



European Sustainable
Phosphorus Platform



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SMART-Plant

ECOMONDO
THE GREEN TECHNOLOGIES EXPO

22ª Fiera internazionale
del recupero di materia ed energia
e dello sviluppo sostenibile

Green & Circular Economy
6-9 Novembre 2018
Rimini Italy

IN CONTEMPORANEA CON
KEY ENERGY

Regulatory framework of nutrient and resource recovery and valorization from water cycle

Lorenzo Bardelli – ARERA

3rd EUROPEAN NUTRIENT EVENT @ ECOMONDO 2018

8 - 9 November 2018, Rimini, Italy

www.smart-plant.eu/ENE3





• Contribution of AREGA Regulation to the Agenda 2030 - Sustainable Development Goals

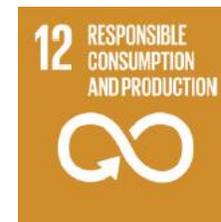
- Clean Water & Sanitation



- Sustainable Cities & Communities



- Responsible Consumption & Production

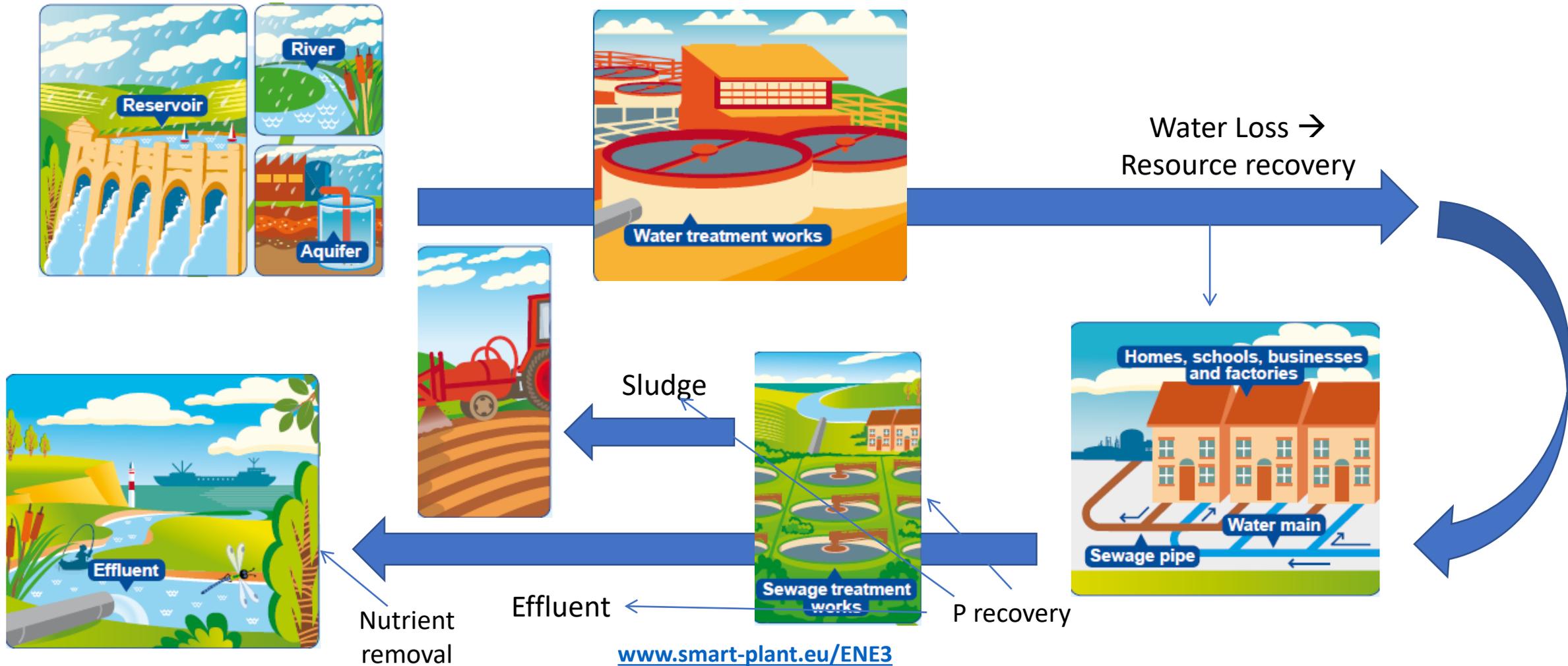


- Healthy Life below Water

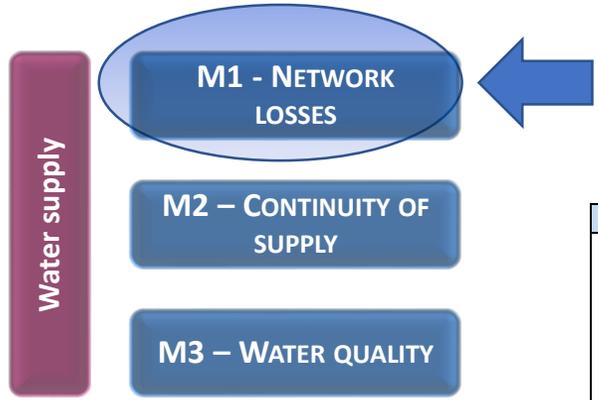




Water service: options for nutrient and resource recovery



Macro-indicators



How it works (example)

M1 - Network losses (water conservation)

ID	Indicator	Tariff type	ID Class	Targets
M1	M1a – Water losses per km [mc/km/day] M1b – Water losses [%]	RES	A	Conservation
			B	-2% M1a yearly
			C	-4% di M1a yearly
			D	-5% di M1a yearly
			E	-6% di M1a yearly

Regulation of technical quality
Resolution 917/2017/R/idr
“Carrots & Sticks” measures

Resource recovery

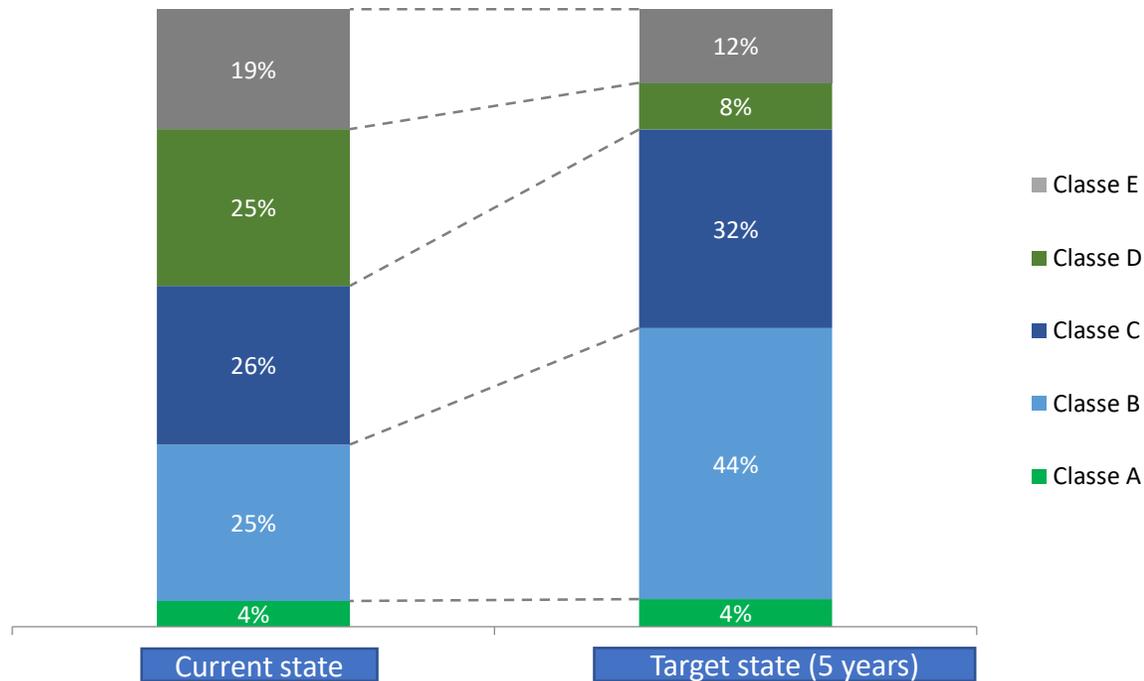


		Water losses per km (mc/km/day)				
		M1a <15	15 ≤ M1a <25	25 ≤ M1a <40	40 ≤ M1a <60	M1a ≥60
Water losses (%)	M1b <25%	A	B	C	D	E
	25% ≤ M1b <35%					
	35% ≤ M1b <45%					
	45% ≤ M1b <55%					
	M1b ≥55%					



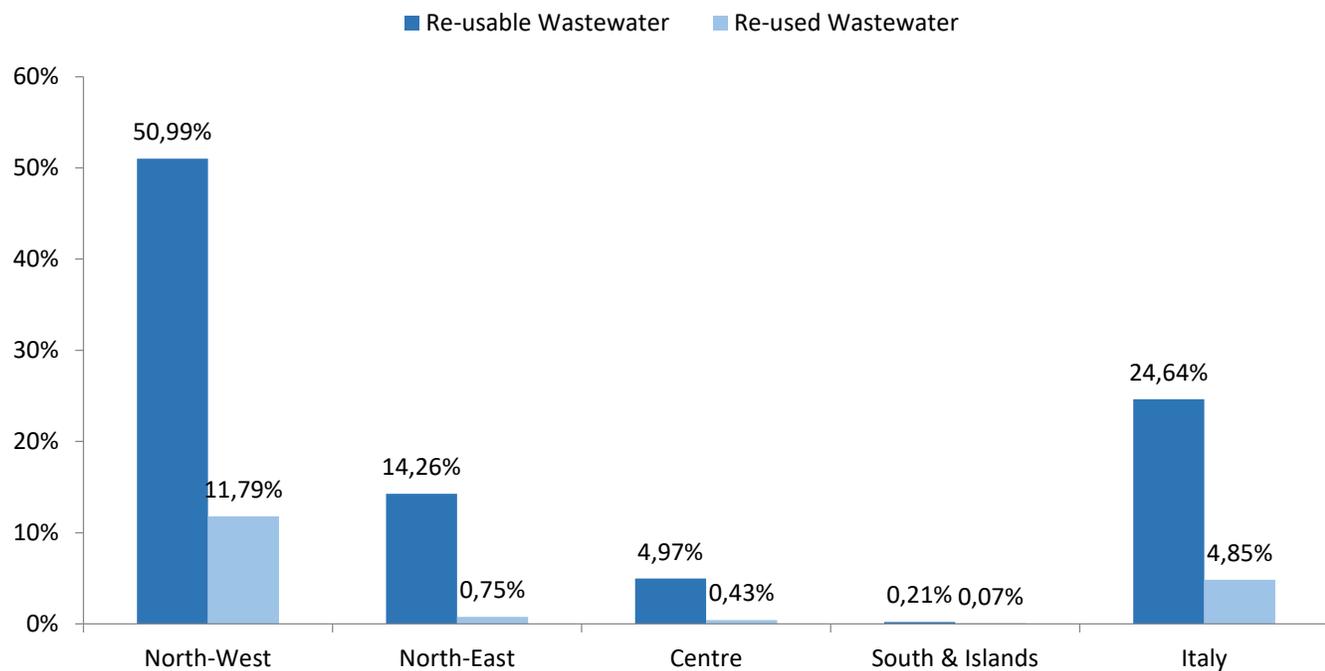
- analysing **water losses** from two different perspectives:
 - **Technical**: impact of water infrastructure on losses
 - **Environmental**: water conservation

- Diagram M1: current and target state



Resource & Nutrient** Recovery

- Re-use of treated wastewater for irrigation (185/2003)



**	Total P	Total N
DM 185/2003	2 mg/l	15 mg/l
d.lgs. 152/2006 [#]	1 mg/l	10 mg/l

[#] size > 100.000 population equivalent



Tariff Method for Water Service Resolution 664/2015/R/idr

Tariff multiplier:

$$g^a = \frac{VRG^a}{\sum_u \underline{tarif}_u^{2015} \cdot (\underline{vscal}_u^{a-2})^T + R_b^{a-2}}$$

If:

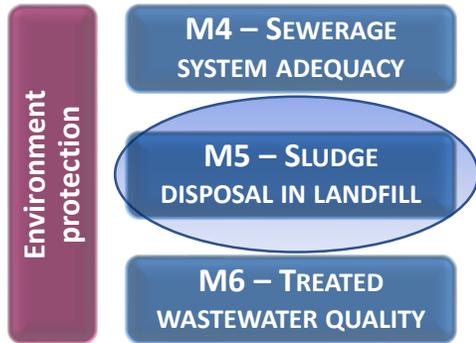
$$Rb^{(a-2)} > Cb^{(a-2)}$$

Than:

$$Rc_{Attività}^a = \%b * (R_b^{a-2} - C_b^{a-2})$$

- Resource & Nutrient Recovery
 - Re-use of treated wastewater for irrigation (185/2003)
- High potential but still few examples
 - lack of demand (?) / social acceptance / awareness (farmers) (?)
 - lack of available infrastructures, i.e. canals (?)
- In spite of tariff incentives on water utilities

Macro-indicators



How it works (example)

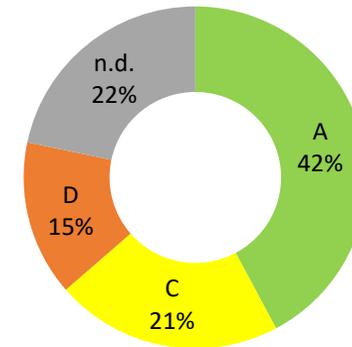


M5 – Sludge disposal in landfill

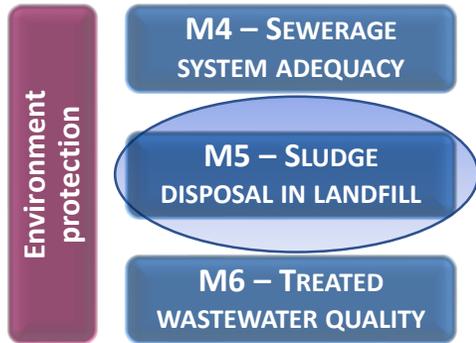
Regulation of technical quality
Resolution 917/2017/R/idr
“Carrots & Sticks” measures

Resource & Nutrient Recovery

ID	Indicator	Tariff type	ID Class	Class	Targets
M5	Landfill sludge disposal [%]	ENV	A	$M5 < 15\%$	Conservation
			B	$15\% \leq M5 < 30\%$ e $\%SS_{tot} \geq 30\%$ of sludge mass overall produced	-1% $MF_{iq, disc}$ yearly
			C	$15\% \leq M5 < 30\%$ e $\%SS_{tot} < 30\%$ of sludge mass overall produced	-3% $MF_{iq, disc}$ yearly
			D	$M5 \geq 30\%$	-5% $MF_{iq, disc}$ yearly



Macro-indicators



How it works (example)



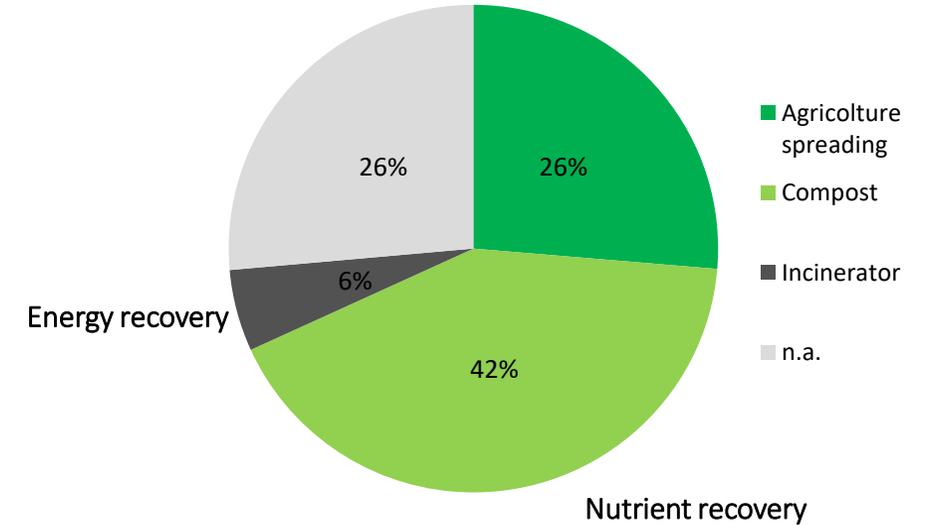
Regulation of technical quality

Resolution 917/2017/R/idr

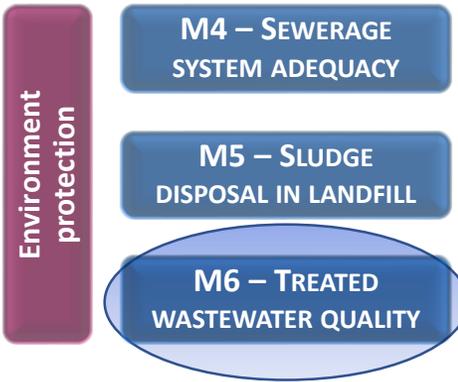
"Carrots & Sticks" measures



Still high landfill disposal (European average about 11%)



Macro-indicators



How it works (example)

M6 – Treated wastewater quality

ID	Indicator	Tariff type	ID Class	Class	Targets
M6	Exceeding limits tax in waste water samples [%]	ENV	A	$M6 < 1\%$	Conservation
			B	$1\% \leq M6 < 5\%$	-10% di M6 yearly
			C	$5\% \leq M6 < 10\%$	-15% di M6 yearly
			D	$M6 \geq 10\%$	-20% di M6 yearly

Regulation of technical quality
Resolution 917/2017/R/idr
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Quality of effluent

