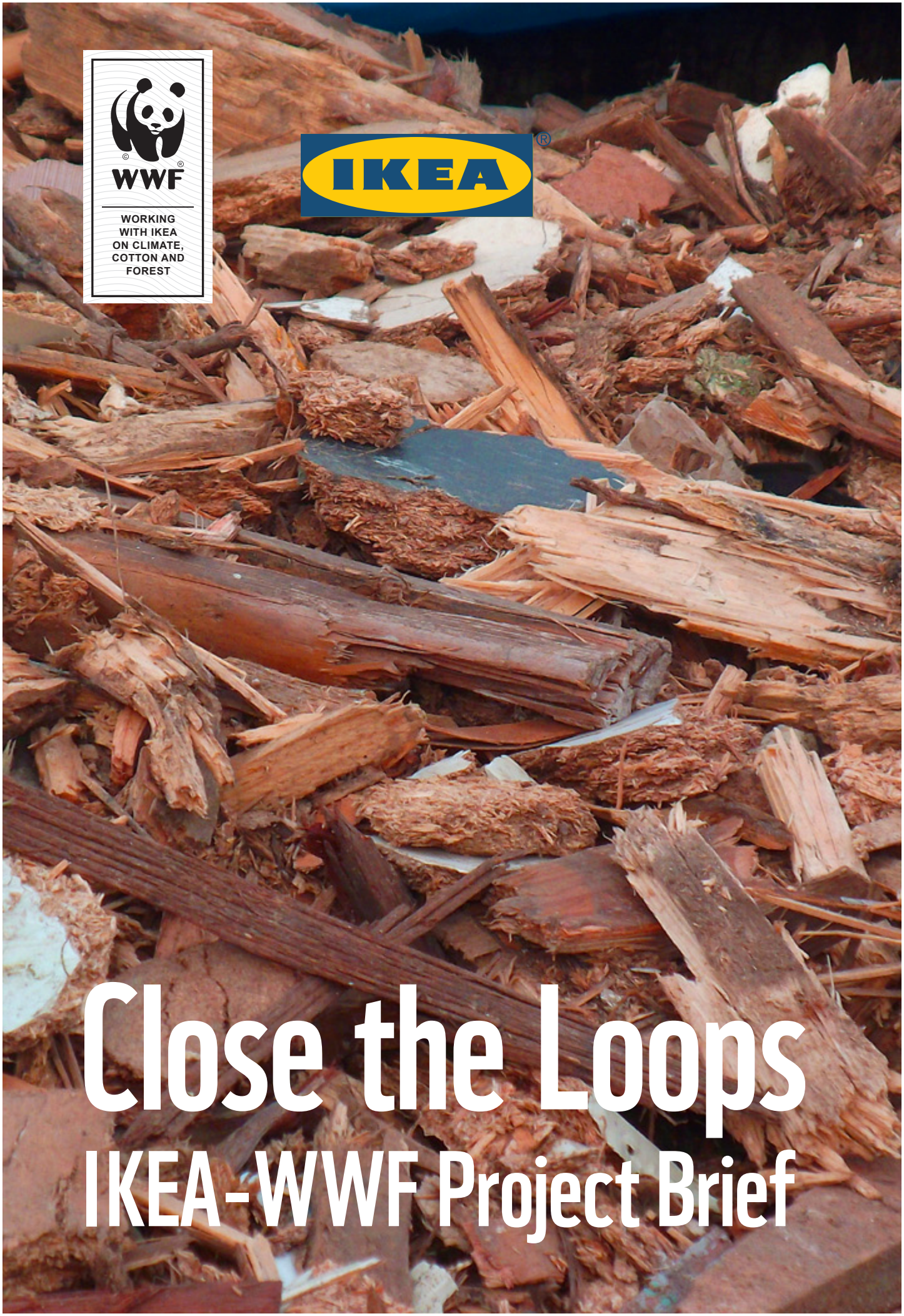

Close the Loops

IKEA-WWF Project Brief

CONTENT:

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WWF IKEA Partnership

IKEA and WWF share common interests, particularly in seeing the considerate, efficient, long-term economically sound use of natural resources and ensuring that the use of renewable natural resources is sustainable.

The Partnership, started in 2002, is founded on each partner's unique competencies and we now work together in 16 countries around the world to promote responsible and sustainable use of resources. The partnership focuses on three areas; climate change, cotton and forest.

In addition to working together in projects, WWF and IKEA want to inspire other companies and networks to address environmental challenges and make people's lives at home more sustainable.

By working together we accomplish more!

OVERVIEW

Humanity's current demand for resources exceeds the Earth's capacity to provide them, according to WWF's Living Planet Report.[1] More efficient and effective use of renewable and non-renewable resources is key to living within the boundaries of one planet and can result in environmental, social and economic benefits. While reduction and reuse are top priority in order to conserve resources, recycling has great potential too. During 2010-2012, IKEA and WWF collaborated to analyse and test opportunities and challenges to close material loops.

1 Highlighted in WWFs Living Planet Report, released every second year. http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/

LEARNINGS

The general conclusions based on the learnings from this Close the Loop (CtL) project are:

- Recycling is not always positive if considering environmental, social and economic impacts. When transitioning to a more circular society[1] we must not only assess recycling from a volume and percentage perspective but also assess the quality of recycling to ensure a positive impact. For example, it is important to make sure that recycling does not prolong the life of debatable and hazardous substances such as brominated flame retardants, or that the recycling process does not reduce the value of high quality materials (i.e. clear plastics) to low quality materials (i.e. black plastics).
- The importance of recycling non-renewable materials is clear since, by definition, they are of limited supply. However, renewable resources are also in limited supply today, given present demand. Identifying the most efficient and effective use of renewable materials is a challenge, and the importance of recycling will vary substantially between local regions and over time. Our recommendation is to at least aim for one recycling loop while planning for the possibility of multiple cycles. For example, the arguments for when and how to recycle wood or use waste wood as a source of energy will be very different depending on whether assessments are done in Finland or Italy.
- There are many old "truths" in the area of recycling. Challenge them! This is a developing area and new opportunities are emerging. For example, various types of chemical recycling are emerging, and textiles that could previously only be down-cycled to become fillers or rags will in time be possible to up-cyclev instead.
- To ensure positive impacts of recycling, it is necessary to assess multiple environmental, social and economic variables. In the CtL project, one model was developed and tested. We hope this can inspire more organisations and corporations to develop tools to assess and facilitate better recycling and closed loop models for the future. The tool developed and used in the project is presented in the appendix.

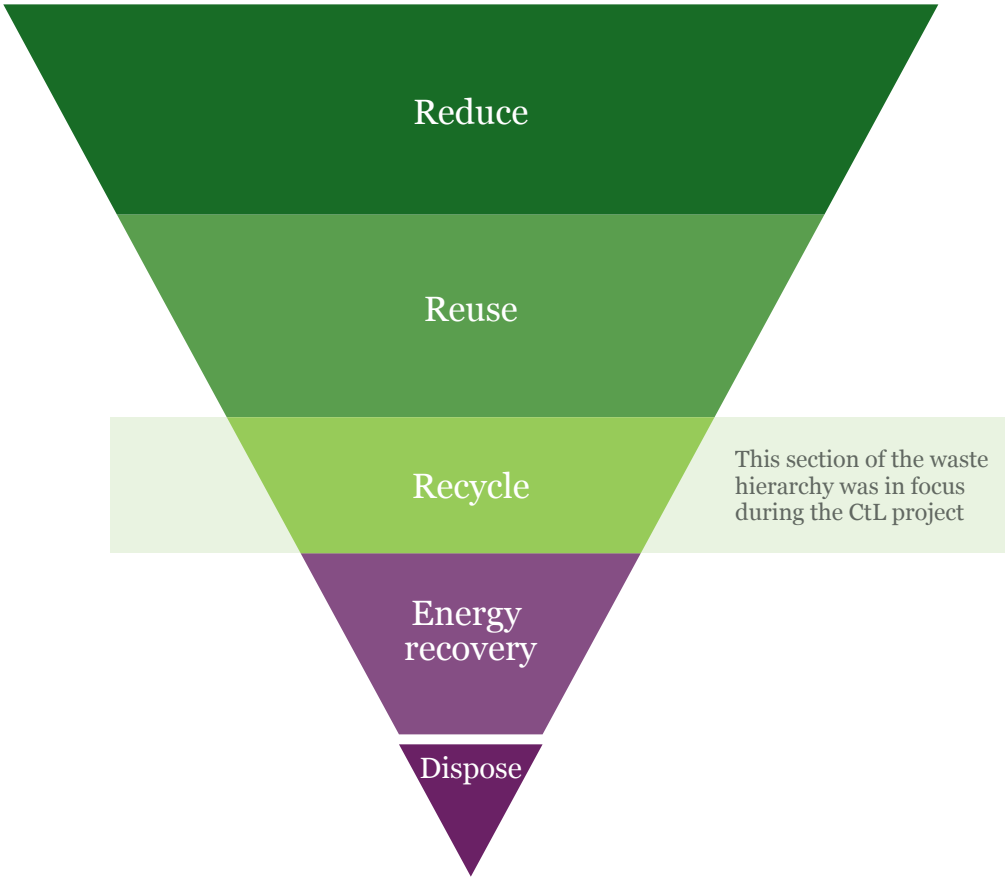
1 Circular society, circular economies or "closed loops" thinking (i.e., to avoid generating waste and instead ensure that materials flow in reuse and recycling loops in society)

1. BACKGROUND

IKEA and WWF have identified climate change as a major threat to both people and the environment. Together we have decided to identify areas of resource efficient solutions with the potential to reduce climate impact.

Close the Loops (CtL) is a project that started from the perspective of a circular society, where waste from one product or process becomes input to another. It has explored how a company such as IKEA can begin to transition into more closed loops material flows. Key drivers behind this project were:

1. The emerging scarcity of raw material
2. The possibility to reduce climate impact
3. The possibility to accelerate the transition to using recycled material the right way.[2]
4. The possibility to develop our competencies related to full recyclability and optimal recycling practices



Picture 1: The traditional Waste Hierarchy was used as a framework for the project; reduce and reuse have priority as means to reduce environmental impact before recycling, energy recovery or disposal. The CtL project focused on the recycling stage.

2 "Using recycled material the right way", i.e., the recycled material should not have higher negative environmental impact than its virgin version. In addition, it should be possible to recycle the material again in more than one loop.

The CtL project applied the following definitions to its work:

Recycled materials: Material diverted from a potential waste stream.[1]

Pre-consumer waste: Material diverted from the waste stream before a consumer buys it, e.g., during a manufacturing process. (**Industrial waste** can be included, but not if it is defined as scrap or spill from production and could be included in the same production with minimal amount of reprocessing.)

Post-consumer waste: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users.

Circular economies or "closed loops" thinking (i.e., to avoid generating waste and instead ensure that materials flow in reuse and recycling loops in society) is not a new concept. Yet, the majority of examples identified during this project appeared to be small scale or clear down-cycling systems, where the recycled material is of lower value than the original material. In addition, the main focus in society (by governments, municipalities, businesses, etc.) seems to be on the collection of material rather than on what will happen after collection.

The project had three main activities during 2010-2011:

1. Recycling survey – Asked different stakeholders from the recycling industry, academia, and non-governmental organisations to define recycling and recyclability, and to rate the challenges they saw in defining a product as recyclable.
2. Plastic loop testing – Conducted tests to "close the loops" for both pre-consumer packaging materials and post-consumer plastic furniture. The post-consumer activity was called "Be a Plastic Donor."
3. Material analysis and prioritisation – Built a model to analyse material suitability for "closed loops" including economic, social and environmental parameters. Subsequently, the model was tested in Sweden and China.

1 This included both potential solid waste streams and materials that were potentially intended for energy recovery.

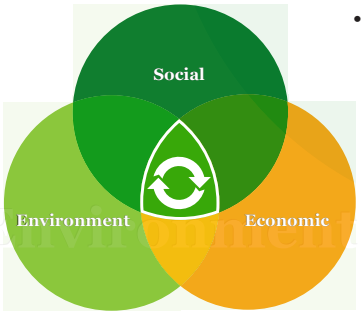
2. HIGH LEVEL FINDINGS

The project found that recycling in today's society is primarily assessed by volume, weight and percentage, with less focus on the quality of the recycling. In a circular society, the quality of recycling will become increasingly more important. If materials are to be used in a circular way, uncontrolled down-cycling must be minimised to ensure that the material value is maintained over time. For example, several types of materials could be recycled into a composite material but the future recyclability of the composite material should be considered.

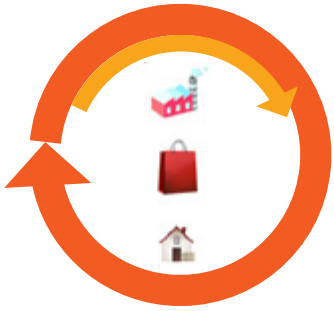
Products made out of recycled materials are often considered "environmentally improved" with reference to reduced use of virgin materials. Recycled materials do have this potential, but it depends on where and how the material was recycled, as well as other factors.

The following describes key factors to consider when deciding whether to use recycled materials to make new products:

ENVIRONMENTAL AND SOCIAL IMPACT



- Does recycling reduce the use of natural resources? Using recycled materials are not necessarily the same as reducing the use of natural resources. It is important to analyse the total environmental impact, e.g., the use of virgin materials and the total energy use. Many recycled materials belong to some sort of material flow and will only be replaced by other materials, if diverted. A good example here is the recycling of wood and wood by-products. If increased recycling of wood drives more virgin wood to energy recovery, then the total environmental impact may be less beneficial than if recycled wood was used as energy recovery. It all depends on the local situation.
- Recognise that the environmental and social impacts of sourcing recycled material depend on local market factors, such as alternative uses of the "waste" materials, transportation requirements, capability to treat contaminated materials, livelihoods of vulnerable populations, etc. In some cases, it may not be desirable to use certain recycled materials from an environmental or social standpoint – this could, for example, be the case in regions where vulnerable populations depend on that material for housing and fuel. It might even be worth steering away from some materials.
- Yet, using recycled materials has great potential to reduce the total environmental footprint. It is important to assess multiple variables that change over time. The CtL project used a model that included environmental, social and economic perspectives and incorporated both local requirements and actor-specific possibilities. We recommend developing more models to build knowledge and identify possibilities.

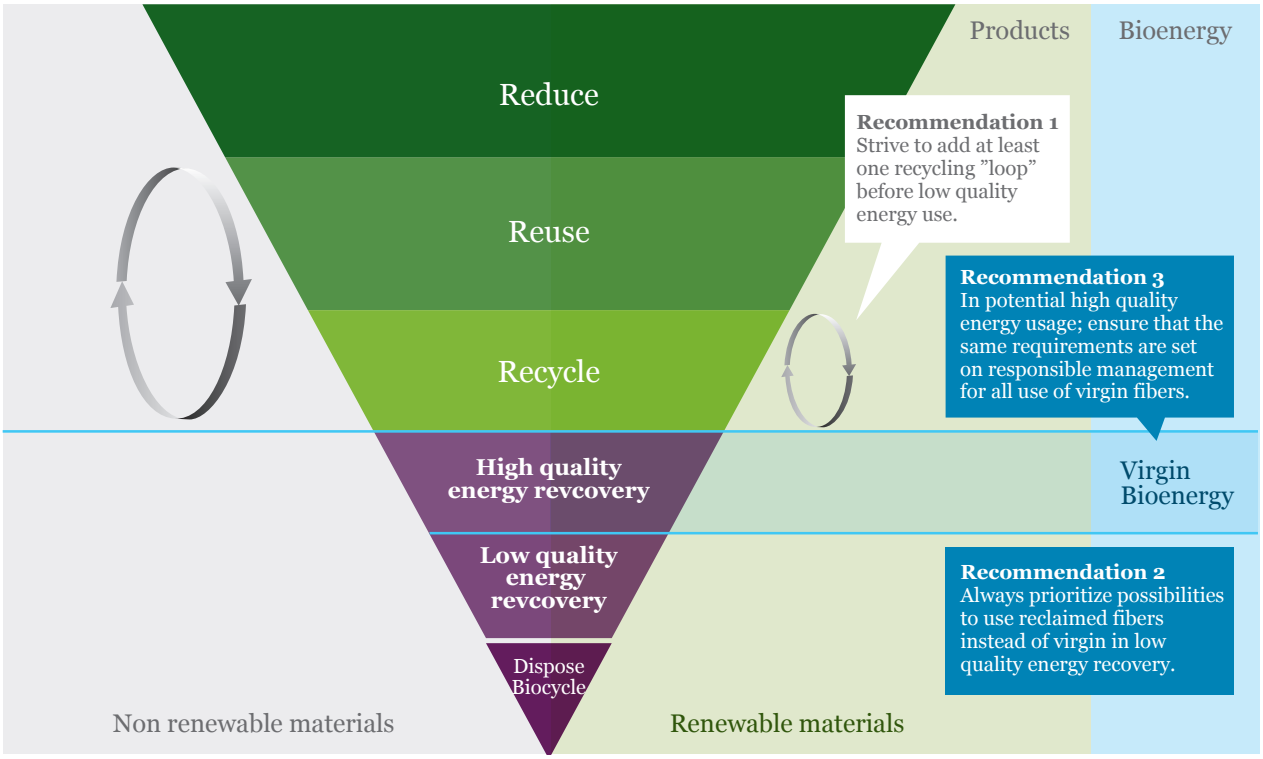


THINKING OF MORE THAN ONE LOOP

- Strive to identify recycling that maintains or adds value to the material. In a circular society, the quality of recycling will become increasingly more important. If materials are to be used in a circular way, uncontrolled down-cycling should be minimised to ensure that the material value is maintained over time. For example, creating composite materials (such as plastic and wood combinations) may in some cases reduce the future possibilities to recycle, rather than prolong the life of the materials.
- Maybe one loop is not enough? For instance, if we use recycled PET plastic to produce synthetic fibres, have we then reduced the number of loops that the recycled PET can be used in a circular society? Or have we extended the use of the material because the material is "locked" into one loop for longer? The total impact will depend on the recycling systems available in the future, as well as the alternative material streams.

Non-Renewable materials compared to renewable materials

- Is the waste hierarchy different for a renewable material compared to a non-renewable material? What is the optimal use of a renewable material? When is the impact of re-generation of the renewable material less than the reuse or recycling of the same? These are complex questions that need to be considered when using recycled renewable materials.
- An issue highlighted during the project was how to control down-cycling. In some markets, using more recycled wood in products could divert recycled wood from energy production, and thus potentially increase the use of virgin wood in energy production. Should the preferred use of recycled wood be used as bioenergy in order to reach climate targets? Or, based on the waste hierarchy, should the wood be recycled at least once before being burned for bioenergy? How do we make the right choices given significant variability between markets and geographies? These are complex questions and the CtL project offers three general recommendations, see picture 2, page 8.
- The study in Sweden showed that the majority of Swedish household waste is currently incinerated. There appear to be few incentives in society to loop materials at least once more. So, how do we optimise controlled down-cycling of materials? Reviewing policies and infrastructure to facilitate a circular society will be important steps.



Picture 2: Waste hierarchy recommendations: Non-renewable materials follow the traditional waste hierarchy, whereas, renewable materials at times may move directly to energy recovery stage and bypass the recycling stage. The general recommendation from the CtL project are still to

1) strive for at least one recycling loop also for renewable materials, while assessing the total environmental impact.
2) Prioritize possibilities to use reclaimed fibres instead if virgin in low quality energy recovery[3]
3) Ensure that the same requirements for responsible forestry is set for all use of virgin fibers.

3 High quality and low quality are relative terms based on best efficient uses given local conditions. In a country like Sweden, high energy refers to electricity and fuels, whereas low quality energy refers to heating.

CHALLENGE OLD "TRUTHS"

- Question barriers and/or "old truths" to identify what is possible in relation to recycling. There are many opinions about recycling that we believe would benefit from being questioned. Statements such as 'recycling is not possible because the recycling process is too energy intensive' or 'recycling will always reduce the use of virgin materials' may once have been given truths. However, recycling has developed and will continue to do so as we move towards a circular society.

CLEAN-UP & LEARN

- Use the "closed loops" perspective as a driver to "clean up." Continue to organise collection and recycling tests. Even rather small tests to collect waste from waste streams have the potential to clean up a problem area and at the same time build material knowledge for the future.


FIVE STEPS TOWARDS A MORE CYCLIC SOCIETY
• TRACEBILITY
• LEGAL ISSUES PATENTS
RECYCLING IS COMPLICATED
-BUT FULL OF POTENTIAL
CHALLENGE THE THRUTH
WHY is RECYCLING GOOD?
WHICH MATERIALS ARE POTENTIAL GAME-CHANGER
WHY ARE WE FOCUSING ON VOLUME/PERCENTAGE
REUSE vs RECYCLE
choosing the right materials for recycling in the future
BANK
SEEING PRODUCTS AS BANKS OF MATERIALS
collecting materials..

APPENDIX 1:

Materials Analysis & Prioritisation

The IKEA and WWF project team contracted management consulting and technology services company Accenture to:

1. Develop a method/tool to identify and prioritise the materials for which it is most important to close the loops. In addition, identify which materials are not highly prioritised to recycle from a closed loops perspective. (While the model was developed, it became clear that it needed a geographical framework and a specific actor-perspective.)
2. Identify barriers, risks and opportunities to close the loops for prioritised materials.
3. Develop recommendations for how to address barriers and risks in order to maximise the potential for closed loop systems based on results from 1 and 2.

A model was developed and used to analyse materials available on the market for their suitability for cyclic (closed loop) use; to map barriers, opportunities, and risks; and to formulate recommended actions for a shortlist of prioritised materials. Environmental, economic and social aspects were included in the structure of the model.

The project did not study material substitution (switching from high impact to low impact material) which can also be a good way to get more sustainable material flows. This would have required product level focus and included details on safety and functionality requirements. Neither did the model look into internal mass flow data, transportation system required, reuse and new business models such as product-to-service models. Instead, the model developed as part of the project is a guide to cyclic materials, and it can be used in addition to other design criteria when assessing materials.

While recycling can be a good way to reduce the environmental footprint and cut costs (if focusing on the quality of recycling and not only the volume), it is not the same as using less material, which comes first the waste hierarchy. Reducing and reusing materials were not part of the market analysis report. This was a study on recycling, the third step in the waste hierarchy.

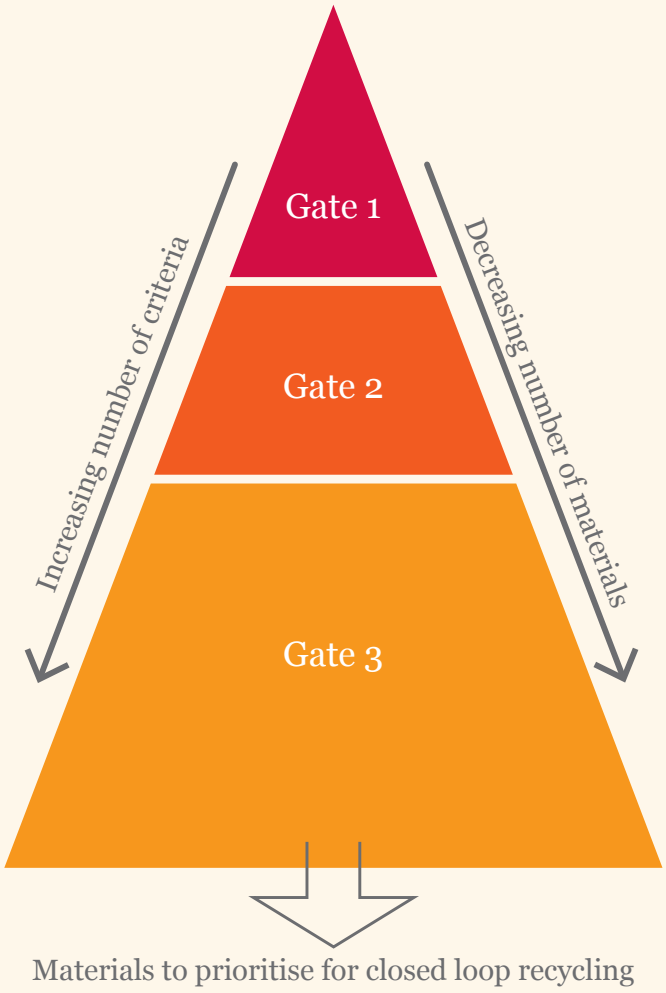
Framework – Closed loop material evaluation model

Purpose and function of model

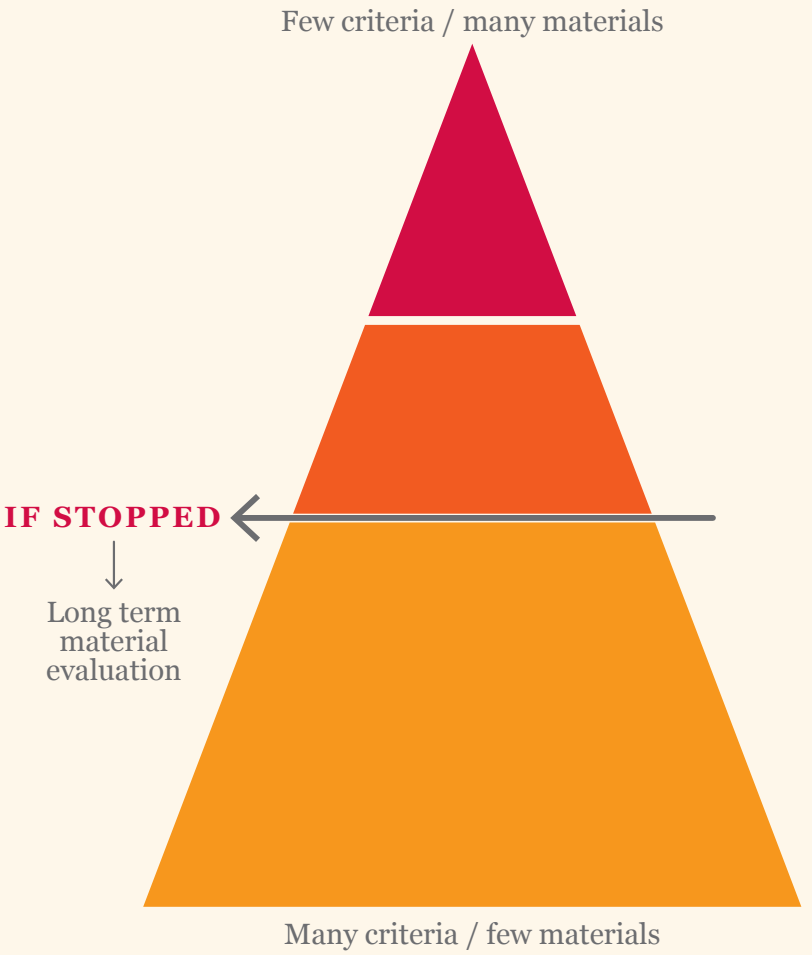
- The purpose of the closed loop material evaluation model developed in this project is to facilitate structured analysis of materials in a short term (5yrs) perspective and identify materials with long term (+5yrs) closed loop potential.
- Materials with short term potential are analysed for industrial suitability and evaluated on a comprehensive set of economic, environmental and social criteria.
- Materials with long term potential (for which there are not yet defined markets and/or commercial recycling processes) are identified by the model and evaluated separately given each material's unique context.
- The output of the model is a list of prioritised materials for closed loop recycling, including full understanding of economic, environmental and social implications of cyclic use.

Three gates

- The model is structured around a set of key criteria that have been organised in three "gates"
- At each gate, an evaluation is made based on criteria covered up until then, and low-scoring materials can be eliminated from further research in order to reduce unnecessary research efforts on materials with poor recycling potential.
- A material must pass all three gates to become prioritised for short term strategic action on closed loop recycling.
- The order in which criteria appear does not reflect importance, but rather the level of discrimination (e.g. "if we know this, we know enough to eliminate the material from a shortlist of high-importance materials").



Framework – Closed loop material evaluation model



Gate 1

1.1 Can this recycled material be used in home furnishing products?

1.2 Does this recycled material exist today?

1.3 Is this material technically possible to recycle again in commercial scale within 5 years?

Gate 2

2.1 Can this recycled material within 5 years be recycled again with acceptable quality losses?

2.2 Can this recycled material within 5 years account for a significant volume compared to other materials in the same material group?

2.3 Is this recycled material less energy intensive than its virgin substitute?

2.4 Can this recycled material be bought at a competitive price compared to the virgin material (now or within 5 years)?

Long-term evaluation

Is there evidence that this material has high potential as a cyclic material in the long term:

– Does production of the virgin material have a high negative social or environmental impact?

– Could recycling the material generate high economic value?

Gate 3

Environmental

3.1.1 Is the recycled material better for the environment than its virgin substitute regarding...

a) ...energy use?

b) ...climate change impact?

c) ...chemical pollution?

d) ...water use?

e) ...land use?

f) ...biodiversity?

g) ...ozone depletion?

h)...acidification?

i) ...eutrophication?

j) ...resource depletion?

3.1.2 To what degree is the recycled material recyclable again after use in our value chain?

3.1.3 Is our use of this recycled material better than other end-of-life options (e.g. incineration, up- or down-cycling)?

Social

3.2.1 Can this recycled material be used without compromising product safety?

3.2.2 Is the recycled material reasonably traceable?

3.2.3 Can this recycled material be bought without directly supporting unethical business practices (e.g. corruption, black market, labour rights, child labour)?

3.2.4 Can this recycled material be handled without unacceptable health risks?

3.2.5 How will the recycling of this material impact job creation?

Economical

3.3.1 Does the recycled material satisfy our price requirements?

3.3.2 Can this recycled material be used without increasing our indirect costs?

3.3.3 Is the recycled material available in sufficient quantities now and in the future?

3.3.4 Does the material come from a scarce primary resource?

3.3.5 Will using the recycled material reduce exposure to price fluctuations?

3.3.6 Can the material be obtained in a well-functioning market?

3.3.7 Can this recycled material be used without imposing supply risks?

3.3.8 Can this recycled material be used without legal constraints?

3.3.9 Can using the recycled material unlock new sources of economic value (e.g. brand reputation, new mixed materials, etc.)?

NOTES

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CLOSE THE LOOPS · IKEA-WWF PROJECT BRIEF

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WITH IKEA
ON CLIMATE,
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