Clean Capital

Circularity Assessment Tool Questionnaire Guide

This questionnaire guide details the specific questions used to assess the desired impacts detailed in previous sections. This guide can be used as a stand-alone document, intended to give investment firms crucial background information about each question, as well as to allow changes in question weighting based on the priorities of each specific investor. For each question, the significance within the circular economy is detailed, followed by any supporting literature, expert feedback, or other relevant research.

Questionnaire Implementation Guide

Goal:

The overall goal of the CAT is to provide a means of data collection from potential investment opportunities to inform an investment firm's decision making process. This tool does not provide insight into what the "right" investment could be, but instead, collects information to uncover potential discrepancies between a company's claims and its delivered products and services in a holistic and data-driven approach. This tool has been developed to be able to overcome gaps in data availability through an extensive and flexible weighting system.

Onboarding:

Prior to implementation, an investment firm should review the CAT in its entirety to determine the specific weighting preference they would like to establish as well as remove any questions they do not feel provide a value-add to the tool. This can be completed independently in the Qualtrics platform.

Implementation:

Upon completion of a preliminary review of the tool, an investment firm can disseminate a link to a potential investment opportunity or existing portfolio company. The receiving party will then be able to securely complete the questionnaire, either on a mobile phone or computer. All responses will be recorded in an excel spreadsheet upon completion.

Analysis:

Finally, an investment firm will be able to assess a company's response through several means. First, they can look at the quantitative responses submitted and determine the differences between industry specific averages and the company's responses. Secondly, they can use the qualitative responses as a means to assess potential areas for a greater focus or engagement. Lastly, any unanswered questions can be followed up on to ensure no significant data gaps exist.

Section 1: Company Structure & Introduction

This introductory section allows companies to describe themselves broadly, and provide

Q1: Describe your company.

Q1 gains insight on the company structure and products/services provided by asking companies to describe themselves. Additionally, the details prioritized by each company in their answer can help investors gain insight into the direction their investment will go.

Q2: Does your company utilize a circular business model? If yes, please indicate which business model best describes your company.

Yes
No

Q2a. If yes, select:

Reduce
Reuse
Recycle
Other

Q2 presses companies to evaluate their business in relation to the broader circular economy. By choosing the circular business model that best suits their company, companies will then be directed to answer a series of questions for their specific business model, as well as two broader sections exploring scaling/displacement and general environmental impact.

Reduce: The reduce paradigm focuses on "reducing the consumption of nonrenewable and toxic raw materials" (Goyal et al., 2018). Additionally, it can be viewed as shifting from the "take-make-dispose" model to the "take-make-reduce" model. Both of these perspectives focus on an overall decrease in the amount of material, energy, or waste associated with a specific product or service.

Reuse: First, a reuse business model aims to reduce the need for primary production of a product which will in turn help accomplish the second goal of the reuse business model, which is to decrease the demand for virgin materials and the amount of energy needed to transform raw materials into consumer products (Urbinati et al., 2017). Third, reuse business models also aim to reduce the amount of waste produced from a product system by keeping products viable in the circular economy and out of landfill through rental, resale, refill, refurbishment, and repair strategies. Additionally, extending the lifetime of products by designing for durability allows for products to remain viable in the economy for longer, further reducing the demand for primary production of the same products (Bocken et al., 2018; Tunn et al., 2021; Urbinati et al., 2017).

Recycle: As it pertains to the circular economy, recycling can be defined as "the most common circular economy process through which used materials are treated so as to make them suitable for reuse" (Urbinati et al., 2017). For the purposes of this project, we have refined the scope as anything pertaining to dismantling products into component parts that will be turned into new products so as to differentiate from refurbishment, which we consider an act of reuse. This includes any physical recycling of products in the traditional sense of home recycling of packaging as well as modern advanced recycling techniques to recover resources from landfills or electronic scrap yards, as well as design concepts that enable recycling of component materials at the end-of-life.

Q3: What industry is your company in?

- Consumer packaged goods
- Packaging
- Food and beverage
- Electronic
- Transport
- Apparel
- Construction & Manufacturing
- Technology
- Other

Q3 provides a basis for comparison in many of the sections to come. In subsequent questions, companies will be asked to compare their own impact to industry standards; this question ensures that investors are aware of what industry that comparison is being made within.

Q4: Does your company or product have any environmental certifications or third-party verifications?

- Yes
- No
- Q4a. If yes, please indicate which certifications or verifications and provide documentation here (upload).

While this tool aims to fill the gaps inherent in many environmental certificate programs, additional verifications can give investors helpful information; Q4 provides a space for

companies to supplement their answer to CAT with documentation of additional certifications or verifications.

Section 2: Scaling and Displacement

Q1. What are the biggest negative impacts of running your operation?

Q1a. How does that compare to your competitors?

Q1b. Where do you see the biggest opportunities to improve your operational footprint?

While subsequent questions collect metrics for company impacts, this question allows companies to self-report impacts. The answers to these questions reveal the impacts the company is currently aware of, as well as the areas in which the company would be most likely to pursue improvements.

Q2: How will company growth change the impact produced from the core product or service?

As companies scale, impacts increase. This question examines whether or not the company has a plan to decouple impact from growth.

Q3: What environmental benefit would an investment facilitate that would not otherwise occur absent of the investment?

This question explores the different potential changes companies will be able to implement with an investment. While companies may not know the specifics of how a theoretical investment could affect their company operations, the answer to this question gives insight into the areas that companies are hoping to improve, pending receival of seed funding.

Q4: Will your product or service displace existing products or services that have a greater environmental impact?

Yes
No

Q4a: If yes, please explain.

Q4b: Have you conducted any research to determine *how* your product or service will displace higher impact products?

Yes
No

Q4c: If yes, please explain.

Displacement, where the purchase of a "greener" product replaces a purchase of a product with a higher environmental impact, is crucial in determining company impact beyond traditional metrics (e.g. GHG output, energy use, etc.). Q4 explores whether companies have taken steps to ensure that their product will displace "worse" products, as well as any research confirming the effectiveness of such steps.

Q5: Does your company attempt to value potential environmental benefits?

Yes

No

Q5a: If yes, please explain how.

Q5 allows companies who have previously attempted to estimate environmental impact to state so, and gives them a space to explain the methodology used to reach an estimate; investors are able to place any benefit quantifications in context of the methods used to obtain those values. For companies that have not yet estimated their monetized environmental benefits, they are able to discuss the factors hindering them from making those estimates. Investors are thus able to identify areas in which support would be needed.

Q6: Are there any relevant policy decisions or incoming regulations that affect your solution or the competitive landscape?

Yes
No

Q6a: If yes, explain.

Due to constantly changing regulations on labeling, disclosure, and sustainability claims, companies that are aware of possible upcoming policy changes, and preemptively compliant with such changes, are a lower-risk investment than companies whose operations may be hindered by the passage of a new regulation. This question gauges companies' awareness of the changing policy landscape surrounding their product and service, and evaluates the steps they have taken to adapt to new policies.

Section 3: Circularity Section

Subsection 1: Recycle

This section aims to assess the amount of material being recovered from waste streams. This section explores product inputs, packaging inputs, and end-of-life options. Point values for weighted questions are indicated to the right of each question; questions without indicated point values are unweighted.

Q1: Does your company use recycled materials as a product input?

Answer Choices:
- Yes
- No

Q1a. If yes, what percent of your product inputs are recycled materials?

Answer Choices:
- 0-25%
- 25-50%
- 50-75%
- 75-100%
- N/A

Q1b. What type of recycled material is used?

Answer Choices:
- Recycled aluminum
- Recycled steel
- Recycled cardboard or paper
- Recycled glass
- Recycled plastic
- Recycled textiles
- Other

Q1c. Does your product use pre-consumer or post-consumer recycled material?

Answer Choices:
- Pre-consumer
- Post-consumer

Q1 assesses the percentage of non-virgin material included in product inputs. Higher percentages of recycled content are preferred to lower percentages and pre-consumer recycled content is preferred over post-consumer content. Companies are also asked to specify the type of recycled material used for data gathering purposes.

Products with higher recycled content would have a lower net environmental impact than the same product constructed with virgin materials. It is also vital to differentiate between

post-consumer and pre-consumer recycled content, and favor the use of post-consumer content. Pre-consumer recycled content is defined by the U.S. Green Building Council as "material diverted from the waste stream during the manufacturing process" – in contrast to post-consumer recycled material, which is defined as "waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose" (*Going All In*, 2022).

Q2: Is your product packaged?

Answer Choices: Yes, No

Q2a. What is the primary material used in packaging?

Answer Choices:
- Thin film plastic
- Cardboard
- Plastic lined cardboard
- Other

Q2b: What % of your product's packaging is recyclable?

Answer Choices:
- 0-25%
- 25-50%
- 50-75%
- 75-100%

Q2c: Does your company reuse its product packaging?

Answer Choices:
- Yes
- No

Q2 collects information on product packaging. Q2a categorizes companies by commonly used packaging varieties (users can also add additional packaging types to expand the selection), while Q2b categorizes companies by percentage of recyclable packaging. Q2c assesses whether companies are reusing within their own product cycle; for example, using reusable containers for product inputs, reusing packaging to consumers, etc.

Q3: Is your product compostable or biodegradable?

Answer Choices:
- Yes
- No

Q3a: If yes, can it be composted in a home composting system with no additional inputs?
- Yes

No

Q3b: If no, explain what additional inputs are necessary.

Q3 assesses any claims about the biodegradability and compostability of a product. Q3a asks for the assumptions used in the characterization as compostable/biodegradable, and asks the company to provide additional information on the predicted break-down process of the product.

Due to a lack of standardization surrounding claims of biodegradability and/or compostability, it is necessary to collect information on the assumptions behind any claims made. The US Federal Trade Commission (FTC) Guide for the Use of Environmental Marketing Claims defines a compostable product as one in which "all the materials in the product or package will break down into, or otherwise become a part of, usable compost (e.g., soil conditioning material, mulch) in a safe and timely manner in an appropriate composting program or facility, or in a home compost pile or device", while biodegradable products require that the "entire product or package will completely break down and return to nature, i.e., decompose into elements found in nature within a reasonably short period of time after customary disposal" (Federal Trade Commission, 2012).

Claims of compostability are evaluated by compliance with existing standards. The American Society for Testing and Materials (ASTM) Standards 6400 is widely used as a standard for determining compostability. ASTM 6400 – the primary standard used by the Biodegradable Products Institute (BPI), a widely-known US 3rd-party certifier – is a four-part biodegradation test that assesses biodegradation, eco-toxicity, and plant growth (ASTM, n.d.; BPI, n.d.; Greene, 2007). While the high temperatures used in ASTM 6400 closely mimic the conditions used in industrial composting facilities, and do not reveal compostability within an at-home composting system, compostable plastics that meet ASTM 6400 requirements were found to degrade at rates similar to cellulose materials in a municipal green yard-waste compost environment (Greene, 2007).

Companies that have evaluated their products using recognized standards and certifications (e.g. ASTM 6400, BPI, etc) are favored over those without verifiable claims of compostability. California AB 1201, which tightened regulations surrounding product degradability claims, indicates that the usage of such claims may be more heavily regulated in the future (Millar et al., 2021) – companies that have preemptively complied with AB 1201 will not need to complete additional steps to achieve compliance if stronger labeling regulations are enacted at the federal level.

Q4: Can your product be recycled?

Answer Choices:

Yes

No

Q4a: If yes, how exactly can it be recycled and what infrastructure is required?

Answer Choice: Fill in response

Q4 determines whether or not a company is producing a recyclable product, and evaluates the infrastructure needed to successfully recycle the product. While a priority of the circular economy is designing products to minimize waste from the outset, the creation of some amount of 'end-of-pipe' waste is inevitable.

This tool specifically gathers information on the assumptions necessary for a product to be recycled. The lack of regulation surrounding use of the chasing arrows symbol (♺) allows any product to display the icon, regardless of whether or not the product is actually recyclable in a municipal recycling program (Tabuchi & Choi-Schagrin, 2021). California SB 343, a 2021 bill estimated to come into effect in 2024, restricts use of the chasing arrows symbol to products or packaging that are considered recyclable based on the statewide criteria detailed in the bill; however, California is the first and only state to enact this type of regulation (Millar et al., 2021). Companies with verifiable claims that their products or packaging is able to be recycled in municipal programs (i.e. products that would already be in compliance with a bill such as SB 343) should be preferred over those without such verification.

Companies that have a takeback program to facilitate in-house recycling are able to give details of their program in Q5.

Q5: Does your company have a takeback program to reclaim consumed goods or packaging?

Answer Choices:

Yes

No

Q5a: If yes, explain

Q5 assesses whether a company has created alternative avenues for post-consumer goods, generally in cases where products or packaging cannot be recycled through a conventional recycling program (i.e. an easily accessible municipal recycling program), such as a takeback, buyback, or recycling program. Companies with a takeback program are asked to describe details of the program.

Companies that have established a takeback program for post-consumer materials are ranked higher than those without a program. Takeback, buyback, and recycling programs are a subset of Extended Producer Responsibility (EPR), a policy approach that shifts the responsibility for the management of post-consumer goods to the producer, rather than to consumers or local waste agencies (Biron, 2020; Rogoff, 2014). EPR programs have been found to lead to higher rates of recycling and collection rates (OECD, 2014) and have achieved widespread success – Best Buy has recycled 2 billion lbs of e-waste since 2009 (Smith, 2019), while Patagonia repaired 100,000 pieces of clothing in 2018 alone (Bianchi, 2019).

In addition, in light of the adoption of EPR policy worldwide (OECD, 2014), companies with already established take-back or recycling programs are regarded by this tool as more attractive investments due to their preemptive compliance with EPR regulations. EPR programs also encourage companies to design their products for easier recycling, repair, or refurbishment (Clean Production Action, 2007), indicating that companies with take-back programs are more likely to be actively designing products for a more circular end-of-life.

Subsection 2: Reduce

This section evaluates the potential for a company's product or service to contribute to reductions in waste, emissions, and other natural resources.

Q1: What does your company aim to reduce?

Waste
Emissions/pollutants
Natural Resources/Virgin Materials
Energy consumption
Other

Q1a: If your company aims to reduce waste, select which type of waste

Plastic Packaging
Cardboard Packaging
Food (Meat)
Food (Produce)
Plastics
Microfibers
Other: Fill in response

Q1a.1: If your company aims to reduce waste, how much waste does your product or service reduce? What baseline comparison is used in your assumptions?

Q1b: If your company aims to reduce emissions/pollutants, which emission(s) and how does your company's primary product or service reduce emissions?

- Air Emissions:
  - CO2
  - Methane
  - Aerosols
  - NOx
  - SOx
  - Halogenated Gases
  - VOCs
  - Other
- Water Pollutants:
  - Nitrogen Compounds
  - Phosphorous Compounds
  - Other

Q1b.1: How much emissions does your product or service reduce? What baseline comparison is used in your assumptions?

Q1c: If your company aims to reduce consumption of natural resources, please explain how:

Q1c.1. How much consumption of natural resources does your product or service reduce? What baseline comparison is used in your assumptions?

Q1d: If your company aims to reduce energy use, please explain how:

Q1d.1. How much energy usage does your product or service reduce? What baseline comparison is used in your assumptions?

Q1 collects information on what reductions a company claims to make. Companies select categories in which they claim to cause reductions and are prompted to answer additional questions for each category.

Q1b collects information about any avenues by which a company's product or service reduces emissions or pollution. Information about the types of emissions/pollutants, as well as details about how the company achieves emissions reductions, is collected in Q1b.1. The emissions and pollutants given as answer choices are divided into Greenhouse Gases, Air Pollutants, and Water Pollutants. Greenhouse gas emissions are ranked by Global Warming Potential, as detailed in the figure below. The primary greenhouse gasses of concern are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. These gasses are compared to one another due to their shared ability to absorb infrared radiation. Table 3 includes some key characteristics of the greenhouse gasses listed.

Table 3. Characteristics of Greenhouse Gases (US EPA, 2016)

Species	Chemical Formula	Lifetime (years)	Global Warming Potential (100 years)
Carbon Dioxide	CO_2	variable	1
Methane	CH_4	12	25
Nitrous Oxide	N_2O	114	298
Hydrofluorocarbons	HFCs	270	14,800
Perfluorocarbons	PFCs	2,600-50,000	12,200
Nitrogen Trifluoride	NF_3	740	17,200
Sulfur Hexafluoride	SF_6	3,200	22,800

Subsection 3: Reuse

This section explores the assumptions behind a reusable product or reuse service. This section assesses product lifespans and displacement of single-use products, as well as environmental effects during the use phase of a reuse service model.

Q1: What is the lifespan of your product?

Answer Choices:
- Single Use
- Weeks
- Months
- Years

Q1a: How does your product lifespan compare to the status quo? Please state any assumptions made.

Answer Choice: Fill in response

Q1 collects information on the estimated lifespan of a product. Investors can compare product lifespan to the average product lifespan across the industry, and examine the assumptions made to obtain that value.

Q2: How many uses does your product get within a single lifespan?

Answer Choice:
- 1-25
- 25-100
- 100-1000
- 1000+

Q2b: Please fill in the specific value here.

Q2 collects information on the estimated number of uses during a product's lifespan. Investors can use this information in further analysis that requires per-use data.

Q3: Is your product designed for reuse (displacing single use products)?

Answer Choices:
- Yes
- No

Q3 and Q4 categorize companies into two prominent business models within the 'reuse' category: rental companies and product life extension companies. Additional questions in this section explore the assumptions behind each business model.

Q4: Is your business a rental service?

Answer Choices:
Yes
No

Q4a: How many times does each customer typically use your product before returning?

Answer Choice: Fill in response

Q3 and Q4 categorize companies into two prominent business models within the 'reuse' category: rental companies and product life extension companies. Additional questions in this section explore the assumptions behind each business model.

Q4a asks companies to give pertinent information about customer behavior when using their rental service. Collecting information on customer usage of a rented product can help investors understand the environmental harm avoided by using a rented product instead of purchasing a new product.

Q5: Is your product designed for refurbishment?

Answer Choices:
Yes
No

Q5a: If yes, please explain your refurbishment process. Is the product returned to the same customer or refurbished and resold to a new consumer?

Answer Choice: Fill in response

Q5 asks companies to explain any product refurbishment that occurs. Companies that provide in-house refurbishment services are able to explain the process of refurbishment, as well as details about the post-refurbishment phase.

Q6: Is your product designed to have a longer lifespan than the industry standard?

Answer Choices:
Yes
No

Q6a: If yes, what is the typical lifespan (or # of uses) of the product following the industry standard?

Answer Choice: Fill in response

Q6b: If yes, what is the lifespan (or # of uses) of your product?

Answer Choice: Fill in response

Q6 allows investors to learn how a product's lifespan compares to the industry standard. This provides investors with a more easily understandable idea of the possible environmental benefits of a reusable product.

Q7: What are the environmental impacts which occur per the use of your product or service?

Answer Choice: Selection of multiple
- Water Use (i.e. washing)
- Shipping (i.e. rental)
- Energy Use (e.g. charging)
- Emissions (e.g. hairspray)
- Refueling/refilling (e.g. refill gas tank)
- Other

Q7a: Explain (quantify if possible)

Q7 collects information on any environmental impacts that occur during the use phase of a reusable product. Using information collected about resources consumed during product reuse allows investors to determine whether the reuse of a product will be able to displace the resources consumed during primary production.

The following equation can be used to compare the impacts of primary production in a linear model to the impacts of a rental business model (this equation assumes the impacts per use of the product or service are the same. If these impacts are different, such as a rental company using chemicals to wash the product that are not otherwise used by a consumer, this can simply be incorporated into the equation):

Rental Equation:

(emissions from primary production) + (# rentals) * (emissions from shipping) * (2)

Linear Equation:

(emissions from primary production + emissions from shipping) * (number of virgin tents purchased)

Q9: What mechanisms are used to ship your product?

Answer Choices:
- Truck
- Marine Shipment
- Air
- Train
- Other: Fill in response

Q9a. Do you know the estimated GHG emissions in kg COeq produced per order?

Answer Choices:

Yes
No
Q9a1: If yes, quantify here

Q9b. What is the average number of shipping miles per order for the last year of sales?

Answer Choice: Fill in response.

Q9c. Is your company taking steps to offset emissions?

Answer Choices:
Yes
No
Q9c1: If yes, what steps is your company taking to offset shipping emissions?

Answer Choice: Fill in response

Q9 explores the emissions resulting from the delivery phase, as well as any offsetting programs used by the company. While a variety of emissions are released in all shipping mechanisms (e.g. NOx, SO2, particulates, etc), this tool focuses on CO2 emissions due to varied effects of additional pollutants. Marine shipment was found to result in the lowest CO2 emissions, followed by train, truck, and air transport (EEA, 2021; OECD, 1997).

Q10: Does your product produce any emissions during use?

Answer Choices:
Yes
No
If yes, explain (quantify if possible)

Q10 collects information on any emissions produced during the use phase of a reusable product. Using information collected about resources consumed during product reuse allows investors to determine whether the reuse of a product will be able to displace the resources consumed during primary production.

Q12: How much energy is required to use one unit of your product one time?

Answer Choice: Fill in Response

Q12 collects information on any energy used during the use phase of a reusable product. Using information collected about resources consumed during product reuse allows investors to determine whether the reuse of a product will be able to displace the resources consumed during primary production.

Q12: Does your product require refurbishment between each use?

Answer Choices:
Yes
No

Q12a: If yes, what inputs are required to refurbish your product?

Answer Choice: Fill in response (N/A is acceptable)

Q12 collects information on any refurbishment or repair that is necessary during the use phase of a reusable product. Using information collected about resources consumed during product reuse allows investors to determine whether the reuse of a product will be able to displace the resources consumed during primary production.

Section 4: Environmental Section

This section collects basic environmental information for monitoring and data analysis purposes. LCA data, primary production impacts, water use, and energy use are covered in this section, along with information on those metrics for close industry competitors. This data can be used in conjunction with others for further analysis; for example, as shown in the case studies included in previous report sections, primary production values are vital in determining the net benefits of a rental model.

This section also includes a question evaluating compliance with REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulations. While this regulation only restricts companies within the European Union, compliance with REACH protocols is highly valued due to the possibility of similar regulations being enacted elsewhere.

Subsection 1: Impact

Q1. Has your company completed an LCA on your product or service?

Yes

No

Q1a. If yes, please upload

Q2. Do you know the environmental impacts of the primary production of your product or service? (in kg CO2eq or other GHG equivalent)

Yes
No
Q2a: If yes, please include here

Q3: Do you know the comparable GHG intensity of your closest industry competitor or industry average?

Q3a. If yes, please include here

Q4: Do you know the comparable water intensity of your closest industry competitor or industry average?

Q4a. If yes, please include here

Q5: Do you know the comparable energy intensity of your closest industry competitor or industry average?

Q5a. If yes, please include here

Subsection 2: Water

Q1. What is your annual water use?

Answer Choice: Fill in response (_____ liters per unit (or annual total if per unit measure does not apply)

Q2. Do you reuse water in your manufacturing process?

Answer Choices:
- Yes
- No

Q2a. If yes, how much water do you reuse?

Answer Choices:
- 0-25%
- 25-50%
- 50-75%
- 75-100%

Subsection 3: Toxic Chemicals

Q1. Do you use any chemicals that are listed on REACH?

Answer Choices:
- Yes
- No

Q1a. If yes, which ones?

Answer Choice: Fill in response

Subsection 4: Energy

Q1. What is your annual energy use (kwH)?

Answer Choice: Fill in response (_____ KwH per unit (or annual energy use if per unit measure does not apply).

Q2. Do you use renewable energy sources?

Answer Choices:
- Yes
- No

Q2a. If yes, which

Answer Choices:
- Geothermal
- Nuclear
- Wind
- Solar
- Other