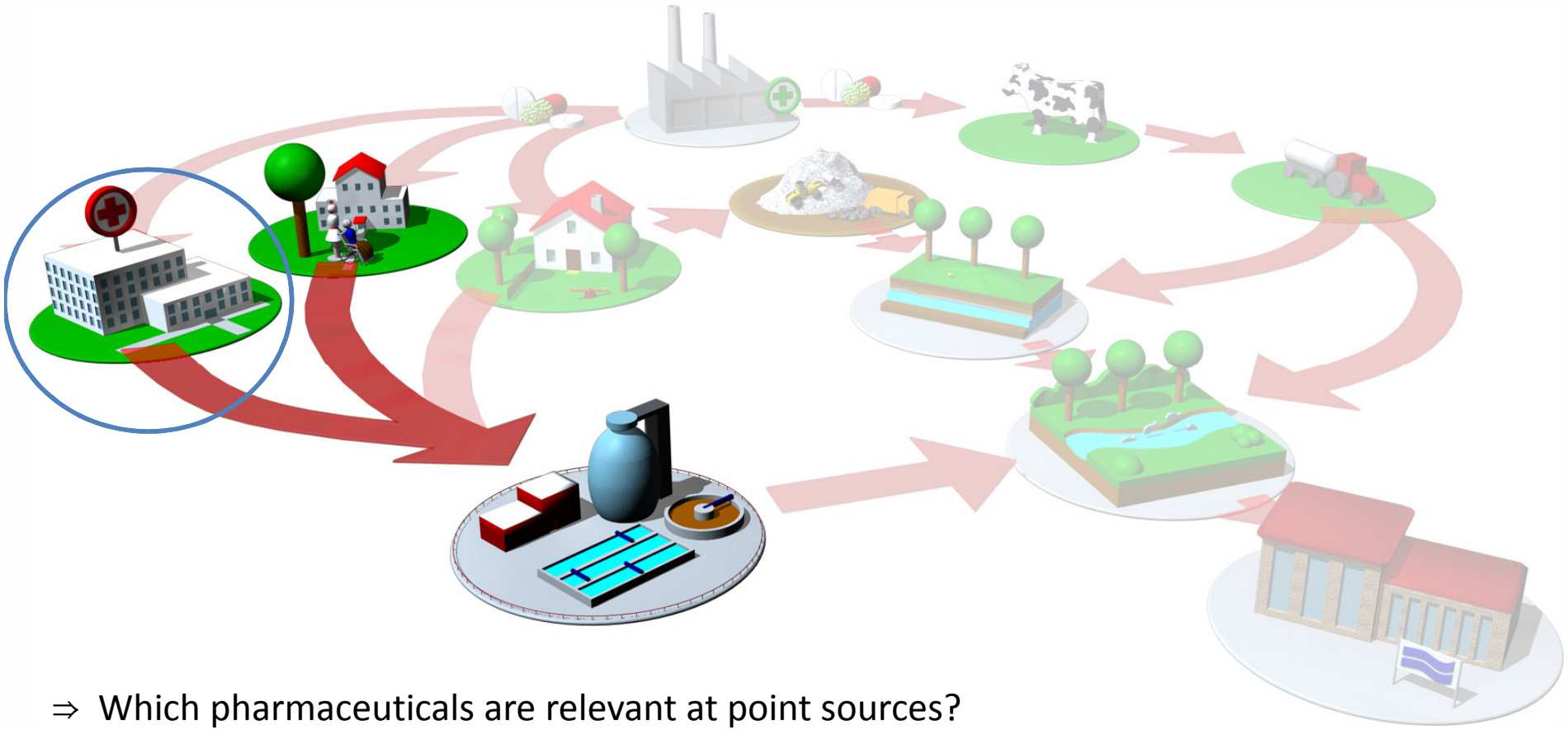
- *"R&D investments, industrial production, sale, and consumption of medicinal products in the EU is expected to reach EUR 242 billion in 2014"*
- *"For human medicinal products, the EU is the second biggest consumer in the world (24% of the world total) after the United States of America."*
- *"Consumption of human medicines in the EU … ranges from 50 to 150 g/capita/year. "*
- *"Between 30 and 90% of the orally administered dose is generally excreted as active substance in the urine of animals and humans"*
- *"A large share of unused human medicinal products (50% on average) is not collected."*

The most discussed options out of the proposed mitigation measures relevant to

- product development, authorization and production
- to product consumption and use
- to disposal

1) Improve availability of Data on substances
2) Improve environmental risk assessment methodology
3) Spread information to general public to rise awareness
4) Find out hot-spots: where are the bigger problems?
5) Develop end-of-pipe solutions taking into account cost-benefit-analysis

Interreg IVB project PILLS
(2008-2012 - www.PILLS-project.eu)



⇒ Which pharmaceuticals are relevant at point sources?

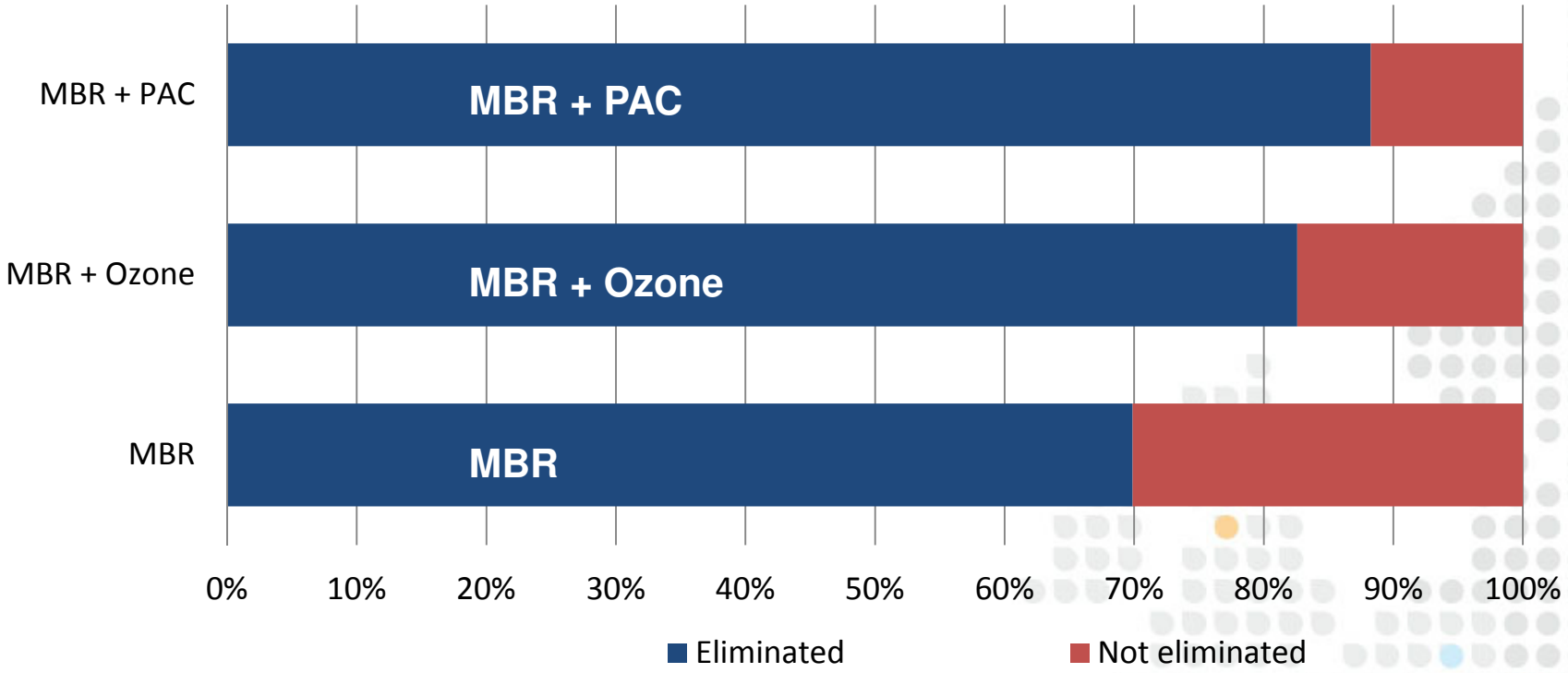
⇒ What is the contribution of hospitals to the overall catchment emission?

⇒ What are the practical and economical consequences of advanced hospital wastewater treatment?

Some conclusions of the PILLS project:

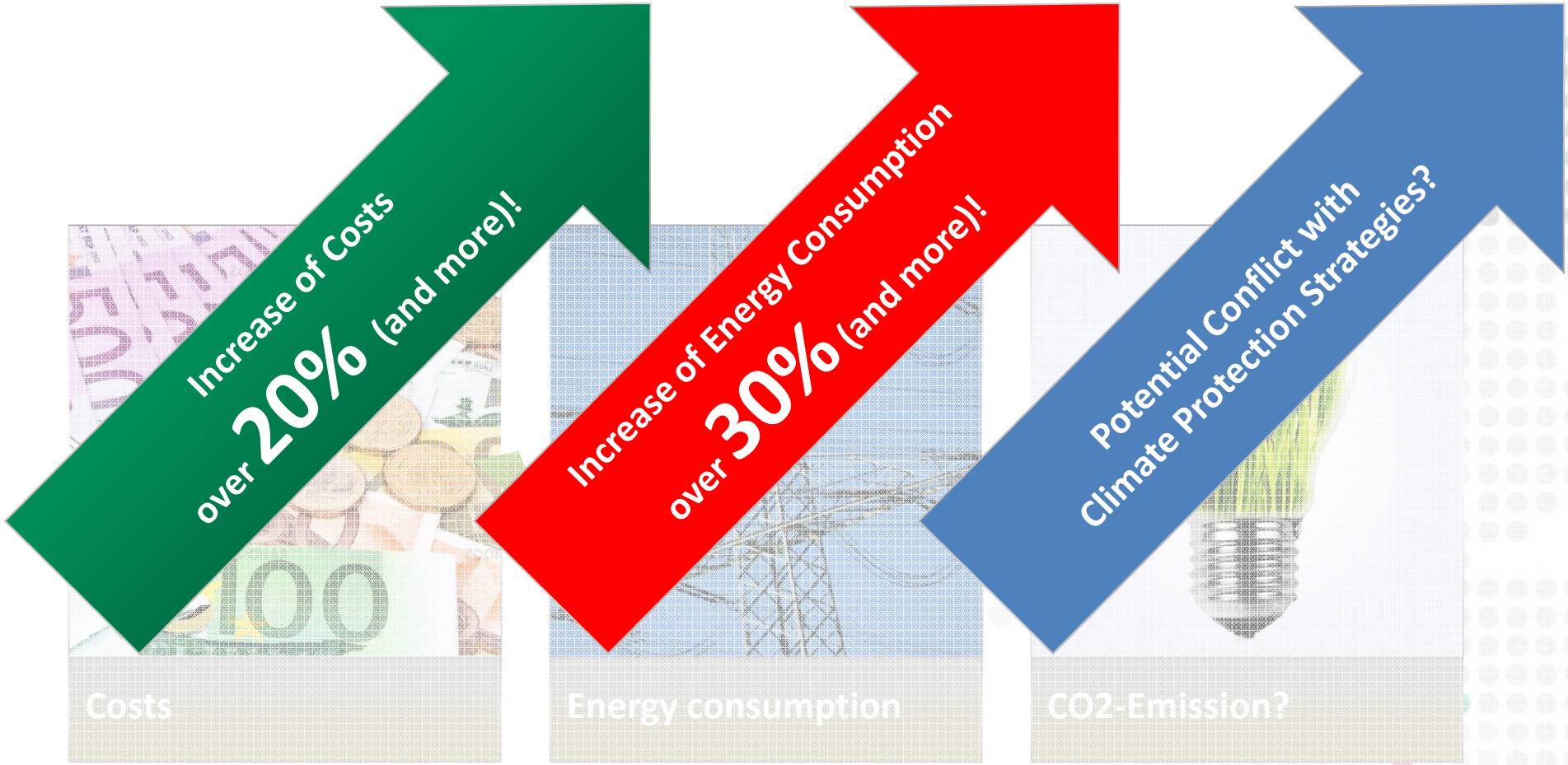
- X-ray contrast media, cytostatics, some antibiotics are distributed in higher amounts in hospitals
- The **contribution of the hospital** to pharmaceuticals emission in sub-catchments is depending on the amount of beds and inhabitants connected to the sewer system
- Hospitals can be local **hot-spots** in a catchment
- However, in general the fraction of pharmaceuticals distributed in hospitals compared to household's consumption is relatively low (around **20%**).
- Treating hospital wastewater at the source **reduces risks** for groundwater and surface waters.
- Advanced treatment **cannot eliminate all** pharmaceuticals!

Mass balance of 30 pharmaceuticals at the pilot plan Marienhospital Gelsenkirchen, Germany (average values)



No total removal of all micropollutants by advanced wastewater treatment!

Consequences of the implementation of advanced treatment technologies



Objectives:

1. **Monitoring of pharmaceuticals,** sources and fates of **antimicrobial resistant bacteria** in the aquatic environment
2. **Awareness raising to mitigate pharmaceuticals in the aquatic environment** by changing behavior (prescription, consumption and disposal habits)
3. **Long-term testing and optimization of technologies** for an advanced wastewater treatment
4. **Impact assessment** of mitigation measures
5. **Recommendations**

6 partners, 5 EU Member States, 2012-2015

Emschergenossenschaft (DE), Lead Partner

Rijksinstituut voor Volksgezondheid en Milieu (NL)

Luxemburg Institute of Science & Technology (LU)

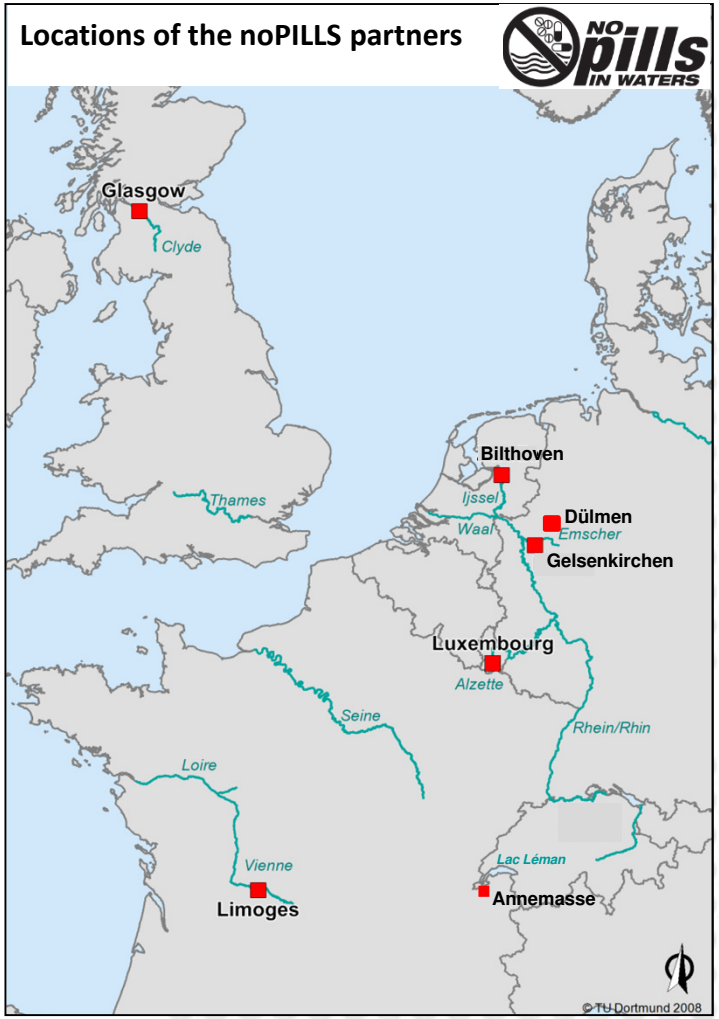
Lippeverband (DE)

Glasgow Caledonian University (UK)

Université de Limoges (FR) with 2 locations

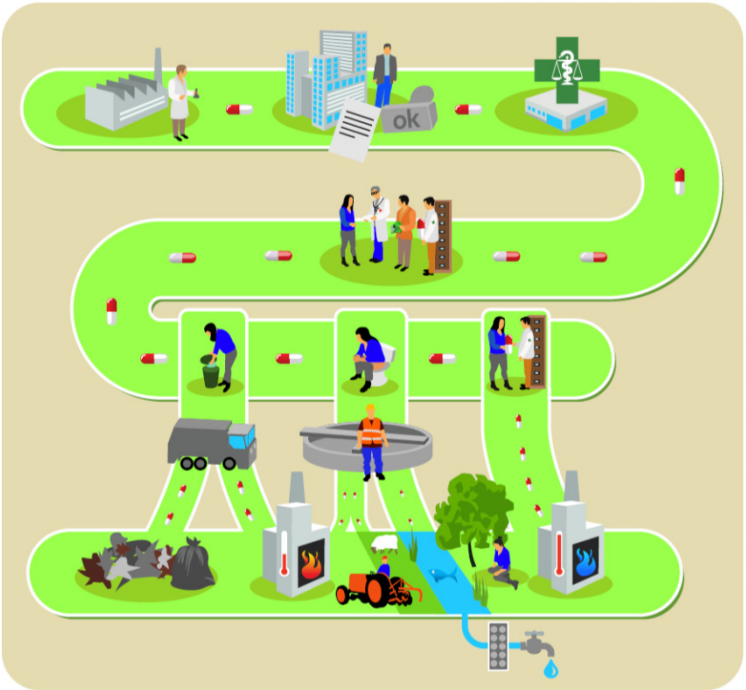
…plus an advisory board with representatives from the pharmaceutical industry, science and administrative/ political level

…total budget 9.3 Mio. € (4 Mio. € EU funding)



Activities of RIVM: Description of product chain and possible levers

- development and production,
- authorization,
- market,
- legislation,
- physicians,
- prescription,
- pharmacies,
- health insurance,
- patients,
- consumption pattern,
- disposal behavior etc.



Activities of LIST:

1. **Measurements campaigns** with focus on x-ray contrast media from source to end-of-pipe
2. **Investigation** of the removal of pharmaceutical residues in a biologically pre-treated wastewater using **Biological Activated Carbon**
3. **Urine separation campaign** for the collection of x-ray contrast media in the regional hospital
4. **Evaluation - recommendations**

Activities of Emschergenossenschaft

- Long-term monitoring of treatment plant
- Optimization of advanced wastewater treatment
- Awareness raising of hospital staff
- Separation study of x-ray contrast media

Activities of GCU:

1. **Monitoring** of pharmaceuticals receiving waters
2. **Ecotoxicity analysis** of wastewater and surface water samples
3. **Field test of ferrate pilot facility** for advanced wastewater treatment
4. **Public engagement** – Investigation of public awareness and behaviour regarding consumption and disposal habits
5. **Development of communication tools** for awareness campaigns

Activities of Université de Limoges:

1. **Monitoring** the sources and fates of **antimicrobial resistance** bacteria in the aquatic environment
2. **Investigation** of the **fate of pharmaceuticals in the sludge** of hospital wastewater treatment plants
3. **Study** on the **perceptions** of pharmaceuticals in the aquatic environment, current **consumption and disposal habits** and **possible levers** (public and relevant actors)
4. **Investigation** of decentralized and centralized **treatment options of hospital effluents**




Activities of Lippeverband in the town of Dülmen

Sensitization to change behavior in dealing with pharmaceuticals in the town with 47,000 inhabitants

1

- Mass-flow analysis of pharmaceuticals
- Awareness raising; target groups: hospitals and clinicians, doctors and pharmacists, broad public, decision makers
- Impact assessment of the advising campaigns
- Recommendations for strategic approaches to face pharmaceuticals input to wastewater.

Implementation of and Investigations on an activated carbon treatment step (PAC) at the wwtp

2

STADT DÜLMEN

Thanks to a great partner group

… and special thanks to Ole Pahl for his work on the final report