



AVOIDED EMISSIONS IN THE RECYCLING AND WASTE SECTOR



Climate-KIC is supported by the
EIT, a body of the European Union



Présentation chez EPE

Commissions climat / ressources

1. Présentation du projet 2019
2. Contexte général et revue de littérature
 - Méthode de recherche bibliographique
 - Présentation des résultats
 - Questions spécifiques pour le recyclage et perspectives
3. Etudes de cas des entreprises
4. Perspectives



2019 pre-guidance project

The project

To have a consensus on the challenges and opportunities for the development of
a **standardized methodology** to assess the circular economy contribution
to **GHG emissions mitigation through waste management and recycling**.



Lots of initiatives but an absence of shared framework

- **Avoided emissions concept is widespread, but little consensus exists on best practices** for many key issues
- Contradictions and confusions are observed between different standards
- Most of the standards are usually **not prescriptive**. The guidelines can be subjectively interpreted depending on the reader.
- More specifically **in the case of recycling**, environmental benefits are often considered as a consequence of the **multifunctionality of waste management**, and the importance of the **market demand for the recycled material** is often cited to arbitrate between several possible methods. **And yet:**
 - Guidelines do not provide a technically-detailed approach
 - Different methods are proposed for a same market context or for a same recycled material

It leads to **confusion and inconsistency**.

Individual companies and industry initiatives are left to develop their own approach.

The major risk is to generate doubts among consumers and stakeholders and so, to weaken the credibility of the company climate claims

A step towards standardisation for the recycling sector...

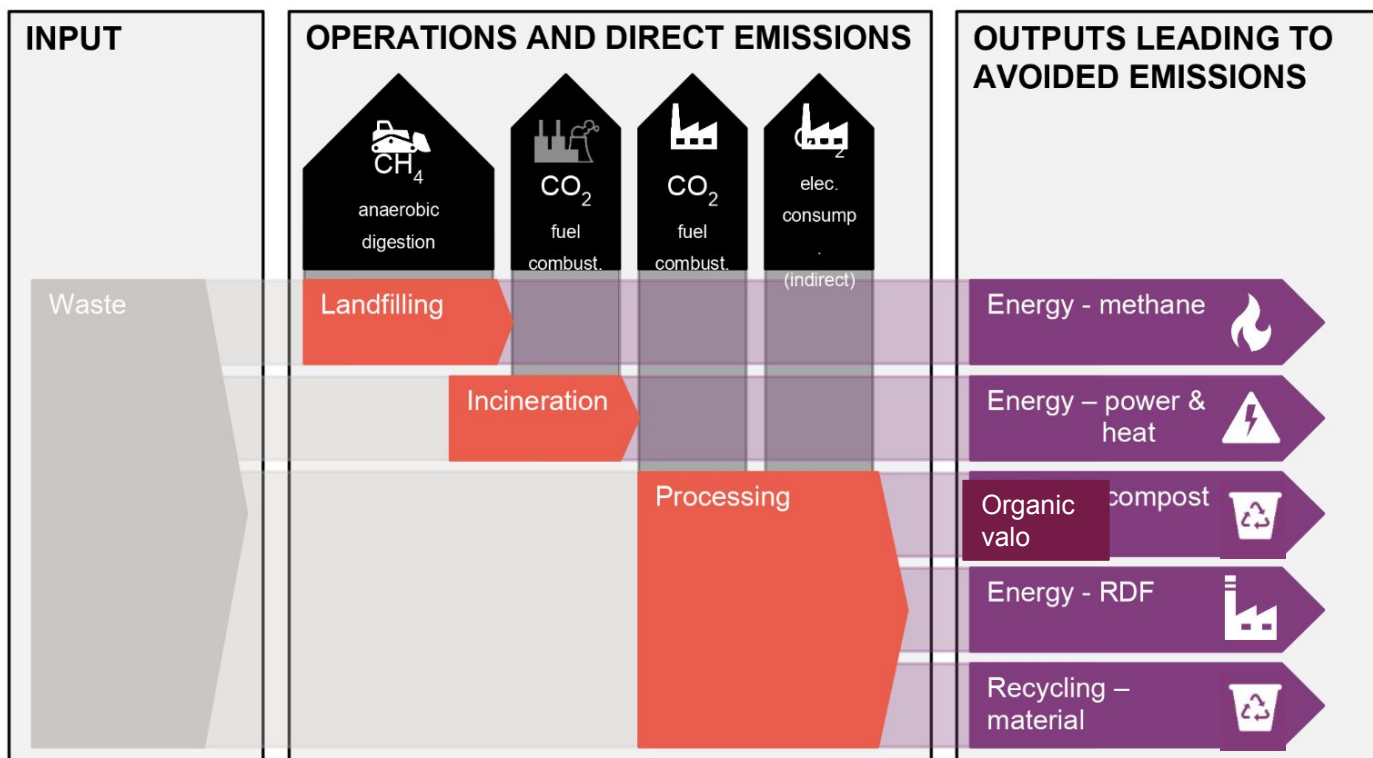
...the Climate-KIC

- Study of **existing documentation** on avoided emissions
- Based on case studies, **identification of methodological issues/choices** that have to be answered/made for standardization calculations
- Guidance document with **recommendations for developing a robust standard** for assessing the recycling industry's contribution to GHG mitigation

“The practice is growing and the only way to avoid greenwashing is by providing standardized methodologies for calculating avoided emissions.”

GHG Protocol Standard on quantifying and avoided emissions -
summary of online survey results (2014)

From “emissions reductions” / “Avoided emissions” to “emissions savings”



Literature review

General context, and finality of the literature review



The circular economy contribution to GHG emissions mitigation through waste management & recycling
Supported by EIT Climate KIC

Avoided emissions : A high topic for companies, sectors and states

Avoided emissions accounting is widespread among companies

*“93% of 377 organisations (private sectors, consultants, governments and NGO, academia and others) currently quantify avoided emissions. 75% report or communicate this information either publically or B2B” (GHG protocol survey, 2014)**

*“Of the more 1,100 companies that report to the CDP, 2/3 say the use of their products directly enable GHG emissions to be avoided by a third-party.” (GHG protocol survey, 2014)**

** GHG Protocol Standard on Quantifying and Avoided Emissions. Summary of online survey results.*

Why ?

- It is a way to valorize **climate positive actions**, projects and products from sectors, countries, policies, actions, projects, products
- It is an attractive concept to achieve the **carbon neutrality target** (Paris Agreement 2016).
- It is considered as a useful addition to companies' **GHG reporting**
- **Finance and investors** are asking for validated methods to invest in projects with low carbon footprint

Lots of guidance & definitions for the “avoided emissions” vs low consensus

- Lots of guidance, from various organizations developed some **guidance applicable for avoided emissions**
- Avoided emissions are defined differently depending on the guidance. For instance :
 1. “Avoided emissions are the **difference** between the **GHG emissions of two solutions** (products or services) satisfying the same function (two products that render the same service or two service satisfying the same need)” (**Epe**, 2018)
 2. “Avoided emissions are **emission reductions that occur outside of a product’s life cycle or value chain**, but as a result of the use of that product. Other terms used to describe avoided emissions include climate positive, net-positive accounting and scope 4”. (**GHG** protocol, 2013)
 3. “Avoided emissions” is the way to call about the **positive difference between 2 situations** that are compared (**WRI**, 2019)

Absence of generally accepted framework

Low level of consensus

Considerable difference that conduct to substantial different results

Guidance for waste & recycling sector is poor

Step 1 of CKIC project → Need to conduct an analysis of existing practices, guidance, applications related to “avoided emissions”

Research methodology for investigation

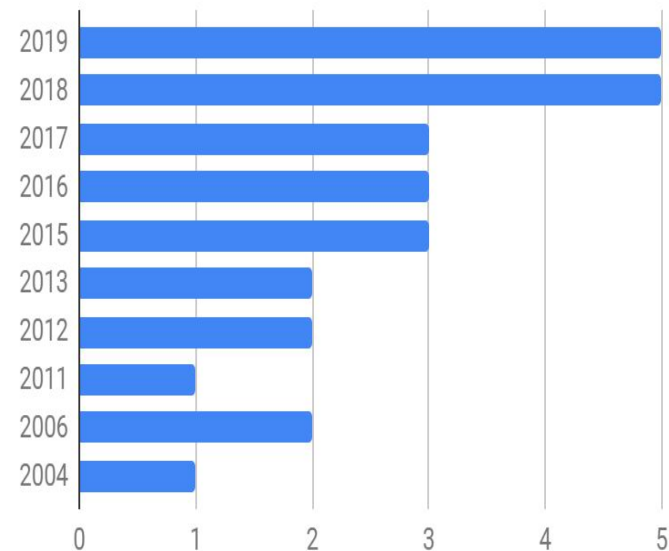
Main statistics



Key words

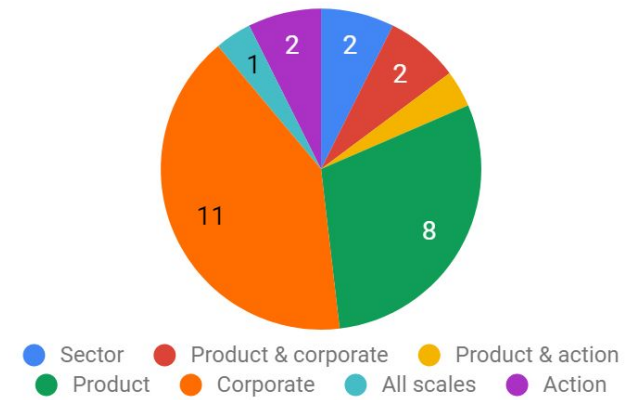
Avoided emissions
 reduction of emissions
 comparative emissions impacts
 GHG savings
 carbon neutral
 climate benefits
 offsets
 scope 4
 climate change mitigation
 climate positive
 net-positive accounting
 allocation
 reduction targets

→ 27 documents were analyzed,
from 2004 to 2019



State of the art

- The aims of the documentation analysis were :
 - To synthesize **the existing** guidance applicable to avoided emissions assessment
 - ✓ LCA and GHG reporting standards
 - ✓ General or specific sectoral guidelines on avoided emissions
 - ✓ Working papers and global communications
 - To identify **research gaps** & highlight **emerging patterns**
 - ✓ Methodological stakes
 - ✓ Type of applications and finalities
 - To point out **specific challenges** that should have to be addressed to build a guidance for the recycling sector



State of the art



Key issues

- 7 key issues associated to avoided emissions accounting
 - ✓ Choice of the **reference solution** to compare to the assessed solution
 - ✓ Choice of the methodological accounting approach
 - ✓ Definition of the **system boundaries** of the system
 - ✓ **Sharing** of benefits between all actors of the value chain
 - ✓ Scaling-up at market level and the **consolidation** at corporate level
 - ✓ Quality of data
 - ✓ Communication

- Several factors were identified and are supposed to be determinant
 - ✓ The **aim of the study** : Corporate reporting ? Product or process differentiation ? Quantification of the consequences of a project ?
 - ✓ The **nature of the solution** : a product ? a process ? a project ? an entire portfolio ?
 - ✓ The **scale** of the solution providing the benefits : site level ? corporate level ? sectorial level ?
 - ✓ For multifunctional solutions, the way to solve the additional function in the comparison of the both solutions

Conclusion

- **No standard** on avoided emissions accounting, but **on-going project** at ISO level
- Existing guidance all based on LCA approach and comparison and refer systematically to either **GHG protocol**, **ISO 14040** series on LCA or **ISO 14060** series on carbon however their first intention is not avoided emissions accounting
- Even if definitions are quite consensual, there is a **considerable variation between the guidance regarding the application** → no explicit excluded/included situations
- **Poor requirements** for the choice of reference scenario, the choice of the methodological approach and the way to share the benefits with the actors of the value chain
- The decision for each issue is likely to lead to **huge difference** in terms of “avoided emissions”
- There is no good choice or bad choice but the study has to be planned depending on **its finality and its scale**
- The **multifunctional solutions** have to be closely studied because it can lead to confusion between avoided impacts concept and avoided emissions concept
 - ✓ Excepted Score LCA study (nov. 2019), none document clearly distinguish both concepts

Defined list of criteria for the analysis of the documentation

- Research process included the analysis of the items below for each document
 - What is the **nature** of the document ?
 - To what **standards** the methodologies are referring to?
 - What is the **scale** for assessing the 'Avoided Emissions'?
 - What is the **approach to define** the 'Avoided Emissions'?
 - How is defined the '**baseline solution**'?
 - Is there recommendations on the **avoidance period**? **Attribution** of avoided emissions on value chain ?
 - Consolidation at corporate level ? Communication ?**
 - Legitimacy and influence of the document ?

Conclusion, recycling issues and perspectives



	Conclusions from literature review	Main debate & challenges arising of each item
Definition of avoided emissions	<p>It is the result of a COMPARISON between an assessed solution and a REFERENCE solution = a REDUCTION of emissions thanks to a solution OR = a difference of emissions between 2 solutions than deliver the same FUNCTION</p>	<ul style="list-style-type: none"> - Lack of clarity about the emissions that are accounted : which GHG - Confusion between emissions that are : avoided, reduced, negative - Avoided impacts versus avoided emissions : only a semantic issue or more? (life stages, systems of comparisons, representation etc.) - Outside the scope of the company only ? Throughout the whole chain value ? - Place of the solutions that increase market size versus market share ?
Assessed solution	<p>Assessed solution = either a product (good or service), a process, a decision (project, action, policy) The assessed solution provides benefits compared to the reference</p>	<ul style="list-style-type: none"> - Does the assessed solution REPLACE the reference solution OR/AND has the same FUNCTION than the reference solution ? - Which solutions (place of reduction tracking, mitigation, carbon sequestration)
Setting a reference baseline	<p>Reference must be the most credible or common situation. It can be the situation : → in the absence of the assessed solution → OR/AND that going to be replace → OR/AND that fulfill the same function</p>	<p>What is the common or most credible situation? Average market, highest concurrent ? A specific alternative ? Best available technology, regulatory requirements ? Is the baseline static, dynamic ?</p>
Choosing the LCA approach	<p>Systematic life cycle thinking approach. Attributional point of view followed (i.e static inventory, absolute emissions, processes directly in life cycle stages), While specifications correspond to consequential approach</p>	<ul style="list-style-type: none"> - How should be done the choice of the approach, which criteria ? - Which is the more adapted approach for long term effects ? Effects that occur beyond the life cycle? Consequential approaches may be more adapted but too complex - How to distinguish process and product? stocks and flows?

	Conclusions from literature review	Main questions & challenges arising of each item
System boundaries	All life cycle have to be considered, but suggestions to simplify authorized with different possibilities	Can we omit some steps ? which ones ? Should we consider the rebound and extra boundaries effects ? Certain types of activities or all activities ?
Attribution on value chain	Benefits come from the collective efforts Attribution sometimes proposed with consensus, OR ratio of contribution OR qualitative For recycling in case of allocation, 100/0, 0/100, 50/50 generally recommended	Risks of double counting if no attribution is done ? Undermining of the potential of the coworking through the whole value chain to reach the benefits ?
Time avoidance	Not well studied but cited as a warning issue Issue for long timeframe products or actions	How to consider the evolution of the reference (regulation, practices)? Dynamic scenarios are complicated to establish
Data quality	Primary data privileged Uncertainty and sensibility analysis generally recommended	Link with reporting data, operational or financial?
Scaling up & consolidation	Poor recommendation, except in guidance for organization (OEF, GHGp corporate, ISO 14064-1) Complete portfolio	Control or equity share? Positive but also negative impacts ?
Communication	Transparency and completeness, reference to (ISO 14044, 14060 series, GHG p)	How & where represent the avoided emissions ? quid the place of negative impacts from old solutions ?

General conclusions 1/3

- Since COP21 meeting, companies and territories are invited to commit **actions and solutions to reduce** GHG emissions
- Therefore communications about avoided emissions is increasing strongly these 5 last years
- However, there is **not yet a standard** that states the way to calculate them. Consequently, to calculate and claim the benefits of their solutions, companies and organizations **develop on their own dedicated guidance** helping to account for avoided emissions.
- The dedicated guidance dealing specifically with the avoided emissions issue are overall initially based on the same guidance, that are:
 - ✓ GHG protocol standards, (or PAS 2050)
 - ✓ **ISO 14040** series on LCA or **ISO 14060** series on carbon quantification and reporting
- These initial guidance are not intended to strictly calculate avoided emissions, but for environmental performance assessments, with comparisons for **performance tracking or product differentiation** (under conditions if comparisons for public with external solutions - assertion -)
- Consequently, the recent guidance had to make specific choices to address the avoided emissions issues → leading to **considerable variation between requirements & practices**, inconsistency and confusion

General conclusions 2/3

- The divergences and lack of consensus can very much influence the results of the studies
- Even if the ways to deal with them are different, **common overall key methodological issues were identified**
 - ✓ The definition of avoided emissions
 - ✓ The setting of the reference baseline
 - ✓ The *LCA approach* for the calculation of avoided emissions
 - ✓ *The system boundaries*
 - ✓ The attribution of the benefits between the actors of the value chain
 - ✓ *The way to calculate or consider the avoided emissions on a long timeframe*
 - ✓ *Data quality*
 - ✓ Scaling up and consolidation
 - ✓ Communication
- Indeed, in addition to the classical issues encountered in comparative LCA (*in italic above*), claiming avoided emissions implies some specific additional concerns
 - ✓ How to define a **credible base case** and the adapted approach to estimate and report “avoided emissions” for general public, investors and policy makers ?
 - ✓ How to share the total positive impact to different value-chain actors (based on estimated contributions to the company’s product or other criteria) ?
 - ✓ How to **aggregate** results for claims at the level of product portfolios, integrating positive but also negative impacts ?

General conclusions 3/3

- Some other issues emerged from the bibliography investigation
 - ✓ There is an **ambiguity between the scope 3 and avoided emissions** in some cases
 - ex : reduction of emissions in the use phase of the final product, thanks to efforts in the production step could be considered as avoided emissions
 - ✓ The **distinction** (or not) about the following terms is not clear between the guidance, sometimes considered as synonymous or not :
 - Reduction of emissions (and where on the value chain)
 - Avoided emissions
 - Negative emissions
 - ✓ The position of the “**carbon sequestration**” and the **purchase of Carbon Emissions Reductions** as solutions to avoid emissions is not clear and contradictory between guidance
 - ✓ Strictly, **tracking performance and reduction targets over time** are not considered as avoided emissions (ex GHG p), but there is transitory situations, when the process is improved where it seems to be accepted

Case studies

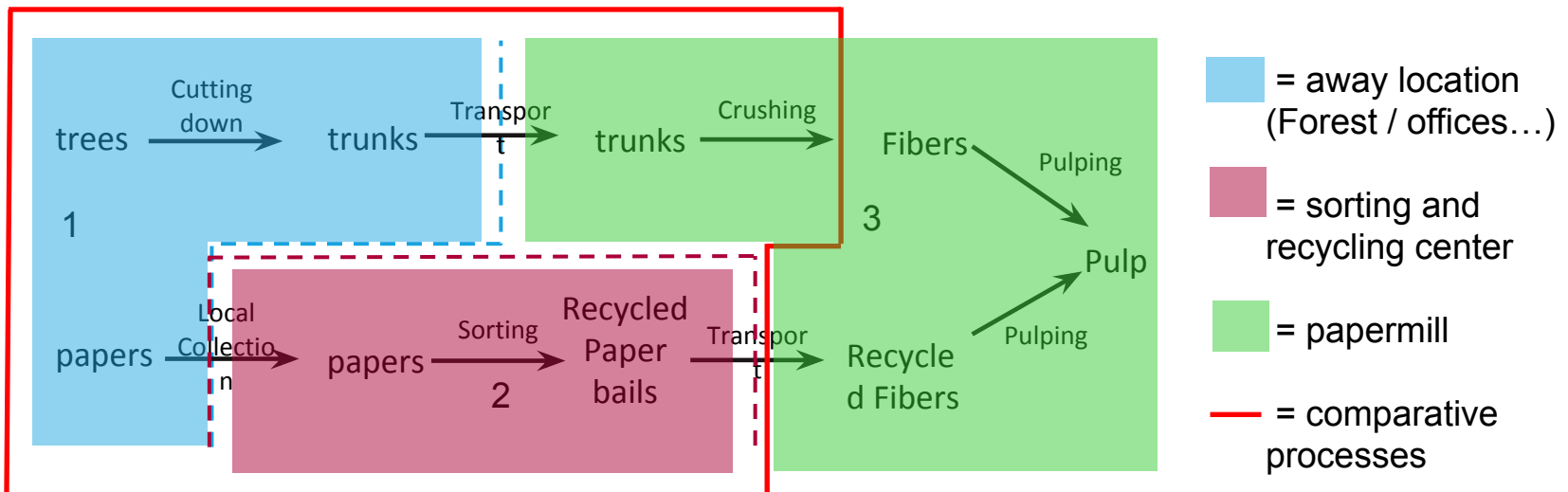
CASE STUDY

Paprec

CONFIDENTIAL DOCUMENT

General description of the case study

- We will focus on the process of producing fibers to make paper pulp from recycled paper (i.e. recycled fibers) vs. from wood (i.e. virgin fibers).



<u>Compared solutions</u>	<u>Main challenges</u>
<p>Recycling paper and cardboard allow avoided emissions as less energy is used to cut down trees or to crush the fibers from trees...</p> <p>But the technology of papermill can also change the balance : depending on the country energy mix for instance, or if the paper mill produces heat by cogeneration technology for instance.</p>	<p>The main challenges are to identify the paper mills standards of production and technology. This may vary a lot from one country to another, even from one plant to another.</p> <p>Also, the carbon contained in fibers is biogenic, i.e. not fossil... Is it legitimate to talk about avoided emissions then? At the same time some projects of GHG compensation aim at planting trees...</p>

<u>Partner conclusion</u>
<p>Regarding paper and cardboard recycling, the environmental benefit is not so obvious when it comes to GHG avoided emissions.</p> <p>The environmental benefit lies in the carbon storage that is maximized thanks to paper and cardboard recycling as it allows a fiber to be recycled up to 8 times, hence allowing trees to grow and forest to be managed responsibly, enhancing its carbon storage facility.</p> <p>Not recycling paper and cardboard would on contrary lead to an increase of GHG emissions from biogenic carbon.</p>

CASE STUDY

Séché Environnement



Avoided GHG emissions High-GWP gas treatment

- High-GWP gases are treated by incineration
 - CFC, HCFC, HFC, SF6
 - The base case currently used is the absence of safe and environmentally sound treatment solution for those gases, considering that they are released in the atmosphere
 - Avoided emissions are not recognized by the administration

 **2612kteqCO₂**
gaz à effet de serre abbatus (ex gaz industriels)





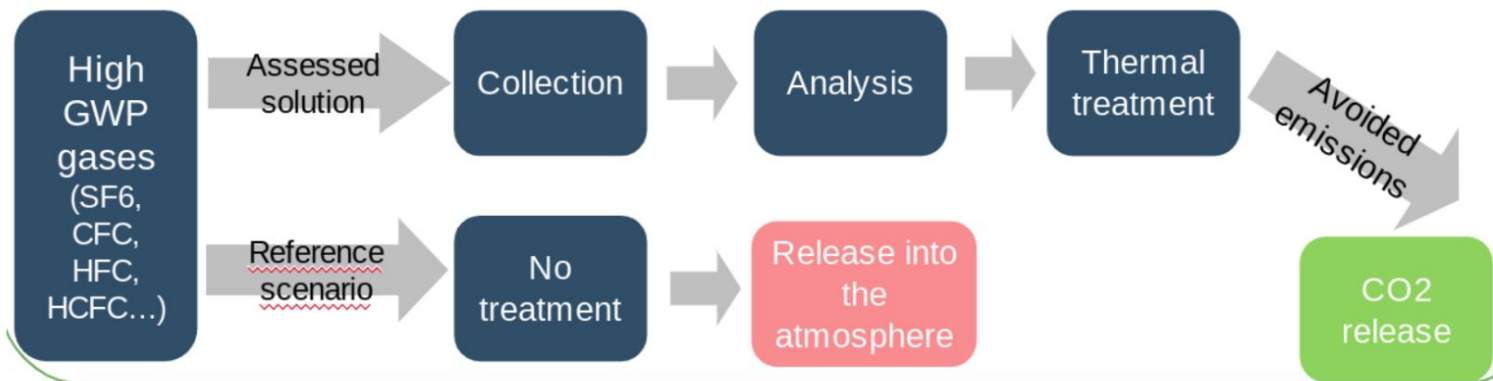
Avoided GHG emissions High-GWP gas treatment

- **Accounting**
 - Leaks (0,5%)
 - CO₂ emissions from combustion
 - Avoidance (raw figure)
- The result of the sum is the net avoided GHG emissions





Avoided GHG emissions High-GWP gas treatment



Compared solutions	The base case currently used is the absence of safe and environmentally sound treatment solution for those gases, considering that they are released in the atmosphere (an example would be that the gases are contained into bottles, stored without a treatment solution. The gas may then gradually leak from the bottle. This scenario is the one most likely to occur in the absence of the assessed solution.
Main challenges	<p>Challenge 1: Try to define the appropriate reference scenario, based on existing statistics between the different outfalls for those gases (recovery, elimination, leak...), or based on the scenario most likely to occur.</p> <p>Challenge 2: Possible evolutions in regard to new regulations, or regarding other countries practices. In fact, an evolution in the regulation could be anticipated, in order to influence a type of treatment (e.g. taxes...). That may change the reference scenario and the avoided emissions accounting.</p> <p>Challenge 3: Allocation of the benefits of avoided emissions among the value chain.</p> <p>Challenge 4: The communication issue on the avoided emission designation, in that case, because it is not recognized as such it in every country.</p>
Partner conclusion	This case study shows the importance of treating those gases of high GWP to fight against climate change. Therefore, it highlights the difficulties and the stakes to consider before building a strong reference scenario and to communicate on the matter.

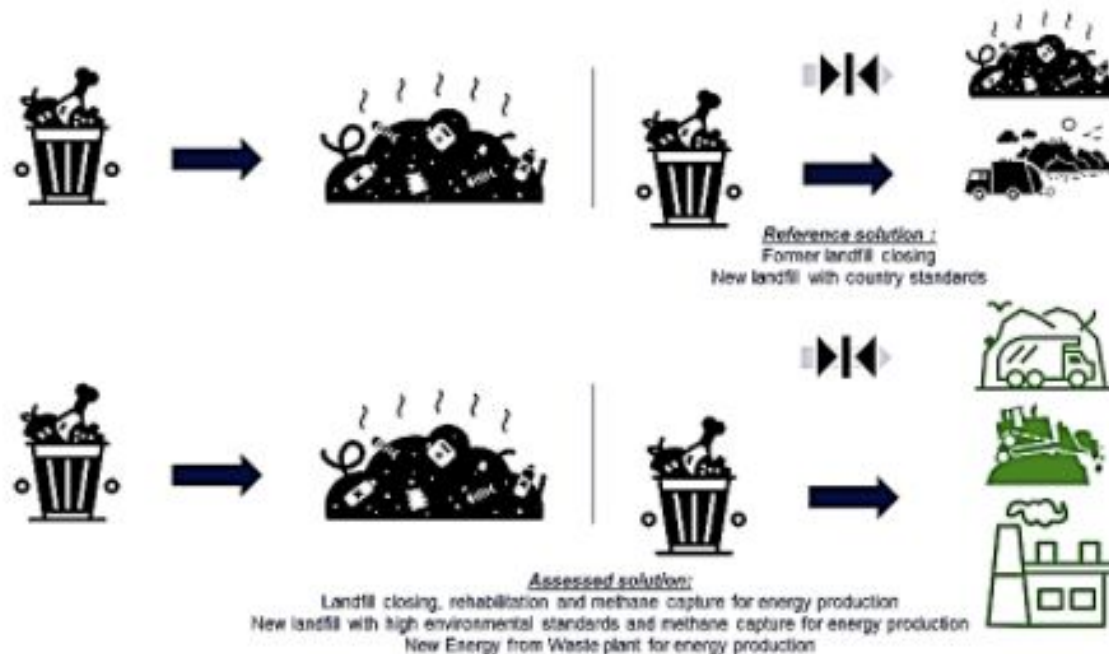
CASE STUDY

Suez

Waste treatment complex composed of a reclaimed landfill with methane capture and energy production and an Energy from Waste plant with cogeneration



Description



<u>Compared solutions</u>	<u>Main challenges</u>
<p>Assessed solution:</p> <ul style="list-style-type: none"> Reduces emissions for the same waste treatment function compared to the reference solution, and avoids energy production emissions by developing renewable energy for electricity production and collective heating as a substitute to fuel and natural gas Occurs <u>cobenefits</u>, as short-term eradication of environmental and public health damages . 	<ol style="list-style-type: none"> Reference baseline: Current waste treatment infrastructure, OR minimum compliant new infrastructure implementation according to local current regulation, OR minimum compliant new infrastructure implementation according to evolution of local regulation during the whole operation period. Scope: Considering the whole scope of the project may makes the reduced and avoided emissions estimation difficult according to current standardized methodologies. Period of avoidance: Evolution of the wasteflow: assumptions have to be made on the amount and the characterization of waste recovered through landfilling and through EfW facility. Evolution of carbon content of local energy mix has also to be considered. Attribution of climate benefits between the different actors of the value chain: Asset owner, operator, local energy suppliers.

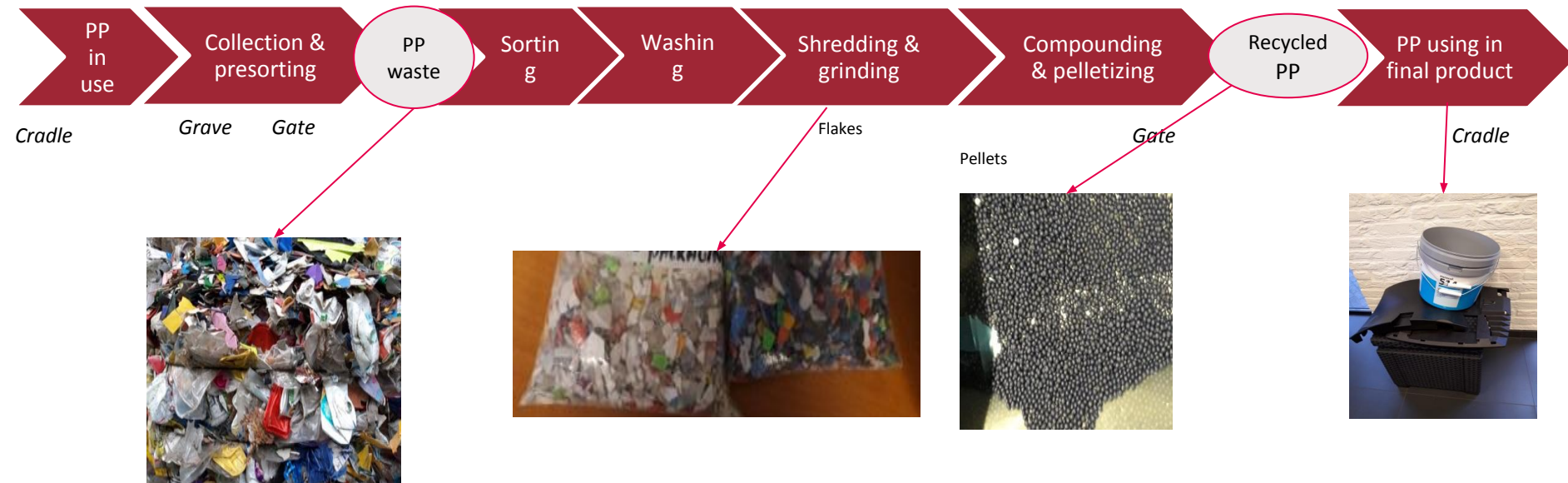
Author conclusion

The case study highlights the case of a multifunctional solution: sustainable waste management and energy from waste recovery. Following an LCA approach, the main contribution to avoided emissions in the value chain of these two functions are located inside the scope of the project. Attribution of climate benefits should be stakeholder inclusive, but also based on a consensus and simple to implement.

CASE STUDY

Veolia

General description of the case study



Description of the steps of the life cycle from PolyPropylene (PP) in use and recycling

<p>Compared solutions</p> <p>Assessed solution : production of recycled polypropylene</p> <p>Reference solution depends on the purpose of the study.</p> <p>Purpose: At site level, purpose is product or process differentiation.</p> <p>Characteristics of the case study: plastic waste input composition is varied, and comes from different places, the process is split into several sites and several actors for the different stages (not all managed by Veolia).</p> <p>Output from the site are pellets for open-loop recycling (automobile components, leisure, construction, household equipment)</p>	<p>Main challenges</p> <p><u>Challenge 1:</u> How to take into account variability in terms of regulation requirements, the presence of numerous places and actors, and variable composition of waste input. in 1/ the system boundaries 2/ the construction of the functional unit 3/ the attribution of the benefits</p> <p><u>Challenge 2:</u> How to manage the intermediate and final end use level and the number of cycles in the functional unit</p> <p><u>Challenge 3:</u> Is the assessed solution monofunctional (i.e production of PP compounds), or multifunctional (production of PP and treatment of waste?). Is the reference solution an alternative recycling pathway? a virgin production pathway? May the reference solution be another PP waste management ?</p> <p>Whatever the retained reference solution → how to define the best reference? (average of existing market, average in a future market, best available technology, (future) regulatory requirements / how to manage the multifunctionality and scope at site level when life cycle is split into several places and several actors ?</p> <p><u>Challenge 4:</u> the purpose is product or process differentiation, but how to account for benefits? Provide recommendations to select the most adapted LCA approach (attributorial or consequential), depending on factors such as the scale of the study, time of avoidance, size of the market, and scaling-up of the process ?</p> <p><u>Challenge 5:</u> How to aggregate site level avoided emissions in a global corporate accounting? is it possible or not?</p>
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<p>Author's conclusion</p> <p>The case study put forward key challenges to address when the purpose is product or process differentiation.</p> <p>The case study allows to put forward the huge consequences on the results about the choice of reference solution and the consideration of the potential multifunctionality of waste treatment or not.</p> <p>It also revealed the complexity of consolidation and attribution of benefits because the value chain is split into several actors and places, even within the same stage.</p>

Preliminary conclusions From the case studies

Specific issues regarding the waste and recycling sector

- In waste management, overall avoided emissions come from **recycling and energy valorization** from waste
- In the literature review, recycling and energy from waste are often cited as a topic in case of allocation
 - ✓ Recommendations are often limited to give methods to deal with allocation issues due to the fact that waste valorization is a multifunctional process that provide benefits beyond the company system
 - ✓ Substitution to virgin products is the preferred approach, with general recommendations on the reference setting and attribution
- Nevertheless, key issues identified above relative to “avoided emissions” are overall not detailed
- Consequently, recycling sector have to fulfill this gap, and the previous listed items will have to be clarified, depending on :
 - ✓ The finality of the study
 - ✓ The scale : site level / corporate / sectorial
 - ✓ The point of view about the “raison d’être” of recycling
Ex : manufacturer of intermediate or final product? Waste manager ? Multifunction?
- For each issue, different choices can be made, there is no a good or a bad choice, choices have to be thought and made depending on the objective of the study

Perspectives



Jan. 2019

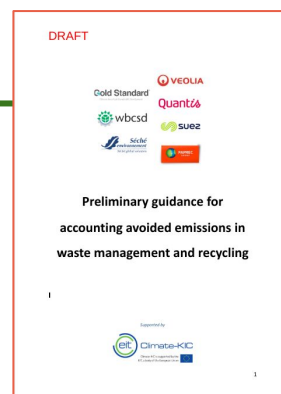
Dec. 2019

2020



Consortium
Recycling companies
NGOs
Experts

Preliminary guidance



Challenges, recommendations based on
State of the art
Case study
Experts



Méthodologie



Operational methodology for the waste management and recycling sector

GT hébergé par EPE
=> projet européen

En lien avec

- GT ASTEE
- FE base carbone
- Travaux ISO - AFNOR
- Fédérations du secteur

GT émissions évitées

- Hébergé par EPE / commissions climat et ressources
- S1 2020 : Faisabilité d'un projet européen pour une méthodologie de calcul opérationnelle et consensuelle pour les activités de gestion et recyclage des déchets
- ✓ Approche sectorielle / consolidation corporate / projet - site - matériau
- ✓ Prochaines dates : 7 février 15h30-17h30, 28 février 9h-10h30