



Annex 3

Documentation on the update of electricity revenues, material revenues and reject rates

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1 Introduction

This annex provides details of the 2017 updates of several variables as well as the implications of these updates on selected outputs of the European Reference Model on Municipal Waste (the waste model). It was deemed necessary to update the following variables as their values change over time:

- electricity revenues;
- material revenues;
- reject rates.

Electricity revenues in the waste model are country-specific, while material revenues and reject rates are assumed to be the same for all EU Member States because data for each Member State are not currently available.

To assess the impact on relevant financial, economic and environmental variables, the analysis has been carried out for a scenario that reflects the targets proposed by the European Commission (EC) in the 2015 Circular Economy Package¹ for the recycling and landfill of municipal solid waste and the recycling of packaging waste.

These targets are used as the basis for the analysis. The results reported in this Annex will then reflect the comparison between two scenarios:

- Scenario N: variables not updated (reflecting the values in the 2015 version of the model);
- Scenario U: variables updated as explained below (reflecting the values in the 2017 version of the model).

¹European Commission, 2015, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions: Closing the loop – An EU action plan for the circular economy, COM (2015) 614 final.

2 Updated variables

2.1 Direct revenues for supplying electricity to grid

Data on direct revenues for supplying electricity to grid (EUR per kWh) have been updated to 2015 data in the 2017 version of the waste model, as reported in Table 1 (Scenario U). The revenues are used in the model for the calculation of financial costs.

Electricity prices for 2015 were obtained by averaging two yearly observations (s1, valid for 1 January, and s2, valid for 1 July). Data, which are in 2015 real terms, are in some cases significantly different from the 2012 data used in the 2015 version of the model, for example in Cyprus and Italy (Table 1).

Table 1 Original and updated values of direct revenues for supplying electricity to grid

Member State	Scenario N	Scenario U	Change
	EUR per kWh, 2015 real terms		%
Austria	0.094	0.073	-22
Belgium	0.1	0.091	-9
Bulgaria	0.077	0.073	-5
Croatia	0.098	0.087	-11
Cyprus	0.225	0.132	-41
Czech Republic	0.1	0.077	-23
Denmark	0.088	0.06	-32
Estonia	0.074	0.079	7
Finland	0.071	0.064	-10
France	0.066	0.074	12
Germany	0.093	0.081	-13
Greece	0.108	0.103	-5
Hungary	0.104	0.078	-25
Ireland	0.143	0.126	-12
Italy	0.15	0.093	-38
Latvia	0.117	0.091	-22
Lithuania	0.12	0.082	-32
Luxembourg	0.106	0.082	-23
Malta	0.19	0.15	-21
Netherlands	0.09	0.072	-20
Poland	0.096	0.082	-15
Portugal	0.105	0.1	-5
Romania	0.091	0.069	-24
Slovakia	0.126	0.108	-14
Slovenia	0.091	0.071	-22
Spain	0.116	0.11	-5
Sweden	0.079	0.06	-24
United Kingdom	0.117	0.12	3

Source: Scenario N – European Reference Model on Municipal Waste, 2015 version (data refer to 2012); Scenario U – Eurostat, Electricity prices for non-household consumers, bi-annual data (nrg_pc_205); extracted

on 03.08.17; Electrical energy, Band IC : 500 MWh < Consumption < 2000 MWh, excluding taxes and levies (data refer to 2015).

2.2 Material revenues

Table 2 reports the original and updated values for material revenues. More specifically, Scenario N refers to data in the 2015 version of the waste model that has not been updated, while Scenario U refers to updated data in the 2017 version of the model. The changes in material revenues are diverse (in real terms), with paper and card increasing in value by around 19 per cent, while plastics and textiles show a much smaller increase and the value of some other materials decreases (significant for glass and steel).

Table 2 Original and updated values of material revenues

Material	Scenario N	Scenario U	Change
	EUR per tonne, 2015 real terms		%
Paper and card	94	111	19
Plastics	113	115	2
Textiles	296	297	0
Aluminium	948	870	-8
Steel	157	122	-22
Glass	24	18	-25

Source of data for the update (Scenario U): With the exception of paper and card: <http://www.wrap.org.uk/content/materials-pricing-report> and <https://www.mrw.co.uk/materials/weekly-prices>; paper and card: Eurostat COMEXT Database².

2.3 Reject rates

Reject rates (losses during sorting of recyclable materials) influence the model results as they determine how much material has to be collected in order to achieve a target recycling rate. A literature review performed by Eunomia Research and Consulting Ltd. for the European Commission and the EEA in 2017 reviewed the reject rates in the model and concluded that the ones for plastics should be revised in the light of new information (Table 3).

² The update was supported by two analytical papers: Eunomia Research and Consulting Ltd., Updating Financial Assumptions in the Municipal Waste Model, provided for the European Commission and the EEA within the project Assistance to the Commission on the assessment of Waste Management Plans and on compliance monitoring and support of the implementation of the Waste Framework Directive, 2017; and Vito, Review and Updates of Secondary Materials Values (not published, available from the EEA), 2017.

Table 3 Original and updated values for plastics reject rates (losses during sorting of recyclable materials)

Collection system	Collection type	Scenario N, %	Scenario U, %
Bring sites	Bulk collection (commingled)	30	40
Kerbside without PAYT	Bulk collection (commingled)	20	30
	Source-segregated	7	7
Kerbside with PAYT	Bulk collection (commingled)	25	35
	Source-segregated	8	8
Civic amenity sites	Source-segregated	7	7

PAYT = pay as you throw

Source: Literature review performed by Eunomia Research and Consulting Ltd. for the European Commission and the EEA within the project Assistance to the Commission on the assessment of Waste Management Plans and on compliance monitoring and support of the implementation of the Waste Framework Directive, 2017.

3 Impacts at the EU level

The following table summarises the impact of moving from Scenario N (data not updated) to Scenario U (updated data) for the period 2015–2035 in terms of changes in financial costs, externalities and net costs at the EU level.

Table 4 Impact of updates in electricity revenues, material revenues and reject rates for plastics on financial costs, externalities and net costs for the EU, relative and absolute differences for the period 2015–2035

	Impact on financial costs	Impact on externalities	Impact on net costs
Updated variable	Billion EURO, 2015 Real Terms (% change)		
Electricity revenues	3.5 (0.82%)	No impact	3.5 (0.88%)
Material revenues	-3.38 (-0.79%)	No impact	-3.38 (-0.85%)
Reject rates	2.78 (0.65%)	- 0.42 (1.36%)	2.36 (0.59%)

Note: Calculated as relative and absolute differences between results for the updated (Scenario U) and not updated (Scenario N) model.

Source: ETC/WMGE elaboration of model-generated data.

The overall impact of updating the electricity revenues at the EU level implies an increase in financial costs over the time horizon. Indeed, the decrease in revenues from selling electricity to the grid generates larger financial costs in most of the countries. The updating of material revenues implies, on the other hand, a decrease in financial costs. The underlying forces are in this case linked in a complex way to the specific countries' features in terms of recycled materials composition. In both cases, the impact on externalities is of no relevance because externalities are not affected by electricity and material revenues in the waste model.

Finally, the aggregate impact of the update of plastics reject rates implies an increase in financial costs at the EU level, only partially counterbalanced by decreases in externalities and therefore resulting in an increase in net costs. Overall, the change is relatively small (above 1% only with reference to the impact of plastics reject rates update on externalities).