



The swiss strategy

An export good?

Milano, 12th June 2018

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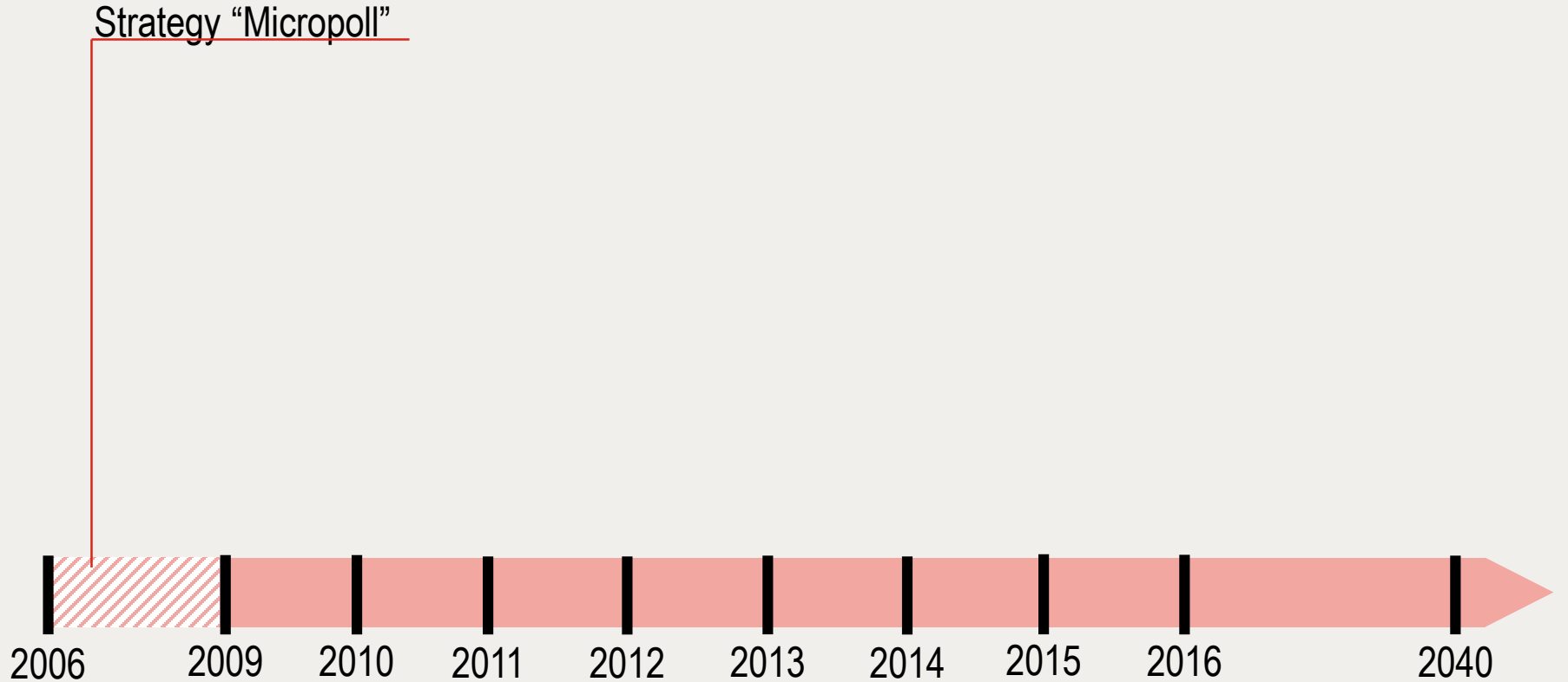
TBF+Partner AG: facts and figures
Milestones
Strategy “micropoll”
Current situation and future challenges
Factors of success



TBF+Partner AG: facts & figures



Milestones

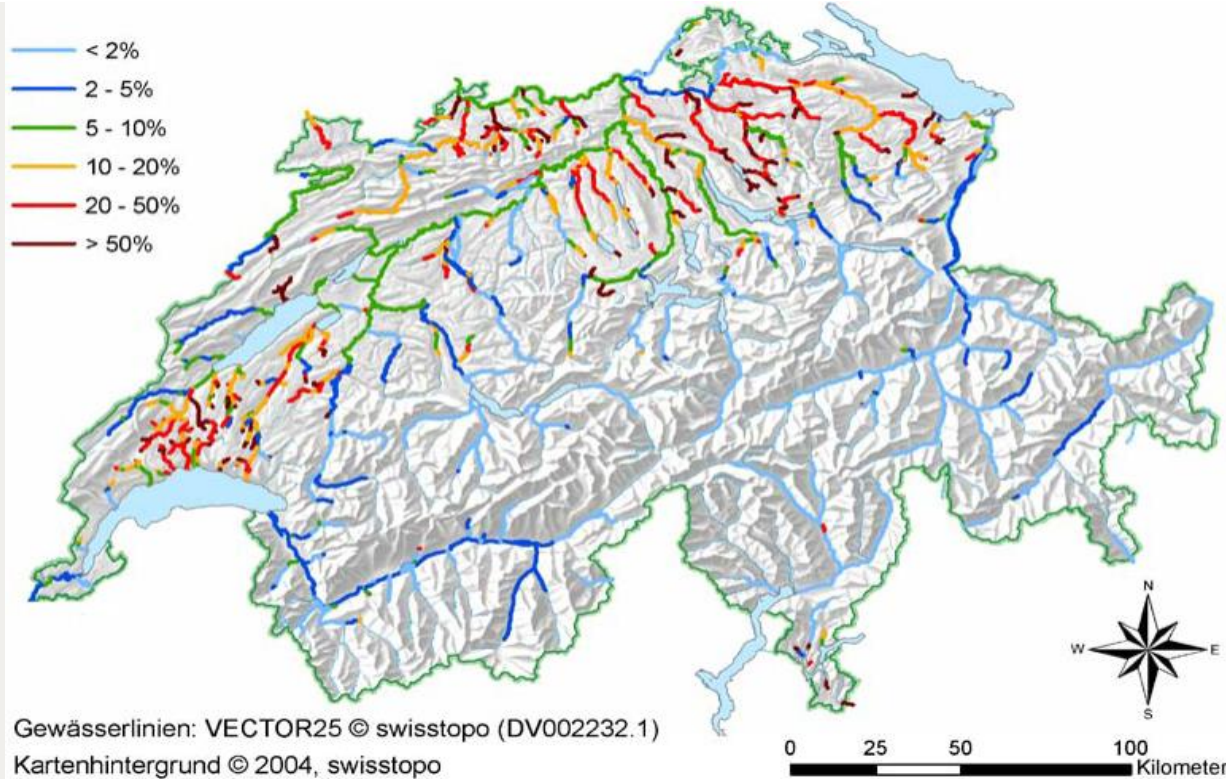


Strategy “Micropoll”

- Negative impact of MP on surface and groundwater?
→ **WP Need for action**
- Are the current WWTP enough efficient?
→ **WP Technical measures**
- How can we measure the impact of MP with a minimal effort?
→ **WP Exposure assessment**

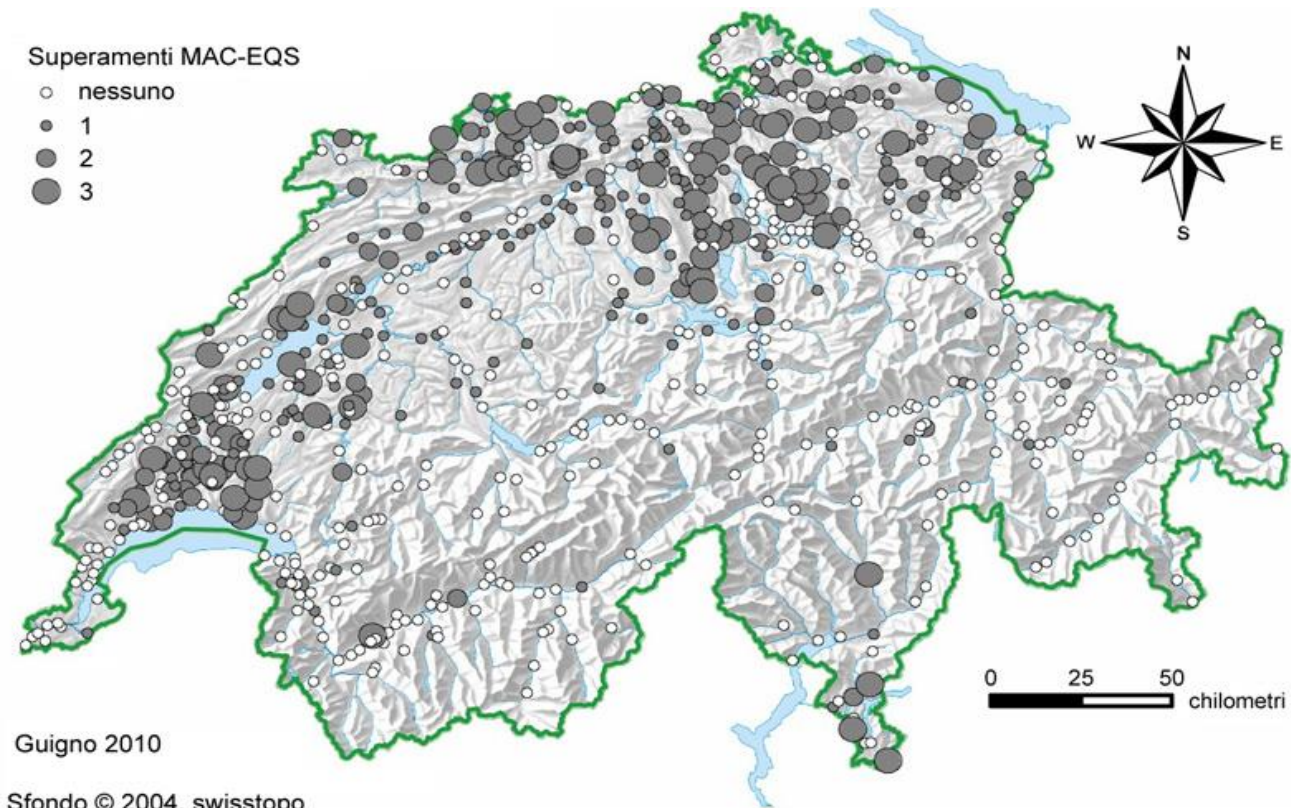


Presence of treated wastewater in surface waters

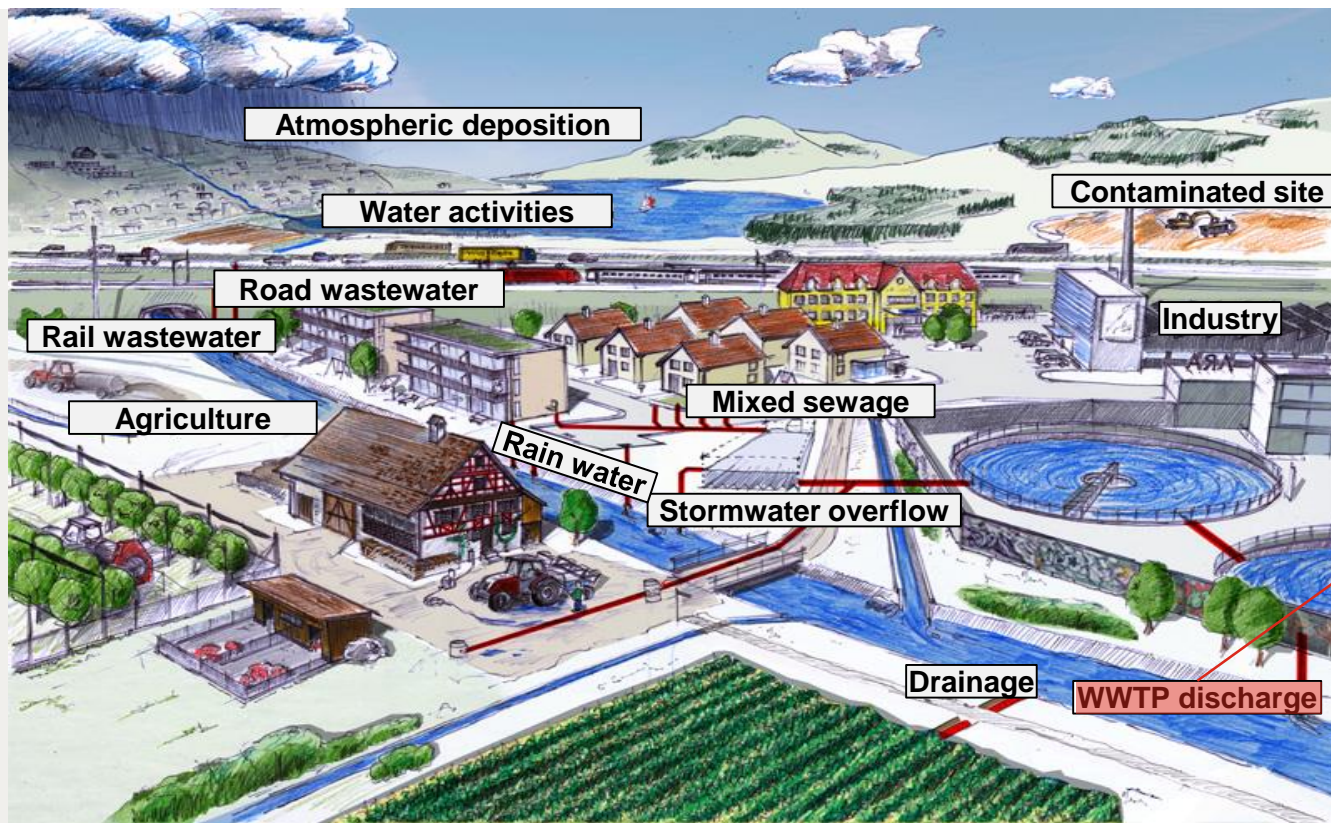


BAFU 2010

Presence of micropollutants in surface waters



Micropollutants sources



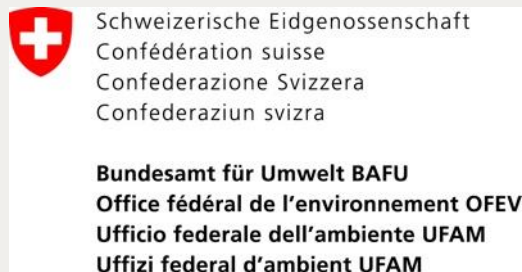
MP “concentrator”



Best ratio
benefits / costs

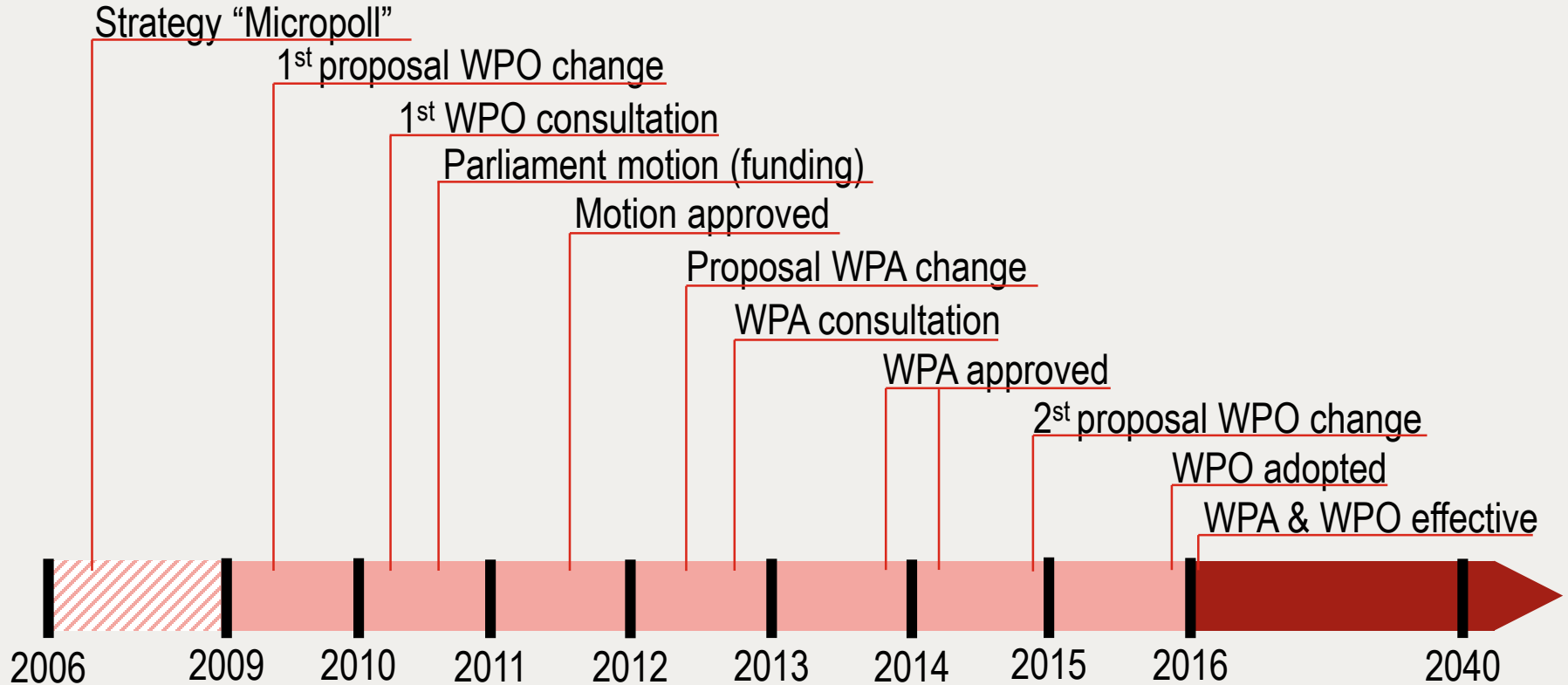
Strategy “Micropoll”

- Houston, we have a problem!
- Let’s solve it together → Micropollutants platform, www.micropoll.ch



- Technical, political and organizational issues

Milestones



Goals

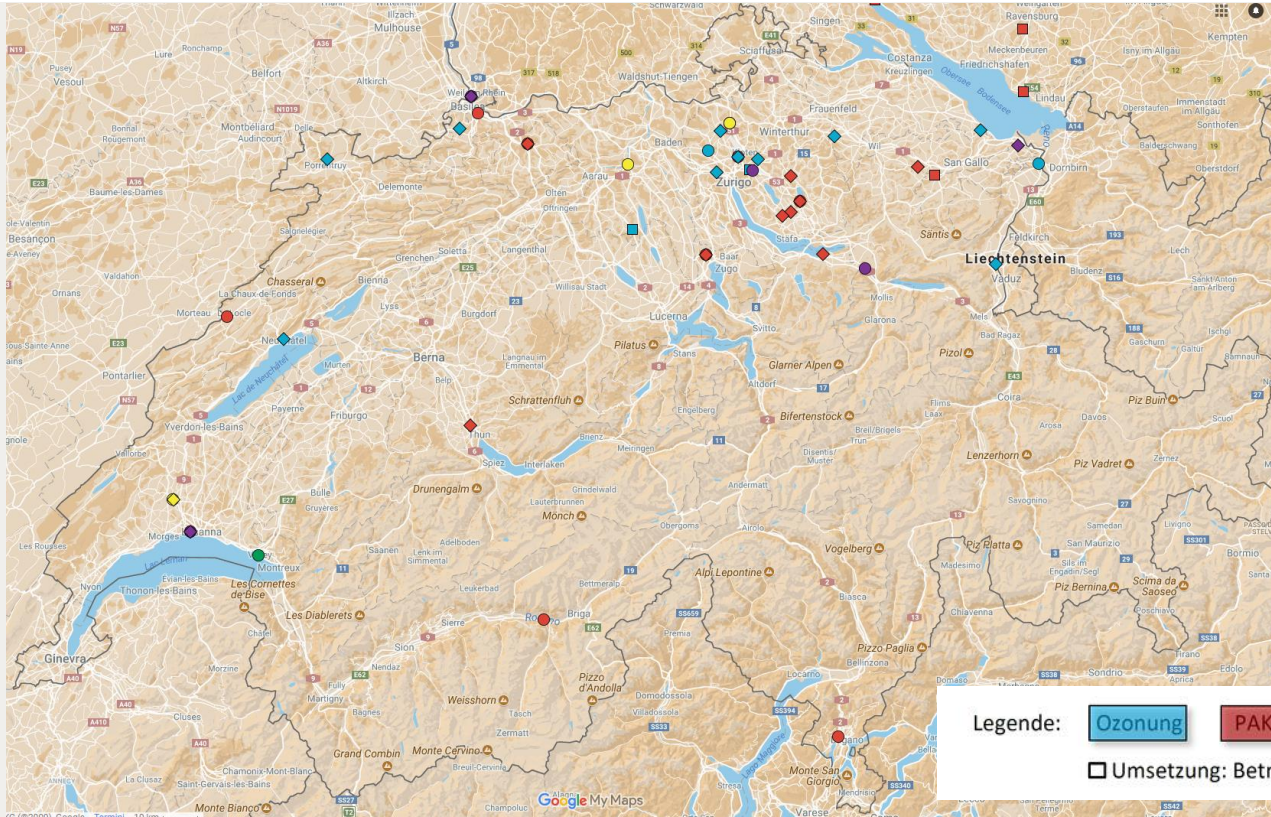
- 50% reduction of MP from WWTPs
- ca. 100 WWTPs, 5 million PE
- 80% elimination rate (Inflow/outflow)
- Pragmatic & user friendly



WWTPs improvement

- Reference technologies:
 - PAC: “Ulmer”, direct dosage in filtration / biology
 - O₃: need for a bioactive step afterwards
 - Combo: O₃ + GAC
- CAPEX: ca. 1 billion €, 75% funded by Bern (special tax, 8 €/P/y)
- OPEX: +10-20%
- Horizon 2040

Current situation

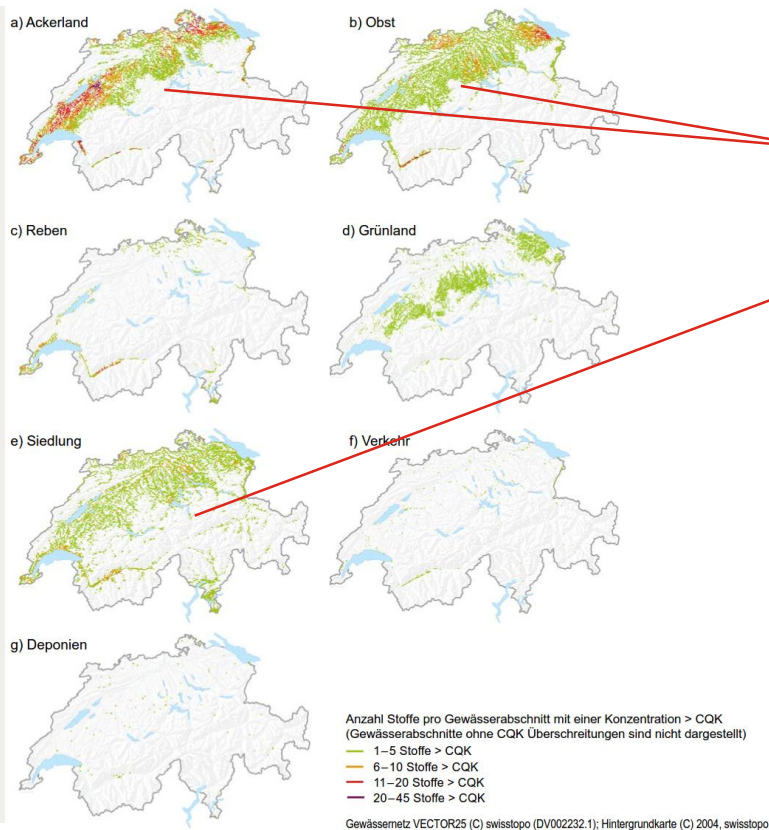


	Operation	Planning / Construction
O ₃	2	12
PAC	1	10

Legende: Ozonung PAK GAK Ferrat mehrere Verfahren

□ Umsetzung; Betrieb ○ Forschungsprojekte ◇ Umsetzung; Planung/Bau

Future challenges: diffused sources



– Farmland / fruit production sites

– Urban areas

– Strategy: sensitization, bans

– Targets: swiss “holy cows”

- Pharma industry
- agriculture

Factors of success

- High connection rate (> 98%) to sewage system and WWTPs
- Sewage system: mixed → separated
- Regional general drainage plans: net management to minimize the impacts on surface waters
- Thermal sludge disposal: MP in sediments is not an issue
- Extensive agriculture



An export good?



Strategy micropoll

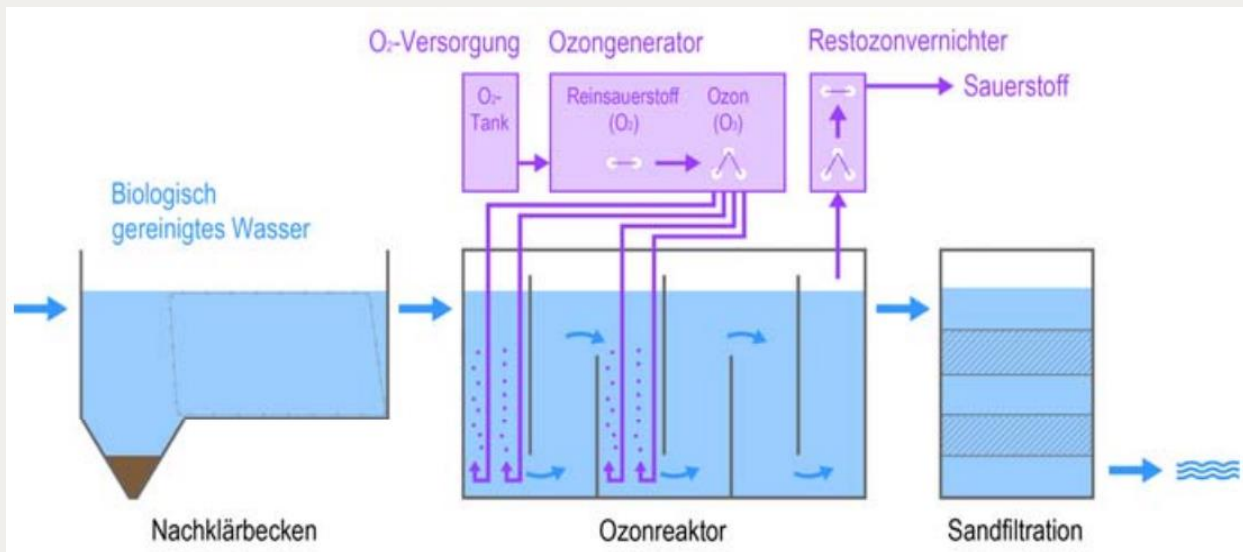


Thanks for your attention

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Example O₃: Neugut Dübendorf



Fonte: ARA Neugut

Zufluss Ozonung Mittelwerte

CSB	16.0 mg/l
DOC	5.3 mg/l
NH ₄ -N	0.08 mg/l
NO ₂ -N	0.03 mg/l
pH	7.4
Q-Vollstrom	70 - 660 l/s

Dimensionierung Ozonung

Reinsauerstofftank	30 m ³
Generatoren	2 x 5.5 kgO ₃ /h

Ozonreaktor

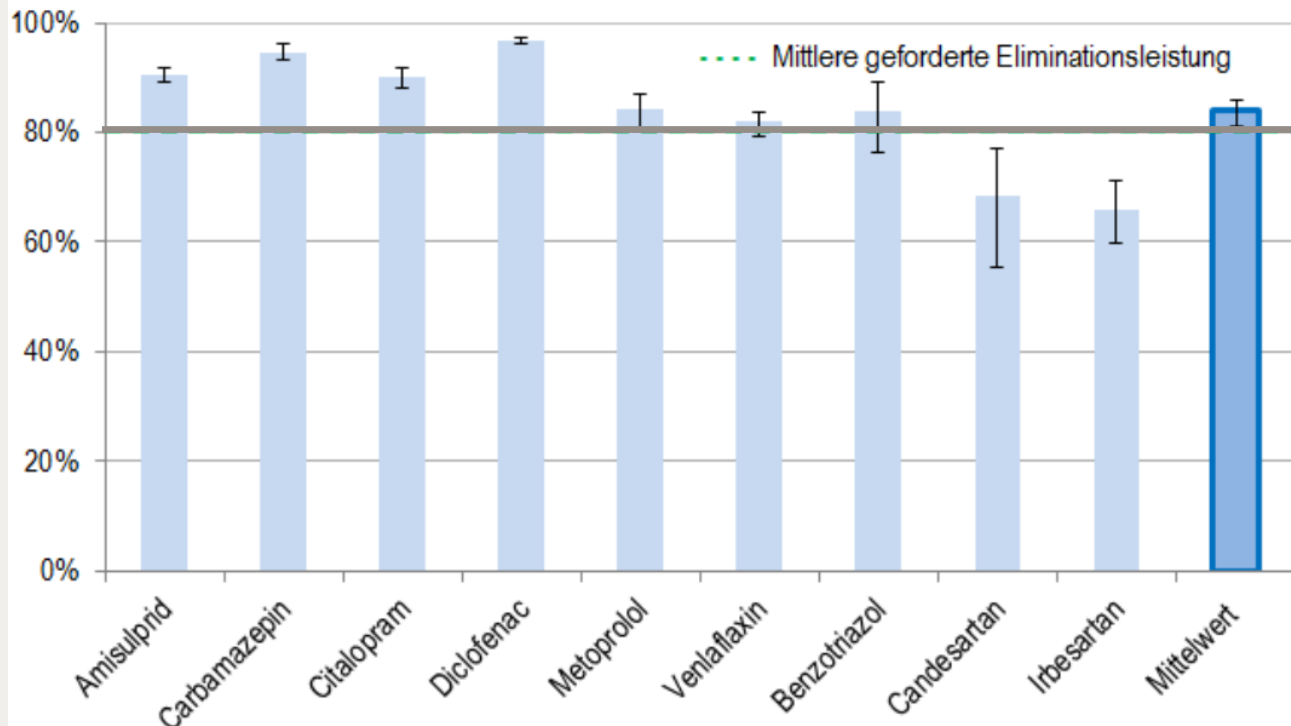
Inhalt	530 m ³
Wassertiefe	6.0 m
Begasungskammern	2 Stück
Keramikk diffusoren	je 20 + 33 Stück
Aufenthaltszeit min	13 Min.
Aufenthaltszeit mittel	37 Min.

Example O₃: Neugut Dübendorf



Fonte: ARA Neugut

Example O₃: Neugut Dübendorf



Fonte: ARA Neugut

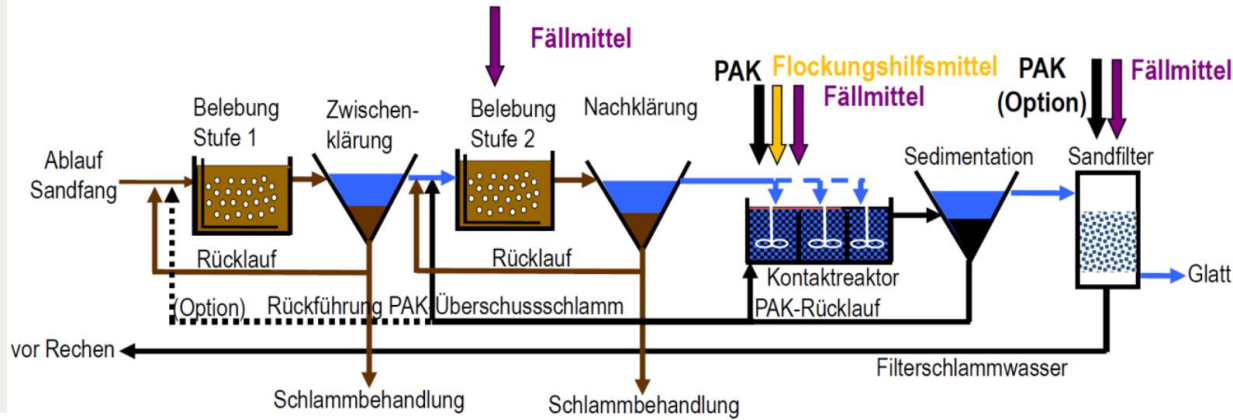
Energiebedarf	
Reinsauerstoff	28 g/m ³
Strom Ozonung	0.024 kWh/m ³
Gesamte Kläranlage	0.42 kWh/m ³
Abwassermenge 8 Mio. m ³ /a	

Eliminationsleistung	
Leitsubstanzen über gesamte ARA	80 - 86 %
DOC-Reduktion Ozonung und Sandfiltration	18 - 24 %
Ozondosierung pro g DOC	0.33 - 0.5 gO ₃
Ozondosierung pro m ³	1.6 - 2.7 gO ₃

Kosten der Ozonung	
Brutto-Investition CHF	3.27 Mio.
Ohne Bundesbeitragsabzug	
Amortisation, Unterhalt 60a Bau, 15a Ausrüstung, 10a EMSR; 2 % Zins; 3 % Unterhalt	0.025 CHF/m ³
Betriebskosten	0.014 CHF/m ³
Kosten pro EinwohnerIn total	6 CHF/a

Betriebskosten Ozonung	
Reinsauerstoff	40 %
Strom	20 %
Analytik Leitsubstanzen	20 %
Personal und Overhead	20 %

Example PAC: Herisau



Fonte: Gem. Herisau

Fonte: VSA

Example PAC: Herisau



Example PAC: Herisau

Parameter	Einheit	Wert
max. Zulauf PAK-Anlage	l/s	170
min. Kontaktzeit PAK-Reaktor	min	30
min. Aufenthaltszeit PAK-Sedimentation	h	2
max. Oberflächenbeschickung PAK-Sedi.	m/h	2
Max. Filtergeschwindigkeit	m/h	15.5
Verweilzeit Abwasser in Filter	min	4
Dosierung PAK	mgPAK/l	10-17
Dosierung FeCl(SO ₄)	mgFe/l	3
Rückführung PAK-Überschussschlamm		Biologie 2. Stufe (optional Biologie 1. Stufe)
PAK-Typ		Carbopal AP (Donau Carbon)
Max. Zulauf Filter	l/s	310

Fonte: Gem. Herisau

