A new Perception of Sludge Management: Role of Regulation and Standardization

L. Spinosa

CNR Scientist (retired), ISO and CEN Officer, Bari (IT), ludovico.spinosa@fastwebnet.it

SLIDE 1
Title and Author

SLIDE 2
Sludge often plays a minor role during the planning phase of water and wastewater treatment operations, being considered the *last wagon* of the water cycle train. In practice, sludge is managed only after it has been produced, without considering that the selection of the most appropriate wastewater treatment chain is strongly driven by the final sludge reuse/disposal options taking into account the specific local situation. Consequently, sludge management should be considered as the *locomotive* of the water cycle train (Spinosa and Doshi, 2018).
Main purpose of this change is the development of more sustainable strategies by replacing solutions aimed at *simply disposing of* sludge to those oriented towards *maximizing recovery benefits*, not only from a *technical* point of view, e.g. reduction of production and improvement of quality, but also from an *institutional/social* one, e.g. regulatory aspects and institutional dynamics.

SLIDE 3
This new perception can be schematically represented by an ancient Greek Temple.

SLIDE 4
This new perception is based on the:
- *Locomotive / Last wagon* concept, acting as Base / Underlying principle,

and includes both:
- *Technical*" aspects (Reduction of Production; Improvement of quality; Recovery maximization; System optimization), and often underestimated "*Institutional and Social*" ones, acting as Columns / Supporting actions,

which for their effective application have to:
comply with:
- general and always valid "*Basic principles*" (Laws of thermodynamics, Sustainability principles and Circular economy concepts), acting as Roof / Overarching concepts,

and fall within:
- specific "*Boundary conditions*" (Isolated/Integrated processes; Past/Future concepts; Disposal/Recovery options), acting as Staircase / Accessing steps) which depend on the technological, economic and social levels of the context where operations take place (Spinosa *et al*, 2017).

SLIDE 5
From the Technical point of view, crucial steps for more sustainable solutions include:
- production of the minimum sludge amount, not in absolute but compatible with the final outlet and the best overall energy balance;
- improvement of sludge quality to reduce nuisances, health risks and handling costs.

SLIDE 6
From the Institutional/Social point of view, important requirements are, among others, the:
- development of realistic and enforceable regulation adapted to the local context, including clear rules for penalties and sanctions;
- definition of standardized characterization procedures and guidelines for good management practices, thus involving objective, transparent, and legally conducted operations;

SLIDE 7
The development of "*realistic and enforceable regulation*" is crucial because an optimal and environmentally safe sludge management can only be achieved through clear objectives, transparency, and legally conducted operations.

SLIDE 8
Furthermore, it must be remembered that regulations, included those on sludge, cover a wide range of scales, from national to regional and local ones, and fall not only in the water and sanitation sectors, but also in the health, agriculture and planning and construction sectors.

SLIDE 9
Within this framework, "*standardization of characterization methods*", in association to issuing of *Guidelines*, is a necessary support to regulation, because well-defined and validated procedures allow legal requirements to be fulfilled in a correct and uniform manner, thus building stakeholder and public confidence (Spinosa and Vignoles, 2012).

SLIDE 10
Stabilization and *Dewatering* are the most important processes in a wastewater/sludge processing as they represent two unavoidable technical hubs to go from origin (i.e. production) to destination (i.e. reuse/disposal).

SLIDE 11
Main purpose of *Stabilization* is to reduce nuisances, health risks and subsequent treatment costs, thus improving sludge quality. Important parameters are those related to the assessment of *biological stability*, e.g. Volatile to Total solids ratio, Biological Methane Potential, Odor intensity, etc., but a widely accepted definition of stability is still lacking.
With reference to volume reduction, several conventional parameters are potentially available for characterization of sludge *Thickenability* and *Dewaterability* (e.g. SVI and SSVI, CST, SRF, Drainability index, Limit dryness, Centrifugability, etc.).

SLIDE 12
However, many of above physical parameters are specific to the method of treatment, and are not able to give fundamental or basic information on sludge as other parameters, like (i) rheological properties, (ii) particle and floc size, and (iii) water distribution, are able to do, so much work is still needed to develop reliable procedures adapted to sludge for evaluating such properties.

SLIDE 13
CEN (Eur. Standardization Committee) and ISO (Int. Standardization Organization) are working on the development of standardized characterization and management procedures within the Technical Committees CEN/TC308 and ISO/TC275, specifically dedicated to sludge management (Spinosa, 2016).

SLIDE 14
The end
Thanks by Ludovico

REFERENCES

Spinosa, L. (2016) Standardized characterization procedures: a necessary support to regulations. *Water Science & Technology*, **74** (1), 220-228.

Spinosa, L. and Doshi, P. (2018). Re-conceptualizing the sludge management within the sustainable development Goal 6.2. Proc. IWA Specialist Conf. on Sludge Management in Circular Economy (SMICE 2018), 34-36, Rome, May 23-25.

Spinosa, L., Ginisty, P. and Hendry, S. (2017). Sustainable sludge regulation: the start-point, not the finish-point. *SludgeTech 2017*, London, UK, July 9-13.

Spinosa, L. and Vignoles, C. (2012). Developments of European standardization on Sludge: Guidelines of good practice. *3rd European Conf. on Sludge Management (ECSM 2012)*, University of Leon, Spain, Sept. 6-7.