Growing Demand for Waste and Residues from Palm and Implications

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Outline

Definition of Wastes & Residues from the EU perspective

The legal framework

- RED II
- Power of the Member States
- How ISCC can help


Challenges & Opportunities
Waste: Material that is to be discarded (e.g. to a landfill)

- “Any substance or object which the holder discards or intends or is required to discard”*
  - Raw materials or substances that have been intentionally produced, modified or contaminated to count as waste under this definition do not qualify as waste
  - The concept of ”discarding” a material according to the WFD requires consideration of all relevant circumstances at the point of origin of a material

- Examples (no explicit reference in the RED):
  - Palm Oil Mill Effluent (POME)
  - Used Cooking Oil (UCO)
  - Spent Bleaching Earth (SBE)
  - Waste Wood

* Definition according to Art. 3 (1) of EU Waste Framework Directive (WFD)
Residues from agriculture, aquaculture, fisheries and forestry

- **General Definition “Residues”:**
  - “Substances not being the end product(s) that a production process directly seeks to produce”

- **Residues directly deriving from or generated by agriculture, aquaculture, fisheries, forestry**
  - Do not include residues from related industries or processing
  - Must comply with the sustainability requirements for cultivation (certification up to and including the farm or plantation / regular ISCC certification process)
  - Zero GHG emissions for cultivation

- **Examples (explicitly mentioned in the RED):**
  - Straw
  - Bagasse
  - Nut Shells

* Definition according to Art. 3 (1) of EU Waste Framework Directive (WFD)
Processing Residues

- General Definition “Residues”:
  - “Substances not being the end product(s) that a production process directly seeks to produce”

- “Processing Residues:
  - Production of the substance is not the primary aim of the production process and the process has not been deliberately modified to produce it
  - Do not need to comply with the sustainability requirements for cultivation of biomass (certification does not start at the farm or plantation / ISCC waste/residue certification process)
  - Zero GHG emissions up to the point of collection

- Examples (explicitly mentioned in the RED):
  - Crude Glycerine (Glycerine that is not refined)
  - Tall Oil Pitch

* Definition according to Art. 3 (1) of EU Waste Framework Directive (WFD)
EU Member States are responsible for the national framework for waste and residues

- MS decide individually which materials are classified as waste/residues

- Double-counting for waste/residue based biofuels in some MS (e.g. UK, NL)

- National “double counting schemes” in addition to voluntary schemes (e.g. Dutch Double Counting, Italian Double Counting)

- “Positive lists” (not necessarily harmonized, i.e. material may be considered as waste/residue in one MS as a product in another)

- Certification and documentation requirements not harmonized

- Multiple Certification may be required
POME and EFBs are specifically included in Annex IX of the preliminary REDII agreement.

### Annex IX of RED II

#### Part A (“Advanced”)

| a) | Algae if cultivated on land in ponds or photobioreactors |
| b) | Biomass fraction of mixed municipal waste but not separated household waste subject to recycling targets |
| c) | Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection |
| d) | Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B |
| e) | Straw |
| f) | Animal manure and sewage sludge |
| g) | **Palm oil mill effluent and empty palm fruit bunches** |
| h) | Tall oil pitch |
| i) | Crude glycerine |
| j) | Bagasse |
| k) | Grape marc and wine lees |
| l) | Nut shells |
| m) | **Husks** |
| n) | Cobs cleaned of kernels of corn |
| o) | Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil |
| p) | Other non-food cellulosic material |
| q) | Other ligno-cellulosic material (...) except saw logs and veneer logs |

#### Part B (Not considered as “advanced”)

| a) | Used Cooking Oil (UCO) |
| b) | Animal fats categories 1 and 2 |

Source: RED II Compromise (2016/0382) as of 21 June 2018
# ISCC list of materials: Information on the waste/residue classification is included

- If a MS officially recognizes a material as waste/residue eligible for biofuel production, the ISCC waste/residue process can be applied.
- Acceptance depends on the individual MS requirements (MS regulations take precedence).
- Materials which are not published on the ISCC list cannot be certified.
- Materials can be considered on request:
  - ISCC to be contacted
  - Evidence shall be provided to ISCC that the material is officially recognized as waste/residue in a MS.
- For some material a case-by-case assessment is required to distinguish between co-products and processing residues (e.g. PFAD).

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## Table 1: Raw material

<table>
<thead>
<tr>
<th>Declaration of material on ISCC EU certificate</th>
<th>Additional information</th>
<th>Classified as waste/residue material in the following MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nut shells (specificiation of nut)</td>
<td>Agricultural crop residue acc. to RED</td>
<td></td>
</tr>
<tr>
<td>Oat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil palm fresh fruit bunches (FFBs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic municipal solid waste (MSW) *</td>
<td>Only the biomass portion of MSW</td>
<td>UK, NL</td>
</tr>
<tr>
<td>Palm Fatty Acid Distillate (PFAD) **</td>
<td>As PFAD has a significant economic value in relation to the main product (palm oil) and a variety of applications (other than bioenergy), several EU Member States explicitly classify PFAD as a co-product (e.g. UK, NL)</td>
<td></td>
</tr>
<tr>
<td>Palm kernel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palm oil mill effluent (POME) *</td>
<td>POME is a waste water/sluice derived from palm oil production usually released to open ponds. The oil extracted from POME is often referred to as „Palm Sludge Oil“ or „Sludge Palm Oil“</td>
<td>UK, NL, FI, IE</td>
</tr>
</tbody>
</table>
ISCC process to distinguish if the ISCC EU waste/residue certification process can be applied (individual assessment at Point of Origin)

1. Was the material deliberately produced?
   - YES
   - NO

2. Is a further use of the material certain (other than bioenergy)?
   - YES
   - NO

3. Can the material be used directly without any further processing other than normal industrial practice?
   - YES
   - NO

4. Is the material produced as an integral part of the production process?
   - YES
   - NO

5. Is the further use of the material lawful in the sense of Article 5 (1) lit. (d) WFD?
   - YES
   - NO

The catalyst for growth:

* Palm industry faces rising costs, lower margins

* increasing pressure to manage its wastes

* Creating more value per hectare improves the bottom line & the sustainability score

* Legislative developments in EU supporting W&R/Low iluc risks biofuels
Palm supply chain: Not all outputs from the palm process are consistently classified (e.g. PFAD)

- Palm Fresh Fruit Bunches (FFBs)
- Crude Palm (Kernel) Oil (CPO / PKO)
- Refined Palm / Palm Kernel Oil

<table>
<thead>
<tr>
<th>Palm Plantation</th>
<th>Oil Mill / Crushing Plant</th>
<th>CPO/BD Refinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Palm Trunk</td>
<td>• Empty Fruit Bunches (EFBs)</td>
<td>• Spent Bleaching Earth (SBE Oil)</td>
</tr>
<tr>
<td>• Palm Frond</td>
<td>• Mesocarp fruit fibre</td>
<td>• Palm Fatty Acid Distillate (PFAD)</td>
</tr>
<tr>
<td></td>
<td>• Palm kernel shells</td>
<td>• Glycerine (crude)</td>
</tr>
<tr>
<td></td>
<td>• Palm Oil Mill Effluent (POME)</td>
<td></td>
</tr>
</tbody>
</table>

- • POME Oil
- • Pellets / Torrified
- • Bio Gas (Power)
- • Bio CNG
- • Spent Husk oil
- • EFB Oil
(New?) Types of Palm Waste

POME Oil (Palm Effluent Sludge Oil) -

- With its classification as feedstock for advanced biofuels, demand is set to grow
- Estimates of its availability vary widely, (500,000 tons – 2.5 mln tons)
- Apprehension that attractive pricing may encourage deliberate creation of waste – (fraud?)

EFB Oil
- Removal of water from wet EFB is necessary before it can be effectively pelletised.
- The water so removed contains residual oil which can be (economically?) extracted
- Dewatering is necessary for the production of long fibre.
- Long fibre market is mainly China, EFB oil possibly EU.

Spent Husk Oil
- The mesocarp contains residual oil.
- This can be extracted economically, if there is demand for short fibre.
- So far not usable in Biodiesel, but this can change
New (?)Types of Palm Waste

- Biogas – to produce power & supply and feed into the Grid

- Compressed Biogas - to supply into the transport fuel market - Pilot in process

- Pellets – (non Torrified/Torrified) - small but growing export volume to East Asian markets.
Challenges & Opportunities:

- Very high Capex/ROI
- Market & Sustained offtake
- Meeting Sustainability Requirements/
- Negative Palm image