

Introduction to EU Project Neptune

**New Sustainable Concepts and Processes
for Optimization and Upgrading
Municipal Wastewater and Sludge Treatment**

Hansruedi Siegrist, Eawag, Switzerland



General scope of NEPTUNE

The scope of sewage treatment is changing: today municipal WWTP are seen as end-of-pipe treatment before discharge to avoid eutrophication, toxic effects and hygienic health hazard in surface water.

Due to the global demographic trends, climate change and new legislations, future focus is put on the quantity and quality of effluents: **WWTP are delivering resources to the environment and for the human activities.**

Existing focus:

- Wastewater treatment
- nutrient removal
- pathogens removal
- energy optimization
- sludge disposal

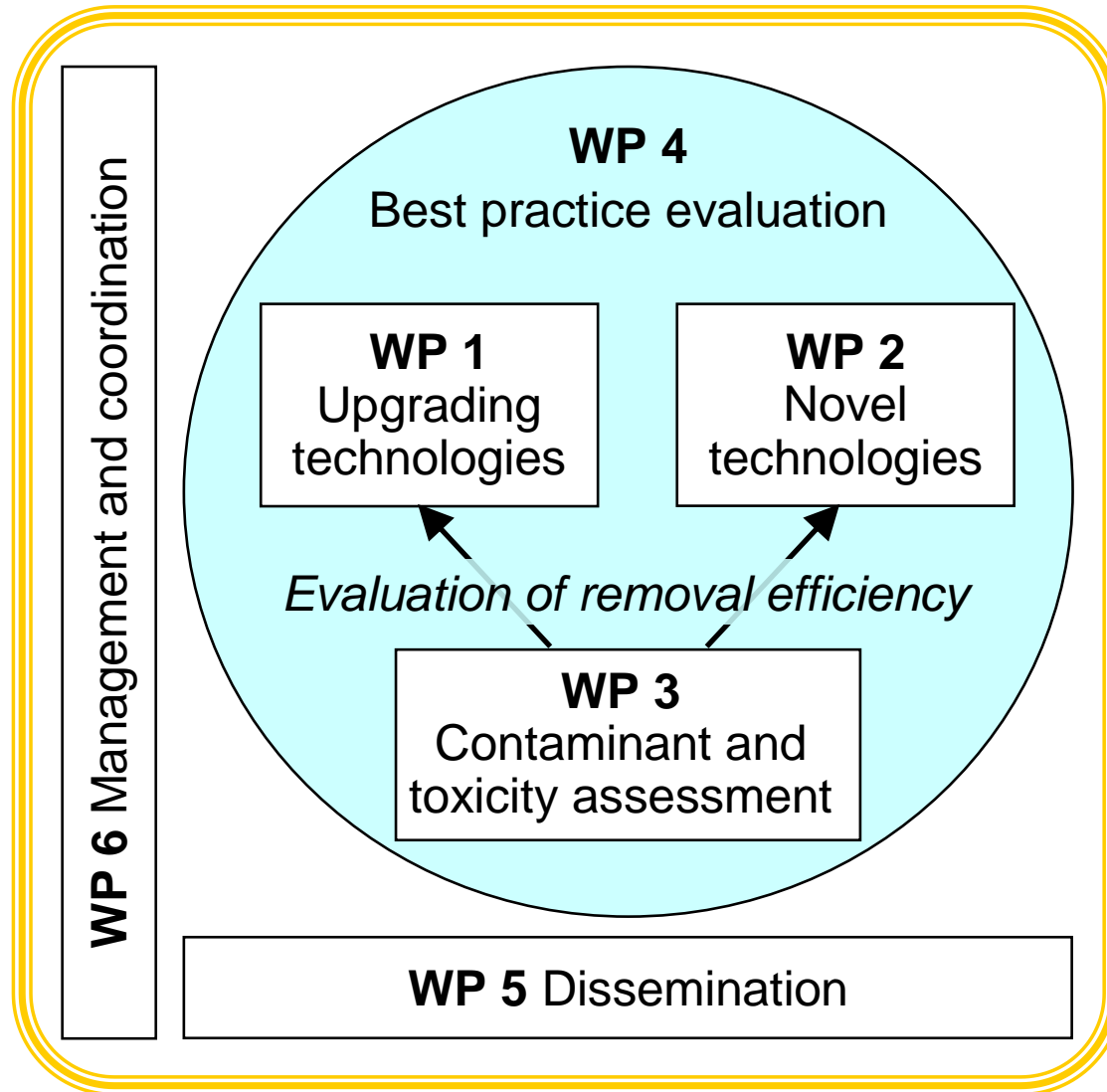
New focus:

- water reuse
- nutrient recycling
- micropollutants and ecotoxicity removal
- energy production
- reuse of sludge and of its resources

This shift has implications on the quality goals for WWTP products.

Structure of the EU Project NEPTUNE

New sustainable concepts and processes for optimisation and upgrading municipal wastewater and sludge treatment



Consortium:

- 7 GOs and Universities
- 2 Industry and consulting
- 7 SMEs
- 2 Non-European partners
- 28 End-users

NEPTUNE WPs (1)

Upgrading of municipal infrastructure (WP1)

WP-leader: Adriano Joss, Eawag, Switzerland

- New control strategies with in-situ sensors
- Micropollutant removal with chemical oxidation, activated carbon adsorption and wetland treatment
- Safe sludge processing and reuse (sludge triage and inertisation)
- Waste design to improve overall treatment efficiency (separate sludge liquid and hospital wastewater treatment)

Novel technologies (WP2)

WP-leader: Ilse Forrez, LabMet, Uni Gent, Belgium

- Microbial fuel cell applications: energy from waste water
- New oxidation processes (with Ferrate and MnO_2)
- Production of polymer from sludge
- High temperature pyrolysis with heavy metal and phosphate recycling

NEPTUNE WPs (2)

Ecotoxicity and micropollutant assessment (WP3)

**WP-leader: Thomas Ternes, Bundesanstalt für
Gewässerkunde (BfG), Germany**

- Fate of selected micropollutants and transformation products in wastewater treatment
- Assessment of the ecotoxicological hazard of whole effluents in conventional and advanced treatment and effluent upgrades
- Identification of process variables that influence the removal of bacterial and viral indicators
- Development of a concept for the necessary basic equipment of an on-site mobile unit for performing ecotoxicological, biological and chemical assessment of effluents

NEPTUNE WPs (3)

Comparability of various technical options (WP4)

WP-leader: Henrik Larsen, TU Denmark (DTU)

- Life cycle assessment studies (LCA) including pathogens and ecotoxicity aspects
- Ranking for following technical options (best practice evaluation)
 - Upgrading of biologically treated effluent
 - Innovative nutrient removal control and processes
 - Sludge reduction methods: physical, chemical and thermal
 - Sludge inertisation and resource recycling

Dissemination (WP5)

WP leader: Marjoleine Weemaes, Aquafin, Belgium

- Website construction (Eawag)
- Midterm workshop and end user conference
- General dissemination of results
- Catalogue with description of investigated processes

Workshop Program

Program (Thursday 25th March)

Micropollutants and evaluation tools – LCA and GHGs

9:00 - 9:30	Registration	
9:30 - 9:40	Official Workshop opening	Peter Vanrolleghem <i>modelEAU (Canada)</i>
9:40 - 9:50	Introduction to the Neptune project	Hansruedi Siegrist <i>(EAWAG, Switzerland)</i>
9:50 - 10:20	Are we about to upgrade wastewater treatment for removal of organic micro pollutants?	Adriano Joss and Thomas Ternes <i>(EAWAG, Switzerland and BfG, Germany)</i>
10:20 - 11:00	Technologies investigated in Europe to improve removal of micro-pollutants (Ozonation and PAC addition schemes, results of pilot and full-scale operations)	Hansruedi Siegrist <i>(EAWAG, Switzerland)</i>
11:00 - 11:30	Coffee break	-
11:30 - 12:00	Fate in Wastewater: Microcontaminants in wastewater treatment plants, status in Canada	Chris Metcalfe <i>(Trent University), Canada</i>
12:00 - 12:30	Microcontaminants in sludge and biosolids. Ongoing research in North America	Hugh Monteith <i>(Hydromantis, Canada)</i>
12:30 - 14:00	Lunch	-
14:00 - 14:30	Inclusion of ecotoxicity in LCA. Ozonation and PAC addition processes as case examples.	Henrik Larsen <i>(DTU, Denmark)</i>
14:30 - 15:00	The current state of the art for GHG models in WWTPs	Andrew Shaw <i>(Black and Veatch, US)</i>
15:00 - 15:30	Coffee break	-
15:30 - 16:15	Discussion	Lluís Corominas <i>modelEAU (Canada)</i>

Program (Friday 26th March)

Nutrient removal - ICA and new technologies

9:00 – 9:30	Nitritation/Anammox, full-scale experience and LCA	Adriano Joss <i>(EAWAG, Switzerland)</i>
9:30- 10:00	Multicriteria evaluation of control strategies	Xavier Flores-Alsina <i>(modelEAU, Canada)</i>
10:00 - 10:30	Use of control to improve nutrient removal (perspectives)	Lluís Corominas <i>(modelEAU, Canada)</i>
10:30 – 11:00	Coffee break	-
11:00 – 11:30	Thermal hydrolysis for biosolids stabilization	Damien Batstone <i>(AWMC, Australia)</i>
11:30 – 12:00	Minimising sludge production by long SRT, trash and grit removal from sludge	Yves Comeau <i>(École Polytechnique Montréal)</i>
12:30 – 13:30	Lunch	-
13:30 – 14:00	Sewage sludge inertisation by ultrahigh temperature pyrolysis	Natalija Miladinovic and Hansruedi Siegrist <i>(EAWAG, Switzerland)</i>
14:00 – 14:30	Bioelectrochemical systems – from power to value added chemicals production from wastewater	Jurg Keller and Zhiguo Yuan <i>(AWMC, Australia)</i>
14:30 – 15:00	Resource Recovery Technology Evolution: Roles of Academics, Practitioners, Manufacturers and Governments.	Dave Kinnear <i>(HDR, US)</i>
15:00-15:30	Coffee break	-
15:30 – 16:15	Discussion	Peter Vanrolleghem <i>(modelEAU, Canada)</i>
16:15 – 16:30	Closing	Hansruedi Siegrist <i>(EAWAG, Switzerland)</i>