

BOM Impact Journey

Pilot 2: Impact of contributing to the protein transition

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MANAGEMENT SUMMARY

This thematic forward-looking impact assessment, focussing on BOM's impact on the protein transition, is a key part of the exploration phase of BOM's impact journey

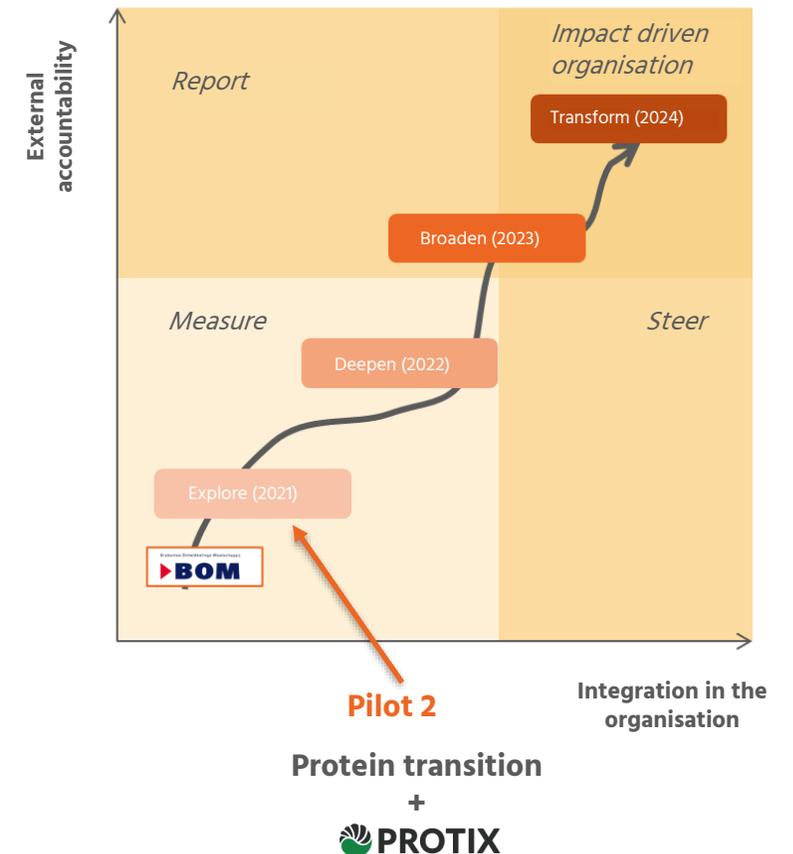
The growing global population and its need for increasing quantities of protein are currently being satisfied by largely unsustainable animal husbandry and agricultural practices. There is an urgent need for a transition towards sustainable production and consumption of protein. BOM is intent on playing a role in facilitating this transition through its venture development, ecosystem building and internalization.

This pilot is a key part of the explorative first phase of BOM's impact journey and their strategy to becoming an impact driven organization. **The goal of the pilot** was for BOM to explore how impact assessment can be a useful for forward-looking decision making. The following key learnings were realized through this pilot:

- Through active knowledge sharing BOM gained insight into the impact assessment process and

methodology followed related to a specific theme - in this case protein transition. The steps taken in the project can be applied to other topics or areas.

- This pilot project provided BOM with an Excel model that can help them understand the impacts of potential partnerships, especially in the alternative protein market. This pilot demonstrated the potential of impact measurement of activities that BOM is involved in that extend beyond just investment.
- The pilot demonstrated the application of using qualitative impact assessment to get a deeper understanding of a sector or topic. The tool provides a scenario analysis functionality of how impact arises in the protein transition and insight into how BOM can drive this impact.



MANAGEMENT SUMMARY

Supporting and accelerating the protein transition offers a great way for BOM to make impact, in particular, where beef-based animal protein is replaced by alternative sources

This pilot helps BOM determine how to best contribute to the current societal challenge of unsustainable methods of protein sourcing.

The tool developed during this forward-looking pilot provides BOM with a qualitative impact assessment of alternative protein sources. The selected protein sources are of strategic importance to BOM, namely plant-based alternatives, mycoprotein alternatives and insect-based alternatives. This tool helps BOM perform a scenario analysis and estimate the current and long-term impact of its involvement within the protein transition and the particular horizons therein.

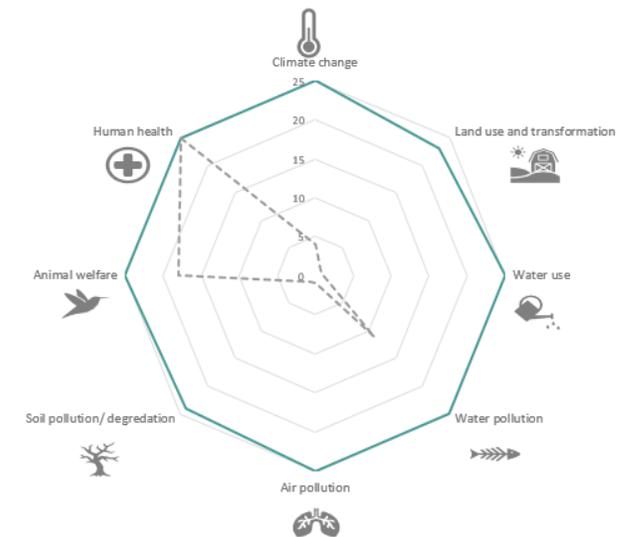
Despite some negative impact on the environment due to their production processes, alternative proteins almost always perform better than traditional animal-based proteins. There are, however, differences in

efficiency between these alternative sources, albeit small.

BOM's involvement in the protein transition will also inspire other actors in the wider system¹, thereby, stimulating a faster transition, which produces a potential large system wide impact.

BOM could amplify its impact by focusing on replacing more unsustainable sources of animal-based protein. By focusing on beef for example, the impact that BOM can make might be larger. BOM could also increase its direct impact by accelerating its involvement in the protein transition, since its direct impact will reduce as the market saturates.

Difference in direct (and absolute) impact of the plant-based protein (green) and beef (grey).



Key:

- Archetype alternative protein = **plant-based**
- - - animal-based protein = **beef**

Scale:

- 0 = negative impact
- 25 = relatively less negative impact



¹The system refers to “organisations and activities beyond the value chain of the organisation in scope. For example, in the wider sector or industry.” ([Impact Institute, 2020](#)).

NOTE TO READER

This is a limited scope pilot focusing on the marginal impact of protein alternatives

The goal of this pilot was to help BOM explore how **impact assessment** can be applied and of **value in the context of a specific theme, in this case the protein transition.**

The reader should keep a few things in mind when reading this report:

- 1) This is a pilot project for BOM with a limited scope. Therefore, a small selection of impacts have been assessed. There are many other impacts relevant in this context. Impacts in scope have been selected based on their materiality but also on feasibility, given the time constraints, and the strategic focus of BOM.
- 2) The assessment of impacts in this pilot is qualitative. Data based on scientific studies and literature have been converted to alternative scales. The

materiality of all direct impacts that are considered in this pilot can be compared to each other on this scale.



INTRODUCTION

The goal of this pilot is to perform an exploratory impact assessment of the contribution of BOM and its partners to the protein transition

BOM is a development organisation that invests in ventures that contribute to the development of a future-proof and sustainable Brabant economy. BOM provides financial investment, facilitates knowledge sharing and provides these ventures with networks and an innovation ecosystem in which to thrive.

A key area of focus for BOM is the agri-food innovation ecosystem. In this area, BOM is intent on playing a key role in facilitating the transition of consumption from resource intensive and environmentally unsustainable animal protein to more sustainable alternative protein sources. This protein transition is the focus of pilot 2, which is a key part of the explorative first phase of BOM's impact journey and their strategy to becoming an impact driven organisation.

BOM would like to understand the best way to make an impact in the protein transition and is faced with several questions in this respect such as:

- Which ventures could be most impactful and how can they be compared?
- What should BOM consider to understand the impact of these ventures?

The added challenge is to answer these questions based on limited information input.

This pilot provided BOM with a tool that qualitatively assesses the impact of ventures based on various scenarios and allows the user to compare these to each other and a reference scenario. The tool gives BOM an insight into the environmental and human impacts of these partnerships and the future systemic impact of these ventures on the protein transition.

The results of this pilot can be used to explore impact thinking and application of a scalable impact assessment methodology in BOM's context, that can support its decision making.



SCOPE

This pilot covers protein alternatives in horizon 1 and 2 of the protein transition

The protein transition is a broad term that captures a variety of developments with the goal of transitioning from unsustainable animal protein to more sustainable sources of protein. In this limited scope pilot, we have built archetypes based on some of BOM's partners and key areas of interest. These archetypes were chosen to ensure that they covered significant innovations in the protein transition and those of relevance to BOM.

The archetypes that were chosen for this pilot were:

- **Plant-based protein:** protein from plant sources for human consumption
- **Mycoprotein:** Fungal protein for human consumption
- **Insects:** Insects (or extraction of protein from insects) used as feed for animals. Direct human consumption is not included.

These archetypes are part of horizon 1 and 2 of the protein transition which include companies that offer products that have relatively high technological readiness and consumer acceptance¹. Examples of companies that fall under these categories are Beyond Meat and Protein Brewery.

Horizon 3 of the protein transition is defined as new sources of food / feed protein that require new technological innovation (relatively low technological readiness) and include cultured meat companies such as Mosa Meat. This horizon is not a key focus area for BOM and hence, is not included in the scope of this pilot.

The tool aims to provide users with a qualitative overview of impact that is based on scientific literature and life cycle analysis studies.

¹ [McKinsey, 2009](#).



IMPACTS IN SCOPE

A limited number of natural and human impacts were analysed because of the explorative nature of this pilot

The scoping phase of the pilot began with the mapping of all the activities, inputs, outputs and resultant outcomes of the different archetypes discussed in the previous page. This exercise culminated in a long list of environmental, human and social impacts that participants of the protein transition have on various stakeholders¹. Based on materiality, feasibility and strategic importance of impacts, the long list of impacts was shortened to a total 9 impacts that can be assessed in this pilot. These impacts are defined in the annex.

Animal husbandry to satisfy the protein needs of a growing population as well as farming for their feed are resource intensive activities with enormous environmental repercussions. Therefore, it is important to compare and contrast the impact of alternative proteins on natural capital as these are believed to be material

advantages over traditional protein sources.

The effect on consumer and citizen health is also included as a material impact, because if alternative protein sources are to replace animal-based protein sources for human consumption the impact this has is critical to consider.

Apart from financial investment and expertise, BOM aims to facilitate the protein transition by providing ventures with an ecosystem in which they can foster and develop. This is an ecosystem of different stakeholders. For BOM to partner with a venture, it assesses the alignment of the organization with its ecosystem, and hence, this impact is deemed material. The ecosystem provides a supportive environment and helps BOM's partners overcome challenges.

Impacts in scope for this pilot



- Contribution to climate change
- Scarce water depletion
- Land use
- Air pollution
- Water pollution
- Animal welfare issues
- Soil degradation



- Effects on consumer and citizen health
- Alignment to the innovation and development ecosystem developed by BOM in Brabant



IMPACT OF A CONTRIBUTION TO THE PROTEIN TRANSITION

Some key takeaways

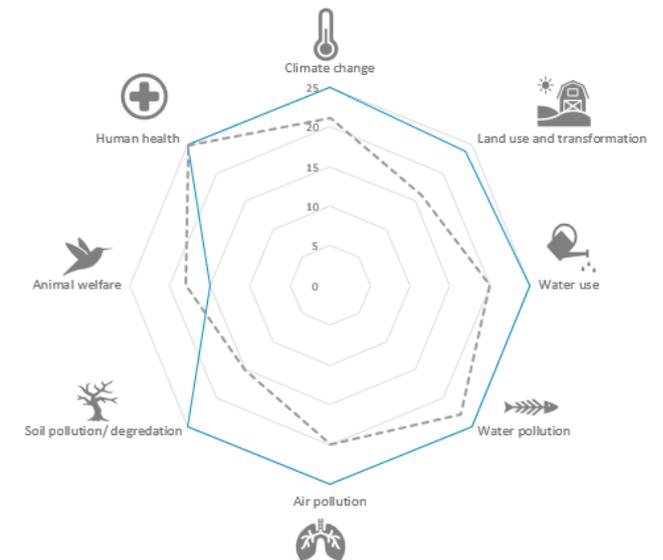
Investments in companies operating within the protein transition help to bring products to market which provide consumers with alternatives to meat-based protein. These products themselves have an impact, and by encouraging different consumption patterns they have a marginal impact compared to meat alternatives.

Outlined below are the key insights that the tool provides:

1. Important drivers of impact are the relevant reference scenario, this is influenced by both the speed of the transition to alternative proteins and the animal-based protein the current alternative is most likely to replace, and the market readiness of the company/technology.
2. All three alternative proteins have negative environmental impact however they are all better than the animal-based protein alternatives.

3. There are differences between alternative-protein types, some protein alternatives have less negative impact than others on different indicators. However, these differences are often small.
4. Marginal impact depends largely on which type of protein the alternative can replace. Because beef has large externalities, substantially larger than, for example, chicken, the marginal impact of an alternative-protein that can replace beef will be larger.
5. Inspiring the wider system, organisations beyond the value chain of the specific organisation, for example, the wider sector industry, can stimulate a faster transition, which produces a large system wide impact.
6. This will reduce BOMs direct marginal impact. If the sector changes faster, there are more alternatives available, which reduces the marginal impact of individual protein alternatives.

Difference in direct (and absolute) impact of the insect-based protein (blue) and pork (grey).



Key:

- Archetype alternative protein = **insects**
- - - animal-based protein = **pork**

Scale:

- 0 = negative impact
- 25 = relatively less negative impact



RESULTS

1. BOM's direct and system impact is influenced by three main drivers

In this pilot, we identified certain drivers of impact that BOM can use to evaluate the ventures that it partners with.

- **Reference scenario:** Based on literature, three protein transitions possibilities (fast, medium and slow) are predicted to occur by 2035 ¹. These form the basis of the reference scenarios described in this pilot. The reference scenarios are compared to a baseline scenario representing society's current plant-based (39%) and animal-based (61%) protein consumption. However, this tool will also allow for alternative reference scenarios to be simulated. The user can choose the reference scenario that they would like to compare the venture in question against.
- **Animal-protein that will be replaced:** The impact of an alternative protein is driven to a large extent by the kind of protein it replaces. For instance, alternatives

that replace beef have more impact.

- **Market readiness:** The market readiness or the point at which an alternative protein can match its animal-based counterparts in cost, texture and taste, is a driver that can determine the indirect/system impact. This is done through discounting of impact depending on how far in the future the venture or innovation will be market ready. In this pilot, it is assumed that the longer a company takes to come to market, the more discounted its impact will be. This, however, does not imply that in the long term the company will not be successful or have low impact. It only implies that in the short term, its impact is lower.



¹[BCG and Blue Horizon, 2021.](#)

RESULTS

2. Replacing animal protein with alternatives generates positive natural capital

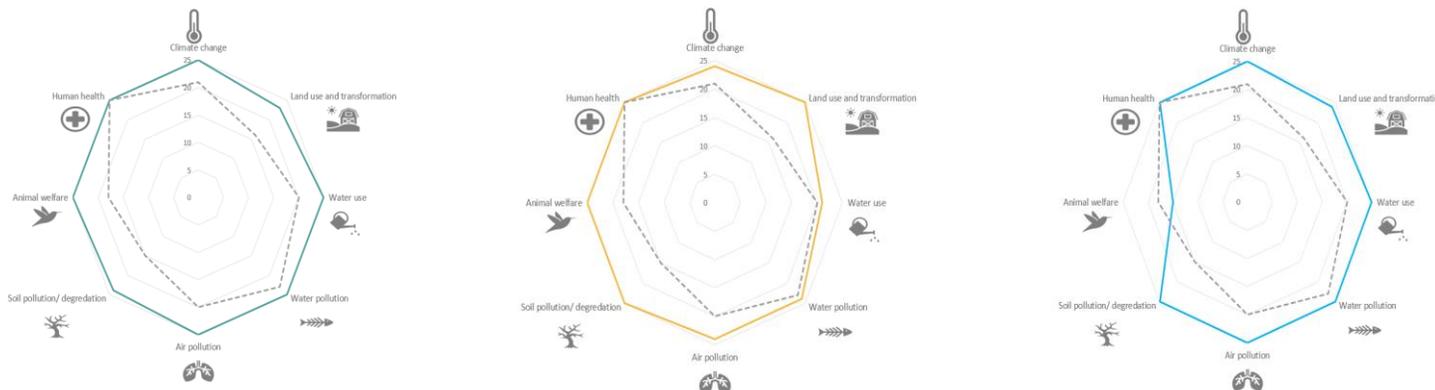
Alternative proteins have a significant positive impact on most natural capital outcomes and this effect is mostly consistent regardless of the alternative protein source. (This magnitude of the effect is dependent on the type of meat protein the alternative is most likely to replace).

Significant natural capital impacts include contribution to climate change, land use and transformation, water

use and water, air and soil pollution. The figures below show the impact of an alternative protein source (colored lines) and pork (grey dotted lines). The difference between the two lines demonstrates the benefit of replacing the one protein type with the other. In all figures, we note a positive natural capital effect from the alternatives when compared with the animal-based protein. The only exception is for animal

welfare, in the case of insect protein as there are significant animal welfare issues present there too. There is mixed research on the extent to which human health is improved by the alternative protein sources and so there is not a comparative effect for this indicator.

Difference in direct (and absolute) impact of the alternative protein (colored lines) and pork (grey).



Key:

- Archetype alternative protein = **plant-based**
- Archetype alternative protein = **mycoprotein**
- Archetype alternative protein = **insects**
- - - Animal-based protein = **pork**

Scale:

0= negative impact
25 = relatively less negative impact



RESULTS

3. The choice of alternative protein is not the most significant impact differentiator

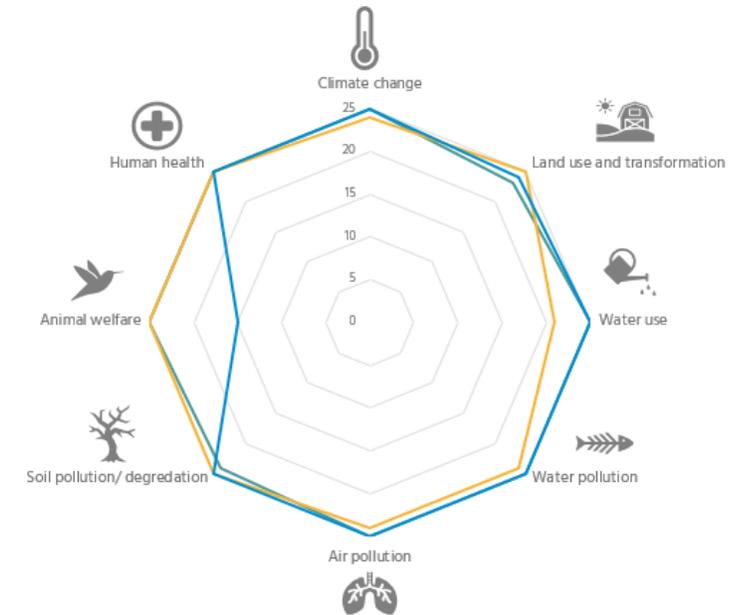
There are differences between alternative-protein types, however they are not that pronounced. This means that the choice of which alternative protein type to invest in, is not a significant impact differentiator.

All three alternative-protein types studied, have positive effects on climate change, land use and water, air and soil pollution, when compared to meat-alternatives.

However, there are some slightly differentiating factors which may be of strategic interest to BOM. Plant-based protein requires slightly more land than the other technologies. Mycoprotein requires large amounts of water and so scores worse on water use than the other alternatives. Insect based proteins, because they

require a large animal input, do not have a positive effect on animal welfare compared to the other alternative proteins.

Difference in direct (and absolute) impact of the three alternative protein types



Key:

- Archetype alternative protein = **plant-based**
- Archetype alternative protein = **mycoprotein**
- Archetype alternative protein = **insects**

Scale:

- 0 = negative impact
- 25 = relatively less negative impact



RESULTS

4. Alternative protein sources that can credibly replace beef will have the largest marginal impact

Marginal impact depends largely on which type of protein the alternative can replace. Animal-based proteins, such as chicken, pork, beef and fish have different impacts. Chicken has relatively lower associated externalities than the others. Beef, by comparison, has large negative externalities (See the grey line in the figure on the far right compared to the

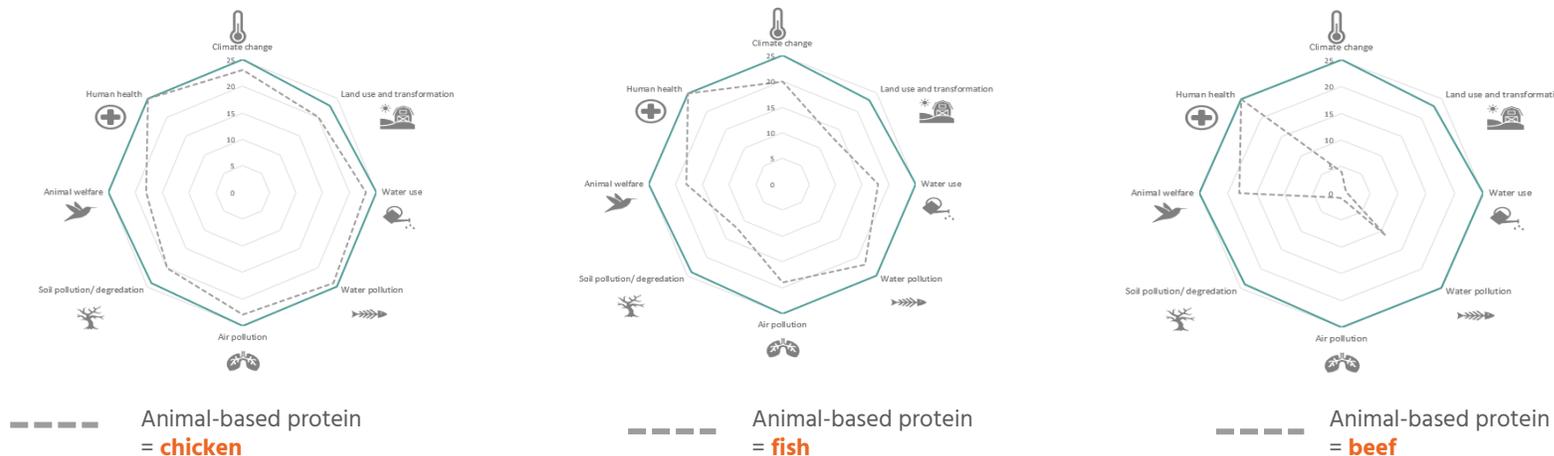
grey line in the figure on the far left).

Because of these differences, the marginal impact of plant-based protein, when compared with the alternatives is significantly larger for beef than, for example, chicken. For this reason, producing alternative protein sources that can credibly replace beef will have

larger marginal impact than those that replace chicken.

Approximately 20%¹ of global meat consumption is beef and buffalo meat, indicating that there is opportunity for large future impact by shifting these consumption patterns.

Difference in direct (and absolute) impact of the plant-based protein (green lines) and three animal-based proteins (grey).



¹ [UN Food and Agricultural Organisation \(FAO\) \(2018\)](https://www.fao.org/3/af082e/af082e01.pdf).

RESULTS | SYSTEM IMPACT

5. BOM has an opportunity to influence the wider eco-system

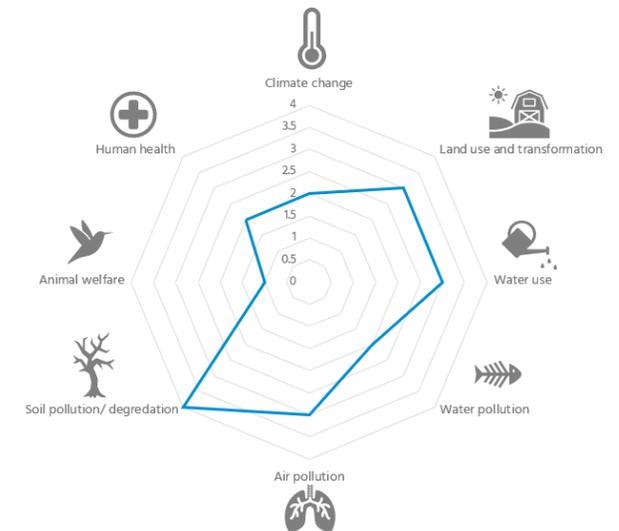
The consumption of protein by society is currently split between 39% plant-based protein and 61% animal-based protein. Current methods of protein sourcing have significant negative externalities such as high land use, contribution to climate change and animal welfare issues, thereby, calling for more sustainable protein sourcing strategies.

Several companies, start-ups and established companies alike, are seeking innovative alternatives to traditional unsustainable sources of protein. These ventures might result in the direct reduction in the amount of animal-based protein consumed by society. Indirectly, the sector also evolves due to innovations such as this. By increasing sales of an alternative protein, there is a system impact which increases

visibility of alternative proteins and encourages consumers to take notice of these products. This helps to educate consumers of the need for a protein transition, the impact of their actions and normalizes consumption of alternative protein, thereby, positively impacting the whole sector.

BOM, by investing in or helping develop alternative proteins, could create large indirect impact by inspiring the eco-system. This is shown in the figure on the right which shows the potential system impact where the alternative insect protein is compared with pork. Alternatives that are less market ready can have a large system impact in the distant future but given a large amount of uncertainty this impact is discounted and so has a lower system impact today.

Indirect system impact of insect protein. The impact seen is the marginal impact between the archetype (insects) the animal-based protein that it replaces.



Key:

— Archetype alternative protein = **insects**, compared with the animal-based protein = **pork**

Scale:

0 = negative impact
5 = relatively less negative impact



RESULTS | SYSTEM IMPACT

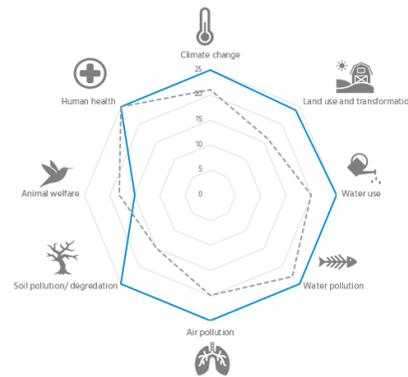
5. A faster transition will decrease BOMs marginal impact but given where the market is now, BOM can have a large direct impact and help inspire system wide change.

In a no-transition scenario, BOM does not have a large indirect system impact as the system does not change (see figure on the top right). However, they have the potential to have a large marginal direct impact (see the difference between the blue and grey lines in the figure on the top left).

In a fast-paced transition scenario on the other hand – BOM can have a large system impact, if they help to inspire the transition (see the figure on the bottom right). Over time this will reduce their marginal direct impact as can be seen by the fact that the space between the blue and grey lines in the figure on the bottom left. The distance is smaller than the space in the figure on the top left.

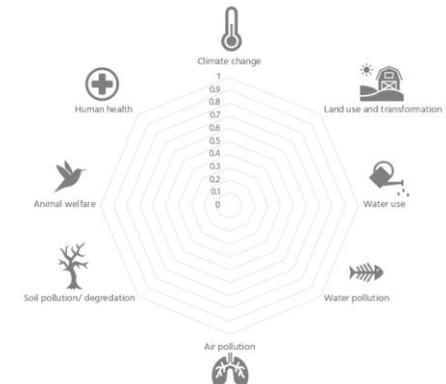
Given that this is a relatively new market, BOM has an opportunity to generate high marginal direct impact now and system impact in the future.

Difference in direct (and absolute) impact of the insects vs pork

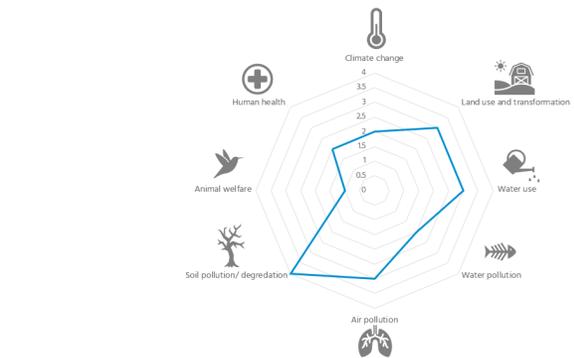
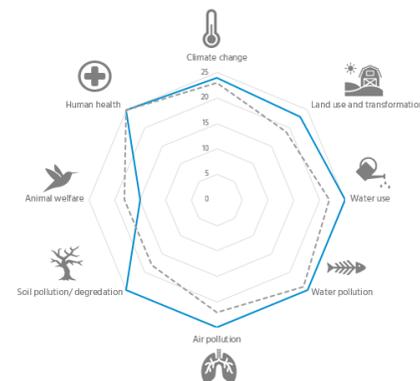


No transition scenario:

Difference in indirect system impact of the insects vs pork



Fast transition scenario:



Key:

- Archetype alternative protein = **insects**
- - - Animal-based protein = **pork**

Scale:

- 0 = negative impact
- 25 = relatively less negative impact

Key:

- Archetype alternative protein = **insects**, compared with the animal-based protein = **pork**

Scale:

- 0 = negative impact
- 5 = relatively less negative impact



THEORY: ABSOLUTE AND MARGINAL IMPACT

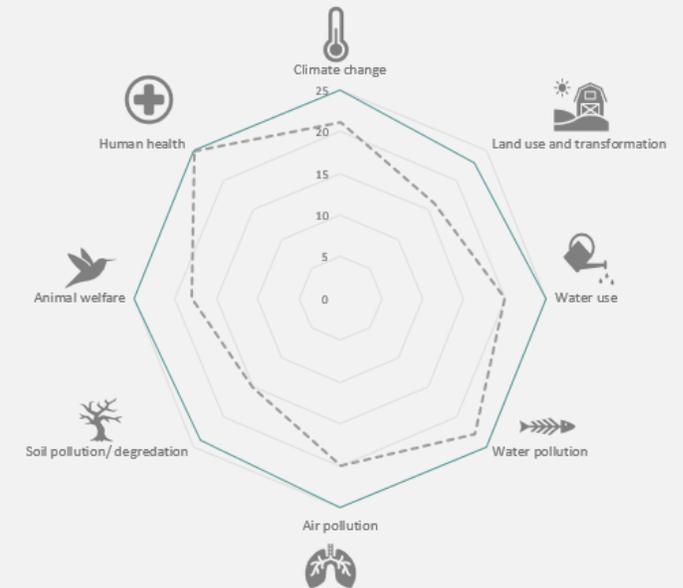
Two types of impact can be defined depending on the choice of reference scenario used to calculate them.

Absolute impact is “the impact in which the activities of the organisation under consideration are compared to a reference scenario in which no activities occur.”¹ Absolute impact would describe, for example the total contribution to climate change, of an organisation or of a protein source, without any comparison. The green line in the figure on the right describes the absolute impact of plant-based protein. The dotted grey line represents the absolute impact for pork.

Marginal impact, on the other hand, compares the impact of the activities of an organisation to those of a likely competitor or alternative. An example of marginal

impact is the limitation of climate change from the production of a plant-based protein compared to animal-based protein which it is likely to replace, at least in part. The marginal impact for a plant-based protein that replaces pork, is the difference between the impact of the two scenarios – the area in between the two lines in the figure, thus gives an indication of the marginal impact.

Difference in direct (and absolute) impact of the plant-based protein (green) and pork (grey).



key:

- Archetype alternative protein = **plant-based**
- - - Animal-based protein = **pork**

Scale:

- 0= negative impact
- 25 = relatively less negative impact

¹ [Impact Institute \(2020\), A Guide for Funders to Assess and Value Impact](#)





THEORY: REFERENCE SCENARIO

Choice of reference scenarios affects the impact

As mentioned previously, impact is defined as the difference between an activity or archetype company and a reference scenario. A reference scenario describes a situation where the archetype company does not exist. This allows to capture both, absolute and marginal impact.

In this model, reference scenarios were based on the shift in consumption of animal versus plant-based protein. Here not individual diets were considered, but the share of animal and plant-based protein consumed by society.

Because the speed of the protein transition is uncertain, we assumed three different reference scenarios depending on more optimistic and more cautious

outlooks based on research¹.

Combining current societal consumption of approximately 61% animal vs 39% plant-based protein with growth assumptions based on literature, we arrived at the following reference scenarios:

- **Slow:** In 2035 the split between animal and plant-based protein will be at 50% animal- and 50% plant-based.
- **Medium:** in 2035 the split between animal and plant protein will be at 45% animal- and 55% plant-based
- **Fast:** In 2035 the split between animal and plant protein will be at 40% animal- and 60% plant-based.

To these three scenarios, additional options were added assuming no transition at all and allowing customized input. These options have been added to allow flexible exploration of the data, however, are not backed by the literature.



¹ [BCG and Blue Horizon, 2021.](#)

THEORY: DIRECT AND INDIRECT IMPACT

Two ways to look at the protein transition

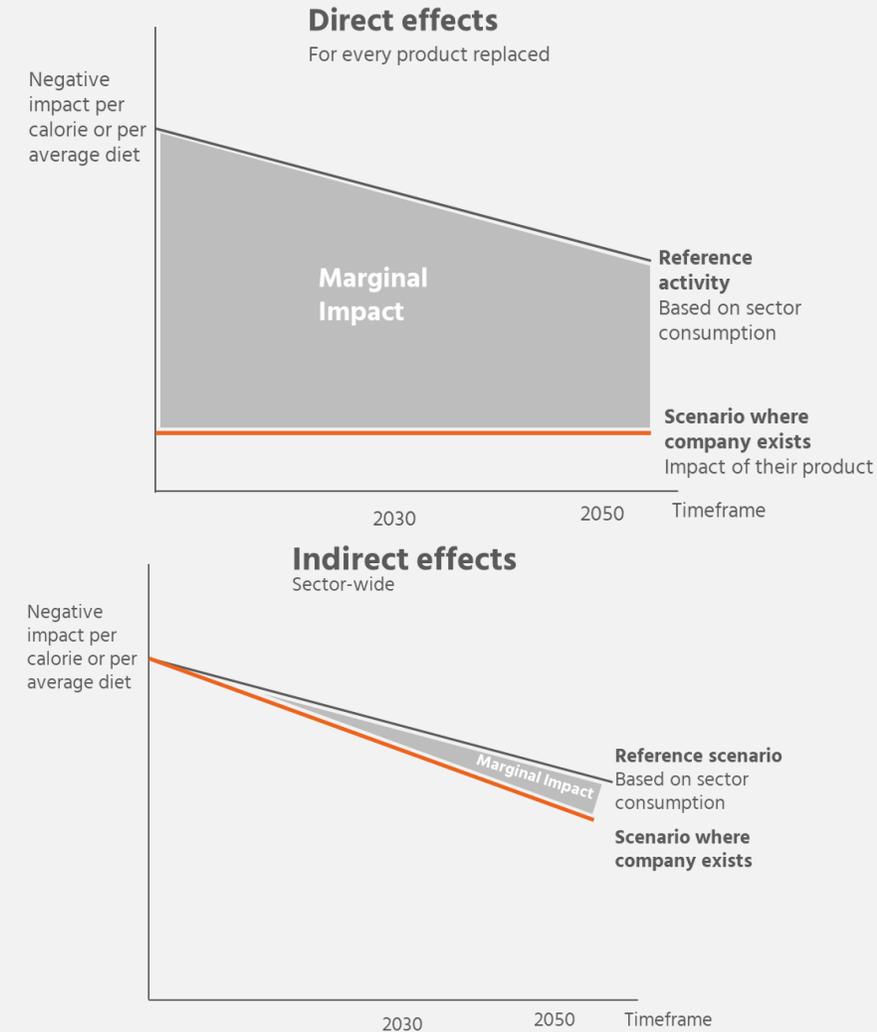
The three reference scenarios in this impact assessment are key determinants of the direct and system impact of a venture on the protein transition. The speed of transition from a largely animal protein-based society to a majority alternative protein-based society has an effect on the size of impact that the ventures have.

In a fast-paced transition, there will likely be several companies working in the space. We also assume that in this scenario, the public will be well educated about the benefits of alternative proteins and have a high acceptance and consumption rate. This would mean that the direct impact that each company is having is small.

However, companies which help to stimulate and inspire this sector wide change, will have a large

indirect impact. The indirect marginal impact describes the difference between the impact that arises in the market as a whole without the specific company and the impact that arises in the market when the company is present. Companies which are very disruptive or influential can have a large indirect impact by inspiring change in the system and giving rise to other protein alternatives.

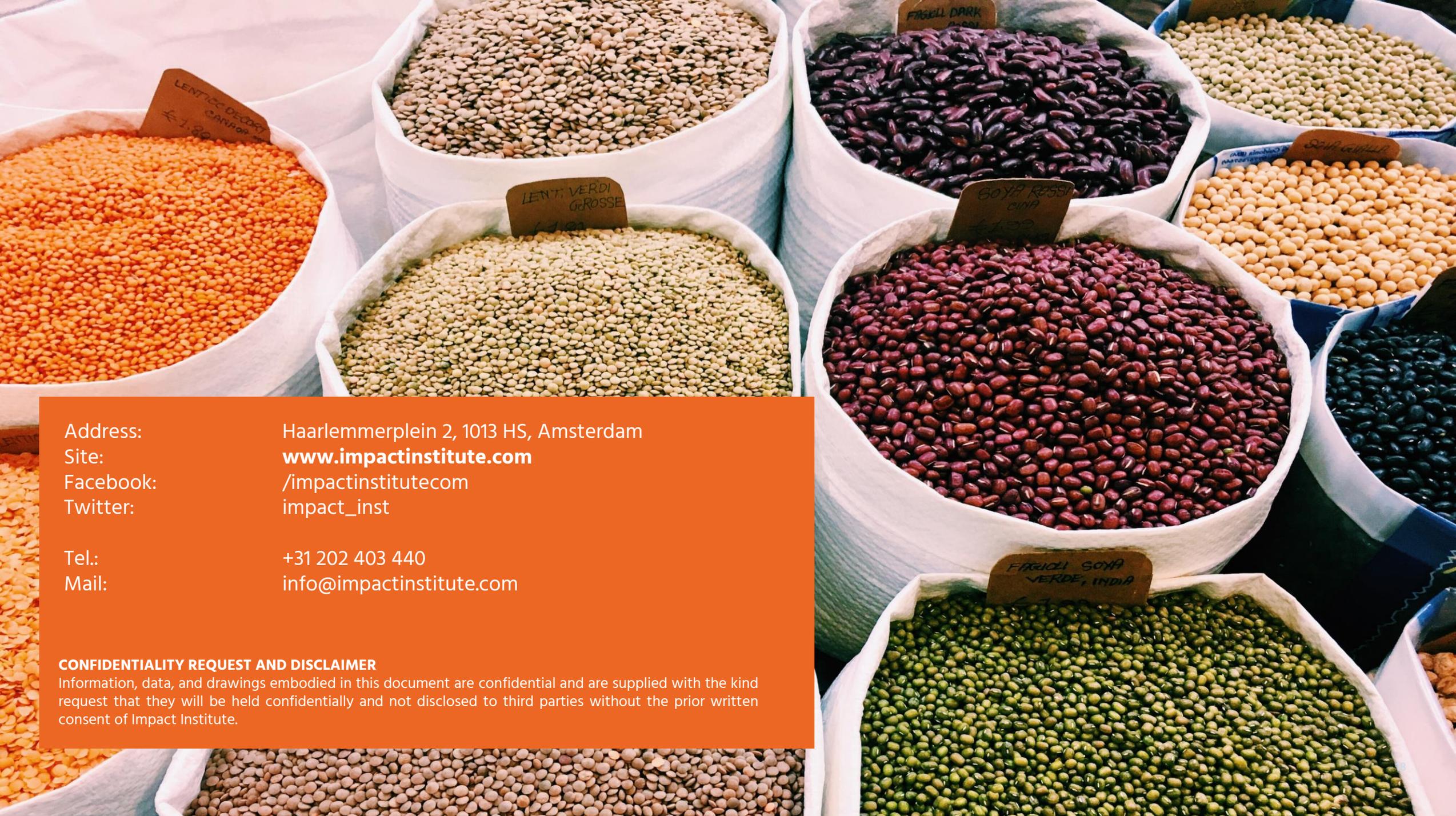
If a company invests early in the protein transition, they will at first, if successful, have a large direct impact. Over time, other parties in the sector will likely be inspired and more competitors will spring up. This will reduce the direct impact over time but, by inspiring the sector, the company is responsible for a large indirect impact.



Illustrations of the direct and indirect effect of a company that is part of the protein transition.



¹ [BCG and Blue Horizon, 2021.](#)



Address: Haarlemmerplein 2, 1013 HS, Amsterdam
Site: www.impactinstitute.com
Facebook: /impactinstitute.com
Twitter: impact_inst

Tel.: +31 202 403 440
Mail: info@impactinstitute.com

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