Circular Economy Business Model Case Studies: Introduction and Methodology

Version 1.0

Work Package 3

Deliverable 3.2a

Lead Author:  Contributors:

www.R2Piproject.eu
Lead author:
Aleyn Smith-Gillespie, Associate Director, Carbon Trust

Contributors:
Ángeles Pereira, Applied Economics Dpt., University of Santiago de Compostela (USC)
Doug Morwood, Managing Director, Business Models Inc.

The R2π Project Consortium consists of 15 partners from 9 countries, coordinated by CSCP:

Ben Gurion University of the Negev
http://in.bgu.ac.il/en/Pages/default.aspx
Business Models Inc
http://www.businessmodelsinc.com
Carbon Trust
https://www.carbontrust.com/home/
Chambre de commerce et d’industrie de région Paris - Île-de-France - ESCP Europe Business School
http://www.escp-europe.eu/
Collaborating Centre on Sustainable Consumption and Production
http://www.scp-centre.org/
Cradle to Cradle Products Innovation Institute
http://www.c2ccertified.org/
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http://www.csreurope.org/
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http://www.ueapme.com/
Institute of Innovative Economy
http://ingos.pl/index/index/language/en
Jerusalem Institute for Israel Studies
http://en.jerusaleminstitute.org.il/
Landbell AG
http://www.landbell.com/
Sapir Academic College
http://www.sapir.ac.il/en
The Ministry of Economic Development of Poland
University of Malta
http://www.um.edu.mt/
University of Santiago de Compostela
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1 Background and context

R2π – Transition from Linear to Circular is a European Union Horizon 2020 project focused on enabling organisations and their value chains to transition towards a more viable, sustainable and competitive economic model. The project supports the achievement of the European Union’s strategy in sustainability and competitiveness by positioning the EU as a world leader in the circular economy.

R2π examines the shift from the broad concept of a Circular Economy (CE) to one of Circular Economy Business Models (CEBM) by tackling market opportunities and failures (businesses, consumers) as well as policy opportunities and failures (assumptions, unintended consequences). Its innovation lies in having a strong business-model focus (including designing transition guidelines) as well as in the role of policy development (including designing policy packages). R2π unfolds in diverse contexts with a strong emphasis on stakeholder involvement and exchange, employing mixed-methods, case studies, desktop research, feasibility assessments (including surveys where applicable) and policy formulation.

The ultimate objective of the R2π project is to accelerate widespread implementation of a circular economy based on successful business models and effective policies:

- to ensure sustained economic development,
- to minimize environmental impact and
- to maximize social welfare.

The mission of the project is therefore to identify and develop sustainable business models and guidelines that will facilitate the circular economy, and to propose policy packages that will support the implementation of these sustainable models.

A core part of this project is to work with organisations who are on the journey towards developing circular economy business models, as well as those who have the ambition to do so but haven’t yet begun.

We plan to do this by conducting case study projects with approximately fifteen selected organisations. Through these engagements, the R2Pi team’s aim is to provide participating organisations with independent analysis and a facilitated process to challenge current business model assumptions, identify new opportunities, and catalyse change.

The broader R2Pi project activities and outputs also provides participating organisations with an opportunity to raise their profile publically (through published case studies); to exchange knowledge and experience with other project participants; and influence policy-making.

For the purpose of this document, participating organisations that are the principal subject for the case study are referred to as ‘the Case Organisation’. 
2 Overview of the case study analysis process

The case study process will be structured in three steps, plus an optional workshop, as summarised below.

![Diagram showing the case study analysis process]

2.1 Kick-off

Prior to starting the work in Step 1, we will conduct a kick-off and planning session with the Case Organisation. This will likely take place about a month beforehand to allow sufficient time for preparation and planning.

The kick-off will include:

- Discussing/re-affirming the project objectives from both the Case Organisation and R2Pi team’s perspective, and how this fits within the Case Organisation’s broader ambition.
- Outlining a simple and robust project governance process, including:
  - Agreeing the key points of contact within the Case Organisation and R2Pi team, and processes for communication
  - Identifying a **Project Sponsor** within the Case Organisation (ideally a senior individual who can provide the project with the necessary profile internally)
  - Potentially defining a **Steering Group** who should be involved at key points (e.g. review and feedback of outputs)
- Confirming the project timeline and plan of activities.
- Identifying key Case Organisation stakeholders who will be relevant for the project (e.g. for interviews and data gathering).

Following the project kick-off, we will work with the Case Organisation to complete preparatory activities.
2.2 Step 1 – Big picture analysis

As a first step, we will develop a ‘big picture’ perspective of the case study organisation’s business model, value chain, and business context. The work will be conducted by the R2Pi team, based on information that is publically available and readily available within the Case Organisation (as well as insights and expertise from within the R2Pi team). This is desk-based preparatory research, and minimal involvement from the Case Organisation is expected at this stage.

This analysis will be done at a high level in order to rapidly define and confirm the broad scope of the case study, and identify any areas where specific attention may be needed. This will cover the following:

- **Business model**: How the Case Organisation’s current business model creates, delivers and captures value, and key mechanics.
- **Value network**: High-level mapping of the value chain/network relating to the focus value proposition / business model for this case study
- **Business context**: Key trends and/or developments that impact the Case Organisation’s business model and broader value chain dynamics. A scan of alternative business models that may be used by competitors and new entrants will also be conducted.
- **Business model options and opportunities**: Opportunities for additional value creation through applying circular economy principles/models. This will be based on research findings as well as hypotheses of alternative business models.
- **Business model challenges**: Potential challenges to the current business model.

After completing this high-level analysis, we will discuss findings with the Case Organisation Steering Group and plan the following steps:

- Confirming that we have the right scope in terms of business model and value proposition
- Identifying particular areas of focus required
- Identifying key stakeholders within the business that should be involved in next steps

**Deliverable**: Big Picture Analysis report (approximately 3-5 pages), summarising initial research findings, and agreed scope and approach for next steps.

2.3 Step 2 – Business context analysis

This step will deepen the initial ‘big picture’ analysis done on business context, described in Step 1. Feedback received from the Case Organisation as well as insights from previous steps will be used to focus the scope of this research on identifying **key barriers and enablers** to circular economy business models within the Case Organisation’s business environment and that of its value chain.

The analysis will mainly involve desk research conducted by the R2Pi team. This will be complemented by **targeted interviews with the Case Organisation**. The following areas will be looked at:

- Regulations and policies (EU, national, and international)
- Industry standards
- Economic, market and industry dynamics
2.4 Step 3 – Business model assessment

The R2Pi team will map out the organisation’s business model and value chain in more detail. In particular, we will assess strengths, weaknesses, opportunities and threats with respect to the Case Organisation’s business model. We will do this through a mix of interviews and data collection, which we will synthesise as an Interim Report together with findings from the business context analysis.

2.4.1 SWOT analysis questionnaire

A SWOT analysis questionnaire will first be completed by the Case Organisation (with assistance from the R2Pi team). This questionnaire probes key issues relevant to circular economy models, and is designed to highlight specific areas for discussion in interviews.

2.4.2 Business model assessment

We will refine and complete the initial perspective on the current (‘as-is’) business model developed in Step 1 as part of the ‘Big Picture Analysis’. Through this process, we will also probe areas of challenge as well as potential opportunities and new options for business model development.

Through targeted interviews, we will develop an understanding of the current model in order to answer the following questions:

- How does the current business model create, deliver, and capture value?
- How are circular economy principles currently being applied, and how do they enhance the business model?
- What are the factors that have historically influenced the current business model design (barriers and enablers)?
- What are the strengths/weaknesses and opportunities/threats to the current business model?
- How could the business model evolve and innovate?

Our analysis will be structured using the Value Proposition Canvas (VPC) and Business Model Canvas (BMC) frameworks. These are tried-end-tested tools for business model design and innovation, used by leading organisations around the world. This will be done jointly with Case Organisation stakeholders through interviews and data gathering.

2.4.2.1 The value proposition and customer needs assessment

We will first assess the current value proposition and customer segments being served. This will focus on understanding:

- Customer needs, including how circular economy helps to meet (or could meet) these. This will also explore how these needs may be changing (using insights from the business context analysis).
- The value proposition, including how circular economy principles create (or could create) value.

Figure 1 The Value Proposition Canvas

<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Customer Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products &amp; services Offering</td>
<td>Customer jobs</td>
</tr>
<tr>
<td>Gain creators How products and services create customer gains</td>
<td>Gains Desired outcomes or concrete benefits sought</td>
</tr>
<tr>
<td>Pain relievers How products and services alleviate customer pains</td>
<td>Pains Bad outcomes, risks, obstacles to customer jobs</td>
</tr>
</tbody>
</table>

2.4.2.2 Broader business model assessment

We will then expand our analysis to the wider business model, looking at the building blocks of the Business Model Canvas, illustrated below. This will include:

- Customer-facing elements: Customer Relationships, and Channels (and how these drive revenues)
- Operational-elements: Key Activities, Key Resources, and Key Partners (and how these drive costs)

Figure 2 The Business Model Canvas

2.4.2.3 Financial and non-financial outcomes assessment

We aim to assess as far as possible the financial outcomes of the business model. Ideally this includes quantification of costs, revenues and profitability at the relevant level. Where possible, we
would also seek to compare financial metrics between ‘circular’ and ‘non-circular’ business model alternatives (for example if both exist within a business, or if historical information is available).

We also wish to quantify relevant non-financial benefits (or costs) of the business model. This would either utilise existing analyses conducted by the Case Organisation, or the R2Pi team can conduct the analysis if data is readily available. This would include:

- Carbon emissions
- Material recycling and/or waste elimination
- Socio-economic (employment, skills development, community cohesion, etc.)

Where quantification of financial and non-financial metrics is not possible or practical, we will assess these qualitatively.

Output: The output of this work will be:

- A visual representation of the organisation’s business model, based on the nine building blocks of the Business Model Canvas. This will incorporate the way in which circular economy principles are applied and embedded.
- A narrative description of the business model.
- A summary of the SWOT analysis and assessment of financial and non-financial outcomes.

2.4.3 Value network mapping

Companies cannot work in isolation to enable circular economy models. This requires suppliers, partners, customers, and other organisations along the value chain to collaborate directly or indirectly. These relationships all involve an exchange of value (financial or non-financial).

We will start by mapping out the flow of key materials which relate to the value proposition and business model being examined in the case study. We will then map out the relationships among key players which influence the material flow and the nature of the relationship in terms of value being exchanged. The ‘value mapping’ will be done from the perspective of both economic/financial value and other types of value (e.g. social). Figure 3 below illustrates the types of material flows which we will map out, as relevant. Figure 4 illustrates the relationship and value flow mapping which will ‘overlay’ above this.
**Figure 3 Material flow mapping (illustrative)**

**Figure 4 Value flow mapping (illustrative)**

**Deliverable:** We will draft a report synthesising the findings and conclusions from the work conducted in Steps 2 and 3.
2.5 Business model design workshop

The business model design workshop will be a **facilitated experience** where participants have an opportunity to challenge the current business model and jointly identify opportunities. This will be done using proven facilitation techniques and business design tools (including the business model canvas and other frameworks). The workshop will be run by the R2Pi team’s circular economy and business model design experts.

The workshop is an opportunity to bring together a broader set of stakeholders in an interactive setting. For example, engaging stakeholders who have had less experience/exposure to new business models; as well as selected external stakeholders (e.g. key partners or customers).

The workshop is scalable in terms of the number of people who can participate. We would expect this to take place at the Case Organisation’s location of choice (for example if the Case Organisation can provide a convenient venue). Table 1 below illustrate the proposed agenda items of the workshop.

**Table 1 Illustrative business model design workshop agenda items**

<table>
<thead>
<tr>
<th>Workshop agenda item</th>
<th>Two potential options to conduct this:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Understand the ‘as-is’ business model</td>
<td>1) Facilitated working sessions, providing a ‘fresh perspective’. If additional stakeholders are involved in the workshop who did not take part in steps 1-3, there is a benefit in having all participants experience the business model understanding and assessment process (e.g. discussions may reveal additional insights or issues)</td>
</tr>
<tr>
<td>• Understand key trends, barriers and enablers in the business environment</td>
<td>2) Presentation and facilitated discussion of findings from steps 2 and 3.</td>
</tr>
<tr>
<td>• Identify strengths, weaknesses, opportunities and threats with the current (as-is) business model</td>
<td></td>
</tr>
<tr>
<td>• Define vision and ambition</td>
<td>Facilitated working sessions. If there is a large number of participants, multiple small groups would work in parallel, sharing outputs and thinking with one another.</td>
</tr>
<tr>
<td>• ‘Ideate’ new business model options</td>
<td></td>
</tr>
<tr>
<td>• Score and prioritise best options</td>
<td></td>
</tr>
<tr>
<td>• Define key success factors needed to work towards new models</td>
<td></td>
</tr>
<tr>
<td>• Summarise and conclude</td>
<td></td>
</tr>
</tbody>
</table>

The Methodology section 3.4 provides a more detailed explanation of the proposed workshop structure and process. This may be adapted based on findings from the previous steps, and can be co-designed between the Case Organisation and the R2Pi team.

**Output**: The output of the workshop will be a ‘visual report’ capturing the content of discussions and visual outputs generated by participants. These will also be summarised and structured in written form.
2.6 Case study report

Following conclusion of the case study analysis, the R2Pi team will develop a final report for the Case Organisation, synthesising the key findings from all stages of the work. This will be presented and discussed with the Case Organisation in a final meeting.

In summary, the report to the Case Organisation will include:

- Business context analysis: key trends; barriers; and enablers (economic, market, competitive, technical, regulatory, etc.)
- Business model description: definition of ‘as-is’ model and role of circular economy in enhancing value creation
- Assessment of business model challenges and opportunities, including potential new business model ideas
- Financial and non-financial assessment of outcomes (at the business model and value chain level)

2.7 Other opportunities for learning and knowledge exchange

A number of other organisations across different sectors and value chains will participate in similar case study exercises. The R2Pi project will provide an opportunity for exchange of knowledge between these organisations. For example, this will be done through:

- Sharing of case study findings (excluding any commercial/confidential information)
- Forums where participants can network and exchange experience

2.8 Project timeframe

We envisage completing the case study project within a 10-week timeframe for Steps 1-3, as illustrated in Figure 5 below. This timeframe is flexible and can be adjusted if necessary. The workshop (Step 4) will be scheduled following completion of Step 3.

We plan to conduct the project (together with other parallel case studies) within the period of October 2017 to April 2018. This require starting work activities between October 2017 and March 2018.
Figure 5 Case study project workplan
2.9 R2Pi Team

The R2Pi team draws on a strong consortium of partners, combining expertise in business model design/innovation, circular economy, research, and analysis.

With respect to the case study project, the R2Pi team will be coordinated by a designated Project Leader. He/she will oversee and manage the project delivery, and act as a single point of contact for communication with the Case Organisation. The Project Leader will also oversee the project activities allocated to R2Pi team members.

*Figure 6 Project consortium members*

![Project consortium members]

2.10 Case Organisation resource commitments

While the project requires no direct financial cost to the Case Organisation, the organisation will need to commit some resource to certain activities, the key ones being: replying to data and information requests; and participating in interviews.

*Table 2* below summarises the expected Case Organisation input required across the project activities, and estimate time commitment. This is indicative, and will be discuss as part of project planning prior to and during the project to ensure that it is manageable.
Table 2 Case Organisation input required and estimated time commitments

<table>
<thead>
<tr>
<th>Key Activities</th>
<th>Case Organisation input required</th>
<th>Estimated time commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick-off and preparation (~1mo. Prior)</td>
<td>• Meeting/conference call</td>
<td>2 hours</td>
</tr>
<tr>
<td>Step 1 - Big picture analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2Pi team data gathering and analysis</td>
<td>• Provide readily available data on the business</td>
<td></td>
</tr>
<tr>
<td>Write output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review and discussion with Case Organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2 - Business context analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 2 planning and preparation</td>
<td>• Identify key stakeholders to interview</td>
<td></td>
</tr>
<tr>
<td>Case Organisation Interviews</td>
<td>• Participate in interviews</td>
<td>4 hours</td>
</tr>
<tr>
<td>Desk research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 3 - Business model assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 3 planning and preparation</td>
<td>• Identify key stakeholders to interview</td>
<td></td>
</tr>
<tr>
<td>SWOT questionnaire</td>
<td>• Complete SWOT questionnaire</td>
<td>2 hours</td>
</tr>
<tr>
<td>Business model mapping and assessment</td>
<td>• Participate in interviews/meetings</td>
<td>5-10 hours</td>
</tr>
<tr>
<td>Financial and non-financial outcomes assessment (firm-level)</td>
<td>• Provide financial and non-financial data/metrics</td>
<td></td>
</tr>
<tr>
<td>Material and value flow mapping</td>
<td>• Provide data on materials (bill of materials, composition, etc.)</td>
<td>2 hours</td>
</tr>
<tr>
<td>Financial and non-financial outcomes assessment (value chain-level)</td>
<td>• Provide information on key value chain players (via meeting)</td>
<td></td>
</tr>
<tr>
<td>Analysis/synthesis and report writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review and discuss report</td>
<td>• Attend review and feedback meeting</td>
<td>2 hours</td>
</tr>
<tr>
<td>Step 4 - Workshop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation - material, planning, attendance</td>
<td>• Identify key stakeholders to participate</td>
<td></td>
</tr>
<tr>
<td>Workshop</td>
<td>• Attend workshop</td>
<td>½ to 1 day per participant</td>
</tr>
<tr>
<td>Visual report preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrate additional findings from workshop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review and feedback with Case Organisation</td>
<td>• Attend review and feedback meeting</td>
<td>2 hours</td>
</tr>
</tbody>
</table>
3 Detailed Methodology

3.1 Step 1 – Big picture analysis

The ‘big picture’ analysis is designed to be a high-level assessment of the Case Organisation’s situation. The output will be a brief report which will be discussed with the Case Organisation to confirm and prioritise the scope of analysis in subsequent steps.

This exercise will be mainly be done by the R2Pi team, based on publically available data and Case Organisation input.

3.1.1 Business model mapping

This section describes a guide for conduction business model mapping. Questions that need to be assessed are indicated in bold bullet points.

3.1.1.1 Understanding of CEBM pattern

- Which of the seven CEBM business model patterns are applicable? How are these incorporated within the Case Organisation’s business model?
  *The purpose is to get an initial appreciation of what aspects of circular economy are relevant to the Case Organisation’s business model, so that these can be identified in more detail when examining the business model building blocks below.*

- What elements of the CEBM patterns are dependent/supportive of dynamics within the broader value chain/network?
  *A high-level description only is required. This will be defined in more detail as part of the value flow mapping.*

Circular Economy Business Model patterns:

<table>
<thead>
<tr>
<th>Production</th>
<th>Consumption/use</th>
<th>End-of-life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-make</td>
<td>Access</td>
<td>Resource recovery</td>
</tr>
<tr>
<td>Circular Sourcing</td>
<td></td>
<td>Performance</td>
</tr>
<tr>
<td>Re-condition</td>
<td>Co-product recovery</td>
<td></td>
</tr>
<tr>
<td>Co-product recovery</td>
<td>Access</td>
<td></td>
</tr>
</tbody>
</table>

Seven circular economy business model patterns

- Enabling business model pattern
3.1.1.2 Business model analysis – the nine building blocks

Customer Segments:

- **Who are the customers for which value is being created?**
  
  *This may be a single segment, or multiple segments. A distinct customer segment has common needs that require and justify a distinct offer. The focus for the case study is on the most important customer segment(s) which are relevant from a circular economy perspective.*

  **Note:**
  
  - Customer segments can be further distinguished if they require significantly different distribution channels or types of relationships; are willing to pay for different aspects of an offer; or have significantly different ‘costs to serve’ and profitability. This can be re-assessed once the other business model elements are described.
  - Companies which have control over recovery of products or materials at end-of-life may have customers relating to this CEBM pattern (e.g. scrap / materials management)
  - For organisations implementing co-product recovery CEBM patterns, customers will include downstream organisations purchasing or receiving these material streams.

Value Proposition:

- **What is the product/service bundle offered to the focus customer segments?**

- **What is the value delivered to the customer?**
  
  *This can for example describe: customer problems being solved; and customer needs being satisfied.*

- **How does the value proposition incorporate elements of circular economy?**
  
  *For example: Design for circularity; circular sourcing.*

- **How do these elements of circular economy drive or enhance value created to customers?**
  
  *For example: Lower cost of ownership; convenience; cost/risk avoidance; reputational or brand value; reliability; etc. (Note: some of these may be hypotheses and should be identified as such, to be validated through stakeholder interviews).*

Channels:

- **Through what channels are customers reached?**
  
  *Channel types include: Direct (e.g. sales force, web) vs. indirect (stores; wholesalers); and own vs. partner (e.g. franchise). Describe whether these differ for different customer segments and/or value propositions.*

- **What are the ‘reverse’ channels for product take-back or end-of-life product/material recovery? (if relevant)**
Customer Relationship:

- What are the types of customer relationship used to serve each of the customer segments?
  *Examples include: self-service; automated; personalised; communities; co-creation.*

Revenue Streams

- For what value are customers paying? How are they paying?
  *For example: Product sale; service fee; pay-per-use; subscription; etc.*

Key Resources

- What are the key resources required for delivering the value proposition; operating channels; maintaining customer relationships; and capturing revenue streams?
  *Example resources include: Physical assets; Knowledge/IP; skills; financial; technological. These may be owned by the Case Organisation; provided/purchased from partners; or external infrastructure.*

- What are the key resources required for enabling circular economy within the business model?
  *These may be owned by the Case Organisation; provided/purchased from partners; or external infrastructure.*

Key Activities

- What are the key activities required for delivering the value proposition; operating channels; maintaining customer relationships; and capturing revenue streams?
  *Example activities include: Production; providing value added services; operating platforms or networks (e.g. for sharing/rental).*

- What additional activities are required to enable circular economy within the business model?
  *Additional activities specifically relevant to circular economy may include: Design; sourcing/procurement; waste/recovered material processing; etc.*

Key Partners

- Who are the key partners and suppliers who provide key assets and/or enable key activities to be performance? (Including those that relate to the implementation of circular economy elements).

Cost structure

- What are the most important costs inherent to the business model?
  *These will relate to Key Resources; Key Assets; and Key Partners.*
  *Where possible:*  
  - Describe which costs are variable or fixed.
• Characterise whether the business models is ‘high-cost’ (e.g. because it is capital or labour-intensive) or ‘low cost’ (e.g. because they require less assets or inputs to operate).
• Identify whether the business model benefits from economies of scale or scope.

• How do circular economy elements have an impact on costs?
  For example: The price of recycled/renewable material inputs may be lower (or not) compared to virgin materials; remanufacturing operations may be more labour-intensive than regular/automated manufacturing.

3.1.1.3 Visual and narrative description of the business model

• Based on the information gained above, create a visual representation of the Case Organisation’s business model using the Business Model Canvas template, showing relationships between the different business model elements.

The Business Model Canvas
• Create a written narrative describing the Case Organisation’s business model, and the role of circular economy principles within it.

Example narrative:

Within the scope of this case study, <CASE ORGANISATION>’s main customers are <INSERT>.

<CASE ORGANISATION>’s value proposition is <INSERT>. This offering enables customer to address the following key needs: <INSERT>. Depending on the options offered within the <VALUE PROPOSITION>, <CUSTOMER> pays for the service through a monthly or annual subscription.

Circular economy is embedded within the customer offering by <INSERT>. This provides additional benefits to customers such as <INSERT>. This is enabled by <KEY ACTIVITIES> undertaken by <COMPANY A> is a key partner, to which <KEY ACTIVITY> is outsourced for <COST>.

<CASE ORGANISATION> provides its offering to customer through <CHANNEL>, and separately provides product take-back through <CHANNEL>. <Company B> is a key partner providing the <KEY RESOURCE> for <CHANNEL>. This is procured for a <SERVICE COST>.

<CASE ORGANISATION>’s relationship with <CUSTOMER> is collaborative and long-term, with an opportunity for frequent personalised interaction through the <VALUE PROPOSITION> service bundle. <KEY RESOURCE> provides the skills and knowledge for this interaction. The <COST> is shared with other business units.

3.1.2 Value flow mapping

• Using the understanding gained from the business model mapping, map out the high-level flow of materials using the template provided. Define the system boundary relevant to this case study.

If possible and relevant, try to map out the flow for different materials types which are incorporated within the product being offered to customers. This does not need to be detailed nor accurate at this stage – the main objective is to get a high-level appreciation of whether and how key materials flow and cycle within the Case Organisation’s value chain.

If a Case Organisation manufactures the product, try and obtain a Bill of Materials (BoM) or other description of material composition to understand the key materials and quantities used, in particular:
• What materials make up most of the product cost and/or weight?
• Are any critical/rare materials required?

Define the system boundary which is relevant to this case study. This may be geographic, industrial, or an environmental ecosystem.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378

Example material flow (Source: Ellen MacArthur Foundation. Circularity Indicators Methodology)
• After establishing the principal value chain and material flow, identify and map out partners, organisations and other third parties which are involved in this. At this stage this will be high-level (e.g. types/categories of partner or player) and may be mainly based on assumptions to be validated later with the Case Organisation. This is illustrated in the diagram below.

![Value Chain Diagram]

3.1.3 Business context

• Identify the key issues and trends within the Case Organisation’s business context which can have an impact on the business model.

The purpose of this is to get an overall view of the issues relevant to the business, and should not necessarily be restricted to circular economy-related themes (issues which may not look relevant could in fact directly or indirectly be a driver for circular economy).

<table>
<thead>
<tr>
<th>Context area</th>
<th>Elements to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer needs</td>
<td>• How are customer needs and requirements changing?</td>
</tr>
<tr>
<td>Demographic trends</td>
<td>• What demographic trends are most relevant? (e.g. if a B2C business, or where end-users are consumers)</td>
</tr>
<tr>
<td>Rules &amp; regulations (EU/international, national)</td>
<td>• How are regulations impacting the business, customers, and the supply chain? E.g.</td>
</tr>
<tr>
<td></td>
<td>o Environmental regulations: Waste; chemicals; carbon &amp; climate change; extended producer responsibility</td>
</tr>
<tr>
<td></td>
<td>o Consumer protection regulations: Extended producer responsibility; data and privacy; liability and insurance</td>
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<tr>
<td><strong>Economy &amp; market environment</strong></td>
<td></td>
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<tr>
<td>---------------------------------</td>
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<tr>
<td></td>
<td>• What economic and market trends are impacting the business, e.g.</td>
</tr>
<tr>
<td></td>
<td>○ Commodities – availability and pricing</td>
</tr>
<tr>
<td></td>
<td>○ Secondary materials – availability and pricing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Competition</strong> (including ‘business model scan’)</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• How are competitors’ business models evolving?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Are there new entrants? Are they employing new business models?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Technology trends</strong></th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>• Are new technologies enabling or threatening your business model, or providing new opportunities?</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Uncertainties</strong></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• What are the biggest uncertainties which can have a significant positive or negative impact on your business?</td>
<td></td>
</tr>
</tbody>
</table>

### 3.1.4 Business model options and opportunities

- Based on the previous assessment, define a few potential business model options and key opportunities that may be relevant to the Case Organisation.

### 3.1.5 Business model challenges

- Based on the previous assessment, identify what you think will be the key challenges which the Case Organisation’s business model is facing.
3.2 Step 2 – Business context analysis

In this step, the objective is to identify the main external factors that need to be taken into account in order to explain the success (or failure) of Circular Economy Business Models (CEBM), as well as their potential role in accelerating the transition towards a Circular Economy.

CEBM can reflect different business strategies and objectives, and therefore, contextual elements can influence them in slightly different terms. Some entrepreneurs may start from the beginning with a specific focus on developing a CEBM. This way, they may define from the beginning all of the building blocks of the business model. A journey towards Circular Economy from a mainstream company will be different. In that case, an incumbent company will potentially take advantage of contextual factors to address changes in its business model and to achieve a certain degree of circularity, which may or may not challenge its dominant business model. The Business context research will be carried out in two stages, as describe below.

3.2.1 Stage 1 analysis

In the first stage, each case study team will conduct desk research in order to identify the country and sector-specific factors that may potentially affect the business model.

Case study teams will start by using the check-list provided in APPENDIX 1. This overall information will be collected from available data and reports on the national and sectoral level. As an example, they may include EU reports about eco-innovation and circular economy on the country level, as well as national and sectoral reports about the state of play of circular economy. Case study teams may also scan sectoral associations, circular economy and sustainability associations. After conducting this desk research, the R2Pi case study team will define questions about those aspects that would benefit from getting the perspective of the Case Organisation.

3.2.2 Stage 2 analysis

In the second stage, each case study team will conduct interviews with relevant key stakeholders within the Case Organisation.

In order to get in-depth information, the case study teams need to identify a key stakeholder in the company. This should be someone who has a general view of the business model and the context. Depending on the case study, this might include one or more of the following:

- General Manager
- Head of Sustainability
- Head of Government Affairs
- Head of Strategy

In order to maintain consistency across the different case studies, a questionnaire guide is provided in APPENDIX 1. All of the case study teams must address the same categories of contextual factors. Nonetheless, the specificities of the case study may require the definition of specific questions.
3.3 Step 3 – Business model assessment

In this step, we will flesh out the high-level mapping conducted as part of the ‘Big Picture analysis’, and assess barriers/enablers and challenges/opportunities to transitioning towards a circular economy business model. This will include:

- Assessing the ‘circularity’ of the business model
- Assessing business model strengths and weaknesses.
- Further detailed mapping of the ‘value flow’ between value chain/network players.
- Assessing opportunities (and threats) and potential new business model options (including using insights from the in-depth business context analysis above).

The following aspects of the business will be analysed:

- The customer-value proposition
- Customer-facing elements of the business model
- Operational elements of the business model
- Financial outcomes
- Non-financial outcomes

Input from the Case Organisation and other stakeholders will be done through structured interviews and potentially small group discussions where relevant.
### 3.3.1 Business model circularity and strengths/weaknesses assessment

Where necessary, we will refine our understanding of the business model mapping conducted under the ‘Big Picture analysis’ (see section 3.1.1).

Following this, we will conduct two questionnaire exercises:
1. Assessment of business model circularity
2. Assessment of business model strengths and weaknesses

The purpose of these will be to produce an overall assessment of the business model ‘state of play’ and to identify specific areas in which to focus follow-on ‘deep dive’ discussions. These follow-on discussions will enable exploration of business model opportunities (and/or threats) and discussion of enablers/barriers to transitioning towards circular economy.

The way in which this will be done is illustrated in Figure 8 below. The questionnaires can be found in APPENDIX 2 (section 5.2).

Key reference material for individuals conducting these assessments can be found in APPENDIX 5, which contains:
- Key elements required for circular economy (Section 8.1)
- Key success factors for circular economy within business models (Section 8.2)

**Figure 8 Process for conducting business model assessment questionnaires**

1. **Business model circularity assessment**

   ![Business Model Circularity Assessment](image)

   ...then assess issues from the perspective of business model elements

2. **Business model strengths & weaknesses assessment**

   ![Business Model Strengths and Weaknesses Assessment](image)

3. **Deep dive discussions on areas that indicate opportunities (or threats), and understand enablers and barriers to addressing these.**

   ![Deep Dive Discussions](image)
3.3.2 Financial outcomes

We will seek to quantify the financial outcomes of the business model in terms of profitability. This will rely on the Case Organisation being able to provide us with either their own analysis, or the data to conduct this analysis. Where possible, we will try to make a comparison with a model that doesn’t employ circular economy principles.

The analysis will aim to specifically quantify the following:
- Revenue streams for the value proposition
- Costs for the operational elements of the business model (allocated to the relevant business model)
- Overall profitability of the business model

*Example financial analysis methods and outputs are included in Section 5.3 (Financial Outcomes) of APPENDIX 2.*

3.3.3 Non-financial outcomes

We will seek to quantify the non-financial benefits (or cost) of the circular economy business model. This will include:
- Socio-economic benefits/costs – e.g. local jobs created/lost
- Environmental benefits/costs – e.g. carbon emissions reduction from circular vs. non-circular models (where feasible).

This will principally rely on analyses which the Case Organisation has already conducted. If these aren’t available, we will conduct a qualitative assessment of costs and benefits through interviews with key stakeholders.

*Example non-financial benefit analysis methods and outputs are included in Section 5.4 (Non-financial Outcomes) of APPENDIX 2.*

3.3.4 Value network mapping

3.3.4.1 Material flow mapping

We will refine and validate the flow of key materials mapped out in the ‘Big Picture analysis’ based on Case Organisation input and, where relevant, input from other stakeholders in the value chain/network. This will likely be an iterative process as we conduct the value flow mapping in parallel (below).

An important requirements will be to obtain detailed information on the material content of products sold. If the Case Organisation manufactures the product, this should be readily available through a Bill of Materials (BoM). Some products may be very complex, in which case the material flow mapping should prioritise:
- Materials that make up most of the product cost and/or weight
- Critical/rare materials
It is important to have a clear definition of the system boundary within which the material flow mapping will be conducted. This should be determined based on what is relevant for the case study business model assessment, and identify aspects of material flow falling outside of this boundary. System boundaries may be defined as geographic, industrial, or environmental ecosystems.

3.3.4.2 Value flow mapping

Based on the material flow map, we will build up a comprehensive map of key categories/types partners and players participating in the Case Organisation’s value network. This will include organisations which play a role in:
- Production/manufacturing
- Transportation
- Services
- Reverse logistics/flow of product
- Materials/waste management or processing
- Brokerage and trade of product or materials (primary/virgin and secondary/recycled)
- Customers
- End-users

Note that an organisation’s value network can be extremely complex. We therefore will not map out specific organisations, but rather the main types of organisation participating in this network. To the extent possible, we will then identify some individual organisations against the types of player. This will allow us to potentially involve them as stakeholders (e.g. through interviews).

Once key players in the value network have been mapped out, we will define the main types of ‘value exchange’ that occur. This concept is illustrated in the Partnership Canvas in APPENDIX 4, section 7.5.

3.3.5 Network-level value outcome quantification

In addition to the financial and non-financial outcomes identified within the business model assessment, we will seek to identify key areas benefits (or costs) arising across other areas of the value chain/network that occur from implementing circular economy business models.

This will be done mainly through qualitative analysis based on Case Organisation and stakeholder interviews as well as desk research. This will include environmental, social and economic perspectives.

3.4 Step 4 – Business Model Design Workshop

The business model design workshop will be planned to take place over one day, after completion of Step 3. The key steps and process are illustrated in Figure 9 below. This will be co-designed with the Case Organisation to maximise value.

Frameworks used for this workshop can be found in APPENDIX 4. These will be adapted as required, incorporating learnings from their use across multiple case studies.
Figure 9  Overall process and frameworks used for the Business Model Design workshop

1. Scene-setting and context
   - Why are we here? (Project Sponsor)
   - What are we going to do today? (R2Pi facilitator)

2. Understand ‘as-is’ business model
   - Map out current business model using post-it notes on Business Model Canvas

3. Business context
   - Map out key trends in the business environment using post-it notes on Context Map
   - Identify ones that are specifically relevant to circular economy

4. As-is business model SWOT analysis
   - Assess and prioritise strengths, weaknesses, opportunities and threats
   - Brainstorm and discussion

5. Vision and ambition – where do you want to go?
   - Based on previous steps: what is our vision and winning ambition?

6. Generate options for future business model evolution
   - ‘Rapid prototyping’ of new business model options
   - Selection of 1-2 promising options
   - If multiple groups: pitch ideas to each other
4 APPENDIX 1: Business context – Data gathering and analysis method

4.1 Business context check-list

The table below lists the main dimensions and factors that potentially affect Circular Economy Business Models. In some way the list of factors may indicate the readiness of the country and sector for Circular Economy. The objective is that the case study team scans the country and sector following the check-list in order to understand the overall business context.

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>FACTORS</th>
<th>EXAMPLES / DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political and legal factors</td>
<td>Overarching framework</td>
<td>Existence of CE roadmap / initiative at the national level</td>
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<tr>
<td></td>
<td></td>
<td>Setting of national end-goals and monitoring (CO2, noise, movements)</td>
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<tr>
<td></td>
<td>Legal issues</td>
<td>Legality of activities, intellectual property rights, warranties, contracts</td>
</tr>
<tr>
<td>Economic and market factors</td>
<td>Environmental &amp; industrial regulation</td>
<td>Resource efficiency targets, requirements of reusing percentage of components and raw materials in new products</td>
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<tr>
<td></td>
<td></td>
<td>Waste regulation, recycling regulation, water regulation, energy regulation and choice restriction</td>
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<td>Effect-based control regulation</td>
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<td>End of life regulations</td>
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<td></td>
<td>Mandatory take-backs</td>
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<td></td>
<td></td>
<td>Extended Producer Responsibility</td>
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<td></td>
<td></td>
<td>Material and design standards (national and across industries)</td>
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<tr>
<td></td>
<td>Tax policies</td>
<td>Fiscal measures (green taxes): land-value taxes, value-extracted tax, product levy and recovery rewards</td>
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<td>Resource taxes (add quantum, ad valorem)</td>
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<tr>
<td></td>
<td></td>
<td>Differentiated VAT rates (e.g. products with high recycled content included among VAT reduced goods)</td>
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<td></td>
<td>Public procurement</td>
<td>Green public procurement</td>
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<td></td>
<td></td>
<td>Performance procurement (services instead of ownership)</td>
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<td></td>
<td>Green industries</td>
<td>Existence of a critical mass of businesses, cluster, in CE-related activities</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>Existence of critical mass of workers in CE-related activities (green industries, engineering and science-related jobs)</td>
</tr>
<tr>
<td></td>
<td>Sectoral economic trends</td>
<td>General economic “health” of incumbent companies in a sector (crisis, decline, stability, growth)</td>
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<tr>
<td></td>
<td></td>
<td>CE and environmental trends among existent and new players in the sector</td>
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<tr>
<td>Technological and system innovation factors</td>
<td>Existence of companies with CSR reports and other voluntary measures in the sector</td>
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<tr>
<td>------------------------------------------</td>
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</tr>
<tr>
<td>Market geography</td>
<td>Existence of relevant circular economy / environmentally oriented market segment in the region / country</td>
<td></td>
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<tr>
<td>Infrastructure</td>
<td>Regional infrastructure for recycling and recovery</td>
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<td></td>
<td>IT-enabled transparency and information sharing; joint collection systems; match-maker mechanisms</td>
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<td></td>
<td>Extensive raw materials information service</td>
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<tr>
<td>Resource prices</td>
<td>Sectoral stress regarding price volatility of primary and secondary raw materials, water, energy</td>
<td></td>
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<tr>
<td>Technology trends</td>
<td>Major technological trends in the sector; new sectoral developments</td>
<td></td>
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<tr>
<td>R&amp;D infrastructure</td>
<td>R&amp;D centres: strengths in CE (innovation agency, university research groups)</td>
<td></td>
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<td></td>
<td>Business parks, clusters of SMEs</td>
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<tr>
<td>R&amp;D funding</td>
<td>Public support for CE-related R&amp;D and innovation (new materials, new products/services, supply chain resource tracking)</td>
<td></td>
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<tr>
<td></td>
<td>Venture and risk capital for environment-related investment and green tech (seeds and start-ups)</td>
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<tr>
<td></td>
<td>Demonstration and commercialisation support for Circular Economy (eco-design, eco-innovation)</td>
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<td></td>
<td>Green lending programmes from banks</td>
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<tr>
<td>Higher education, professional training</td>
<td>Masters and PhD programs dealing with CE, environment and resource use</td>
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<tr>
<td></td>
<td>Training courses oriented towards CE</td>
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<tr>
<td>Urban / rural population</td>
<td>General patterns of population distribution</td>
<td></td>
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<tr>
<td>Age patterns</td>
<td>Ratio of young vs old population</td>
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<tr>
<td>Environmental values and attitudes</td>
<td>Attitudes towards waste and recycling</td>
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<td></td>
<td>Attitudes towards eco-friendly production and consumption</td>
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<td></td>
<td>Attitudes towards water use</td>
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<tr>
<td></td>
<td>Public awareness of environmental problems</td>
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<tr>
<td></td>
<td>Perception of green brands by consumers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perception of environmental problems by businesses</td>
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</tbody>
</table>

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378.
4.2 Interview guide

<table>
<thead>
<tr>
<th>Introduce self</th>
<th>Date/time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permission to record</td>
<td>Setting</td>
</tr>
<tr>
<td>Purpose of study</td>
<td>Respondent</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
</tr>
</tbody>
</table>

GUIDELINES FOR INTERVIEWERS

The objective is to get insights into how much of an enabler or barrier different external factors have been for the studied CEBM. After conducting desk research, you will be able to identify the key factors that might affect the business model. Below you can find a guide with the main aspects that need to be included in a fine-tuned questionnaire adapted to the case study. Depending on the specific case study some questions might be dispensable and some others would be included.

Below you will find the main themes to ask about, some explanation to help you to fine-tune your questionnaire, as well as an example of questions for the specific case of a company focused on managing electrical and electronic waste and remanufacturing electronic equipment.

The questionnaire is designed for a qualitative interview; answers to each of the questions may lead to follow-up questions, which bring up the most important insights.

Political and legal factors

- **How has your company been affected by specific environmental & industrial regulation?**
  
  *Existence of specific standards, obligations, bans, etc. that affect the organisation.*
  
  - To what extent has Waste Electrical and Electronic Equipment (WEEE) regulation been a driver / barrier for your circular business model?
  
  - To what extent has regulation of waste transportation in your country been a driver / barrier for your circular business model?
  
  - To what extent has the Extended Producer Liability that applies to WEEE been a driver / barrier for your circular business model?

- **How has your company dealt with legal aspects?**
  
  *This question refers to complex administrative or legal procedures affecting both the construction of specific infrastructure (e.g. requirements to set up treatment plants) and products management (e.g. warranties, waste management, etc.).*

  - How difficult / easy has been for implementing your circular business model to comply with the Law on the sale of consumer goods and associated guarantees?

- **How property rights affect your business model?**
  
  *In circular activities such as repairing and remanufacturing, the use of components that are protected with regards to industrial property, patents, brands,... might hinder the implementation of CEBM*

  - To what extent is your circular business model affected by property rights of computers’ components?
• How the tax system affects your business? Are there eco-taxes affecting the market?
  Depending on the activity, the taxing of resources (renewable / non-renewable) may be a
driver / barrier to CEBM. For instance, if the company is labour-intensive, it might be
benefited by a low labour taxation.
  In second-hand markets, lower taxes could promote them while standard add-valorem taxes
and taxes on property transfer could prevent its realization.
  In some specific markets eco-taxes (on energy, waste management, resources...) may affect
the organisation.
  o How the tax system affects your business?
  o How eco-taxes on waste management affect your circular business model?

• Has your company benefited from green public procurement? To what extent is / has it
been important for the business?
To what extent the existence of public demand with environmental criteria is important to
the business model.
  o Has your company benefited from green public procurement of computers and
monitors?
  o How important is / has it been for the implementation of your circular business
model?

Economic and market factors

• How have general macroeconomic trends affected the uptake of your business?
  General economic “health” of incumbent companies in a sector (crisis, decline, stability,
growth)
  o Has the circular business model been favoured by a scenario of crisis? (e.g. second-
hand markets)

• To what extent has your business model been influenced by trends among your
competitors regarding Circular Economy?
  Existence of innovative initiatives in Circular Economy (CE)-related activities that are getting
momentum in the market (car sharing, collaborative networks, second-hand stores, repairing
cafes...)
  o Is your company aware of CE-related activities among competitors?
  o Is your company aware of CE-related initiatives in the market?
  o How are CE trends in your sector affecting your circular business model?

• How international competence in your sector affects your business model?
  Differences in environmental requirements across markets and other aspects linked to
International Trade Agreements may influence circular economy activities. For instance, in a
scenario of trade liberalisation products with low environmental performance requirements
may take advantage over national products. Market protection for specific products may
also influence the success of specific business models

• How important is the existence of inter-firm relations within your country (region) for your
business?
  Existence of a critical mass of businesses, cluster..., in CE-related activities
  Existence of a local / regional network of interrelated industry and services companies that is
necessary to implement the business model
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378

- Has the existence of (local) stakeholders (providers, partners...) in your region been important to implement your circular business model?

**Market geography**

Existence of an important local / regional market segment for CE products / services
- Has the existence of (local) customers in your region been important to implement your circular business model?

**How has the (local / regional) physical infrastructure affected your business?**
Regional infrastructure for recycling and recovery; IT-enabled transparency and information sharing; joint collection systems; match-maker mechanisms
Extensive raw materials information service
To what extent the physical infrastructure hinders / supports the business model, e.g. existence of take-back systems (collecting points and logistics) may favour remanufacturing and recycling activities (and vice versa)
- Has your circular business model benefited from regional infrastructure for recycling and recovery of WEEE?
- Has your circular business model benefited from the existence of IT-systems for information sharing with regards to WEEE?

**How have resource prices influenced your sector and business?**
Sectoral stress regarding price volatility of primary and secondary raw materials, water, energy
Low resource prices may hinder the search for substitutes (and vice versa)
- To what extent is your circular business model influenced by the price of metallic resources?

**Technology and the innovation system**

- How have major technology trends influenced your business model?
  - Major technology trends in the market
  - Emerging technologies that are being adopted by peripheral customers
  - How advances in IT affect your circular business model?
  - How ongoing innovation in the computer and electronics sector affects your circular business model?

- How is your business related to the existent R&D infrastructure?
  - The objective is to know whether the existence of local / regional research centres and universities with a focus on CE-related activities have been important for the CEBM
  - How has the existent R&D infrastructure influenced your circular business model?
  - Has it played an important role for your circular business development?
  - Are there strengths in local universities / research centres in CE activities (chemical processes, materials, engineering, etc.)?
  - To what extent has your circular business model benefited from partnerships with local universities and professional training centres?
  - Do you belong to a business park or to a cluster?
  - To what extent the integration in a network of interrelated business has benefited your circular business model?
Has your business benefited from R&D funding and investments? How important have they been?
The objective is to know how easy / difficult is for the company to access R&D&i funding and the importance for business development
Availability of seed capital, venture capital, public funding, market capital or credit in the market and specific green loans may support CEBM
- Has your business had access to (environmental) public R&D funding?
- How difficult / easy has it been to access (green) R&D funding?
- Has your circular business model received any eco-innovation award / subsidy?
- How easy / difficult has it been to get funding for your circular business model?
- Are there green funds from local / regional entities? Have your company had access to them?
- How costly has funding been for your circular business model?

How easy (difficult) has been for your business to find adequate educated & trained employees?
The objective is to know whether the availability of a critical mass of workers in CE-related activities (green industries, engineering and science-related jobs) has benefited the business model. This may also include Masters and PhD programs dealing with CE activities, environment and resource use, as well as training courses oriented towards resource efficiency and CE activities
- How has the existence (lack of) skilled and highly educated employees in IT and recycling in the region influenced your circular business model?
- Does your business offer internships to students? What is the benefit for the circular business model?

Sociocultural factors

How have general demographic trends (growth and ageing) affected your business?
For specific business models, some demographic trends may enable some business models (e.g. second hand, recycled products, sharing)
- Has your circular business model been influenced by the high rate of ageing population in the country?

How has the rural / urban distribution of population affected your business?
Some business models may make sense in urban contexts (e.g. car sharing) and not in rural ones
- Has your circular business model been influenced by the high degree of rurality of the country?

To what extent have general awareness and environmentally-friendliness in the society (industry and market) influenced your business?
General attitudes towards waste and recycling; eco-friendly production and consumption; water use; public awareness of environmental problems; perception of green brands by consumers; perception of environmental problems by businesses; pressure from environmental groups
- To what extent is your circular business model influenced by (lack of) awareness of environmental problems in the society (other businesses, consumers)?
5 APPENDIX 2: Business Model Assessment

5.1 Business model mapping

The questions below apply to the process undertaken under the ‘Big Picture analysis’ which will be refined as required through detailed discussions with the Case Organisation.

5.1.1 Customers and value proposition

Customer Segments:

- **Who are the customers for which value is being created?**
  This may be a single segment, or multiple segments. A distinct customer segment has common needs that require and justify a distinct offer. The focus for the case study is on the most important customer segment(s) which are relevant from a circular economy perspective.
  
  **Note:**
  - Customer segments can be further distinguished if they require significantly different distribution channels or types of relationships; are willing to pay for different aspects of an offer; or have significantly different ‘costs to serve’ and profitability. This can be re-assessed once the other business model elements are described.
  - Companies which have control over recovery of products or materials at end-of-life may have customers relating to this CEBM pattern (e.g. scrap / materials management)
  - For organisations implementing co-product recovery CEBM patterns, customers will include downstream organisations purchasing or receiving these material streams.

Value Proposition:

- **What is the product/service bundle offered to the focus customer segments?**

- **What is the value delivered to the customer?**
  This can for example describe: customer problems being solved; and customer needs being satisfied.

- **How does the value proposition incorporate elements of circular economy?**
  For example: Design for circularity; circular sourcing.

- **How do these elements of circular economy drive or enhance value created to customers?**
  For example: Lower cost of ownership; convenience; cost/risk avoidance; reputational or brand value; reliability; etc. (Note: some of these may be hypotheses and should be identified as such, to be validated through stakeholder interviews).
5.1.2 Customer Interface

Channels:

- **Through what channels are customers reached?**
  
  *Channel types include: Direct (e.g. sales force, web) vs. indirect (stores; wholesalers); and own vs. partner (e.g. franchise).*
  
  *Describe whether these differ for different customer segments and/or value propositions.*

- **What are the ‘reverse’ channels for product take-back or end-of-life product/material recovery? (If relevant)**

Customer Relationship:

- **What are the types of customer relationship used to serve each of the customer segments?**
  
  *Examples include: self-service; automated; personalised; communities; co-creation.*

5.1.3 Operating Model

Key Resources:

- **What are the key resources required for delivering the value proposition; operating channels; maintaining customer relationships; and capturing revenue streams?**
  
  *Example resources include: Physical assets; Knowledge/IP; skills; financial; technological. These may be owned by the Case Organisation; provided/purchased from partners; or external infrastructure.*

- **What are the key resources required for enabling circular economy within the business model?**
  
  *These may be owned by the Case Organisation; provided/purchased from partners; or external infrastructure.*

Key Activities:

- **What are the key activities required for delivering the value proposition; operating channels; maintaining customer relationships; and capturing revenue streams?**
  
  *Example activities include: Production; providing value added services; operating platforms or networks (e.g. for sharing/rental).*

- **What additional activities are required to enable circular economy within the business model?**
  
  *Additional activities specifically relevant to circular economy may include: Design; sourcing/procurement; waste/recovered material processing; etc.*

Key Partners:

- **Who are the key partners and suppliers who provide key assets and/or enable key activities to be performance? (Including those that relate to the implementation of circular economy elements).**
5.1.4 Revenues/Costs

Revenue Streams

- For what value are customers paying? How are they paying?
  For example: Product sale; service fee; pay-per-use; subscription; etc.

Cost structure

- What are the most important costs inherent to the business model?
  These will relate to Key Resources; Key Assets; and Key Partners.
  Where possible:
    - Describe which costs are variable or fixed.
    - Characterise whether the business model is 'high-cost' (e.g. because it is capital or labour-intensive) or 'low cost' (e.g. because they require less assets or inputs to operate).
    - Identify whether the business model benefits from economies of scale or scope.

- How do circular economy elements have an impact costs?
  For example: The price of recycled/renewable material inputs may be lower (or not) compared to virgin materials; remanufacturing operations may be more labour-intensive than regular/automated manufacturing.
5.2 Business model circularity and strengths/weaknesses assessment

Figure 10 below contains a set of questions which will be covered with the Case Organisation to assess the circularity of their business model. Figure 11 following this maps each question against the seven CEBM patterns and the Business Model Canvas elements (building blocks). This indicates which areas of the business model to focus on in deep-dive discussions which will explore opportunities/threats and enablers/barriers.

Figure 12 shows the questions which will be used to assess business model strengths and weaknesses in the context of the value proposition(s)/business model(s) which are the focus of the case study.

The way in which the questionnaires will be used to identify key areas of analysis is illustrated below.
<table>
<thead>
<tr>
<th>Tending toward circular</th>
<th>5 = Strongly agree</th>
<th>1 = Strongly disagree</th>
<th>Tending towards linear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 We have fully assessed the identity of all materials used within our product (composition of all parts, toxicity, etc.)</td>
<td></td>
<td>We do not understand the identity of materials used in our product (compounds, toxicity, etc.)</td>
<td></td>
</tr>
<tr>
<td>2 We maximise use of recycled materials in our product</td>
<td></td>
<td>We do not seek to use recycled materials in our product</td>
<td></td>
</tr>
<tr>
<td>3 We maximise the use of third party co-product or waste streams as an input to our own production</td>
<td></td>
<td>We do not seek to use third party co-product or waste streams as an input to our own production</td>
<td></td>
</tr>
<tr>
<td>4 We maximise the use of remanufactured, refurbished, or repaired parts and components within our products</td>
<td></td>
<td>We do not seek to use remanufactured, refurbished, or repaired parts and components within our products</td>
<td></td>
</tr>
<tr>
<td>5 We maximise use of rapidly renewable materials in our product</td>
<td></td>
<td>We do not seek to use rapidly renewable materials in our product</td>
<td></td>
</tr>
<tr>
<td>6 We maximise use of compostable/biodegradable materials in our product</td>
<td></td>
<td>We do not seek to use compostable/biodegradable materials in our product</td>
<td></td>
</tr>
<tr>
<td>7 We only use materials in our products that are proven to be technically and economically recyclable (e.g. non-toxic, separable into material streams, etc.)</td>
<td></td>
<td>We do not consider the ‘recyclability’ of materials used in our products</td>
<td></td>
</tr>
<tr>
<td>8 Product is designed for durability</td>
<td>Planned obsolescence is built into product design</td>
<td>Product technical lifetime is below industry average</td>
<td></td>
</tr>
<tr>
<td>9 Product technical lifetime is above industry average</td>
<td>Product technical lifetime is above industry average</td>
<td>Product functional lifetime is below industry average</td>
<td></td>
</tr>
<tr>
<td>10 Product functional lifetime is above industry average</td>
<td></td>
<td>Product warranty period is below industry average</td>
<td></td>
</tr>
<tr>
<td>11 Product warranty period is above industry average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Product is designed to be economically disassembled/deconstructed in order to recover and reuse component materials</td>
<td>Product is not designed to be economically disassembled/deconstructed in order to recover and reuse component materials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Product designed to be economically repairable by user or third party</td>
<td>Product is not designed to be repairable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Repair service network and spare parts are actively established in the market</td>
<td>Repair services and availability of spare parts are not actively established</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Product designed to be upgradeable, adapting to changing customer needs (e.g. by being modular, via software upgrades, etc.)</td>
<td>Product designed to be upgraded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Product is designed to be economically re-manufactured</td>
<td>Re-manufacturing is not taken into account in product design</td>
<td></td>
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</tr>
<tr>
<td>17 Re-manufacturing services actively established in market (own or third party)</td>
<td>Re-manufacturing services not actively established in market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Revenue driven mainly by monetising usage and/or performance of asset</td>
<td>Revenue driven mainly by asset sale</td>
<td></td>
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</tr>
<tr>
<td>19 Value exchange focuses on customer lifetime benefit (including reducing/controlling cost of ownership, asset performance)</td>
<td>Value exchange mainly focused on driving a product sale transaction (e.g. competitive price)</td>
<td></td>
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</tr>
<tr>
<td>20 Value proposition is positioned as a service (including product/service bundle)</td>
<td>Value proposition focuses on the product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Value proposition includes bundled maintenance or other value-added services</td>
<td>Value proposition does not include maintenance or other value-added services</td>
<td></td>
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<tr>
<td>22 We maximise the reuse of co-products or waste streams from our operations, putting them back into our production</td>
<td>We do not seek to reuse co-products or waste streams from our operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 We maximise the reuse of co-products or waste streams from our operations by supplying them to third parties as an input into their production (e.g. through direct or indirect supply relationships)</td>
<td>We do not seek to reuse co-products or waste streams from our operations as an input to third party production (e.g. through direct or indirect supply relationships)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 We have in place a take-back or recovery scheme that fully covers all our products at end-of-life (own or via a third party, e.g. EPR arrangement)</td>
<td>We do not have in place a take-back or recovery scheme for our products at end-of-life (own or via a third party)</td>
<td></td>
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</tr>
<tr>
<td>25 We have in place a take-back or recovery scheme that fully covers all components from our products at end-of-life (own or via a third party)</td>
<td>We do not have in place a take-back or recovery scheme for components in our products at end-of-life (own or via a third party)</td>
<td></td>
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<tr>
<td>26 We have in place recycling arrangements for materials within our product at end-of-life</td>
<td>We do not have in place recycling arrangements for materials within our products at end-of-life</td>
<td></td>
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<tr>
<td>27 We provide incentives to return our product at end-of-life (e.g. deposit, exchange, cash)</td>
<td>We do not provide incentives to return our product at end-of-life</td>
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<tr>
<td>28 We have full visibility on the actual effectiveness of our product take-back at end-of-life</td>
<td>We have no visibility on the actual effectiveness of our product take-back at end-of-life</td>
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<tr>
<td>29 We have full visibility on the destination of our products taken back at end-of-life</td>
<td>We have no visibility on the destination of our products taken back at end-of-life</td>
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<tr>
<td>30 We have full visibility on the actual effectiveness of material recycling from our products recovered at end-of-life</td>
<td>We have no visibility on the actual effectiveness of material recycling from our products recovered at end-of-life</td>
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<tr>
<td>31 We have full visibility on the destination of materials recycled from our products at end-of-life</td>
<td>We have no visibility on the destination of materials recycled from our products at end-of-life</td>
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</table>
Figure 11 Mapping of circularity assessment questions against CEBM patterns and key Business Model Canvas elements

<table>
<thead>
<tr>
<th>Question #</th>
<th>Circular Economy Business Model Pattern</th>
<th>Operating model</th>
<th>Customer interface</th>
<th>Financial</th>
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<td></td>
<td>Circular sourcing</td>
<td>Key Partners</td>
<td>Key Activities</td>
<td>Key Resource</td>
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<td>1</td>
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</table>

- **Priority business model element**
- **Other relevant business model element**

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378
<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Our value proposition fulfils all significant needs of target customer segments</td>
<td>5 = Strongly agree</td>
<td>Our value proposition leaves significant customer segments’ needs unmet</td>
</tr>
<tr>
<td>2 Customer satisfaction is high</td>
<td>4 = Agree</td>
<td>Customer satisfaction is low</td>
</tr>
<tr>
<td>3 Our value proposition has strong network effects</td>
<td>3 = Moderate</td>
<td>Our value proposition has no network effects</td>
</tr>
<tr>
<td>4 Our charging and pricing models effectively meet customer needs and expectations</td>
<td>2 = Disagree</td>
<td>Our charging and pricing models don’t meet customer needs and expectations</td>
</tr>
<tr>
<td>5 We fully capture ‘sustainability value’ created for customers</td>
<td>1 = Strongly disagree</td>
<td>We do not capture ‘sustainability value’ created for customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost/Revenue</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Our cost structure is asset-heavy and costs are mainly fixed</td>
<td>5 = Strongly agree</td>
<td>Our costs are unpredictable</td>
</tr>
<tr>
<td>7 Our revenues are predictable</td>
<td>4 = Agree</td>
<td>Our revenues are unpredictable</td>
</tr>
<tr>
<td>8 Each sale requires additional effort</td>
<td>3 = Moderate</td>
<td>Each sale requires additional effort</td>
</tr>
<tr>
<td>9 We earn revenue before incurring costs of goods/services sold</td>
<td>2 = Disagree</td>
<td>We earn no revenue before incurring costs of goods/services sold</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Margins</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Our margins are high compared with competitors</td>
<td>5 = Strongly agree</td>
<td>Our margins are low compared with competitors</td>
</tr>
<tr>
<td>11 Our margins are low compared with competitors</td>
<td>4 = Agree</td>
<td>Our margins are high compared with competitors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Our key activities are hard to copy by competitors</td>
<td>5 = Strongly agree</td>
<td>Our key activities are easily copied by competitors</td>
</tr>
<tr>
<td>13 Our key activities need significant investment in order to scale with growth</td>
<td>4 = Agree</td>
<td>Our key activities are not hard to copy by competitors</td>
</tr>
<tr>
<td>14 Our key activities match the core competencies we need</td>
<td>3 = Moderate</td>
<td>Our key activities do not need significant investment in order to scale with growth</td>
</tr>
<tr>
<td>15 Our key activities match the core competencies we need</td>
<td>2 = Disagree</td>
<td>Our key activities do not match the core competencies we need</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Resources</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 Our key resources fully support circular economy within our business model</td>
<td>5 = Strongly agree</td>
<td>Our key resources do not fully support circular economy within our business model</td>
</tr>
<tr>
<td>17 Our key resources are not hard to build or acquire by competitors</td>
<td>4 = Agree</td>
<td>Our key resources are hard to build or acquire by competitors</td>
</tr>
<tr>
<td>18 Our key resources are not hard to build or acquire by competitors</td>
<td>3 = Moderate</td>
<td>Our key resources can be easily built or acquired by competitors</td>
</tr>
<tr>
<td>19 Our key resources are not hard to build or acquire by competitors</td>
<td>2 = Disagree</td>
<td>Our key resources are not hard to build or acquire by competitors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Our key partners provide us with exclusive competitive advantage</td>
<td>5 = Strongly agree</td>
<td>Our key partners do not provide us with exclusive competitive advantage</td>
</tr>
<tr>
<td>21 Our key partners are not exclusive or competitive</td>
<td>4 = Agree</td>
<td>Our key partners do provide us with exclusive competitive advantage</td>
</tr>
<tr>
<td>22 Our key partners are not exclusive or competitive</td>
<td>3 = Moderate</td>
<td>Our key partners can be easily acquired or negotiated with</td>
</tr>
<tr>
<td>23 Our key partners are not exclusive or competitive</td>
<td>2 = Disagree</td>
<td>Our key partners are exclusive or competitive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Activities</th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>24 Our key activities fully support circular economy within our business model</td>
<td>5 = Strongly agree</td>
<td>Our key activities do not fully support circular economy within our business model</td>
</tr>
<tr>
<td>25 Our key activities match the core competencies we need</td>
<td>4 = Agree</td>
<td>Our key activities do not match the core competencies we need</td>
</tr>
<tr>
<td>26 Our key activities match the core competencies we need</td>
<td>3 = Moderate</td>
<td>Our key activities do not match the core competencies we need</td>
</tr>
<tr>
<td>27 Our key activities match the core competencies we need</td>
<td>2 = Disagree</td>
<td>Our key activities do not match the core competencies we need</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Interface</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 Customer loyalty is high</td>
<td>5 = Strongly agree</td>
<td>Customer loyalty is low</td>
</tr>
<tr>
<td>29 Customer churn is low (customer retention is high)</td>
<td>4 = Agree</td>
<td>Customer churn is high (customer retention is low)</td>
</tr>
<tr>
<td>30 New customer acquisition rate is high</td>
<td>3 = Moderate</td>
<td>New customer acquisition rate is low</td>
</tr>
<tr>
<td>31 Our market share is growing</td>
<td>2 = Disagree</td>
<td>Our market share is shrinking</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Segments</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 Our customer churn is low (customer retention is high)</td>
<td>5 = Strongly agree</td>
<td>Customer churn is high (customer retention is low)</td>
</tr>
<tr>
<td>33 New customer acquisition rate is high</td>
<td>4 = Agree</td>
<td>New customer acquisition rate is low</td>
</tr>
<tr>
<td>34 Our customer churn is growing</td>
<td>3 = Moderate</td>
<td>Our customer churn is shrinking</td>
</tr>
<tr>
<td>35 Our customer churn is low (customer retention is high)</td>
<td>2 = Disagree</td>
<td>Our customer churn is high (customer retention is low)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Channels</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 Our customer relationships are strong</td>
<td>5 = Strongly agree</td>
<td>Our customer relationships are weak</td>
</tr>
<tr>
<td>37 Our customer relationships are well aligned to target customer segments</td>
<td>4 = Agree</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
<tr>
<td>38 Our customer relationships are well aligned to target customer segments</td>
<td>3 = Moderate</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
<tr>
<td>39 Our customer relationships are well aligned to target customer segments</td>
<td>2 = Disagree</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Relationships</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Our customer relationships are strong</td>
<td>5 = Strongly agree</td>
<td>Our customer relationships are weak</td>
</tr>
<tr>
<td>41 Our customer relationships are well aligned to target customer segments</td>
<td>4 = Agree</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
<tr>
<td>42 Our customer relationships are well aligned to target customer segments</td>
<td>3 = Moderate</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
<tr>
<td>43 Our customer relationships are well aligned to target customer segments</td>
<td>2 = Disagree</td>
<td>Our customer relationships are not well aligned to target customer segments</td>
</tr>
</tbody>
</table>
5.3 Financial outcomes

The financial outcomes of circular economy business models can be assessed in a number of ways. This section illustrates these based on a number of examples and approaches used by other parties.

5.3.1 Profitability Impact of Circular Initiatives

*The content below is sourced from: Circularity Indicators – An Approach to Measuring Circularity (Ellen MacArthur Foundation).*

Businesses can capture significant economic benefits from circular economy principles: materials and energy cost savings, new markets and sources of revenue, and a greater resilience to external shocks. A number of companies are already leveraging these opportunities across sectors. How profitable a circular initiative is will depend on a number of factors.

This section aims to provide guidance to help estimating the profitability of circular economy initiatives in the technical cycle.

5.3.1.1 Four key strategies

5.3.1.1.1 Resale and Use Period Extension

*Reselling a product in its entirety or extending its use period* is the strategy that preserves most of its integrity and complexity. This is therefore the approach that can give rise to the greatest economic benefits compared to a linear model. In most cases, the increase in profitability will come from *capturing new markets*, for example, by offering a more cost effective option for a high-performing product. In some models (e.g. if product quality and price point only change marginally), it may also be interpreted as a cost reduction instead.

Activities such as *repair and maintenance* help to achieve the product’s best performance for as long as possible, and when these are offered as services, they can translate into *new revenue streams*. Tweaks or more radical changes in product design can further optimise the benefits by helping extending a product’s lifetime.

5.3.1.1.2 Refurbishment and Remanufacturing

*Refurbishment* refers to returning a product to good working condition by replacing or repairing major components that are faulty and can also include making ‘cosmetic’ changes to update the appearance of a product. *Remanufacturing* restores at a component level: reusable parts are taken out of a used product, potentially repaired and rebuilt into a new one. This process usually includes quality assurance and products can be sold ‘as-new’. Both of these approaches retain major parts of the integrity and complexity of a product, and therefore can also enable *savings in materials and energy costs*. Rethinking product designs is especially important for these strategies and is sometimes needed to create a positive business potential.

Similar to resale, revenue opportunities can also be captured by exploring *new revenue streams* or increasing *market share*. Performance models can be especially interesting for a company to retain ownership of the product and therefore facilitate its recovery while offering options for different pricing and service models to customers.
5.3.1.3 Recycling

If there is no possibility for reuse, refurbishment or remanufacture, the materials in a product can still be recycled. While in this case all the integrity and complexity of the product is lost, the value of the materials contained in the product can be preserved. A company might decide to sell the recyclable parts of a product to a third party treatment plant or reuse the recycled materials for its own production. In the first case, the company creates a new revenue source, while in the second case, it captures materials cost savings but it also secures a safe supply of materials. Improvement in design can greatly improve the profitability of the model, for example by enabling easier disassembly or using pure and easy-to-recycle materials. This can help to optimise the revenue or saving costs depending on the case.

5.3.1.4 Service and Performance Models

Service and performance models allow companies to preserve ownership of their products and facilitate their after-use recovery. They include models such as rentals (e.g. clothing rental model), pay-per-use (e.g. a pay-per-wash model for a washing machine) or a service offering including the maintenance, repair and upgrade of the product. These can be combined with the other strategies mentioned above and can help to facilitate the collection of the products while creating new sources of revenues (e.g. by combining the model with a service offering) and capturing larger market share (e.g. by making a product available at a low initial investment).

5.3.1.2 Revenue and Cost Drivers

The two tables below synthesise the key drivers of revenue (in the first table) and costs (in the second table) across the different strategies. The first column of each table gives the new revenue or cost saving while the second column details possible drivers of revenue reduction or new costs, respectively. The last column suggests approaches by which a company can optimise the profitability of the model.
### 5.3.1.2.1 Impact on Revenues

<table>
<thead>
<tr>
<th>Potential drivers of revenue increase</th>
<th>Potential drivers of revenue decrease</th>
<th>Approaches to consider to optimise profitability</th>
</tr>
</thead>
</table>
| Capturing new revenue streams        | • Moving to service models can help companies to capture new revenue streams, for example, by starting a leasing solution or offering complementary services.  
• New revenue streams can also be achieved through the sales of end-of-use products or by-products to third parties (e.g. a recycling plant). In some cases, improvement in designs can help to improve the relationships with the third parties or to land a better contract. | |
| Capturing new markets or a greater market share | • Through circular economy principles, companies can improve the attractiveness of their products by offering cheaper, more convenient or higher quality solutions. The right pricing will help to reach the right segments and maximise total revenue.  
• In the case of industries with a grey market capturing value from the company’s products, there is an opportunity of expanding market share while keeping better control of the use of the company’s brand. | |
| Cannibalising existing sales         | • When offering new product lines, companies need to mitigate the risk of cannibalisation (i.e. the loss of existing sales). Targeted marketing can also be helpful here. | |
5.3.1.2.2 Impact on Costs

<table>
<thead>
<tr>
<th>Potential drivers of cost decrease</th>
<th>Potential additional costs</th>
<th>Approaches to consider to optimise profitability</th>
</tr>
</thead>
</table>
| Reducing the costs of production by preserving embedded energy, materials and labour |                           | • Inner circle approaches, such as reuse or refurbishment, preserve more of the integrity and complexity of products, which can be seen as their embedded energy, materials and labour. These approaches therefore enable greater cost savings.  
 • More durable products also make better use of embedded materials, energy and labour. The planned product lifetime should also take into account the intended use. For example, the design of a high tech product should take into account that technologies will evolve in the coming years. |
| Costs of collection and reverse logistics (in particular labour and transportation) |                           | • Most circular approaches require some sort of product collection. Innovative business models, such as take-back schemes or performance models can facilitate the collection of products.  
 • In some cases, idle space can be leveraged in return trips from forward logistics (e.g. empty trucks returning from a delivery). This can significantly reduce logistics costs.  
 • Collaboration is often essential at this stage. |
| Costs of treatment (e.g. remanufacturing or recycling process) |                           | • Changes in design and treatment approaches help to reduce the costs of reverse treatment (e.g. design for disassembly). Already small tweaks requiring minimal investment and relying on existing technology can significantly improve the business case. |
| Potential other costs: initial design or R&D investment; marketing |                           |                                                 |
Cost Saving Driver Tree
Source: Ellen MacArthur Foundation. Towards the Circular Economy, Vol. 1

FIGURE 24 Driver tree: Factors affecting net material cost savings as a percentage of total input costs

Refurbishment/reuse
Net material cost savings per product
Material cost saved:
material cost of primary production
Material cost in refurbishment/reuse process
Remanufacturing
Net material cost savings per product
Material cost saved:
value of reused components
Material cost in remanufacturing process
Recycling
Net material cost savings per product
Material cost saved:
value of recycled materials
Material cost in recycling process

Net material cost savings in market p.a.
Weighted net material cost savings per product
Collected end-of-life products p.a.
Number of end-of-life products p.a.
Number of products put on market p.a.
Number of products in market p.a.

Key drivers in circular business practices

1 Rates as percentage of collected products, add up to 100%
SOURCE: Ellen MacArthur Foundation circular economy team
5.3.2 Example financial evaluations

5.3.2.1 Washing machines

Source: Ellen MacArthur Foundation. Towards the Circular Economy, Vol. 1

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**Figure 13** Washing machines: Leasing durable machines can be beneficial for both parties

- Customer's net present costs\(^1\) of washing machine usage over time\(^2\)
- USD per customer

- Purchase of low-end machines\(^3\)
- 5-year leasing model for high-end machine

- 26% - 38% customer cost savings through leasing schemes
- 35% increase in producer profits through leasing arrangements

**Figure 30** Washing machines: Economics of circular business activities

- USD per product\(^1\), status quo and transition scenario

<table>
<thead>
<tr>
<th>Recoverable Value</th>
<th>Refurbish</th>
<th>Recycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status quo</td>
<td>Transition</td>
</tr>
<tr>
<td>Treatment costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collection and transport</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Activity specific process (refurbishment or recycling)</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Other(^2)</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Material costs</td>
<td>297</td>
<td>161</td>
</tr>
<tr>
<td>Profit</td>
<td>93</td>
<td>228</td>
</tr>
<tr>
<td>Net material cost savings</td>
<td>140</td>
<td>275</td>
</tr>
</tbody>
</table>

1 Here, net present cost is the sum of a customer's discounted cash outflows for washing machine purchases over a specific time horizon (5, 10, and 20 years)
2 Applied 8% discount rate
3 Low-end washing machines with a lifetime of 2,000 cycles and cost around USD 540

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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378
5.3.2.2 Power Drill

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 730378.

Drill Driver Model - Calculation in US$

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Status Quo</th>
<th>Manufacturing</th>
<th>Recycling</th>
<th>Additional Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash-back cost</td>
<td>0</td>
<td>1,400</td>
<td>4,200</td>
<td>5,040</td>
</tr>
<tr>
<td>Material cost</td>
<td>13,000</td>
<td>10,660</td>
<td>4,836</td>
<td>5,980</td>
</tr>
<tr>
<td>Labour cost</td>
<td>9,674</td>
<td>9,064</td>
<td>9,940</td>
<td>12,045</td>
</tr>
<tr>
<td>Plant cost</td>
<td>9,718</td>
<td>8,479</td>
<td>6,710</td>
<td>8,757</td>
</tr>
<tr>
<td>Shipping cost</td>
<td>3,322</td>
<td>3,322</td>
<td>5,242</td>
<td>5,242</td>
</tr>
<tr>
<td>SG&amp;A cost</td>
<td>8,088</td>
<td>7,058</td>
<td>5,372</td>
<td>6,580</td>
</tr>
<tr>
<td>Total costs</td>
<td>45,812</td>
<td>40,013</td>
<td>36,300</td>
<td>43,043</td>
</tr>
<tr>
<td>Profits</td>
<td>26,258</td>
<td>27,257</td>
<td>30,970</td>
<td>38,239</td>
</tr>
</tbody>
</table>

Improved margins with different scenarios of circular business setup:

- **Base case**: 1,000 drills are made in China and sold in EU.
- **Manufacturing case**:
  - Drills are made in China and sold in EU
  - 20% of units will be refurbished in EU and sold in EU
  - Total number of units remains as with base case
- **Recycling case**:
  - Drills are made in China and sold in EU
  - 20% of units will be refurbished in EU
  - 70% of units will be collected and recycled, with components used in manufacturing
  - Total number of units remains as with base case
- **Additional sales case**:
  - Drills are made in China and sold in EU
  - 20% of units will be refurbished in EU
  - 70% of units will be collected and recycled, with components used in manufacturing
  - 20% units increase in sales due to new segments of customers for cheaper re-manufactured units

**Other assumptions**:

- Unit price for one new drill is USD 70, re-manufactured units sold at 80% of original price
- Cash cost back assumed at 10% and 5% of original price for good condition and poor condition sets
- Shipping included at current prices, labour plant and material cost based on expert SG&A 25%
5.3.2.3 Light Commercial Vehicles
Source: Ellen MacArthur Foundation. Towards the Circular Economy, Vol. 1

FIGURE 29 Light commercial vehicles: Economics of circular business activities

USD per product, status quo and transition scenario

<table>
<thead>
<tr>
<th>Recoverable value</th>
<th>Refurbish</th>
<th>Recycle</th>
<th>Recycle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status quo</td>
<td>Transition</td>
<td>Status quo</td>
</tr>
<tr>
<td>Treatment costs</td>
<td>13,796</td>
<td>13,796</td>
<td>1,174</td>
</tr>
<tr>
<td>Collection and transport</td>
<td>0</td>
<td>426</td>
<td>0</td>
</tr>
<tr>
<td>Buy-back</td>
<td>7,366</td>
<td>7,366</td>
<td>0</td>
</tr>
<tr>
<td>Screening</td>
<td>13</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Depollution</td>
<td>42</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>Activity specific process (refurbishment or recycling)</td>
<td>1,044</td>
<td>319&lt;sup&gt;1&lt;/sup&gt;</td>
<td>472</td>
</tr>
<tr>
<td>Other&lt;sup&gt;4&lt;/sup&gt;</td>
<td>2,070</td>
<td>2,070</td>
<td>0</td>
</tr>
<tr>
<td>Material costs</td>
<td>4,150</td>
<td>2,448</td>
<td>0</td>
</tr>
<tr>
<td>Profit</td>
<td>-889</td>
<td>1,167</td>
<td>648</td>
</tr>
<tr>
<td>Net material cost savings</td>
<td>18,613</td>
<td>20,316</td>
<td>1,174</td>
</tr>
</tbody>
</table>

Improvements in product design and reverse cycle skills
- 33% decrease in refurbishment time realised by
- Engine modularisation, wider design of engine bay (increased accessibility of connection points such as screws and plugs), usage of quick fasteners
- Process standardisation, workforce optimisation, and specialisation in dedicated refurbishing centers (would typically be located centrally within the OEM’s dealership and service network)
- 40% decrease in material cost for refurbishment as centrally located, OEM related refurbishing centers can source spare parts at reduced cost

1 Representative light commercial vehicle with an average lifetime of around 8 years in the EU (500-700 thousand kilometres)
2 Collection and transport costs only in transition state for refurbishment as this includes the transport to centralised refurbishment facilities
3 Includes costs for screening and depollution
4 Other includes S&G&A costs, which are driven by recoverable value

SOURCE: Georg Mehlhart et al., European second-hand car market analysis, Öko-Institut working paper, February 2011; Eurostat, ELV waste database, 2011; GHK, A study to examine the benefits of the End of Life Vehicles Directive and the costs and benefits of a revision of the 2015 targets for recycling, reuse and recovery under the ELV Directive, GHK report, May 2006; Ellen MacArthur Foundation circular economy team
5.3.2.4 Office chairs – BMA Ergonomics

Source: ING Economics Department – Rethinking finance in a circular economy

With the increasing focus of Case Organisations on sustainability and circular products, BMA is further developing its circular business model. BMA is incorporating the following aspects in a circular product offering:
1) Pay per use. The service ‘sitting’ or the use of the chairs.
2) Circle the chair. Chairs have to return to BMA after the Case Organisation’s use of them to enable re-using them.
3) Value for all. Customers should benefit in flexibility, high ergonomics and high quality chairs, BMA makes a good business while the impact on the environment is reduced.
5.3.2.5 Financial outcomes assessment – Generic Remanufacturing Example

Remanufacturing cost structure

<table>
<thead>
<tr>
<th>Price/cost</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labour + overhead</td>
</tr>
<tr>
<td></td>
<td>Materials + non-labour inputs</td>
</tr>
</tbody>
</table>

Remanufactured product

New product

40-60% lower cost than new product

Return deposit

Additional margin potential

Reman price flexibility
5.4 Non-financial outcomes
Non-financial benefits of circular economy business models can be assessed in a number of ways. This section illustrates these based on a number of examples and approaches used by other parties.

5.4.1 Complementary indicators
The content below is sourced from: Circularity Indicators – An Approach to Measuring Circularity (Ellen MacArthur Foundation).

Note: MCI = Material Circularity Index

Complementary indicators may be broadly categorised into:

- Complementary risk indicators that may provide further insights into potential risks in relation to business priorities
- Complementary impact indicators that may provide additional information to evaluate how changing the level of material circularity affects other impacts of interest to businesses and their stakeholders

5.4.1.1 Complementary Risk Indicators

Material Price Variation Risk

Knowledge of historic material prices (and/or future price projections) can be used to identify high-risk materials from price variation and price volatility perspectives. An approach has been developed for this project, termed Material Price Variation, and is detailed below. However, other approaches may be used, for example using historic price data from McKinsey Global Institute\(^{17}\) or other measures of price volatility or maximum price variation for materials from relevant sources.

The Material Price Variation Indicator has been developed in conjunction with this MCI methodology. It can provide an indication of the change in material price for a given product, on an annual basis and a given time horizon, for example, the past five years. It also provides statistical analyses to indicate the trend over the same period. It represents a new indicator added by this methodology, unlike the other indicators that already exist.\(^{18}\)

Considering the annual product mean price over the past 5 years, different statistical analyses are conducted to identify if the trend has been due to increment, decrease or no change, as well as to indicate level of price volatility of the product. The statistical analyses can include:

- price arithmetic mean over the past 5 years
- price delta over the past 5 years (Year 1 price subtracted from Year 5 price, a +/- sign shows the overall trend)
- price standard deviation over the past 5 years
- price range over the past 5 years (maximum price minus minimum price)
- average annual price variation over the past 5 years\(^{19}\)

\(^{17}\) The McKinsey Global Institute publishes historic price data, variation and volatility statistics for a number of commodities at http://www.mckinsey.com/insights/energy_resources_materials/resource_revolution_tracking_global_commodity_price_volatility

\(^{18}\) Sources for existing material criticality risk indicators include:


\(^{19}\) In order to take into account both long-term and short-term risk, an estimation of price variation within each year (used for the 5 year variation calculation) is recommended. The annual price variation should be estimated according to at least one of the following statistical analyses:

- price standard deviation of prices from recent annual prices
- price range over the year (maximum price minus minimum price)
Material Supply Chain Risk

Risks concerning the continuity of supply of a material for a product are related to the availability of that material for purchase by the product’s manufacturer. In practice, there exists a complex interaction between the availability of a material, the competing markets for the use of that material, supply and demand within each of those markets, regulatory limitations for legal extraction, political stability of states rich in the material and the ability of their respective product purchasers to absorb increases in cost due to these factors.

Hence, supply chain risk can be associated with a number of factors. For example, high risks may be experienced in supply of materials where countries:

- have a monopoly, or near monopoly, of supply
- have weak legal and governance systems
- have poor environmental standards
- are sources of conflict minerals as specified under the Dodd Frank Act20

The following specific indicators related to the above may be used:

- The **Herfindahl-Hirschman Index (HHI)** is an indicator of monopoly of supply for an element. It is defined by the sum of the squares of the market share for the producers of that element.21
- The **Sourcing and Geopolitical HHI** is a modified and scaled version of the HHI that embodies the geopolitical risk of the producing countries, as well as the monopoly in the supply of the material. It uses the World Bank’s Worldwide Governance Indicator (WGI),22 which represents six dimensions of governance for each producing country. The dimensions of governance have been aggregated to provide a single indicator (WGI) that is expressed for 213 economies.
- The **Environmental Country HHI** is a modified and scaled version of the HHI that embodies the producing countries’ environmental performance as well as the degree of monopoly in the supply of the material. It uses the Environmental Performance Index (EPI)23 produced by Yale University as the measure for the environmental performance associated with each country.
- An indicator that reports the risk that an element has been obtained from a ‘conflict mineral’. The concept of a conflict mineral is enshrined under the US Conflict Minerals Law and at present includes: columbite-tantalite (coltan), cassiterite, gold and wolframite or any derivative of these, and any other mineral or derivative determined by the US Secretary of State to be financing conflict in the Democratic Republic of Congo.24

The analyses should be performed on monthly, weekly or daily prices according to the specific needs of the case or the availability of data.

23 Yale University, Environmental Performance Index, http://epi.yale.edu.
Material Scarcity

Future supply may be constrained for particularly scarce materials (in the earth’s crust). There are a number of approaches to assess scarcity, each of which having its own benefits and constraints. These include:

- crustal abundance
- reserves to production ratios
- the results of the EU Ad-hoc Working Group on Defining Critical Raw Materials

Specific indicators related to the above include:

- abundance in the Earth’s crust as an estimate of the element’s abundance in the Earth’s upper continental crust (in parts per million, by mass) which can be obtained from a range of sources, including British Geological Survey and US Geological Survey
- availability of critical raw materials, as described in the EU Report of the Ad-hoc Working Group on defining critical raw materials

5.4.1.2 Complementary Impact Indicators

The complementary indicators described in the product-level methodology can all be used at the company level provided there is a suitable way of combining the complementary indicators for each product range.

Additionally, it may be appropriate to use relevant complementary indicators that have already been established at the company level. For example, many companies report according to the Global Reporting Initiative (GRI) guidelines. Whilst the actual indicators used in a GRI report will depend on the materiality of the different issues with respect to the business and its stakeholders, they are likely to include many of GRI’s standard disclosures as displayed below.

Some of these standard disclosures are very closely linked to the MCI. For example G4-EN1: Materials Used by Weight or Volume is a measure of the company’s total weight or volume of materials used to produce and package its primary products and services split into non-renewable materials and renewable materials.

Full definitions of the GRI standard disclosures are provided in the GRI Implementation Manual available from the GRI website.
Non-financial assessment – Example

<table>
<thead>
<tr>
<th>Recycled and virgin materials in AXIA chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of material in kilograms</td>
</tr>
<tr>
<td>Steel</td>
</tr>
<tr>
<td>Aluminium</td>
</tr>
<tr>
<td>Polypropylene</td>
</tr>
<tr>
<td>Nylon</td>
</tr>
<tr>
<td>Polyurethane (PUR)</td>
</tr>
<tr>
<td>Textiles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO2 footprint BMA in value chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw materials</td>
</tr>
<tr>
<td>Manufacturing of components</td>
</tr>
<tr>
<td>Chair assembly</td>
</tr>
<tr>
<td>Use of chair</td>
</tr>
<tr>
<td>Collection of used chairs &amp; transport</td>
</tr>
</tbody>
</table>

Source: ING Economics Department – Rethinking finance in a circular economy
6 APPENDIX 3: Business model design workshop

A detailed 'script' and process will be defined for running the business model design workshop. This will be developed after designing and agreeing the workshop scope with each case study company.
7 APPENDIX 4: Business Model Innovation Frameworks

7.1 The Value Proposition Canvas
<table>
<thead>
<tr>
<th>KEY PARTNERS</th>
<th>KEY ACTIVITIES</th>
<th>VALUE PROPOSITION</th>
<th>CUSTOMER RELATIONSHIPS</th>
<th>CUSTOMER SEGMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who are your key partners?</td>
<td>What are the activities you perform every day to deliver your value proposition?</td>
<td>What is the value you deliver to your customer? What is the customer need that your value proposition addresses?</td>
<td>What relationship does each customer segment expect you to establish and maintain?</td>
<td>Who are your customers?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KEY RESOURCES</th>
<th>CHANNELS</th>
<th>REVENUE STREAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the resources you need to deliver your value proposition?</td>
<td>How do your customer segments want to be reached?</td>
<td>How do customers reward you for the value you provide to them?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COST STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the important costs you make to deliver the value proposition?</td>
</tr>
</tbody>
</table>
7.3 The Context Map
7.4 The Vision Canvas
7.5 The Partnership Canvas
APPENDIX 5: Key elements and success factors for CEBM Patterns

This Appendix contains materials developed as part of Work Package 2 which should be understood and used as reference when understanding the circularity of a Case Organisation’s business model, opportunities to improve this, and enablers/barriers.

8.1 Summary of circular business model elements

Each of the seven CEBM patterns can be described by a distinctive combination of key business model elements which produce a circular economy outcome. The focus here is on the essential elements that make a CEBM pattern distinctive. These elements are described and categorised below according to the nine building blocks of the Business Model Canvas.

Value Proposition elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC</td>
<td>Lower (lifetime) Cost: Lower cost of product, or reduced lifetime cost of ownership to an end-user.</td>
</tr>
<tr>
<td>PX</td>
<td>Performance: Provides outcome and level of performance corresponding to a customer’s ‘job-to-be-done’ (e.g. equipment up-time; output; etc.). Includes product-service system models.</td>
</tr>
<tr>
<td>AX</td>
<td>Access: Convenience of on-demand availability; flexibility; and greater range of choice. Models include: Pay-as-you-go; rental; leasing.</td>
</tr>
<tr>
<td>SU</td>
<td>Sustainability: Provides a sustainability-related outcome that is valued by the customer (environmental, social, etc.).</td>
</tr>
<tr>
<td>CV</td>
<td>Co-value: Value provided to a ‘vertical customer’ outside of the main value chain.</td>
</tr>
</tbody>
</table>

Customer interface elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT</td>
<td>Long-term or recurring: Such as a subscription, part of a long-term relationship service, etc.</td>
</tr>
<tr>
<td>TN</td>
<td>Transactional: Single sale, one-off transaction.</td>
</tr>
</tbody>
</table>

Customer Relationships

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>New Customer Segment: Sale to a different customer segment</td>
</tr>
<tr>
<td>VC</td>
<td>Vertical Customer: Customer outside of main product value chain</td>
</tr>
</tbody>
</table>

Channels

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC</td>
<td>Re-sale channel: Distinct sales channel, separate from ‘new’ product sales</td>
</tr>
<tr>
<td>RN</td>
<td>Return channel: Collection or return channel for product at end of life.</td>
</tr>
<tr>
<td>SM</td>
<td>Secondary material Market: Markets for sale of recovered materials (co-products; scrap; recycled, etc.)</td>
</tr>
</tbody>
</table>

Revenue Streams

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS</td>
<td>Product Sale revenue: Sale of product, component, or material (customer-owned)</td>
</tr>
<tr>
<td>SR</td>
<td>Service Sale Revenue: Sale of service only (no ownership)</td>
</tr>
<tr>
<td>BR</td>
<td>Bundled Product-service sale Revenue: Sale of product and service bundle (customer-owned)</td>
</tr>
<tr>
<td>WV</td>
<td>Waste-as-value: Revenue stream from waste or co-product being used instead of disposed</td>
</tr>
</tbody>
</table>

Operating model elements

Key activities

- **DX** Product design: Design-for-"X" (repair; maintenance; disassembly; remanufacturing; recyclability; material substitution; etc.)
- **RL** Reverse Logistics: Executed in-house by organisation.
- **SV** Service provision: Provision of ‘product-as-service’; and/or value-added services (e.g. preventative maintenance, asset diagnostics etc.)

Key Partners

- **CM** Circular Materials supplier: Supplier of circular materials
- **RL** Reverse Logistics: Provided by a third party
- **TC** Technology: Partners providing key technologies.

Key Resources

- **AP** Asset management Platform: Booking, paying, tracking assets.
- **SP** Specialised Production process: Specialised processes and facilities (e.g. remanufacturing; 3D manufacturing; etc.)
- **AS** Assets: Assets or product stock available to provide as a service.

Cost Structure

- **FI** Financial Incentive: To incentivise take-back or return of product.
- **LA** Labour: Labour cost
- **MT** Materials: Materials costs
- **FC** Financing cost: Cost of customer financing
- **WD** Waste Disposal: Cost of disposing waste outputs

The figures below use the Business Model Canvas to show how these elements combine to describe the seven CEBM patterns. An organisation may incorporate two or more of these patterns within its business model.
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 730378.

CEBM Pattern: Re-make

Key Activities

Specialised Production: ‘Core’ inspection; and remanufacturing.
Product design: Where reman is done by original manufacturer, “design-for-remanufacture” is key to make processes economical.

Key Resources

Assets: Stock of ‘core’ ready for remanufacture.

Key Partners

Reverse Logistics: May partner with third party reverse logistics providers to manage take-back of ‘core’

Cost Structure

Financial Incentive: A Core Deposit is often needed to incentivise return of assets for remanufacture.
Labour cost: Typically more labour-intensive and less automated.
Material costs: Significantly lower compared with original manufacture.

Value Proposition

Lower lifetime cost: Remanufactured products can be sold at significantly lower price.

Customer Segments

New customer segment: Provides an opportunity to serve new segments who are more price-sensitive but still require quality products.

Customer relationships

Long-term: The aim is to develop close, long-term relationships to ensure parts and products are returned.

Channels

Re-sale Channel: Reman products may be sold under a separate brand, with dedicated channels (e.g. dealer network).

Revenue Streams

Product Sale: Revenues derive from sale of reman parts and products. These could be bundled with a service contract for ongoing servicing and maintenance (not shown in the above model).
Key Activities
Specialised Production: Repair and refurbishment activities.

Key Resources
Assets: Stock is generally low due to fast turnaround and re-sale of items.
Specialised Production facilities.

Key Partners
Reverse Logistics: May partner with retailers or other reverse channels for product returns/take-back.

Value Proposition
Lower lifetime cost: Re-conditioned products are generally sold at significant discount to new, and are often considered ‘second hand’.

Customer Segments
New customer segment: Customer segment is typically different to that which buys new product.

Customer relationships
Transactional: Typically transactional.

Channels
Re-sale channel: Refurbished/ repaired products generally sold through separate channels to those for new product.

Cost Structure
Financial incentive: Financial incentive (e.g. cash-back or voucher) is often used to enable product take-back.

Revenue Streams
Product sale: Revenues derive from sale of items.
CEBM Pattern: Circular sourcing

Key Activities

**Product design:** Designing products to use higher levels of recycled content, or substituting more ‘circular’ materials (e.g. bio-based).

Key Resources

Additional resources generally not required.

Key Partners

**Circular Materials:** Sourcing recycled / circular materials from commodity partners.

Value Proposition

**Sustainability:** Main value to customers is environmental sustainability of product. Price isn’t necessarily lower than alternatives (and may have a premium).

Customer Segments

**New customer segment:** Potentially new segments of ‘sustainability-conscious’ customers.

Customer relationships

Not necessarily longer-term relationships, but may generate loyalty from customer segments valuing sustainability features.

Channels

May use distinctive channels to reach sustainability-conscious customers if product is sufficiently differentiated.

Cost Structure

**Materials:** Cost of materials is driven by market price for secondary materials, or raw material cost of bio-based options.

Revenue Streams

**Product sale:** Product may be priced at a premium to ‘non-circular’ alternatives.
CEBM Pattern: Co-product recovery

Key Activities
Processes for capture or recovery of secondary materials from co-product streams.

Key Resources
Plant and equipment for recovery processes, where relevant.

Key Partners
Technology: May include partners for recovery and processing of co-products into secondary materials for sale.

Value Proposition
Co-value: Value to customer includes reliable supply of material; and/or Lower Cost vs. other sources.

Cost Structure
Waste Disposal: Reduction/elimination of own disposal/removal costs which organisation may have to otherwise incur.

Customer Segments
Vertical Customer: Customers are in different 'vertical' segments. May be commodity companies, or manufacturers.

Customer Relationships
Generally transactional relationships. May be long-term within an 'industrial symbiosis' arrangement.

Channels
Secondary material Market: Markets for sale of recovered materials (co-products; scrap; recycled, etc.)

Revenue Streams
Waste as value: Sale of co-product direct to customer or to secondary material markets.
CEBM Pattern: Access

Key Activities

- **Service Provision**: Customer service; asset management; etc.
- **Reverse Logistics**: For return of products at end of use cycle.

Key Resources

- **Asset management Platform**: End-user interface for booking and payment; and back-end for asset management.
- **Assets**: Stock of assets to deploy.

Key Partners

- **Technology**: Asset tracking and management may be provided by third parties.

Cost Structure

- **Assets**: Cost of maintaining and insuring assets, and having working capital tied up.
- **Asset management Platform**: Cost of running the platform, third party service provision.

Value Proposition

- **Access**: Convenience of on-demand availability; flexibility; and greater range of choice. Models include: Pay-as-you-go; rental; leasing.
- **Lower cost**: Turns ‘fixed’ into ‘variable’ cost.

Customer Segments

- **New customer segment**: Potentially unlocks new customer segments by providing new value proposition.

Customer relationships

- **Long-term**: Generally longer-term relationship, directly with end-user (e.g. eliminating intermediaries).

Channels

- **Asset management Platform**: End-users reached via technology platform (e.g. mobile and/or web app).

Revenue Streams

- **Service Revenue**: Recurring service revenues (previously owned product may be considered to now be ‘serviced’). Revenue model is generally that of a service, potentially with add-on ‘consumables’.
CEBM Pattern: Performance

Key Activities
Service provision: Providing services to ensure guaranteed service level agreement (SLA). May include: diagnostics and performance reporting; preventative maintenance; upgrades; repair/maintenance; etc.

Key Resources
Asset management Platform: Technology platform for remote management of asset performance.

Key Partners
Technology: Asset management technology and services may be provided by third parties.

Cost Structure
Asset management Platform: Cost of running the platform, third party service provision.

Value Proposition
Performance: Provides outcome and level of performance corresponding to a customer’s ‘job-to-be-done’ (e.g. equipment up-time; output; etc.). Includes product-service system models.

Revenue Streams
Bundled product and service Revenue: Recurring service revenues and bundled equipment sale; OR
Service Revenue: Recurring service revenues under fully ‘servicised’ model.

Customer Segments
Usually an enhance value proposition to existing customer segments.

Customer Relationships
Long-term: Generally long-term contractual relationships (vs. sale of equipment)

Channels
Customers can be reached through existing channels.
### CEBM Pattern: Resource recovery

#### Key Activities

**Reverse Logistics:** Recovery of materials at end-of-life.

#### Key Resources

Plant and equipment for recovery processes, where relevant. This may be outsourced to a Key Partner.

#### Key Partners

**Reverse Logistics:** Partners in the reverse-logistics chain – e.g., waste management; municipalities; etc.

#### Cost Structure

**Waste Disposal:** Reduction/elimination of own disposal costs which organisation may have to otherwise incur.

#### Value Proposition

**Sustainability:** Environmental sustainability of recovered material.

**Lower cost:** May be priced at a discount to virgin materials on secondary markets.

#### Customer Segments

**Vertical Customer:** Customers may be in different ‘vertical’ segments; or secondary material commodity companies. May include internal Procurement customer in a fully closed-loop model

**Customer relationships:** Generally transactional relationships.

#### Channels

**Secondary material Market:** Markets for sale of recovered materials (scrap; recycled, etc.).

#### Revenue Streams

**Waste-as-value:** Sale of recovered material direct to customer (may be internal Procurement customer if fully closed-loop) or to secondary material markets.
8.2 Key success factor for each CEBM pattern

The following sections summarise key success factors for each of the seven CEBM patterns. These are generic, and can be used as reference to prompt discussion and idea development during interviews.
8.2.1 Re-make

**Value Proposition**

- Products are as good (or better) than new, and have a matching warranty. May cost less than buying new (but not necessarily).

**Features**
- Lower lifetime cost of ownership compared with non-Reman options...
- ...at the same level of quality and reliability.

**Pain reliever / Gain creator**

**Customer Segment**

- Who?
  - Buyer or end-user of asset.
  - Willing to consider purchasing a pre-owned asset.

- Job-to-be-done
  - Same as expected performance/outcome from using a 'non circular' asset.

- Pains / Gains
  - Reducing cost of ownership.

**Customer Relationships**

- Ideally, customers should be open to a long-term relationship and potentially a product/service contract bundle to ensure parts / equipment can be recuperated and are suitable for remanufacture at end-of-life.*

**Revenue Streams**

- A long-term relationship and predictable part/equipment lifecycles can produce recurring and reliable revenue streams.

**Channels**

- Organisations may sell re-manufactured products under a separate brand and channel (compared to new products).

- Organisations will typically have a product take-back channel for receiving parts / equipment at end-of-life (“core”). This can provide initial inspection of parts and customer management (including management of a ‘Core Deposit’ financial incentive for return of core).

**Key Activities**

- Skilled labour and testing equipment needed to effectively and efficiently assess whether ‘core’ is suitable for remanufacturing or not.

- Products should be designed for ease of remanufacturing, including: ease of disassembly; modularity; ease of re-manufacturing process; etc.

**Key Partners**

- Suppliers of specialised equipment needed for remanufacturing.

- Aspects of the business model may be outsourced to third parties – e.g. reverse logistics, remanufacturing operations, etc.

**Key Resources**

- Channel for product take-back management.

- Skilled labour experienced in remanufacturing.

- Specialised remanufacturing equipment (e.g. may include 3D / additive manufacturing; testing and inspection equipment; etc.)

- Stock of “core” parts/equipment is needed to remanufacture on demand.

- Brand/Sub-brand to create trust and communicate quality to the market.

**Cost Structure**

- Labour costs will typically be higher for remanufacturing compared with making a product new, however given that most of the value is retained within the products at end-of-life, significantly lower material and production costs make the model economical.

- To incentivise return of parts / equipment at end-of-life, organisations may operate a financial incentive (e.g. a deposit scheme). This will form part of the cost structure of remanufacturing business models.*

*Note: It is important that parts / equipment are recuperated before failure / breakage so that remanufacturing is feasible/economical.
### 8.2.2 Re-condition

<table>
<thead>
<tr>
<th>Value Proposition</th>
<th>Customer Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features</strong></td>
<td><strong>Who?</strong></td>
</tr>
<tr>
<td>▪ Product provides expected end-user experience (functionality, aesthetic, etc.) at a lower price than buying new.</td>
<td>▪ Buyer or end-user of asset.</td>
</tr>
<tr>
<td>▪ Willing to consider purchasing a used/pre-owned asset; acceptance of ‘older generation’ product fashion / technology / features.</td>
<td>▪ Willing or end-user of asset.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pain reliever / Gain creator</th>
<th>Job-to-be-done</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Lower cost compared to buying new.</td>
<td>▪ Same as expected performance/outcome from using a ‘non circular’ asset.</td>
</tr>
<tr>
<td>▪ Rapid replacement or fixing of asset.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Relationships</th>
<th>Revenue Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer relationships</strong> will typically be transactional (e.g. one-off purchase).</td>
<td>▪ Market price for used items is key to determining level of revenue and profit margin. This will depend on:</td>
</tr>
<tr>
<td>▪ There may be an opportunity to establish a brand/reputation as the ‘go to’ supplier of quality used items in order to generate repeat sales and larger orders (e.g. supplying a group of end-users for B2B transactions).</td>
<td>▪ Product lifecycle and timeframe for depreciation/obsolescence – e.g. ‘fast fashion’ or consumer electronics items will reduce in value quickly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channels</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Mainly online retail sales channels are typical given lower product margins and to maximise reach.</td>
<td>▪ Assessment of pre-used item quality and degree to which it can be economically re-conditioned for re-sale at market price.</td>
</tr>
<tr>
<td>▪ ‘Reverse Channel’ for take-back and collection of items may either be online (e.g. by mailing item) or via network of own/partner physical retail outlets.</td>
<td>▪ Repair and/or refurbishment processes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Resources</th>
<th>Cost Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Potential partnership for sourcing of used products for refurbishment, repair, and resale. This may include:</td>
<td>▪ Facilities and specialised skills or equipment for product inspection and/or repair/refurbishment.</td>
<td>▪ Preserving and maximising end-of-life value of used items is essential for maximising profitability and resale value. Below a certain threshold, products cannot be economically re-conditioned for resale at the market price and require scrappage (see ‘Resource Recovery’ for input into alternative circular route).</td>
</tr>
<tr>
<td>▪ Managing incentivised return schemes and collection;</td>
<td>▪ Financial resources / cash flow to provide incentive for returns.</td>
<td>▪ Financial incentive for encouraging return / take-back (e.g. cash back, voucher, discount on new purchase, etc.)</td>
</tr>
<tr>
<td>▪ Reverse logistics; etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.2.3 Circular sourcing

<table>
<thead>
<tr>
<th>CEBM Pattern: Circular Sourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Proposition</strong></td>
</tr>
<tr>
<td>Features</td>
</tr>
<tr>
<td>- Environmental sustainability, while maintaining/exceeding other buying criteria such as cost and quality. Any price premium needs to be justified or will not gain market traction.</td>
</tr>
<tr>
<td>Pain reliever / Gain creator</td>
</tr>
<tr>
<td>- Meeting sustainability/ethical criteria.</td>
</tr>
<tr>
<td>- Competitive price and/or lower Total Lifetime Cost vs. 'non circular' items.</td>
</tr>
</tbody>
</table>

| **Customer Segment** |
| Who? |
| - 'Green buyer': Customers who value environmental sustainability (and may be prepared to pay a premium). |
| - Other customers: May not necessarily buy based on sustainability credentials, but value price stability or lower cost of products using recycled material content. |

| **Customer Relationships** |
| Opportunity for creating long-term, trusted relationship by differentiating brand/product from 'non-circular' alternative. |
| - There is a potential linkage to the Resource Recovery CEBM pattern by maintaining relationship with customers throughout product lifecycle in order to recover materials at end-of-life. |

| **Channels** |
| In addition to ‘traditional’ channels, organisations should identify ways of reaching ‘green buyers’. This may require identifying and engaging with new customer segments (e.g. public procurement; niche consumer markets; etc.). |

| **Key Activities** |
| Sourcing materials that are re-cycled or ‘circular’ (e.g. bio-based) that meet criteria e.g. quality, reliability of supply, cost. |
| Product design for integrating ‘circular’ materials into product. |
| Marketing of sustainability features to target customer segments. |
| Potential linkage to Resource Recovery model. |

| **Key Partners** |
| Suppliers of materials that are re-cycled or ‘circular’ (e.g. bio-based). |
| Third party certification/verification of 'circular content'. |

| **Key Resources** |
| Supply contracts for ‘circular materials’ – ensuring competitive price and reliability. |
| Branding for ‘green’ customer segments (may include maintaining third party certification). |

| **Revenue Streams** |
| Pricing (or overall value proposition) should be competitive with ‘non-circular’ alternatives to have maximum commercial impact and market traction. |

| **Cost Structure** |
| The market price of recycled (or bio-based) materials vs. virgin (or non bio-based) materials will influence price competitiveness and/or profit margins. |
8.2.4 Co-product recovery

**CEBM Pattern: Co-product Recovery**

### Value Proposition

**Features**
- Supply of material (co-product) at required quality, reliability, and price.

**Pain reliever / Gain creator**
- Reliable supply of material.

### Customer Segment

**Who?**
- Buyers of co-product materials in separate value chain.
- May be sold/bought via intermediary secondary markets for commodities.

**Job-to-be-done**
- Procurement of input materials at competitive price.
- May or may not value ‘circular’ element of purchased material.

**Pains / Gains**
- Reliability of supply.

### Customer Relationships

- Industrial symbiosis: Relationships are physically close and long-lasting as supplier and buyer are part of the same system (e.g. within an industrial zone).
- Secondary markets: Relationship is transactional and may be brokered by intermediaries.

### Revenue Streams

- Revenue generated from sale of co-product at market price.

### Channels

- Industrial symbiosis: Customers are physically proximate and tightly connected via distribution network infrastructure.
- Secondary markets: Customers reached via brokers and distributors.

### Key Activities

- Recovery of co-product streams from production.
- May require processing for required quality of material.

### Key Partners

- Third parties may provide infrastructure for recovery, processing, and distribution of co-product materials.

### Key Resources

- Co-product material stream.
- Material recovery and processing equipment / facility.

### Cost Structure

- Typically no incremental cost of production.
- Additional cost may be incurred if co-product requires further processing to meet quality requirements as well as transport/distribution to customer.
- If co-product is otherwise considered waste, producer can avoid disposal costs.
8.2.5  Access

**Value Proposition**

- Pay-per-use / pay-as-you-go, with a variable cost that is affordable (vs. upfront capital expenditure and/or locking into buyer financing contract).
- Pricing may be adjusted based on: volume; features/specs; peak demand; etc.
- May include a flat subscription / membership fee in addition to variable usage fee.
- Ability to access the right assets when and where required.
- Potentially wider range of choice, adjustable to different customer needs.
- Potential value-added service add-ons.

**Customer Segment**

**Who?**
- End-users in a B2C context.

**Job-to-be-done**
- ‘Hiring’ asset to deliver a certain outcome or perform certain function at the desired location and time.

**Pains / Gains**
- Capital tied up in assets through capital expenditure (capex).
- Cost of ownership (insurance, maintenance, fleet/stock management, etc.).
- Unexpected costs and disruption (repair, equipment downtime).

**Customer Relationships**

- Aim to have long-term and recurring/repeat customer relationship. May have a degree of short-term lock-in if charge a flat subscription / membership fee to provide access over a defined period of time (e.g. monthly, yearly).

**Revenue Streams**

- Variable usage fee.
- Flat/fixed membership / subscription fee (monthly, yearly).
- Fees for value-added service add-ons.

**Channels**

- Online automated / ‘self-service’ channels.
- Sales force (in particular for B2B).

**Key Activities**

- Managing stock/fleet of assets to ensure effective utilisation and availability for customer use.
- Marketing and sales to promote potentially new usage model to customers.

**Key Partners**

- Technology platform providers (e.g. asset tracking and customer interface).
- ICT/mobile service providers (e.g. GPS tracking, remote tracking and performance diagnostics, etc.).

**Key Resources**

- Stock/fleet of assets or equipment.
- Fleet management and tracking platform.
- Customer platform for booking and payments.
- Sales force (especially for B2B).

**Cost Structure**

- Optimal utilisation of assets is key to financial sustainability of the model.
- Scale economies to afford overhead costs of managing and servicing assets.
8.2.6 Performance

Value Proposition

Features
- Delivering required output or outcome at a guaranteed level of service / performance.
- Product/asset may be sold as part of a service bundle (or combined with‘Access’model).
- Pricing may include:
  - Fee for service (e.g. ‘managed service’)
  - Bundled product sale/lease.
  - Penalties (to supplier) of not meeting service level agreement.
- Potential value-added service add-ons (e.g. performance diagnostics and data/intelligence).

Pain reliever / Gain creator
- Eliminating or mitigating the risk of asset performance not meeting required standards, and related negative impacts.

Customer Relationships
- Long-term relationship, often locked-in with multi-year contract.
- Requires close interaction and collaboration to ensure assets are used correctly/optimally by customer (to ensure performance is delivered and service costs such as unscheduled maintenance are minimised)

Channels
- Generally through a direct sales force (required for communication of benefits, design of end-to-end service package, negotiation of terms, etc.)

Key Activities
- Service provision as part of package to deliver required performance/outcome, e.g.:
  - Performance diagnostics and reporting
  - Scheduled preventative and reactive maintenance
  - Equipment and service upgrades
  - Product/System design, installation and commissioning (to ensure optimal performance)

Key Partners
- Technology suppliers
- Sub-contractors (e.g. for maintenance)
- Equipment suppliers (if not manufactured by own organisation)

Key Resources
- Skilled service personnel
- IT platforms for remote diagnostics and asset management (including maintenance scheduling, etc.)
- User base / installed base of assets.

Cost Structure
- Labour costs are a key driver given service element
- Material/manufacturing costs if equipment is supplied to customer as part of service bundle.
- Maintenance and servicing costs need to be effectively managed through product, system, and service delivery optimisation.
- Risk of incurring penalties for not fulfilling performance obligations needs to be minimised/eliminated.

Customer Segment
Who?
- ‘Prosumer’ in B2C segments – consumers requiring high-end/high-fidelity experience.

Job-to-be-done
- Generating a given outcome at a guaranteed level of performance (output, uptime, service level).

Pains / Gains
- Negative impact of asset downtime or lower performance/output.
8.2.7 Resource recovery

**Value Proposition**

Supply of material at required quality, reliability, and price.

**Features**

- Pain reliever / Gain creator
  - Reliable supply of material.

**Customer Segment**

Who?

- B2B buyers of materials/commodities, including:
  - Direct B2B end-customer
  - Secondary materials market brokers

Job-to-be-done

- Procurement of input materials at competitive price.
- May or may not value ‘circular’ element of purchased material.

**Pains / Gains**

- Reliability of supply.

**Revenue Streams**

- Revenue generated from sale of recovered material at market price.

**Customer Relationships**

- Resource customer: Relationship with buyer of recovered materials may be transactional (e.g. if sold via secondary material market).
- Product end user / customer: Maintaining a relationship during product lifetime is important in order to have access to a reliable supply of material to be recovered at end-of-life.

**Channels**

- Customers typically reached via secondary materials market brokers and distributors.

**Key Activities**

- Product end-of-life recovery of material streams.
- Processing of end-of-life product, e.g. disassembly; sorting by material stream; material processing to required standard for sale.
- Typically requires incentivised take-back / return scheme.
- For recovery of materials from own products: Product design to enable ease of disassembly; material identification, separation, and processing.

**Key Partners**

- Third parties may provide infrastructure for material recovery, processing, and distribution to customers or secondary markets.
- Provision of reverse logistics for return to manufacturing / supply chain.

**Key Resources**

- User base / installed base of assets if either owned (e.g. leased/hired), or include incentive or contractual condition to take-back at end of life.
- End-of-life product processing facilities.

**Cost Structure**

- Costs for end-of-life product recovery, processing, and logistics need to be effectively managed. This can be optimised if organisation has control over product design (see Key Activities).