



Valorisation alternatives to landfill for organic residues

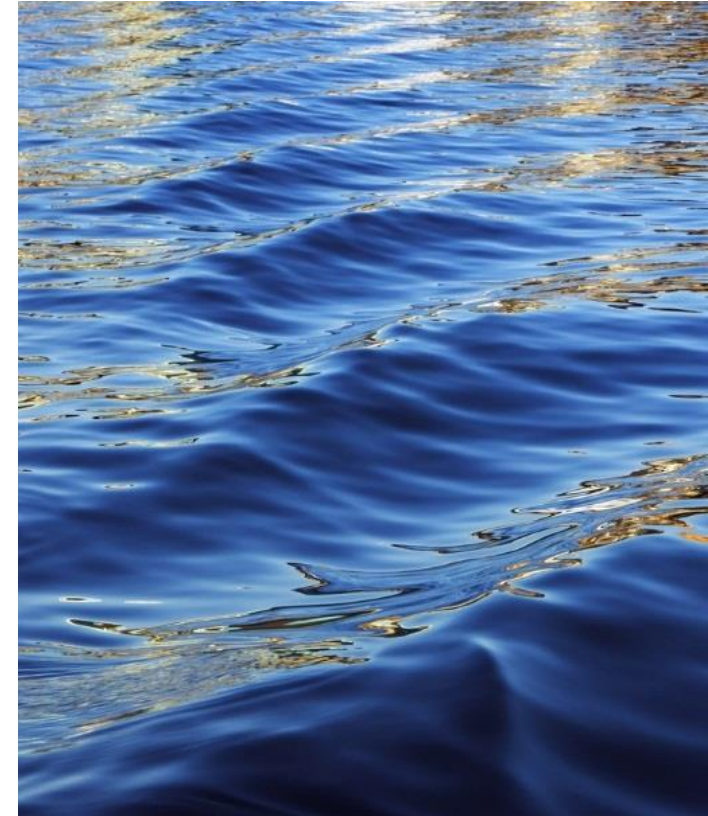
Jessica Graça, Brian Murphy and Brian Kelleher
EGU2020



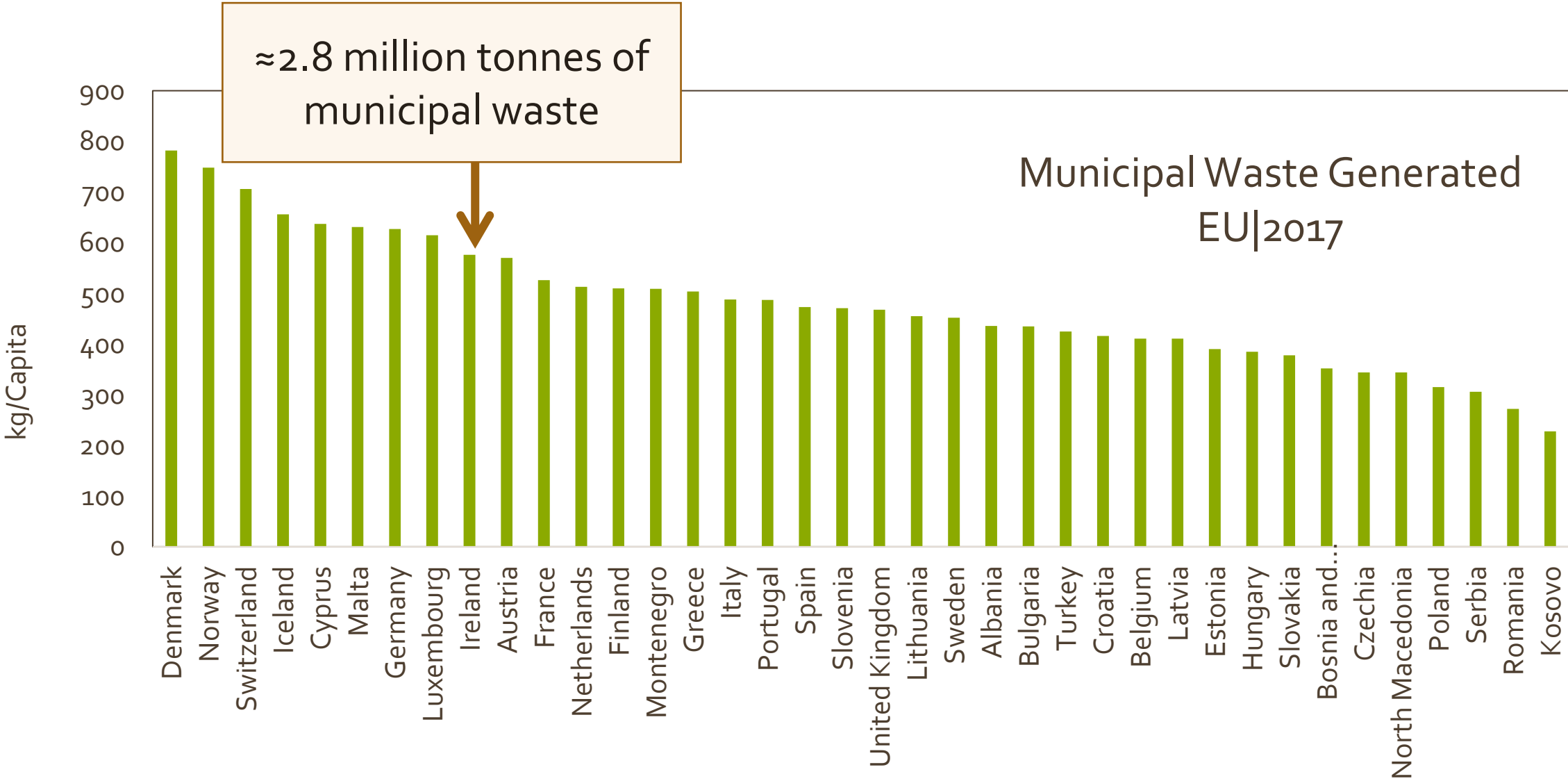
Brian Murphy



Brian Kelleher



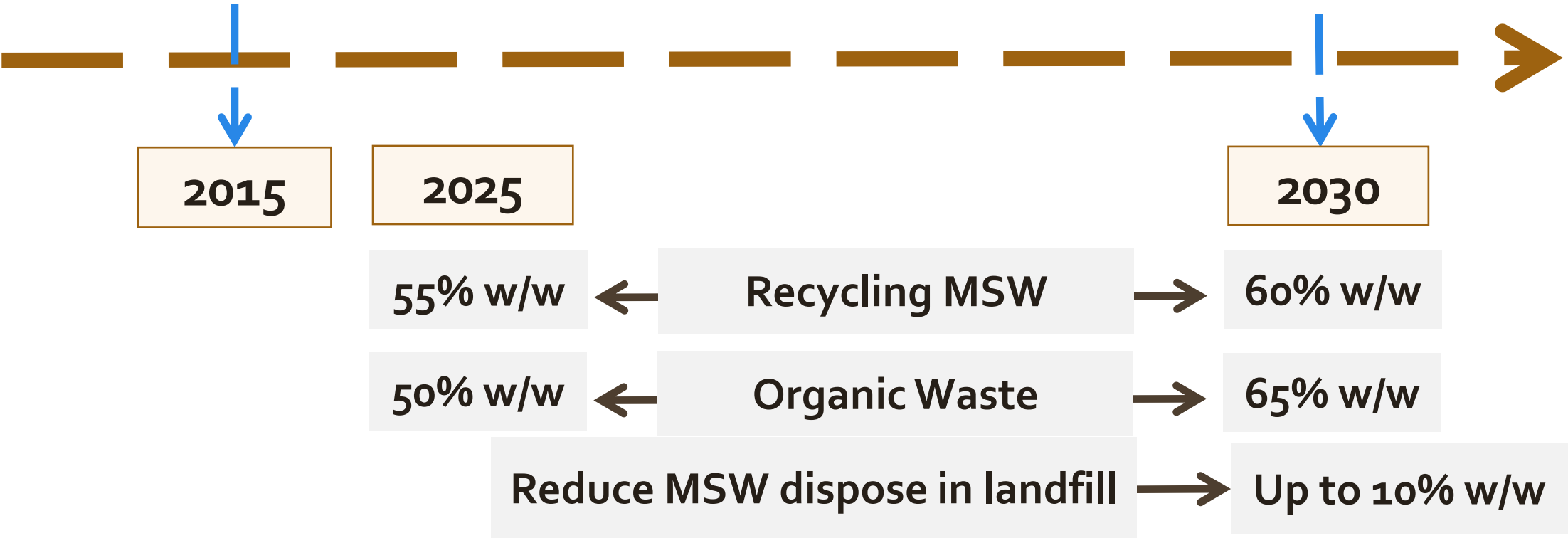
Municipal Waste Generation - Europe



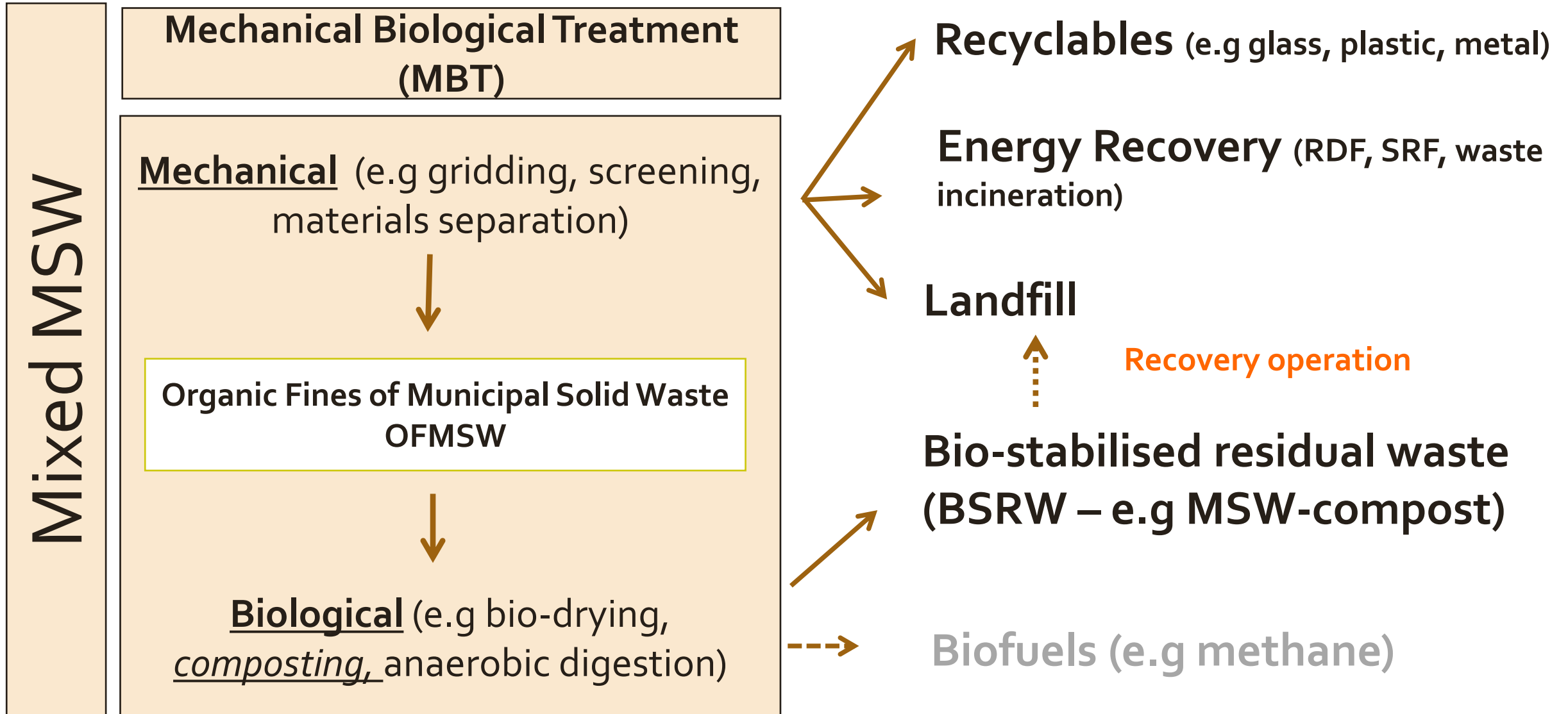
EU Circular Economy Package - NEW TARGETS

Reuse and recycle of MSW by 65%

Reuse and recycle of MSW by 75%



Municipal Solid Waste (MSW) | Current Management



VALOR Focus on...

Organic Fines MSW



BSRW Ireland |2017

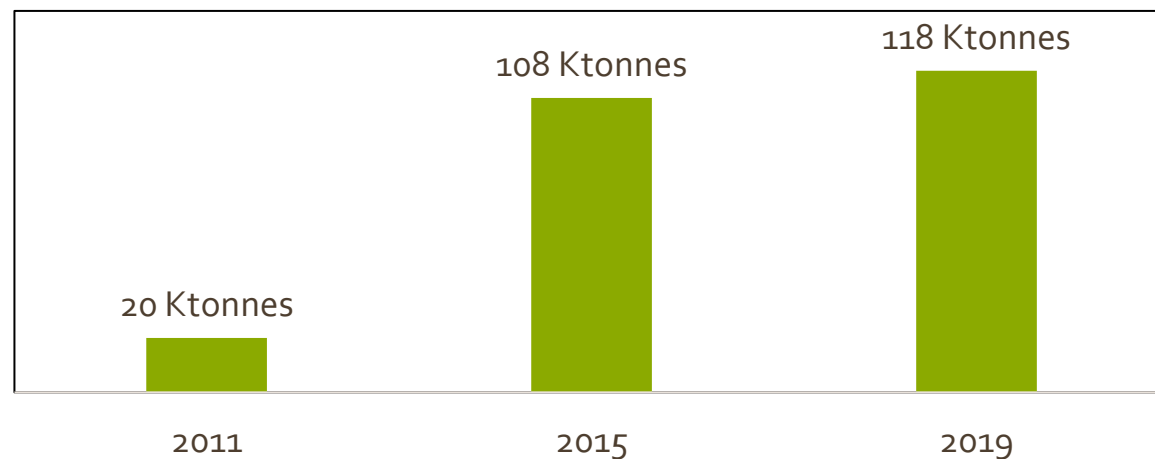
3.3% MSW generated

@ Eurostat

Bio-stabilised Residual Waste BSRW



Bio-stabilised Waste Generation | Ireland



@ EPA, 2019

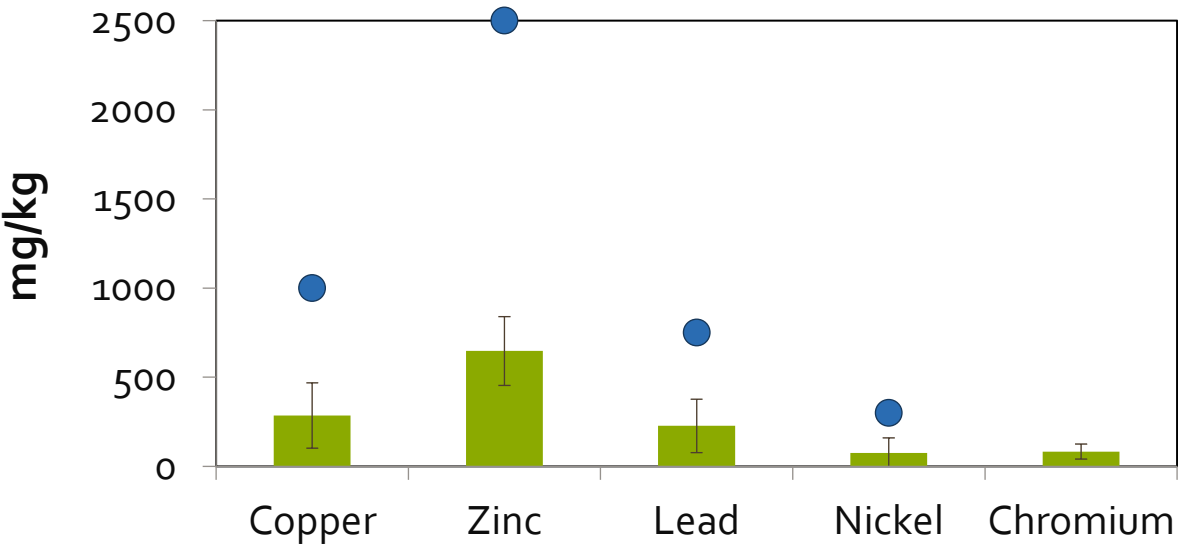
MSW-compost

Historical Data

Nutrients (w/w %)	BSRW	Compost [®]
Total Nitrogen	2.0 (0.3)	1-2.5
Total Calcium	7.1 (1.1)	3-6
Total Magnesium	0.64 (0.11)	0.3-0.55
Total Phosphorus	0.40 (0.06)	0.2-0.4
Total Potassium	0.71 (0.12)	0.6-1.5
Organic matter	41.7 (7.0)	30-60
Organic Carbon	24.2 (4.1)	--

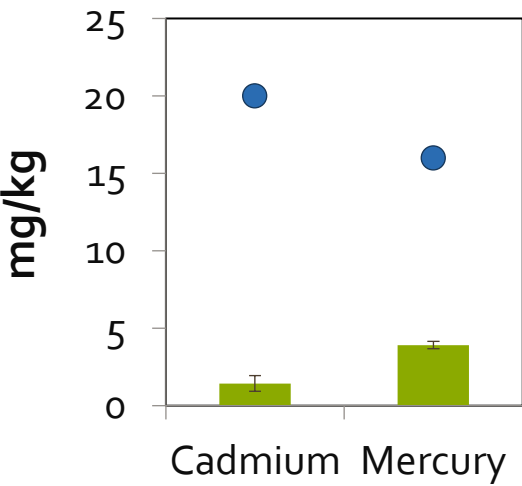
@ Enrich Environmental Ltd

Currently being applied to land
in some EU countries
under regulation



● Sewage Sludge S.I. No. 183/1991

Total Heavy Metals



Validation as soil amendment

Water quality evaluation

Does t land application of MSW-compos affect water quality (NH_4 , NO_3 , P, metals)?



- ✓ Forest soil under Sitka Spruce cultivation (>20 years)
- ✓ IBC tanks with 20cm soil (approx. 200kg)

Experimental treatments:

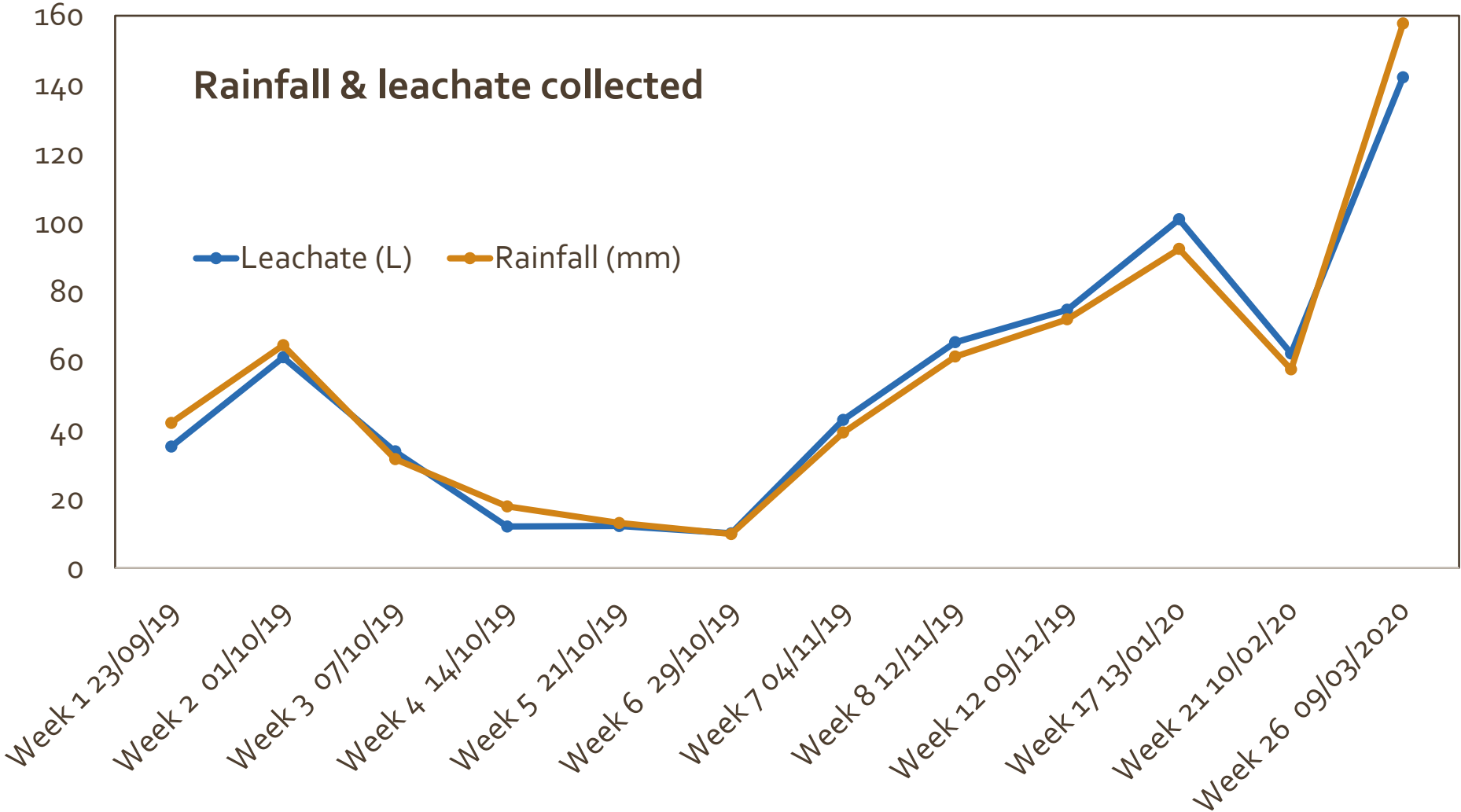
- ✓ Control
- ✓ Sewage Sludge 10 t/ha (DM) – S.I. No. 267/2001
- ✓ BSRW 10 t/ha (DM)
- ✓ BSRW 25 t/ha (DM)
- ✓ Leachate analyzed for 26 weeks

Water quality evaluation

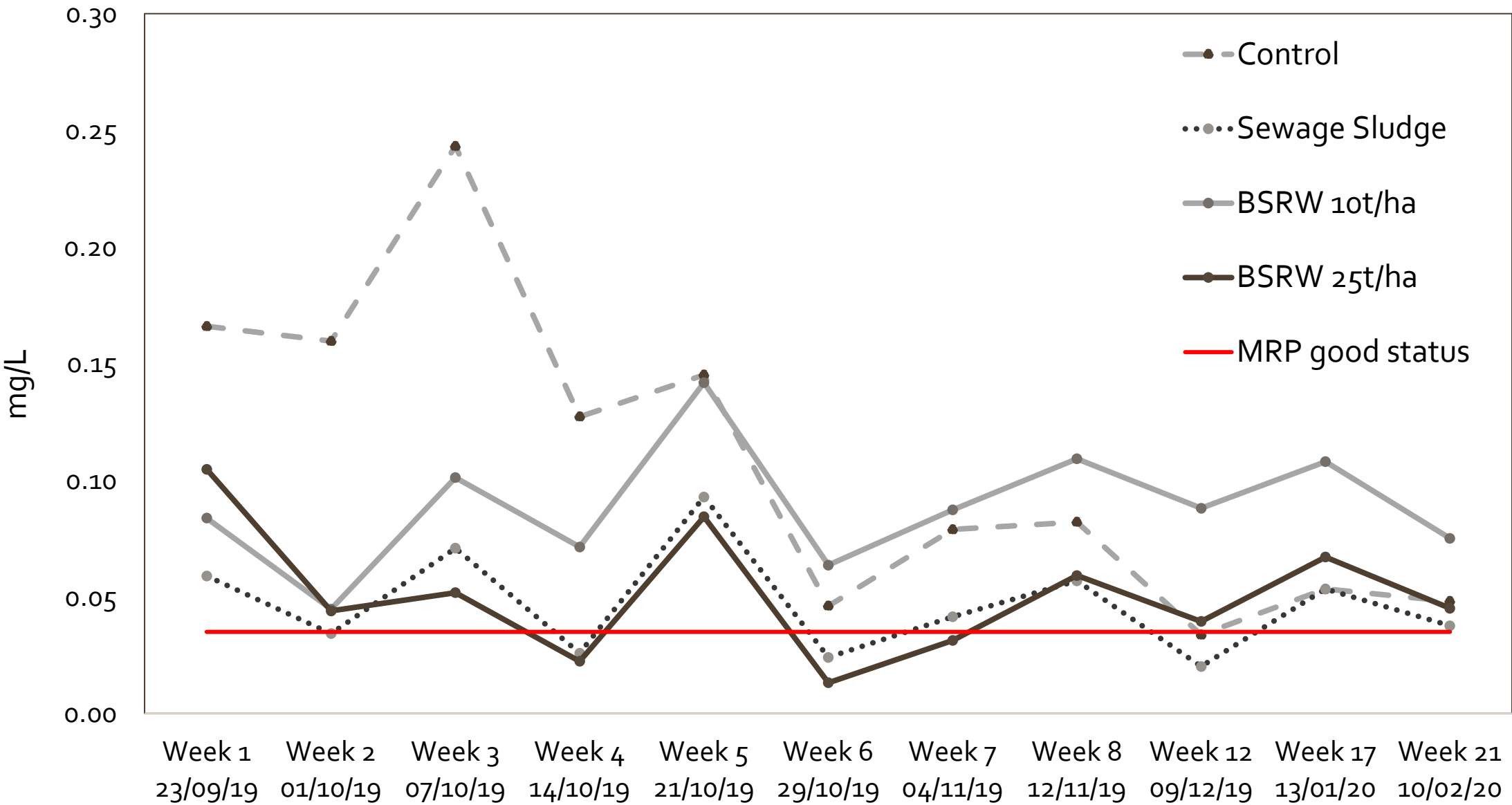
	MSW-compost	Stabilized sewage sludge	S.I. No. 267/2001
Total Nutrients % DM			
Phosphorus	0.47	2.28	
Potassium	0.43	0.05	
Magnesium	0.93	0.31	
Sodium	0.78	0.19	
Calcium	2.07	1.12	
Metals mg/kg DM			
Cadmium	9.02	10.71	20
Chromium	43.7	20.65	NA
Copper	494.6	392.8	1000
Nickel	66.9	17.88	300
Lead	317.5	90.5	750
Zinc	1018.9	344.1	2500

Nutrients and metal
content of
amendments used

Water quality evaluation



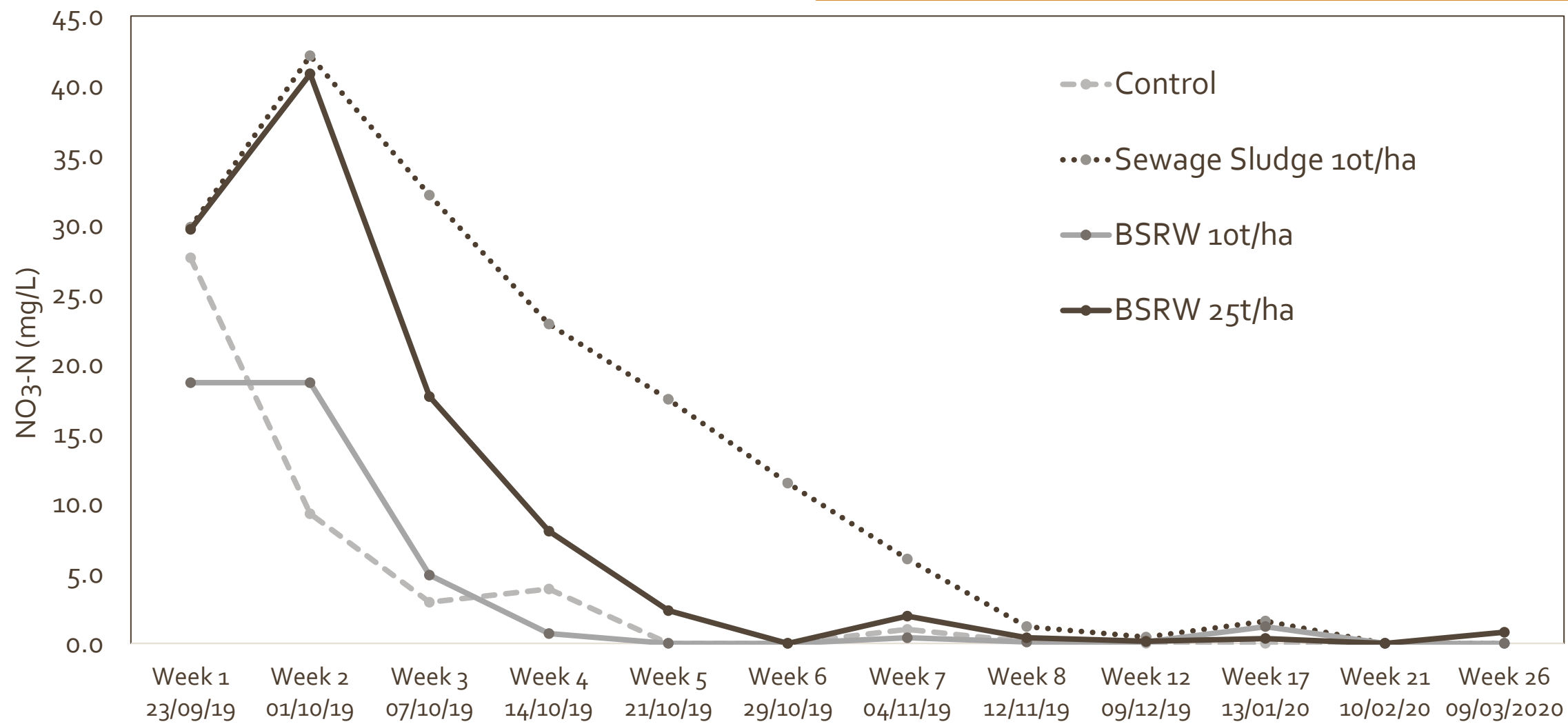
Molybdate Reactive Phosphorus



Nitrates & Ammonium

Ammonium (NH₄) surpassed 0.2mg/L | Week 1

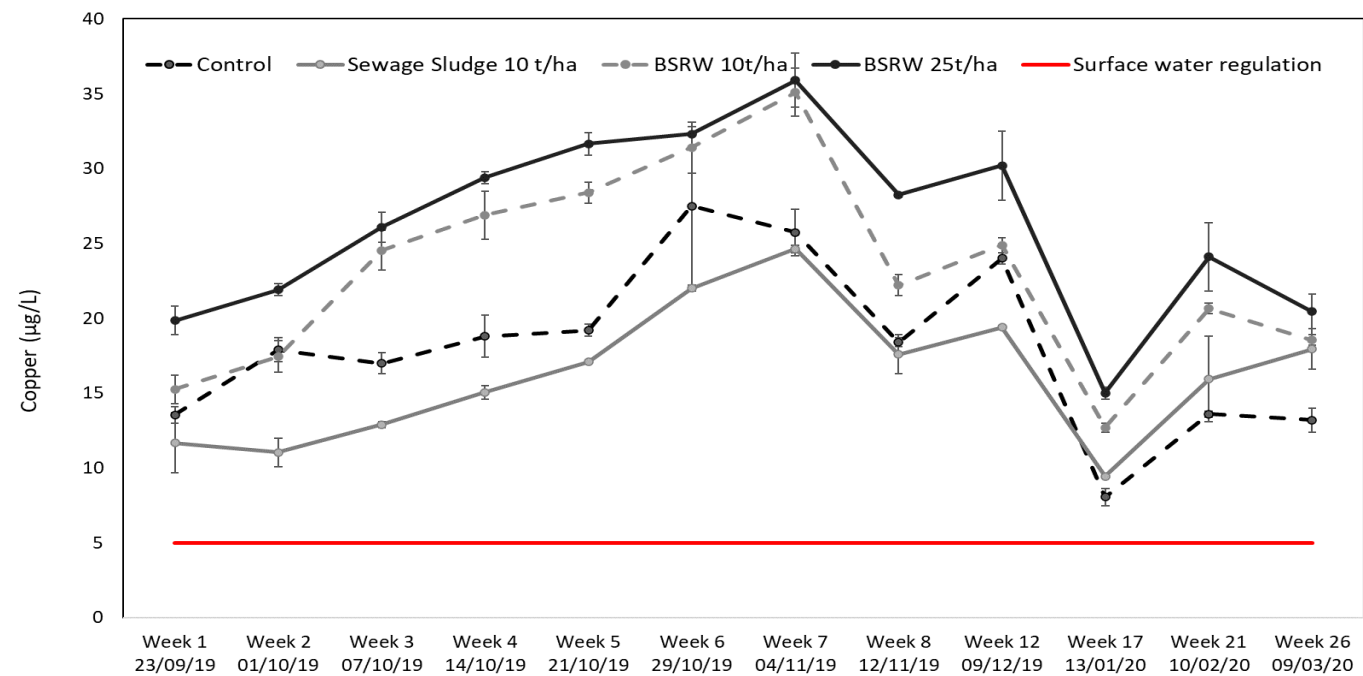
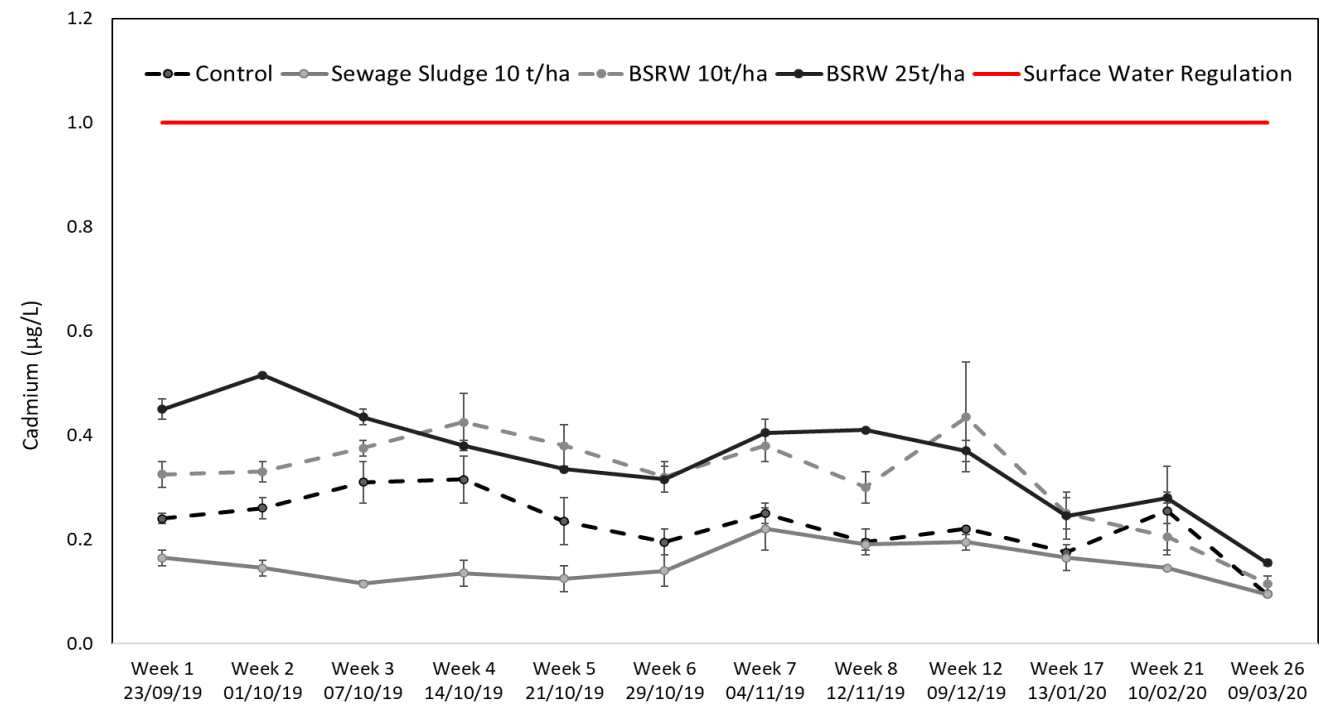
Nitrate < 50mg/L



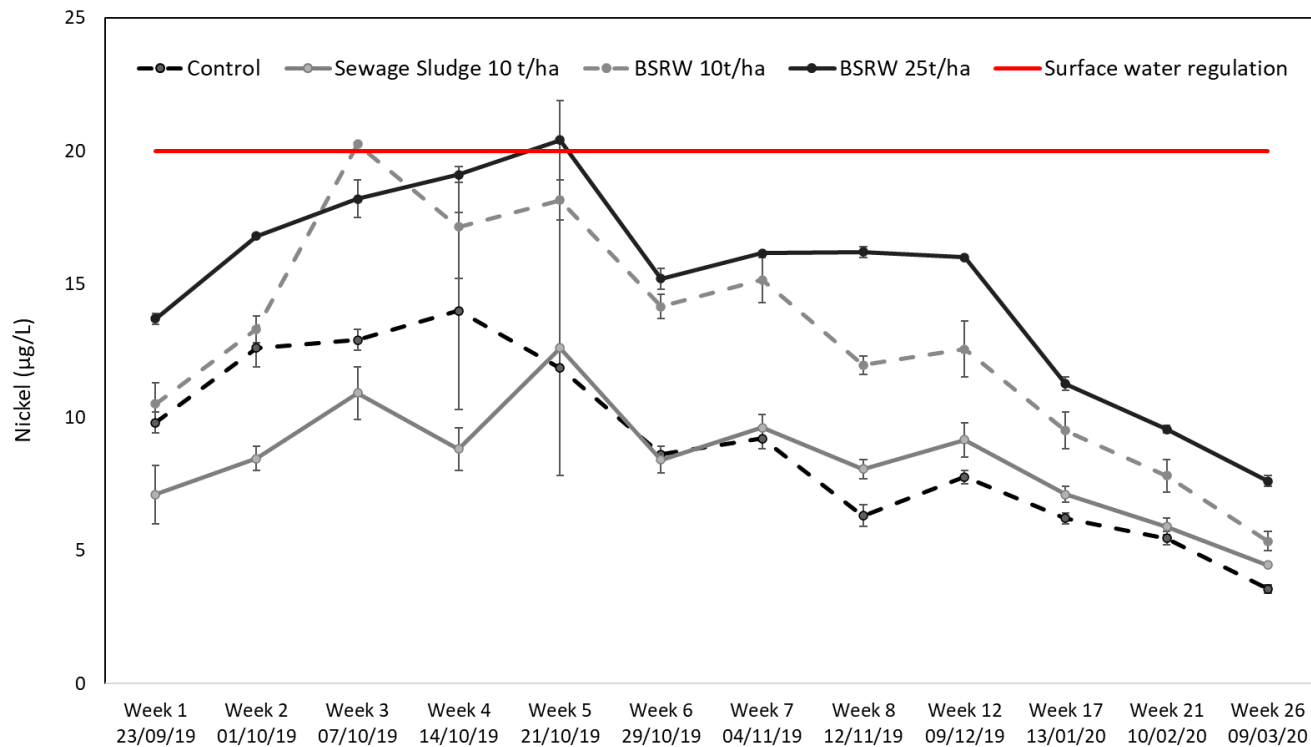
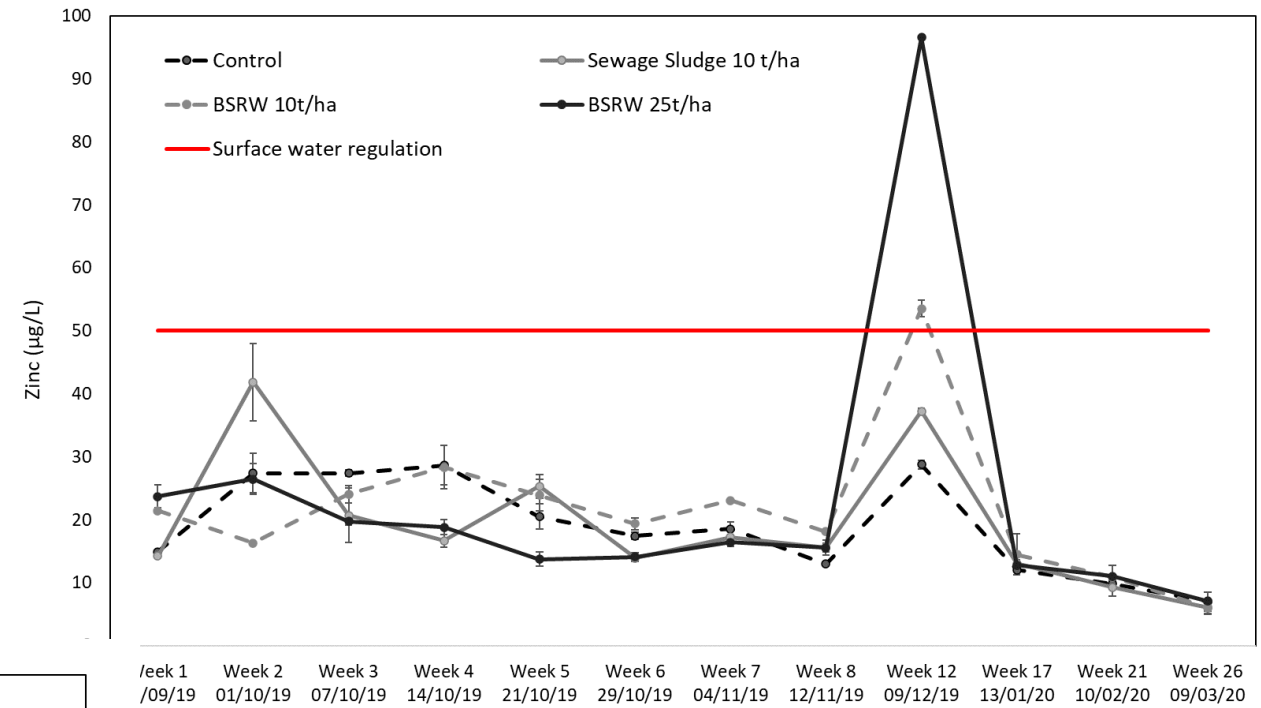
Metals

✓ Cadmium, Chromium & Arsenic below
Surface Water regulation limits

✓ Copper above 5 mg/L



Zinc



Nickel

Key Study findings

- ✓ Use of MSW – compost compares to stabilised sewage sludge and did not affect water quality
- ✓ BSRW could be used on land under regulatory alignment
- ✓ Added value drives the potential for the use of MSW-compost



@Braval, 2019

NEXT STEPS

- ✓ Soil metal loading ?
- ✓ Soil nutritional and quality improvement ?
- ✓ Field-based case study using MSW-compost for soil remediation

Thank You



Jessica Graça

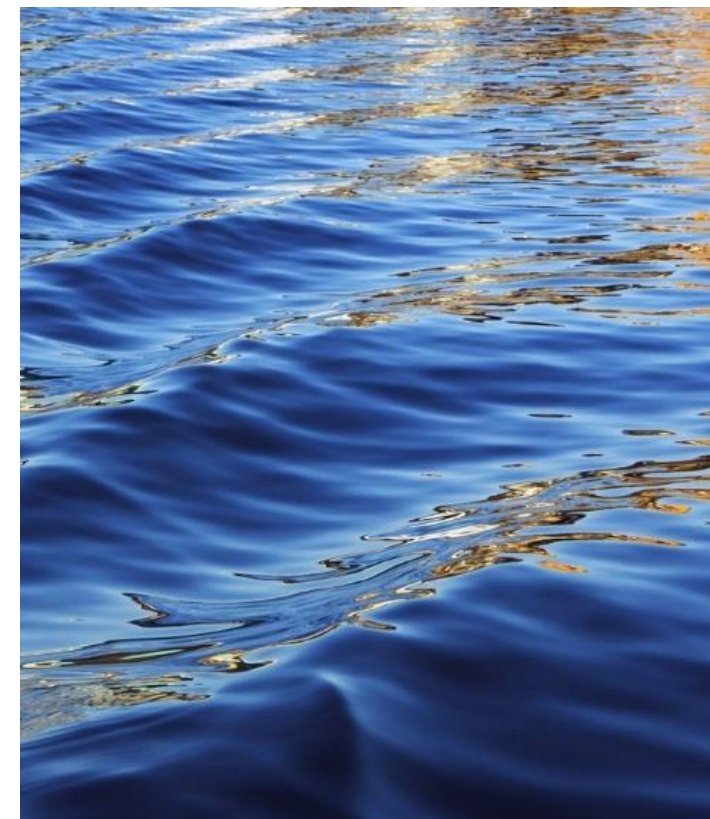
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<https://valorprojectdcu.wixsite.com/website/the-valor-project>



@project_valor



This project is funded under the EPA Research Programme 2014-2020 and by the Southern Waste Region. The EPA Research Programme is a Government of Ireland initiative funded by the Department of Communications, Climate Action and Environment.