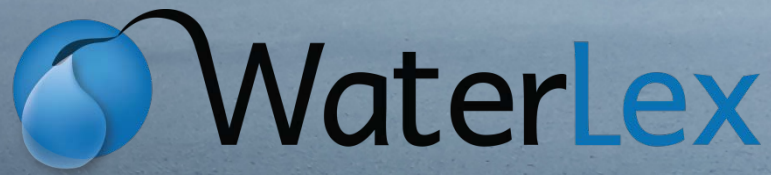
The pioneering strategy in Switzerland to treat micropollutants: Legislative, Financial and Technical measures



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SWEDEN

Sida
SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

SIWI WORLD WATER WEEK

UNESCO
UNITED NATIONS
Educational, Scientific, Cultural Organization

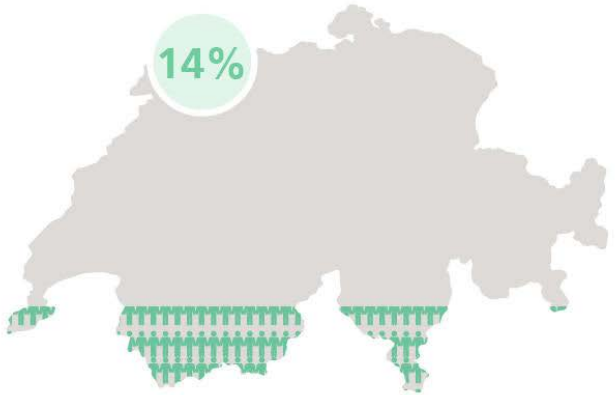
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

From nutrient (& trace metals) to micropollutant challenges

Until the 50s, **wastewater dumped directly into rivers and lakes**, resulting in dying fish, bad smells and swimming bans (phosphorus & eutrophication)

Lake Neuchâtel in 1964: Bathing prohibited, polluted water



% Population connected to a sewage treatment plant

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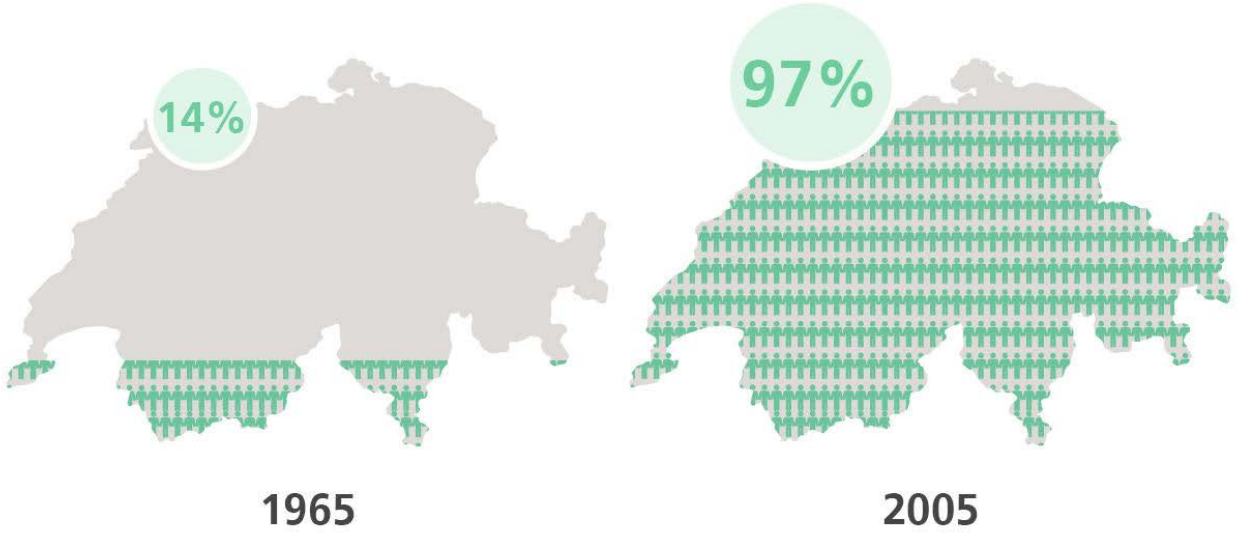
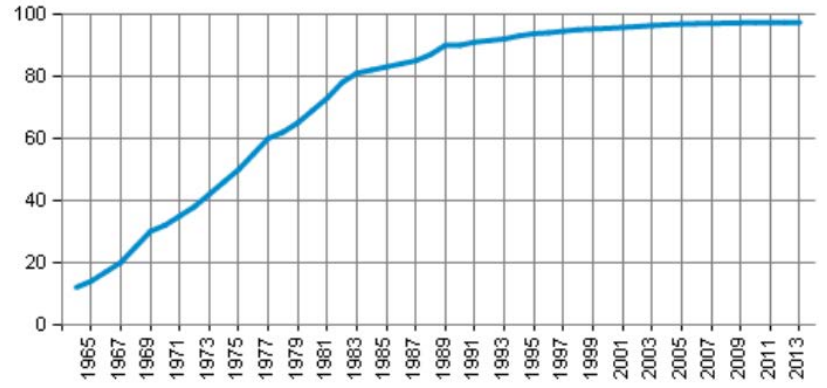
From nutrient (& trace metals) to micropollutant challenges

Wastewater treatment plants = **Main point source of micropollutants** (drug residues, pesticides, chemicals, hormones..) **entering aquatic ecosystems**



% Population connected to a sewage treatment plant



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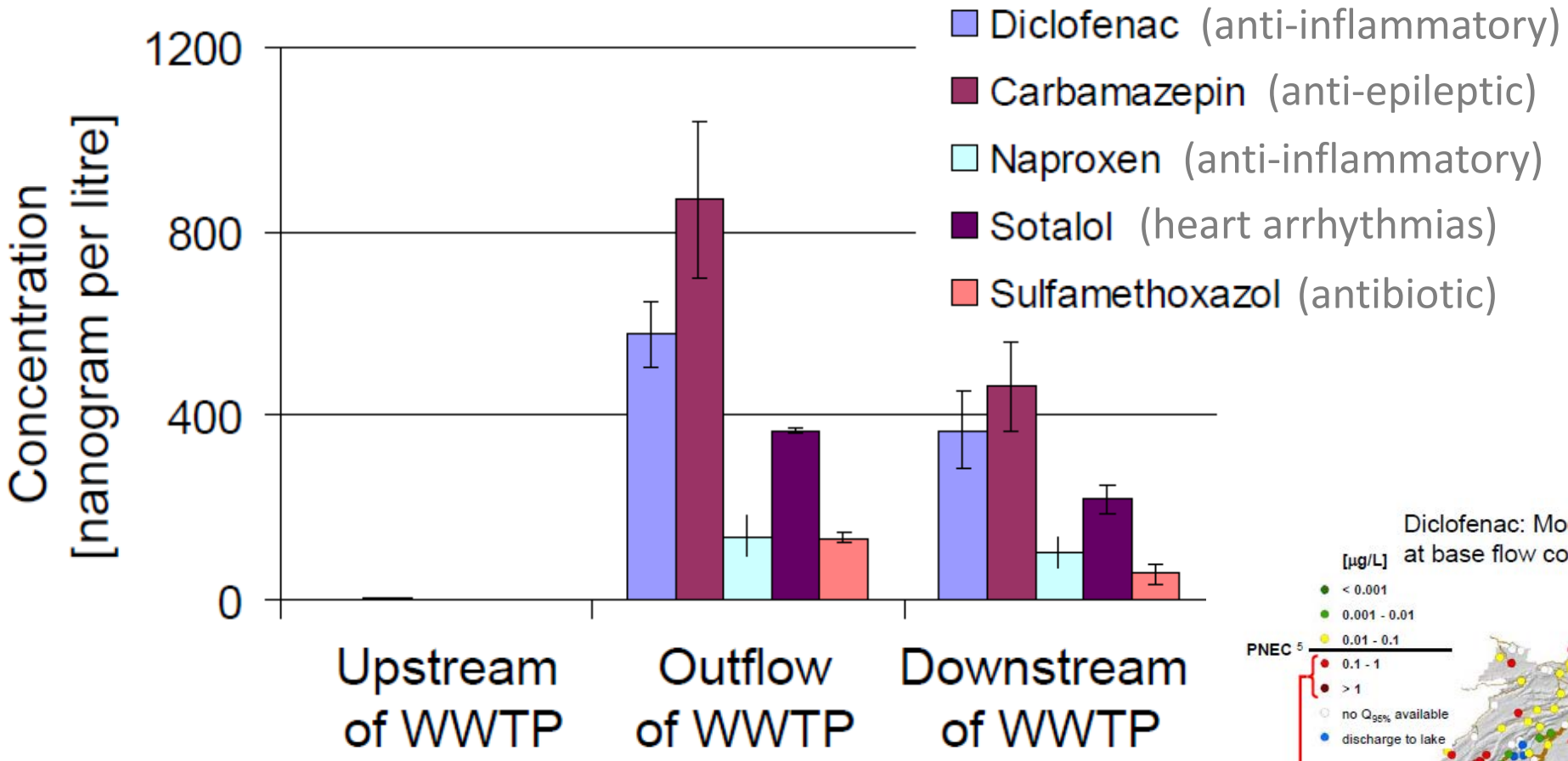
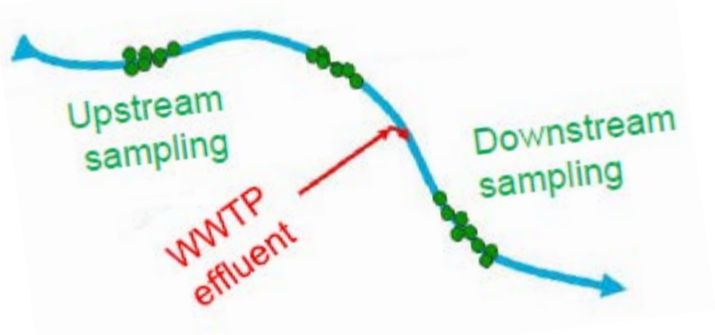
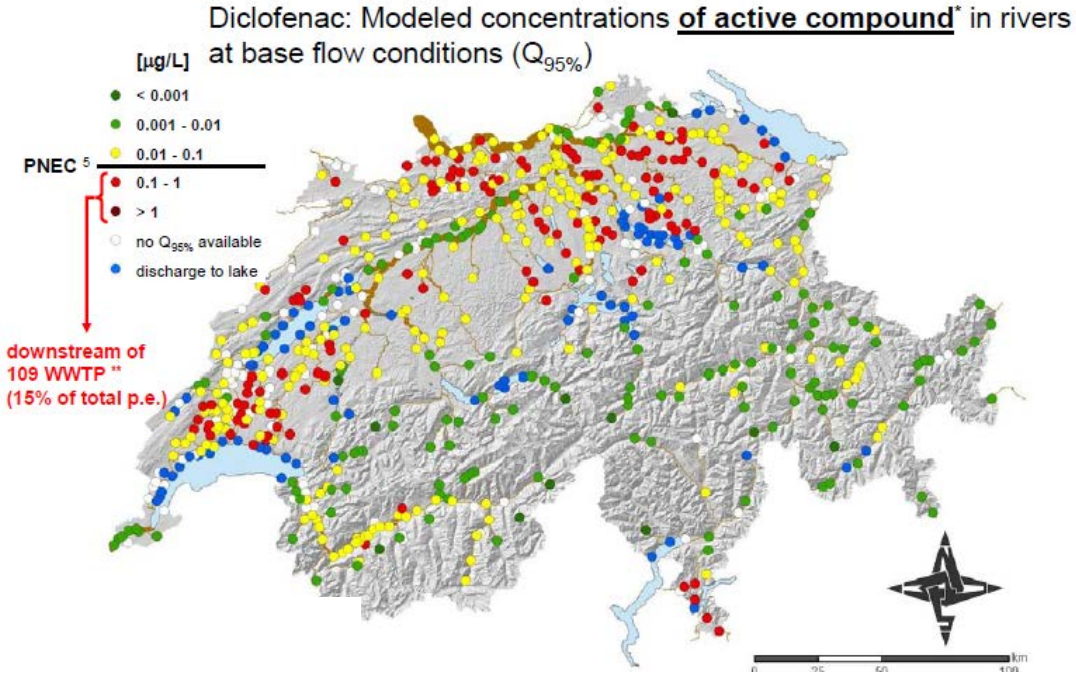
Strategy for reducing micropollutants primary (end of pipe) sources







EAWAG & FOEN

Strategy MicroPoll: A 7-year decision-making process

Led by FOEN. Goal: Develop a strategy with regard to micropollutants in municipal wastewater.

- Evaluate situation/need for measures, in working groups
- Collaboration with States, WW operators/owners, research (EAWAG), industry, …

➤ Financing solution, planning of measures & technical processes

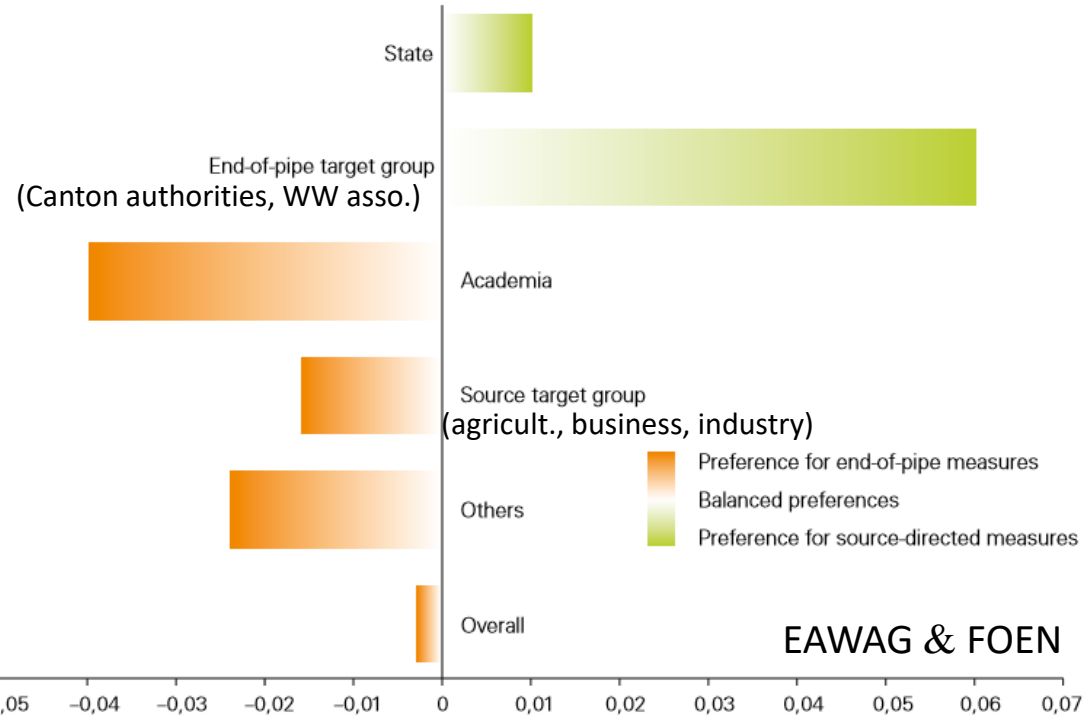
Survey on the revision of the Swiss Waters Protection Act and Ordinance

Preventive approach (Precautionary principle):
Reduce chemicals at source

Preferred by actors closely involved in the decision-making process (more logic but difficult)

Reactive approach: Eliminate chemicals via WWTP (**technical end-of-pipe solutions**)

Preferred by research community & int. actors (more costly, but feasible, predictable, measurable)
Swiss responsibility + **cleantech exports**



Legislation: Parliamentary intervention & legal requirements

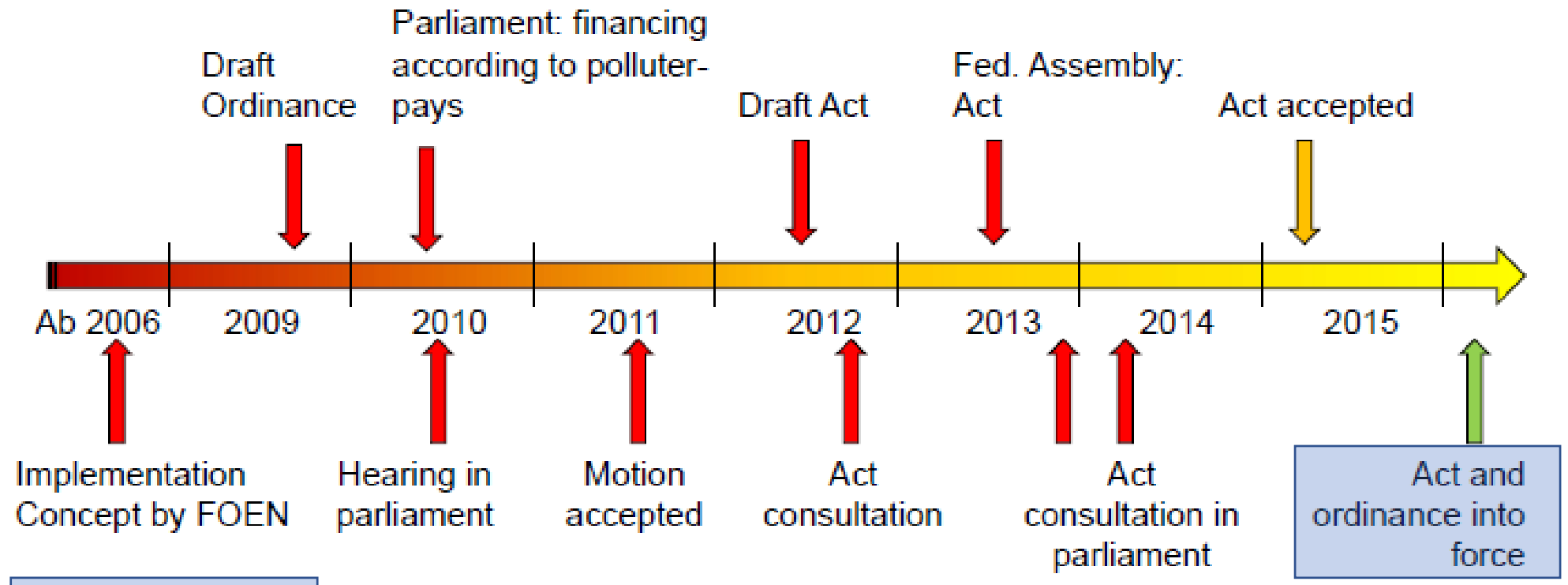
- 1953: Protection of lakes and rivers in the Federal Constitution
- 1957: The Waters Protection Act (renewal in 1991) & Ordinance
- 1971: The treatment of wastewater was written into law
- 2006-2011: MicroPoll strategy

- 2014: The 2 parliamentary chambers agreed to finance the **upgrading of ~100 WWTPs** (over 700) **based on the polluter-pays-principle**

- 80% removal of organic trace substances
  - > 80’000 pollutant load reduction
  - > 24’000 into lakes catchment areas drinking water protection
  - > 8’000 if effluents > 10% dilution environmental protection

Legislation timeline: Revision of Waters Protection Act & Ordinance

Parliamentary intervention of the Committee for the Environment, Spatial Planning and Energy. Established the legal requirements for financing. The National Council and Council of States approved the revision of the Waters Protection Act proposed by the Federal Council in 2011.



Financial: New Federal sewage tax based on polluter pays principle

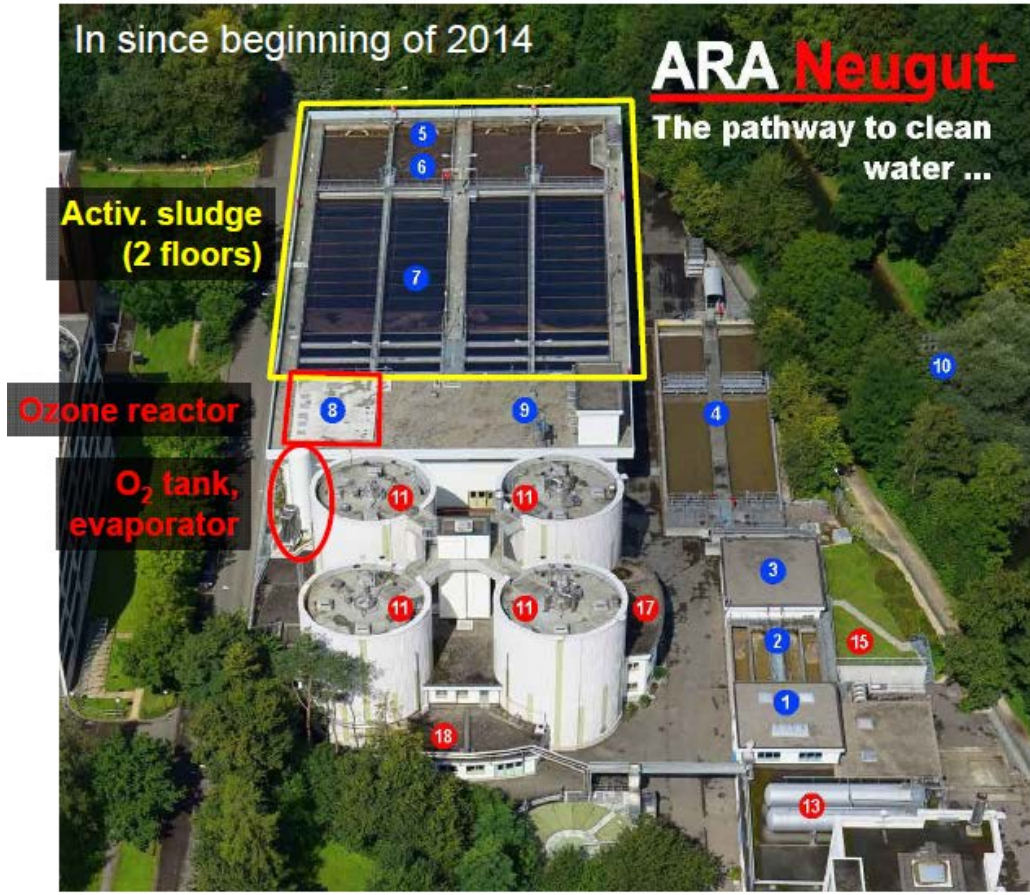
Total investment to equip 100 WWTPs: ca. 1 billion €

Increase annual costs (incl. electricity): ca. 115 million €

Total increased < 20 €/person/year = 6

75% of the investment payed by national budget:

- **Everyone pays a new tax of 9 €/person/year**
- Financing starts in 2016 and ends in 2040
- Municipalities with upgraded WWTPs exempted
- 25% of the investment + operation costs covered by the municipalities

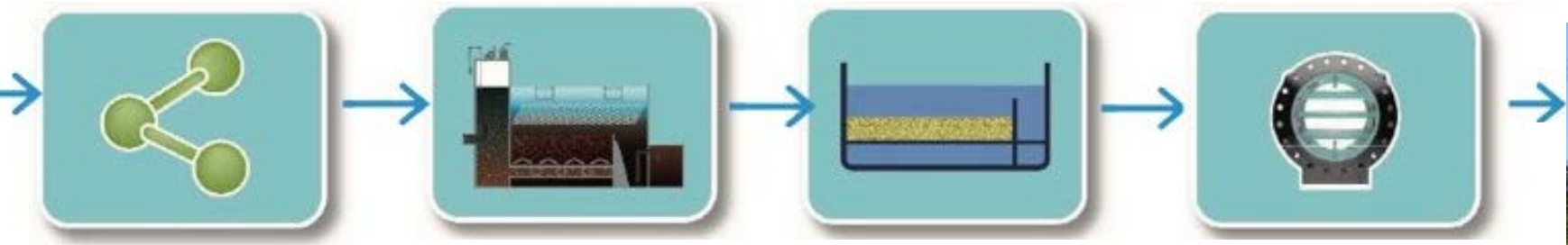


Regendorf WWTP

Technology: Pilot tests and micropollutants monitoring

- Avoid the formation of toxic or stable transformation products
- Integration into existing infrastructure and operation feasible

Lausanne: 300 million €, 9 million for pilot test (58 problematic substances monitored)



Ozonation | **Activated charcoal** | Sand filters | UV Disinfection

Wastewater of 1'335 million people

Potable water for more than 700’000 people

Technology: Removal from 20% to 80% of micropollutants

- Micropollutants are efficiently removed by both

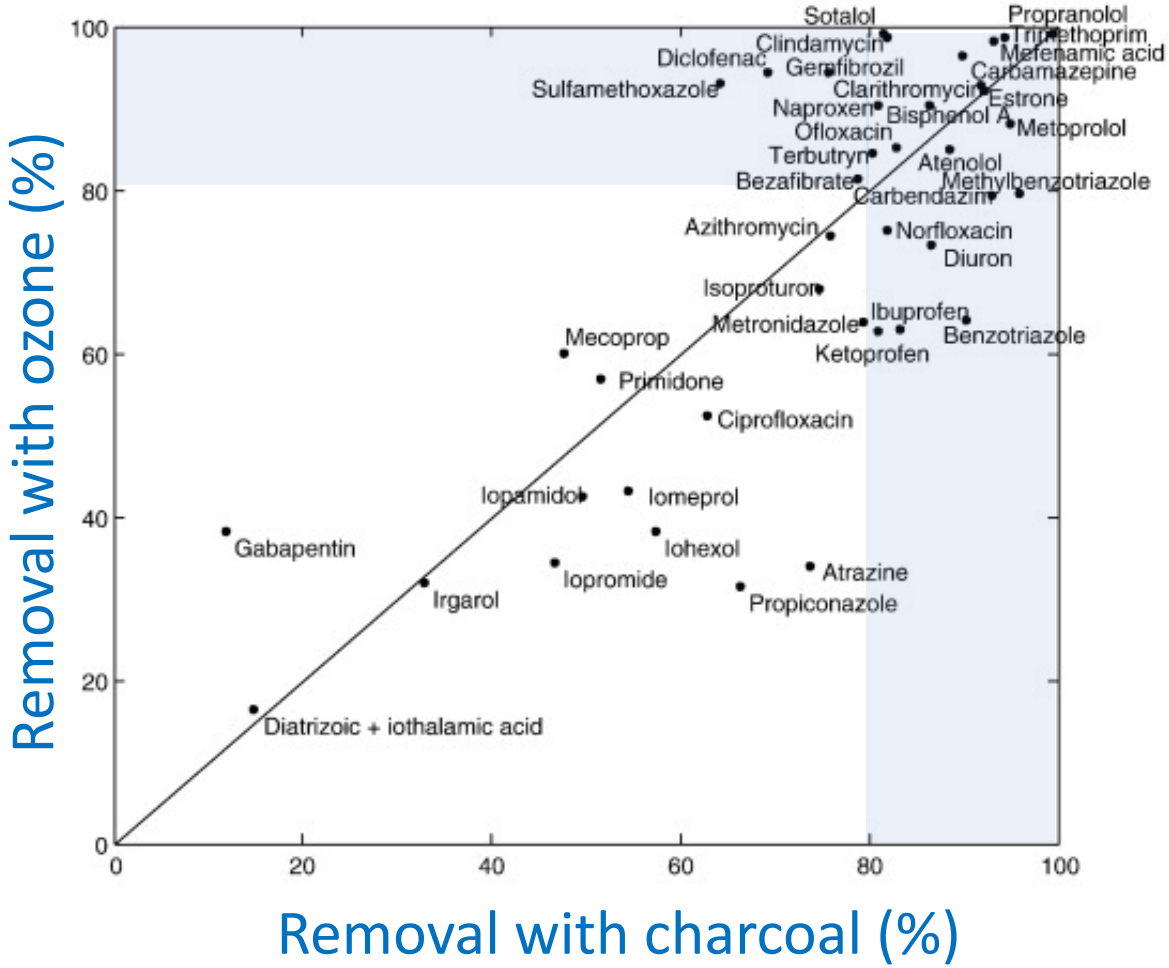
- Specific substances were removed more efficiently by ozone

- Charcoal removed a wider range of pollutants

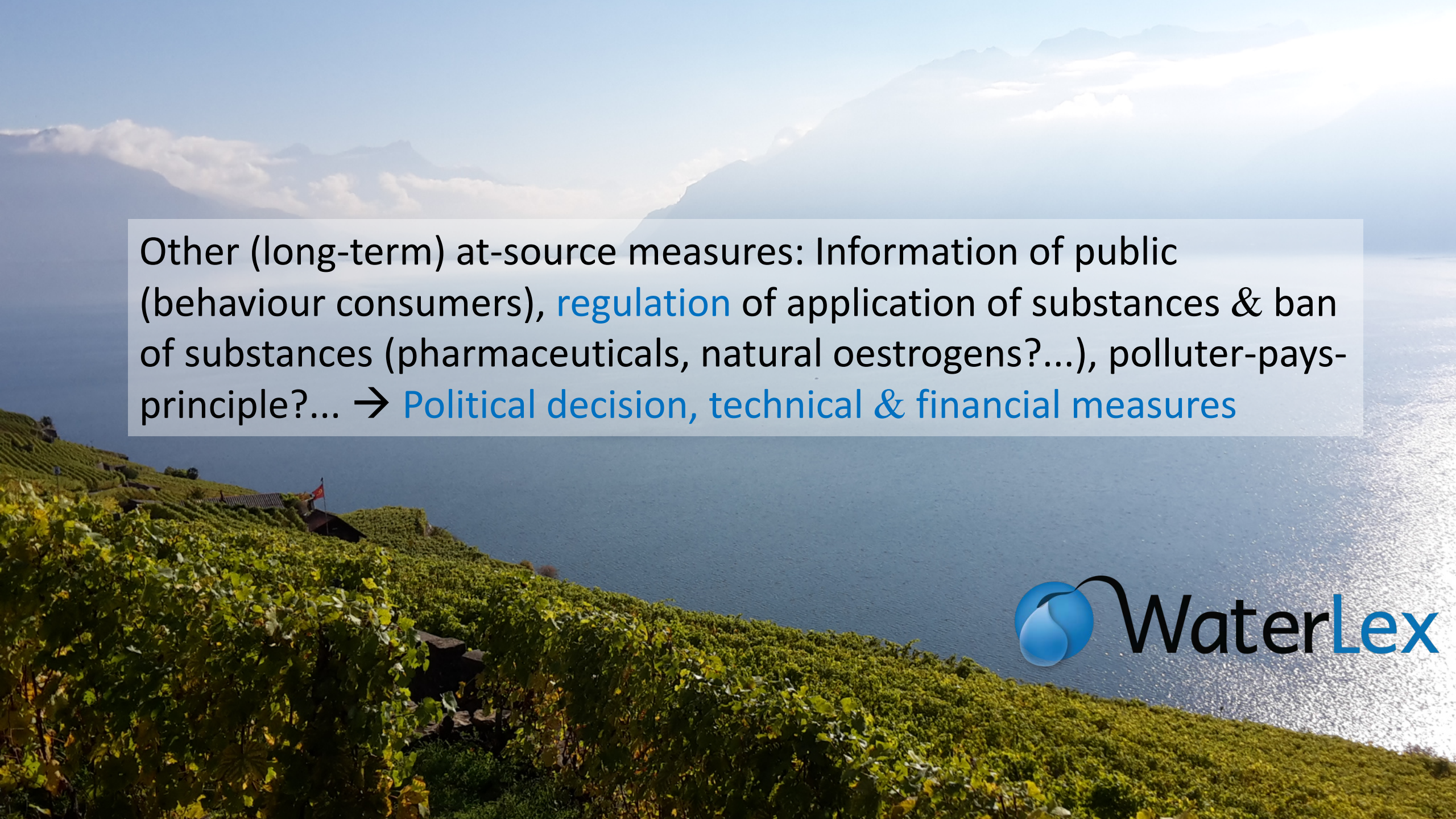
- Both treatments are feasible & significantly reduce the toxicity of WWTP effluent

- Some are resistant to both treatments
  → avoid their release into the sewer system
  (e.g. incineration of patient urine)

Ozone or charcoal (Powdered Activated Carbon ?)



Margot et al., 2013



Other (long-term) at-source measures: Information of public (behaviour consumers), regulation of application of substances & ban of substances (pharmaceuticals, natural oestrogens?...), polluter-pays-principle?... → Political decision, technical & financial measures

WaterLex

Lavaux Vineyard Terraces: UNESCO World Heritage Site