



22 September 2015

ESPP comments to Deloitte draft phosphorus MSA documents circulated 1/9/2015

We have considerable difficulties commenting on these documents because it is very difficult to understand the logic or the figures, as specified in our comments below.

Until the documents are fully revised and presented in a form which makes more sense and is coherent, we cannot comment on the actual figures (data), because we do not understand what they are supposed to mean nor to what they refer.

Throughout, if parameters, coefficients and assumptions are made, it is essential to

- make this clear (where, to which flow)
- specify on what basis these are estimated, giving source literature to back up

Overall, we note that the text attempts to give some data on phosphorus imports, exports and uses. However, there is no comparison of these data to losses / storage (to landfill, surface waters, agricultural soils), nor to potential for recycling and to real levels of bio-nutrient recycling today (cf. comments above).

A number of key results are calculated by the application of “coefficients” for which no justification is provided. The choice of these will completely modify the results. For example:

- In use % dissipation rate of “detergents and other products” = 74.19%
- In use % dissipation rate of animal feed and food additives = the same 74.19%
- Recovery rate in use of mineral fertilisers: why is MAP set at 92.21% but TSP only at 77.92% ?
- Ventilation between (a) disposal and (b) recycling of “P in animal and mixed food waste, vegetal waste, animal faeces, urine and manure and common sludges”. This ventilation is effectively a coefficient for recycling.

At present, we do not see what added-value this exercise brings to the existing published phosphorus MFA data in Europe, which have attempted to use the data available for the large P flows apparently not considered here.

In particular, the data developed do not appear to bring any information to support assessing to what extent different sectors in Europe are strategically dependent on phosphorus imports: fertiliser production, farmer access to fertilisers (be they produced in Europe or imported), chemical industry access to specific forms of phosphorus needed by specific sectors (e.g. white phosphorus P4) nor the potential to reduce this dependency by e.g. recycling, improved use efficiency.

As already indicated, we do not have time/budget to completely reassess the model and data used, but to date this appears to be impossible anyway because hypotheses and data sources are not specified.



To answer your specific question regarding making information publicly available. We do not agree that data and calculations should not be public (except for confidential trade data, if any). On the contrary, it is important to make the study fully transparent, so that other data users and producers of MSAs can see which data has been used and how it has been used, in order e.g. to update the study and develop for other years, or for regions.

General comments

- As already indicated, the two flow charts (figs. 2 and 3) are not readable (except to specialists) because the numbers are expressed as indexes ($3.8 \text{ e}9$). This makes it difficult to compare the importance of one flow to another, and also difficult to compare to other published phosphorus MFAs which are all expressed in $\text{Gg} = \text{tP} / \text{year}$. Also, it makes comparison with the text difficult, because the numbers in the text do not use the e notation.
- The term “common sludge” is used in several places. This is not usual and is imprecise. Does it refer to industry sludges, sewage sludges, both ?
- The text makes the error of confusing units of “phosphate” with units of “phosphorus” with units of product. Although it is indicated at the start that figures are in P, the actual text is liable to lead to confusion and errors. We remind that such confusion has led to serious problems in the past (see e.g. error by Comber et al. 2012 leading to a 4x overestimation of phosphorus flows in food phosphate additives, cited by DEFRA UK report). E.g. in the text: paragraph “total stock of phosphates in use” versus paragraph “amount of phosphorus in end-of-life products”. The paragraph “Secondary materials result mostly ...” appears to concern tonnes of product, but is presumably in fact tonnes P/year. E.g. in the paragraph “Within the EU ...” imports of “primary phosphate” are compared to imports of “processed material” – are these as tonne product (as text is written) or tonnes P ?
- It is not clear whether the two paragraphs “end of life products” and “Secondary materials result mostly ...” refer to stocks or to annual flows. Presumably stocks, in that they follow on from the paragraph “The total stock” which specifically refers to stocks, and in that the numbers are expressed as “tonnes” and not “tonnes/year”
- The paragraph “end of life ...” does not mention losses, in particular losses to surface waters and does not mention accumulation in agricultural soil, both of which are essential for consideration
- There appears to be a structural concept problem with the approach to “end of life products”. For example, it is clear that (e.g.) detergents, which are cited here, cannot be collected for treatment at the end of life. Unless this is sorted out, this paragraph cannot be considered. This has already been indicated by ESPP, and was underlined during the stakeholder workshop, but this major conceptual problem does not appear to be resolved
- In the figures on EU imports (paragraph “Within the EU ...”) imports of “primary phosphate” are compared to imports of “processed material”. What do these two terms cover: presumably from the flow chart above, respectively phosphate rock and phosphoric



acid ? If so, why not say so clearly. If this is the case, however, what about imports in finished products, animal feeds (which are very significant flows) ?

- It is stated that 180 000 tonnes P of recycled materials are “mainly used for mineral fertiliser production”. This is not correct, probably because of confusion in the definitions not the numbers: by far the biggest tonnages of P recycled are in manure, sewage biosolids, food industry wastes, and are recycled in organic form not as mineral fertilisers. There seems to be a general confusion around the use of secondary materials for the production of primary material, maybe because as defined in the model used this does not “work” for phosphorus-containing products, leading to apparent errors in the data. Mass flows, P concentrations in each flow and the destinations of flows should have similar and high importance.
- The data sources cited suggest that key data for the biggest phosphorus flows in Europe (manure production, sewage works discharge to water and P in sewage sludge, meat and bone meal ash ...) have not been used. We continue to not understand why? Much of this data is available, e.g. sewage works discharges in official EU reports and data (albeit with issues of completeness of data, accuracy, up to date ... but these issues do not justify ignoring this data)
- It is noted that global phosphate rock resources are highly geographically concentrated, but not data is provided as to whether the EU's imports (both direct of phosphate rock or phosphoric acid, or indirect in particularly in animal feedstuffs) is geographically concentrated. Also should be assessed to what extent imports are “upstream integrated” (EU fertiliser producer or chemical manufacturer part of an international group with its own phosphate mine outside Europe) or not, because this will impact supply stability.
- This flow analysis has only been conducted for one base year. Do you have the data for other years ? Timeline series are important in flow analysis work. In particular, for phosphorus, given the significant long term changes in fertiliser use (from 1960's to today) and short term changes (following the 2008 price hike).
- References to data are not transparent and complete. If the raw datasets are not included in the study or complete descriptions of from where data comes and how it has been adapted, then the study cannot be considered reliable.

Specific input regarding the “chapter” document:

- “chemical fertilizers”

>>> better to refer to “mineral fertilizers”, everything in this world is chemical (e.g. water). Mineral fertilisers enables clear distinction from “organic fertilisers”.

- Caption of figure 1 mentions orange boxes, but these orange boxes are not in the figure. Please explain, or remove.

- “*The amount of phosphorus in end of life products (i.e. animal and mixed food waste, vegetal waste, animal faeces, urine and manure and common sludge) collected for treatment*”



is 271 thousand tonnes: 231 thousand tonnes for fertilizers, 21 thousand tonnes for detergents and other products and 19 thousand tonnes for feed and food additives.“

>>> What is the source of this information? What is recycled to produce detergents?

- “biogenic waste flows”

>>> Not defined, also for many other non-common words

>>> This is also the case for other specific terms used. All such terms should be clearly defined.

- “This can be considered a functional recycling because when this waste is used as fertilizer it replaces phosphorus from industrial fertilizers”

>>> Industrial fertilizers? Is this the same as “chemical” and/or “mineral”? Or does it also include organic fertilisers produced in industrial processes ?

- “waste databases”?

>>> Please define more specific...

- “can be considered quite reliable”

>>> This is no strong message. What is quite?

- “some coefficients found in literature”

>>> please specify which coefficients come from which literature source

- “ P content”

>> In several cases this probably means “P concentration”.

- “Little information was found on efficiency of recycling and share of functional/non-functional recycling. These factors therefore have been estimated which results in high uncertainties related to indicators of the recycling phase”

>>> We disagree, there is detailed work by Van Dijk et al on Phosphorus flows and balances of the European Union Member States, but this is not taken into account:

Van Dijk KC, Lesschen, Jan Peter, Oenema O. Phosphorus flows and balances of the European Union Member States. Science of the Total Environment Accepted

-“function recycling”

>>> How is this defined? What does it mean?

Specific input regarding the “background document”:

- “Study on Data for a Raw Material System Analysis: Roadmap and Test of the Fully Operational MSA for Raw Materials”

>>> Please define exactly what “test” and “fully operational” mean here, in that this does not appear to correspond to the currently incomplete nature of the document

- Please put the quantities in a unit bigger than tonnes to make readable

- Is this all data that the project will publish? It is missing the explanation about data sources. It is not traceable where data is coming from, not transparent enough to repeat the study for



another base year. This seems to be contradictory to the words “test” and “fully operational” in the title

- “Feed and food additives imports to EU28 (primary material)

Calculation based on the hypothesis that it is 10% of produced feed and food additives.”

>>> Important flow. No information about the source of produced feed and food additives.

Same point for “Detergents and other products imports to EU28 (primary material)

Calculation based on the hypothesis that it is 10% of produced detergents and other products.”

Both these coefficients are totally arbitrary and probably largely wrong and misleading.

- Whole “Collecting & Recycling”

>>> There is statistical data, but it appears to be not used

>>> The whole concept and system boundaries continue to pose major problems in taking data into account. As already indicated, this needs revising to become relevant.

>>> “*P in exported animal and mixed food waste, vegetal waste, animal faeces, urine and manure and common sludges (F.1.1)*” – this category mixes a number of different flows which should be separated to be meaningful. If this is not done, then it is impossible to assess whether the data is realistic, impossible to repeat the study for different years, or to use its results.

- In use dissipation rate for “detergents and other products”

>>> It is indicated “*Detergents and other products are dispersed in the environment, but part of them is recovered in the form of animal and mixed food waste, vegetal waste, animal faeces, urine and manure and common sludges. In use dissipation rate was modelled in order to reduce dissipation by amount of P collected by these wastes.*” This mixes different products, and completely different end points. It is not explained how the coefficient of 74.19% is calculated.

- “Eurostat waste statistics”

>>> Please provide specific references to the names of tables.

- We exchanged emails in August concerning the use of a “coefficient” for “share of phosphorus recovered through manure, sewage sludge, etc. which originates from fertilizers, food additives and detergents applied/consumed that year”, which at the time you had fixed at 50%. We did not receive a reply explaining the justification for this coefficient. Please confirm that this coefficient is no longer used (not at 50% and not at some other level).

>>> This appears to be replaced by a ventilation between disposal and recycling of “P in animal and mixed food waste, vegetal waste, animal faeces, urine and manure and common sludges”. This does not make sense, in that the collection and recycling rates for these completely different streams are very different, treating these streams as one results in data which makes no sense. These streams should be treated separately. They should also be defined correctly (currently there is confusion: e.g. “animal faeces” and “manure” suggests that this stream is counted twice whereas human faeces is not listed. Is “urine human or animal ? If “common sludges” includes sewage sludge, then human urine would be double counting ...)