

Creating a Solutions Portfolio for Supporting Sustainable Startups

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Project Team

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1. Executive Summary

Quantis is an environmental sustainability consultancy specializing in climate strategy, communication, and impact measurement. Quantis' overall mission is to better align businesses with planetary boundaries and the circular economy. As startups will be a critical piece in innovating towards the circular economy, Quantis wants to understand how they can use their institutional knowledge as sustainability consultants to help startups get to market and operate sustainably and efficiently. Currently, the literature on sustainability innovation suggests that there is a strong need for new ways to bridge the gap between start-ups and big firms, to facilitate the transfer of innovations and promote transformative ideas to existing firms. Quantis would be well suited to fill this gap and provide services that cater to sustainably minded disruptive start-ups that enables them to maximize the sustainability benefits of their growth and to convert their sustainability advantage into market advantage.

To assess the potential for Quantis to support these start-ups, a literature review was first completed to define sustainable innovation, the characteristics of a disruptive start-up, and the necessity of markets in which these companies thrive. Additionally, this review was used to landscape the feasibility of incumbent environmental consulting firms in addressing the needs of start-ups while also creating a symbiotic relationship. Findings showed that both entrepreneurial start-ups and incumbent firms are needed to support sustainable innovation. Start-ups, which are less constrained by existing assets and market dynamics, are best equipped to bring disruptive ideas to the market. Incumbents, meanwhile, with their superior resources and efficiency, can support faster, more widespread dissemination of these ideas. The literature also suggests that there is a strong need for new ways to bridge the gap between start-ups and incumbents, to facilitate the transfer of innovations and promote radical ideas to existing firms.

To assess the validity of the findings of our literature review, and to provide personalized recommendations, internal Quantis staff interviews and external start-up interviews were then conducted. The Dow team grouped startups into five categories: Pre-seed, Seed, Series A, Series B-E, and Exit. Start-ups provided insight on their needs from environmental consulting firms, along with ways in which they would envision engaging with an incumbent environmental consulting firm. Quantis staff were able to provide insight into the current services provided by the organization, while also positing potential areas for development or market focus.

Based on our literature review and the insight gained from our interviews, the Dow team has crafted recommendations for Quantis to consider:

Business Case:

- Quantis should focus on startups in industries that Quantis has experience in and that have high decarbonization potential. Agriculture could be a good starting point as it relates to Consumer Package Goods Industry
- Quantis should partner with accelerators, incubators or state governments to screen potential start up clients and improve access to diverse start up markets.
- Quantis may meet the demands of startups by offering limited technical services and advising on the strategic communication of sustainable value.

Mission Case:

- Build expertise over time by starting with pro-bono work for startups in industry, electric power, and transportation fields.

2. Introduction & Background

Quantis Introduction

Quantis is an environmental sustainability consultancy based in Zurich, Switzerland with additional offices in Europe and the United States. They guide their clients through critical environmental challenges to drive sustainable transformation around the world and across industries. Quantis specializes in climate strategy, communication, and impact measurement. Quantis' key sectors include food and beverage, cosmetics and personal care, fashion and sporting goods. Quantis also partners with clients in agriculture, chemicals, construction and materials, information communication technology and the public sector. They broadly categorize their key areas of expertise as: biodiversity, climate, land and agriculture, plastics, and water.

Quantis' overall mission is to better align businesses with planetary boundaries and the circular economy. Startups will be an important part of the shift to a more circular and sustainable economy; Quantis wants to understand how they can use their institutional knowledge as sustainability consultants to help startups get to market and operate sustainably and efficiently. This project analyzes Quantis' capabilities, the startup landscape, and methods to bridge the gap between the two in the United States market.

Existing Capabilities

The firm's general approach is to: (1) assess environmental data; (2) use it to map out informed sustainability goals; (3) and assist clients in meeting those goals. Quantis has especially strong capabilities in the assessment phase; it offers a number of data-intensive modeling services, such as lifecycles assessments, and collaborates with other organizations to develop relevant pre-competitive databases. Quantis' acumen in environmental data assessments still appears to be one of the firm's key differentiators. While technical environmental services were Quantis' primary offering, the firm is transitioning into becoming a more involved advisor with services such as corporate sustainability, marketing, and communications strategy. Consultants emphasized an increasing focus on helping clients engage internally, within their value chains, and externally on various sustainability topics.

Current Clients

Quantis' clients are typically large, established companies with both time and capital to devote to sustainability assessments and goal setting. Most of their clients fall within the following key sectors: food and beverage, cosmetics and personal care, and fashion and sporting goods. Other sectors with fewer clients include agriculture, chemicals, construction and materials, information communication technology, public sector and government. For startups, Quantis has worked with a variety of clients at different funding stages. This includes "spin-offs" of larger companies that may be primarily supported by the parent company. Startups' products have included insect-based proteins, waste management, and chemical recycling.

3. Research Methods

Literature review

Sustainable Innovation

The reduction of business environmental impacts, whether deliberate or not, is a key component of sustainable innovation. Sustainable innovation may take place in a variety of contexts, including design, user experience, product service, and governance.¹ The interplay between these dimensions and the participation of key stakeholders in the innovation process are what enable sustainable innovations to create new market possibilities and accelerate the development towards a more sustainable society.

One of the biggest drivers of this project is the question of where sustainable innovation will originate and who the key stakeholders are. Some argue that the size and entrenched power of existing businesses means that any real impact will have to come from incumbents. Others contend that the economy's unsustainability is so innate that the solution cannot come from within. From this perspective, only outsiders with new ideas and new ways of doing business can catalyze the necessary changes. We conducted a literature review to better understand these two hypotheses.

Most modern theories of innovation begin with Joseph Schumpeter's concept of creative destruction, wherein economic growth depends on the disruptive entry of entrepreneurs into the market.ⁱⁱ In Schumpeter's theory, new ideas are critical to the overall strength of the market economy, even if they depreciate the value of existing products. Schumpeter emphasized the necessity of these innovative forces but paid less attention to their likely sources and drivers. In the years since Schumpeter's 1934 book, there has been considerable research examining the relationship between market structure, firm size, and innovation. Some have argued that large R&D budgets, diversity of marketing and finance resources, and greater ability to absorb losses make incumbents better suited to innovation.ⁱⁱⁱ However, a more robust body of work argues that environmental innovation relies on the interplay between large and small firms. For example, general research on market structure evolution finds that, during periods of innovation, markets tend to include a large number of small, young companies that are nimble enough to transform themselves as technology changes. As markets mature, this population gives way to a smaller number of large, mature firms.^{iv} Additionally, recent research argues that, due to growing economic complexity and uncertainty, incumbent firms should increasingly rely on partnerships with external sources of knowledge to acquire new technologies.^v

Hockerts and Wüstenhagen (2010)^{vi} emphasize these findings, arguing that start-ups and incumbent businesses undergo a "co-evolution" to produce sustainable innovation. In their framing, start-ups initially have an advantage over incumbents because they are unencumbered by existing assets or products that could be cannibalized by new innovations. As innovations mature, however, the advantage swings to large firms because of their superior resource bases, economies of scale, and experience with process innovation. Large incumbents are then more able, and in some cases more willing, to lift sustainable products out of their eco-niches and into mass markets. Hockerts and Wüstenhagen conclude by underscoring the need for "a fine-tuned mix of disruptive and incremental innovation" (p. 490) and argue that support for start-ups in this space lags behind support for incumbents. Bendig, et al. (2022)^{vii} support Hockerts and Wüstenhagen's conclusions and add that a bridge between technology creation by startups and innovation dissemination by incumbent is needed. They propose corporate venture capital as a potential solution.

The findings of this literature review suggest that both entrepreneurial start-ups and incumbent firms are needed to support sustainable innovation. Start-ups, which are less constrained by existing assets and market dynamics, are best equipped to bring disruptive ideas to the market. Incumbents, meanwhile, with their superior resources and efficiency, can support faster, more widespread dissemination of these ideas. The literature also suggests that there is a strong need for new ways to bridge the gap between start-ups and incumbents, to facilitate the transfer of innovations and promote radical ideas to existing firms. We believe that Quantis would be well suited to fill this gap, as we will outline in the rest of this report.

Technological Disruption

High impact industries for decarbonization

The human population has caused climate warming at an unprecedented rate, at least in the last 200 years. Inhabited regions around the globe are affected by the ongoing climate change, and human

contribution continues to worsen inevitable changes in climate and weather extremes. Recent and historical studies show that to hold the global temperature rise no more than 1.5C by 2100, solutions to mitigate climate change and reach a sustainable future boil down to limiting greenhouse gas emissions and capturing already released carbon in the atmosphere. In order to meet these targets, it is essential to understand the current situation and significant emitters as well as explore business-as-usual projections to know where to focus efforts.

According to US Environmental Protection Agency^{viii}, Global Greenhouse Gas emission sources can be analyzed into four different categories such as "Carbon Dioxide," "Methane," "Nitrous Oxide," and "Fluorinated Gases" causing 79%, 11%, 7%, and 3% of GHG emissions in the US respectively (Figure 1). EPA also reports^{ix} that "Transportation" (27%), "Electric Power" (25%), "Industry" (24%), "Commercial & Residential" (13%), and "Agriculture" (11%) are sectoral sources of GHG emissions in the US (Figure 2).

Transportation emissions are led by road transportation, light-duty vehicles, and medium & hard-duty trucks, responsible for 57% and 26 % of transportation emissions, respectively. Aircraft emit 8% of transportation emissions, while Rail and Maritime each are responsible for 2% of transportation emissions (Figure 3). Industry emissions contain some hard-to-abate sectors that are hard to decarbonize, such as Cement, Steel, Aluminum, and Chemicals production.^x The chemical sector is the largest industrial energy consumer and the third largest industry subsector in terms of direct CO₂ emissions after cement and steel. Related to the agriculture sector, the food industry's value chain emissions come from all mentioned stages, such as farm supplies, farming, processing, distributing, cooking & storing, and waste. Still, farming and waste emit more than any other.^{xi} Some of the high GHG topics in agriculture are Rice Cultivation, Drained Peat, Synthetic Fertilizers, Manure, Enteric Fermentation, and Peat Fires^{xii}.

Why are new technologies essential for a sustainable future and to meet net-zero goals?

Although there is prominent news in critical clean technologies such as sustainable airplane fuel, green steel, or extra-powerful batteries, developing and deploying climate technologies remains essential to keeping the global net-zero agenda on track. According to World Economic Forum^{xiii}, digital technologies can reduce GHG emissions from energy, transportation, and agriculture by 20% before 2050 if they are brought to scale. Experts claim that data transparency, digital talent, and partnership will be critical factors in materializing technology adoption.

Early-stage companies will be vital to delivering disruptive innovation to these areas, and supporting these companies with the proper form of services and financing structure will unlock opportunities and determine winners of the new economy. The Figure 4^{xiv} illustrates^{xv} a mismatch of sustainable venture dollars to relative GHG emissions reduction potential. For example, between 2020-2022, while \$16B went into electric mobility subsectors with approximately 1.7 GtCO_e annual emissions reduction potential, only \$0.2B flowed into ecosystem restoration, which has 2.9 GtCO_e annual emissions reduction potential.

Breakthrough Energy is another organization that aims to accelerate innovation in sustainable energy and other technologies to reduce greenhouse gas emissions by partnering with private and public stakeholders. Accordingly, they identified^{xvi} Clean Hydrogen, Direct Air Capture, Long Duration Energy Storage, and Sustainable Aviation Fuels as the world's most pressing needs to tackle climate change.

Startup Stages analysis

Maturity, Raise and Valuation at each stage

Startups are launched to evolve ideas with significant business and impact potential. The evolutionary phase from idea to exit is a continuous process and it is critical to understand the different stages of

startups. Although moving from early-stage to growth stage (venture-funded) can be defined easily, the transition among subsequent stages is loosely defined. In other words, since there are many factors involved, it is hard to identify the exact stage where a given start-ups is in its lifecycle. The duration spent at each stage varies largely based on operating industry, business idea, ownership structure and fundraising capabilities of startups. Like market capitalization to compare the scale of established companies, startups stages give average understanding for organizations' needs, resources and valuation.

As part of this study, the Dow team grouped startups into five categories: Pre-seed, Seed, Series A, Series B-E, and Exit (Figure 5). Each stage represents different maturity, typical raise, and valuation levels. During Pre-Seed Stage, startups are primarily about a business concept or idea, raising less than \$1M through non-dilutive resources such as government grants. Typical valuation at this stage ranges between \$1-3M. Moving to the Seed stage, the Minimum Viable Product and prototypes become visible. The ty raise remains less than \$2M, and the valuation ranges between \$3-10M. Upon proving their product-market fit at the Serie A stage, startups increase their raise to \$3-12M while valued between \$10-30M. From there, startups can raise multiple rounds from Series B to E to drive their growth and expansion journey to become established organizations. At this stage, the typical raise starts from \$10M and goes up to three digits values with a valuation over \$100M. The final step is Exit, where startups demonstrate diverse revenue streams, raise more than \$100M, and are valued at billions of dollars.

In previous sections, the Dow team demonstrated that despite the common negative belief among end consumers towards consumer-packaged goods and plastic usage, the real potential and challenge to reduce global GHG emissions and tackle climate change to reach a sustainable future is correlated with how we make goods (Industry), how we energize infrastructure (Electric Power) and how we move around (Transportation). Accordingly, The Dow team recommends Quantis build expertise over time by starting with pro-bono work for startups in these spaces. The Dow team developed two ways of engagement depending on the startups' maturity.

Internal and External Interviews

A range of start-ups and Quantis staff members were interviewed for qualitative analysis, to obtain insight on the current needs of start-ups for a suite of sustainable tools/recommendations from consultant companies, alongside Quantis's capacity for integrating and utilizing such tools. The list is of interviews is shared under the Acknowledgements Section.

Responses from start-ups were collated to determine trends, consistencies, and outliers between responses. These were then compared to current research on mechanisms used, and the value proposition of, orienting companies around a core value of sustainability to consumers and investors alike. Quantis staff insights were then compared with startup responses to determine overlap and disparities between startup needs and Quantis's current offerings. Please see Appendix C for the interview questions asked to both Quantis staff and start-ups.

4. Insights and Recommendations

Insights

Quantis Internal Interviews

The interviews with Quantis staff member had three goals: 1) to assess whether staffers believe incorporating startups into Quantis' business model is critical to Quantis' mission, (2) to solicit ideas about how to more systematically engage start-ups going forward, and (3) to collect information about past

experiences and challenges working with startups. The key takeaways from the interviews are described below.

- [Startups are critical to closing the ‘gap to target’ for sustainability goals](#)

Each interviewee viewed startups as having the important role “to challenge the status quo, to challenge the current thinking, to challenge the way we are producing and bringing products to the market.” They also expressed the belief that Quantis’ ability to make significant, sustainable change is higher if they work with innovative startups, and they all agreed that this aligns with both the firm’s and employees’ values. Staff viewed most of Quantis’ existing services and clients as creating incremental improvements, so innovative startups are especially valuable to bridge the gap between what’s possible with incremental changes and the sustainability goal or decarbonization target.

- [Working with startups offers an opportunity for deep partnership and lasting impact](#)

Staff are interested in startups whose needs will lead to both a continuous relationship with Quantis and reusable knowledge for other clients. Consultants have done this with current clients, starting with footprinting and then building strategies around biodiversity and climate; these clients host webinars with consultants and their relationship has produced replicable, easily disseminated learnings. Staff feel that their work can significantly shape how a startup develops across all aspects of its business, where as, in larger companies, it is hard to make transformational, business model changes. Larger companies tend to have more inertia and silo-ing, so that the impact of any given project is relatively limited. These deeper partnerships with startups may invigorate staff by directly connecting them to the impact of their work.

- [Knowledge of innovative startups can give Quantis an edge with large clients](#)

Working with startups, which have smaller budgets than more established clients, may require Quantis to offer a discount of their services. However, there may be nonmonetary value in working with startups; particularly innovative processes and products may be routed to Quantis’ more established clients for investment or acquisition. In fact, several interviewees mentioned that some clients already pay Quantis to research startup innovations they’re interested in investing in or acquiring. Quantis may be able to act as a connector between established companies and startups. Additionally, gaining more knowledge in the startup field would allow Quantis to help investment funds develop their internal investment theses. Large investors want to understand how individual projects will contribute to the overall solution to key decarbonization challenges.

External Interviews

The interviews with startups were conducted to assess the range of environmental services needed by early-stage companies in order to best posit how Quantis may be able to fulfill these roles, with services already provided or with potential services in the future. The interviews were also used to gauge the likelihood of startups contracting environmental consulting services, and the form with which such an agreement would take place.

- [Start-ups see value in having technical consulting services](#)

When asked whether they saw value in engaging with an environmental consulting firm, 70% of interviewed companies expressed the desire for environmental consulting services, as it pertains to their company’s mission and consumer base. The companies who did not express such desire found that their products/services either had a limited carbon footprint or were not targeting environmentalism, and therefore did not prioritize sustainability as a driver for their target market. The companies that found value in environmental consulting services posited several potential mechanisms of support, including:

- Improving the start-up's knowledge of sustainable practices.
- Improving their consumer base's knowledge on sustainability.
- Offering more robust briefs/reports.
- Life Cycle Analyses and a "Sustainability Certification" that helps to affirm the science of their product.
- A "sustainability calculator" with associated environmental and economic costs.

- Start-ups find these services to be essential

Not only did the majority of respondent start-ups find environmental consulting services valuable, but some interviewees also found such services essential and central to the progression of their business/products. Interviewees found that this essentiality was dependent on the services provided by the consulting organization. Start-ups that did not find such services essential to their business either felt that they could potentially fulfill their needs themselves or the stage of their business did not yet require such services.

Interviewees agreed that startups, particularly early-stage startups, are less likely to need highly precise, technically complex footprint analyses or LCAs. Startups are primarily concerned with making their case to investors, and investors are often more interested in a company's high-level impact story than in the specific details of the analysis. Interviewees suggested that a more strategy-oriented service could help startups craft their sustainability cases and identify additional audiences for their impact stories. Interviewees believed this could be considered a 'slimmed down' version of Quantis' services and could therefore be offered at a reduced price.

- Investors place high value on sustainability, but ultimately prioritize product and competition scope

Interviewees mostly agreed that investors placed moderate to high value on their company's alignment with sustainable practices. Respondents noted that environmentally friendly messaging, regardless of its magnanimous intentions, appealed to the consumer base of sustainability-oriented start-ups. Some interviewees stated, however that they are weary of greenwashing—superficial claims of achieving environmental justice to appeal to consumers—and advocate for further differentiation between environmentally sound start-ups and competitors who are less so. Interviewees expressed that although investors prioritize an alignment with sustainable practices, product sales, utility, and market competitiveness ultimately take precedence.

Recommendations

Business case

- Quantis should focus on startups in industries that Quantis has experience in and that have high decarbonization potential. Agriculture could be a good starting point as it relates to Consumer Package Goods Industry.

Ultimately, consultants viewed working with startups as a valuable effort. In addition to the mission case benefits discussed below, intentionally working with startup clients allows Quantis to stay on the cutting edge of sustainable innovation and cultivate relationships between established companies and startups. Quantis should consider bridging the gap between their existing knowledge in the consumer-packaged goods, food and beverage sectors, and a more high-impact sector like agriculture. The agriculture sector has significant greenhouse gas emissions and decarbonization potential. Quantis has technical strength in data management and experience in the food and beverage supply chain; agricultural startups tend to be data-oriented and may be critical to food supply chains. High-impact innovations such as regenerative and precision agriculture are coming out of startups and Quantis is lacking involvement in this space currently.

In order to capitalize on Quantis' existing capabilities, Quantis should prioritize startups focused on agricultural or food-based innovation. The following states, in descending order, have the highest agricultural production in terms of cash receipts: California, Iowa, Nebraska, Texas, Illinois, Kansas, Minnesota, Indiana, North Carolina, and Wisconsin ([USDA](#)).

- Quantis should partner with accelerators, incubators or state governments to screen potential startup clients and improve access to diverse startup markets

Several interviewees suggested that Quantis should fill the gaps in its market expertise by partnering with accelerators or incubators. One of the barriers to working with startups that interviewees identified most frequently was the challenge of finding startup clients. With limited staff time to devote to startup clients, Quantis needs to prioritize startups that seem likely to succeed in the market and to have a significant impact on environmental problems. Quantis does not have the expertise or the capacity to filter the startup landscape for potential clients. Accelerators and incubators, on the hand, essentially perform this function when they select applicants for inclusion in their cohorts. Partnering with accelerators or incubators would allow Quantis to offer its services to a select group of startups. It would also ensure that Quantis' clients have access to critical business development resources in addition to sustainability services. Additionally, startups may be better able to afford Quantis' services if they are purchased as part of the accelerator program, so that each startup is only responsible for part of the cost of the service.

In order to reach startups in highly agriculturally productive states (Appendix B: Sustainable Agriculture Incubators in Top-Producing States), Quantis should consider partnering with state/local government grant programs or existing startup incubators. Key concerns about working with startups included the startups' lack of budget and Quantis' lack of capacity to seek out these new clients. These programs will have existing connections to startups and access to funding, either through investors or government grants. This will reduce the amount of Quantis capacity needed for finding applicable startups and managing the startup lifecycle.

- Quantis may meet the demands of startups by offering limited technical services and advising on the strategic communication of sustainable value.

Startups are primarily looking for: (1) dynamic tools and software to track their impacts real time; and (2) business development services for reaching investors. Quantis made a conscious decision to not pivot towards software as a service (SaaS) but paring down typical technical services is still an option to help startups track their impacts. Interviewees mentioned partial lifecycle analyses that were completed on shorter timelines and at less cost. Continuing to offer partial versions of current, strong technical services allows Quantis to serve startups without significantly changing Quantis' core competencies and current business model.

While Quantis does not offer formal business development services, Quantis is extremely competent in communicating value, especially environmental value. Quantis should, as capacity allows, continue to learn about the startup lifecycle and investors' requirements. Consultants have interviewed some venture capital firms to gather insight and should continue to do so, especially if the venture capital firms have a focus on sustainable innovation. In the short term, continuing to offer communication services with a focus on the value of sustainability, reduction in environmental impacts, etc. is a valuable service to startups. Building relationships with venture capital firms and other investors will also allow Quantis to find valuable potential startup clients, rather than using Quantis' capacity to do so.

Mission case

- Quantis should develop sustainable business certification for early-stage startups

Early startups fiercely compete to access capital by drawing the attention of Venture Capital investors and Public Agencies. According to Corporate Finance Institute, only 0.7% of startups are funded by Top Venture Capital firms. In this ecosystem, it is critical to have tools to distinguish from the crowd. Because they are new and lack brand recognition and consumer trust, startups may look to Quantis to establish credibility. This is partially accomplished with technical services, but some startups have asked for a type of certification or “stamp of approval” from Quantis. Startup clients would like to use this certification to demonstrate the legitimacy of their environmental claims and differentiate themselves from other sustainable products. Every interviewee mentioned that startup clients they had worked with in the past were interested in a service like this. Ultimately, Quantis-approved sustainable startups will be in a stronger position to communicate their value proposition to investors and stakeholders in the ecosystem and will increase their fundraising probability and valuation.

The sustainable business certification will have two facets: the internal and external sustainability journey analysis. On the internal side, Quantis can help startups reflect on their own carbon emissions and DEI approach to sustain a sustainable internal structure. On the external analysis, Quantis can analyze the global decarbonization potential if the startup succeeds at scale.

However, interviewees also had strong reservations about pursuing a formal certification option. Staff were concerned that this strategy could lead to legal liability challenges that Quantis is not equipped to address or that it could be perceived as endorsing one technology at the expense of others. Interviewees did not believe such an outcome would be compatible with Quantis’ mission.

- Quantis should perform materiality assessment for VC-backed startups at later stages such pre-IPO

Upon analyzing academic literature, expert interviews, and public corporations’ websites, the Dow team discovered that leading companies^{xvii} determine (Figure 6) and organize their sustainability priorities through materiality assessment. It is a method to define the ESG topics that matter most to the business and stakeholders. In addition, the Materiality Assessment is an emerging area in reporting frameworks and accounting standards such as the Sustainability Accounting Standards Board (SASB) and the Global Reporting Initiative (GRI). The Dow team concludes that the materiality assessment type of engagement would be more suitable for startups that are in the later stages of their life cycle, backed by VC companies already, and have reached maturity in their market.

To create a Materiality Assessment for VC-backed startups, Quantis should follow three steps approach. First, it should help startups to identify and collect data from stakeholders. Second, Quantis should help analyze results and uncover themes specific to business and customers’ needs. Finally, it should help review survey results and visualize them as a chart to compare increasing importance to the organization (x-axis) and stakeholders (y-axis).

5. Conclusion

This report has demonstrated that innovation is essential to deep decarbonization of the modern economy and that the most likely source of this innovation is start-up businesses. These firms are flexible and lack the perverse incentives that might drive an incumbent to sacrifice a more sustainable technology or business model to protect existing products. This report has also clearly shown that the three highest impact sectors for decarbonization in the U.S. and Europe are transportation, electricity, and industry, all of which are outside Quantis’ existing scope of expertise. The highest impact sector that falls within

Quantis' expertise is agriculture, which is the fifth highest impact sector in the U.S. and Europe, though it is the second highest impact sector globally.

As a result, we concluded that Quantis should make increasing engagement with startups a priority and developed recommendations describing how Quantis should approach this challenge from both a business and mission case. From the business case perspective, we recommend that Quantis focus on growth stage start-ups in the agricultural sector. We believe that Quantis' best strategy for increasing its startup clients is to partner with accelerators, incubators or state governments to provide sustainability services on top of the business development services already provided by these organizations. Failing that, we recommend that Quantis develop a slimmed down, less technical version of its services designed to help growth stage startups identify sustainability markets for their products. For the mission case, we recommend that Quantis use pro bono work, a technology neutral sustainability certification program, and an additional materiality assessment service to expand its expertise to high impact sectors like electricity, transportation, and industry.

6. Acknowledgements

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Academic Advisor:

- Prof. Gautam Kaul, Ross School of Business

Quantis Sponsors:

- Jon Dettling, Global Director, Services + Innovation at Quantis
- Mark Green, US Sales Enablement Lead

Quantis Internal Interviews:

- Adrien Trompier, *Food and Beverage Lead, Quantis France*
- Marcial Vargas-Gonzalez, *Innovation Strategy Global Lead*
- Amanda Martin, *Global Client Transformation Lead*
- Philipp Meister, *Global Fashion and Sporting Goods Lead*

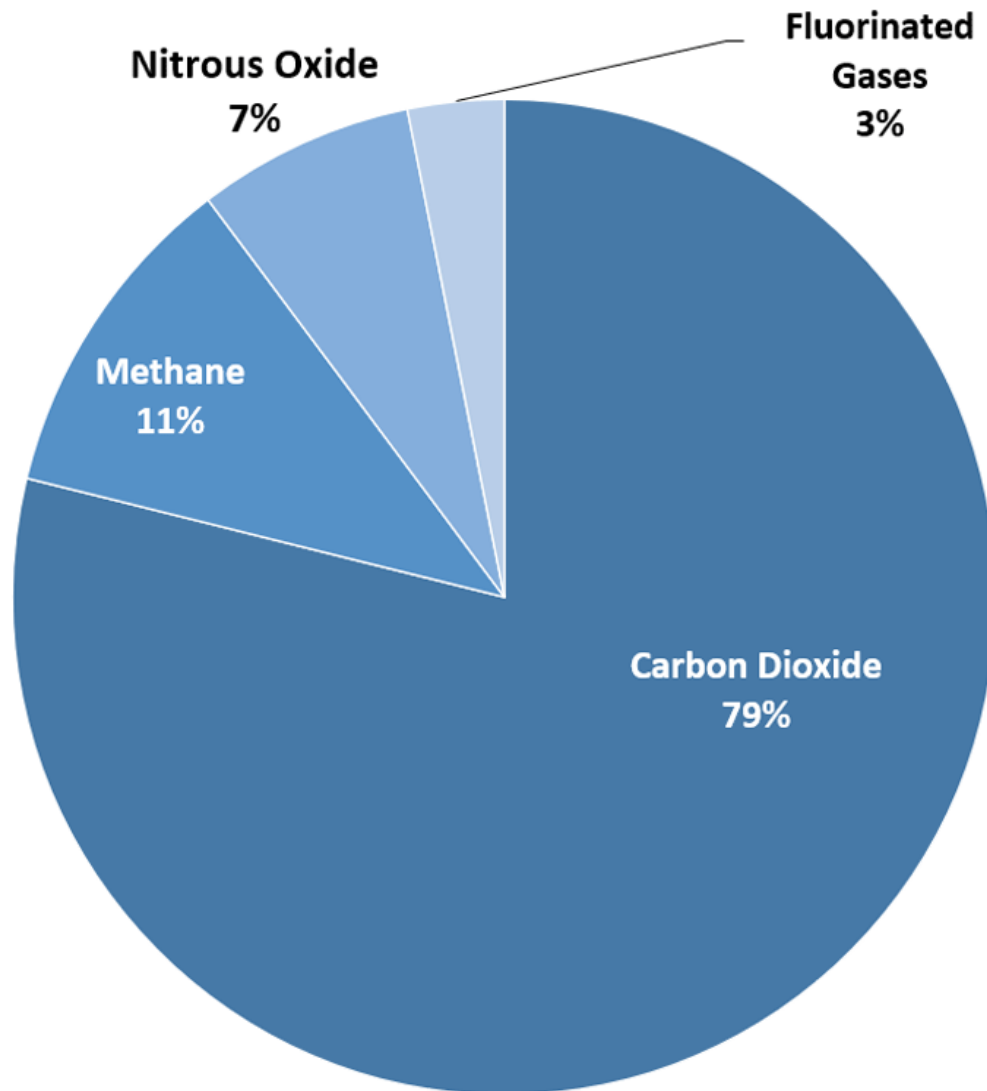
External Interviews:

- Algenesis - Stephen Mayfield, *CEO*
- ContinuumAg - Mitchell Hora, *CEO*
- Creathadh Energy - James McCullagh, *CEO*
- Fluence - Jon Newman, *Commercial Strategy Manager*
- Future Fit Foods - Paloma Lopez, *CEO*
- Greenfield Solutions - Jennifer Luchte, *Sustainability Director*
- Swine Technologies - Matthew Rooda, *CEO*

7. Appendices

Appendix A: Figures

Overview of U.S. Greenhouse Gas Emissions in 2020

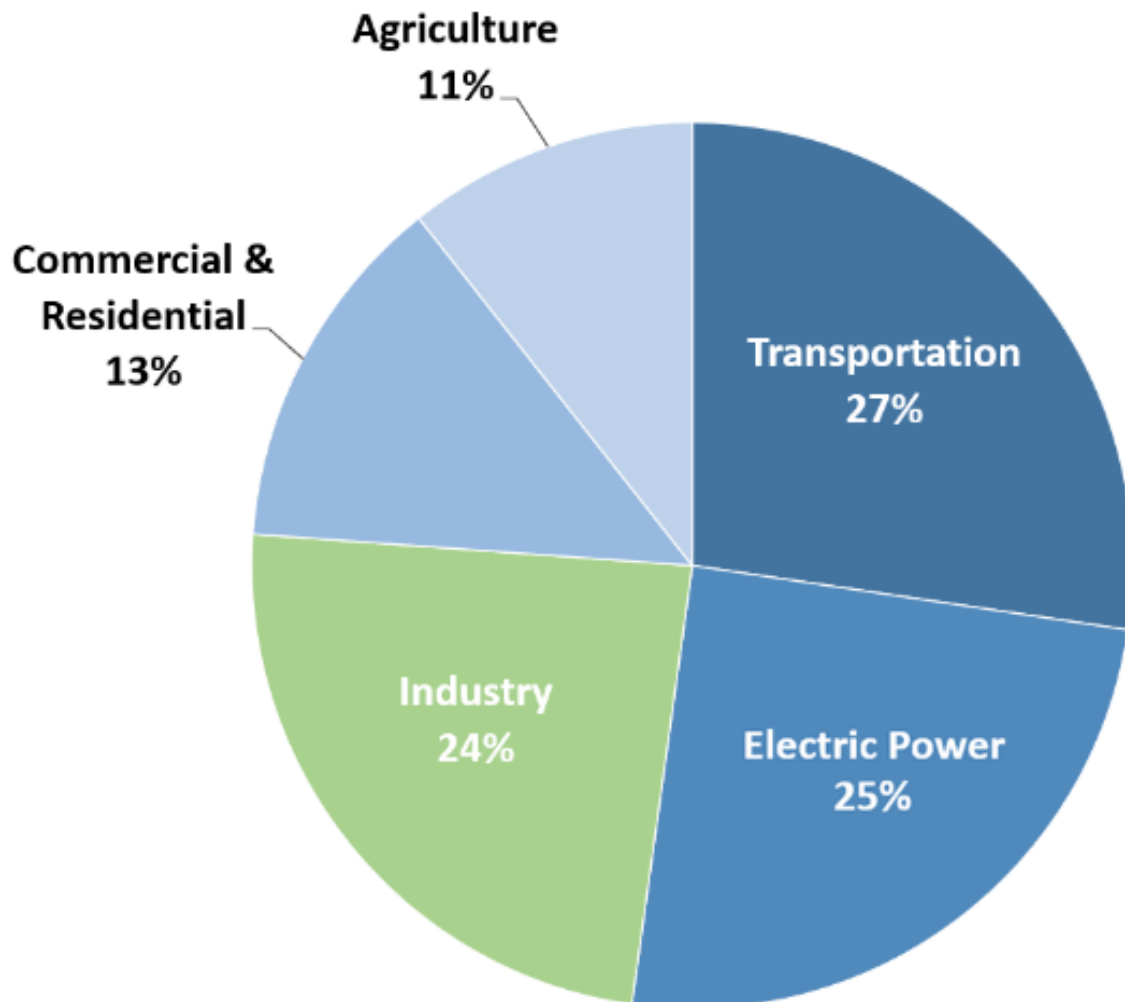


U.S. Environmental Protection Agency (2022). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020

Figure 1: Overview of US GHG in 2020



Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020



Total Emissions in 2020 = 5,981 [Million Metric Tons of CO2 equivalent](#). Percentages may not add up to 100% due to independent rounding.

Figure 2: US GHG by Economic Sector in 2020

2020 U.S. Transportation Sector GHG Emissions by Source

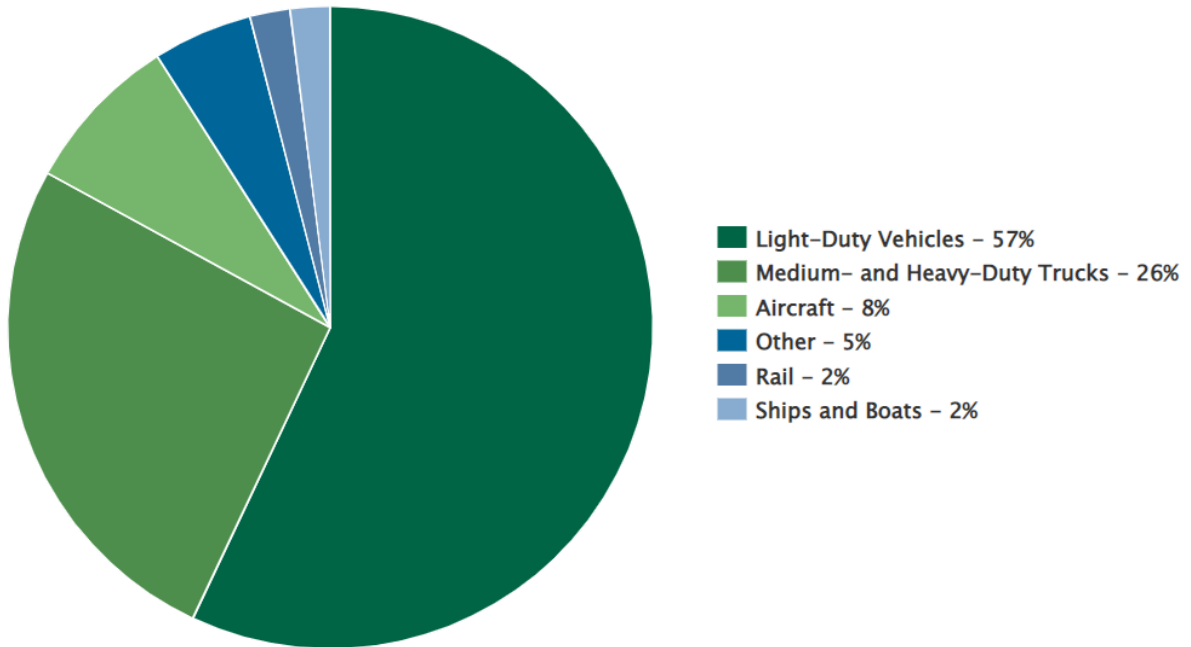
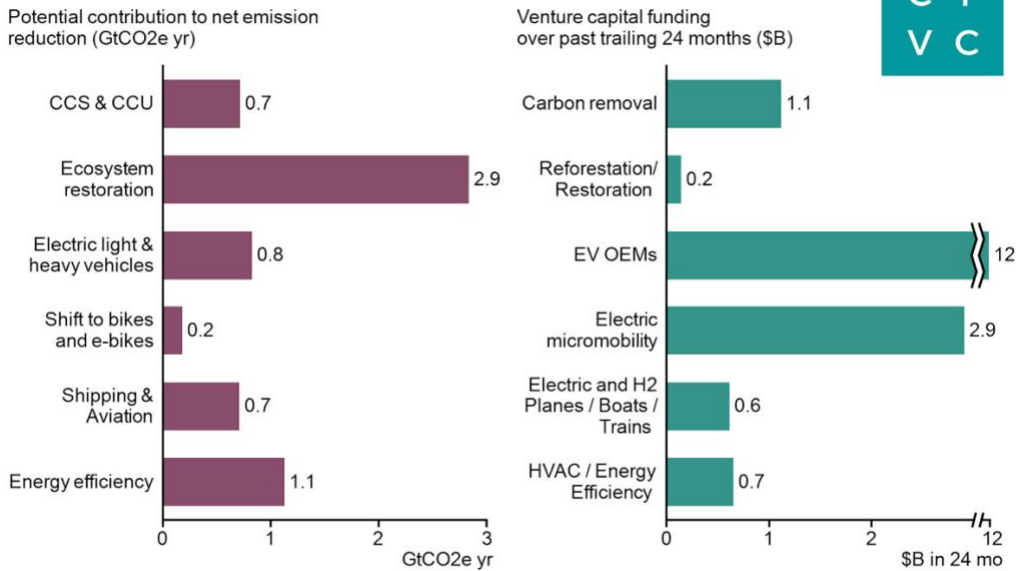


Figure 3: US Transportation Sector GHG Emissions by Source

IPCC mitigation options by CO₂e reduction vs venture funding



Notes: Exhibits select mitigation options from IPCC Figure SPM.7 with a corresponding matching subsector from CTVC climate venture deals tracking. GtCO₂e yr are illustrative and non-exact, based off non-exact visual data. Some IPCC options are grouped and GtCO₂e yr totals are summed. Fundraising data based off all CTVC tracked venture capital deals for trailing 24 months since April 2020.

Figure 4: CO₂e reduction vs venture Funding

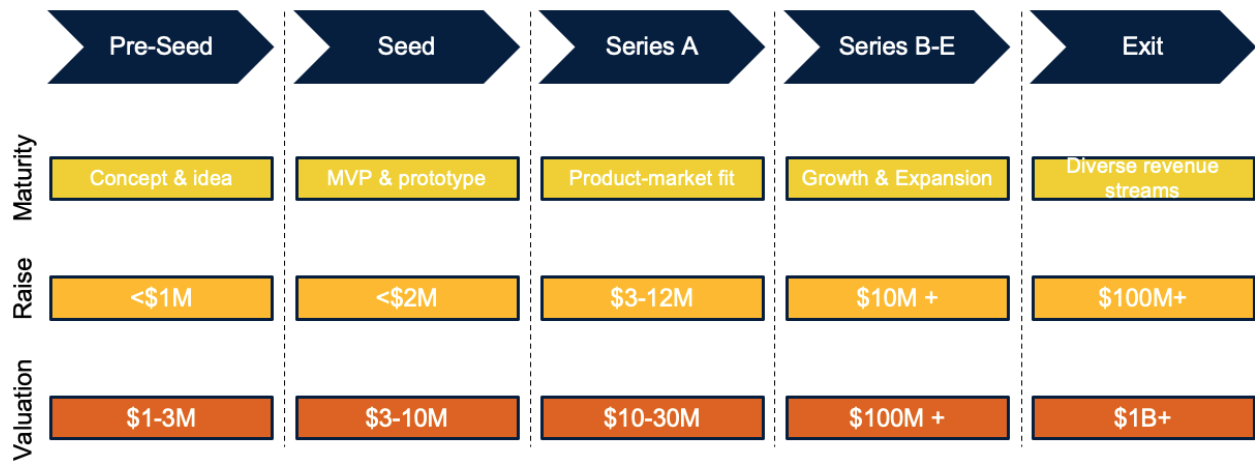


Figure 5: Startup Life Cycle



Figure 6: Kroger's Materiality Assessment in 2020

Appendix B: Sustainable Agriculture Incubators in Top-Producing States

1. California

- a. [AgStart](#): “We provide entrepreneurs in our Northern California region with the connections, education, mentors and access to resources they need to commercialize their innovations.”
- b. [THRIVE](#): “We work with leading corporations, startups, universities, and growers to solve the biggest challenges facing the food and agriculture industries.”
- c. [CA Department of Food & Agriculture](#): There are a number of grant programs available through CDFA centered on anything from pollinators to water conservation to nutrition.

2. Iowa

- a. [Cultivation Corridor](#): Compiles agricultural startup accelerators and incubators around the state.
- b. [Ag Startup Engine](#): “ASE works in tandem with the ISU Startup Factory, ISU Pappajohn Center, and the ISU Agricultural Entrepreneurship Initiative around agriculture-centric ventures and works with AgTech industries including Robotics, Animal Health, Precision Ag, Livestock Automation, and Clean Energy. Along with other related applications.”
- c. [Iowa Grant Watch](#): This website compiles all grants available in Iowa.

3. Nebraska

- a. [The Combine](#): “The Combine is a statewide initiative supporting high growth entrepreneurs in food and agriculture. The program consists of commercialization support through mentorship and a capital readiness program, networking events, a network of partnering producers across the state, as well as incubation space on Nebraska Innovation Campus.”
- b. [Nebraska Innovation Fund](#): The Nebraska Innovation Fund (NIF) Prototype Grant is a matching program that provides financial assistance for new product development to businesses operating in Nebraska.

4. Texas

- a. [Texas Grant Watch](#): Tracks all available grants from Texas state government.
- b. [Agvocate Texas](#): This site tracks all the Texas accelerators, incubators and angel funds interested in agricultural innovation.
- c. [Austin Technology Incubator](#): ATI aims to identify technology-driven companies across the food chain that are working to help create an abundant and sustainable food future.

5. Illinois

- a. [Illinois AgTech Accelerator](#): The Illinois AgTech Accelerator recruits best-in-breed agtech startups worldwide to Champaign for an intensive, 12-week accelerator. Both past clients and upcoming startups are listed on the website.
 - b. [Illinois Innovation Network](#): This incubator acts as a connector between researchers, startups, and investors.
 - c. [Illinois Grant Watch](#): This site tracks all available grants in Illinois.
6. Kansas
- a. [Kansas Freedom Farms](#): An incubator “intent on disrupting ag, energy, grocery, water security, and data processing.”
 - b. [Kansas Department of Agriculture](#): Current grant and cost sharing programs through the KDA.
7. Minnesota:
- a. [University of Minnesota Venture Center](#): “As the largest producer of high-tech startups in Minnesota, the University of Minnesota’s Venture Center facilitates the launch of some 20+ startups each year. The impressive 75+ percent survival rate of these startups is due in part to the resources, connections, and expertise the center can provide.”
 - b. [Agricultural Growth, Research, and Innovation \(AGRI\) Program](#): Minnesota Dept. Of Agriculture grants for agricultural and renewable energy innovation. The program hosts a number of specified grants for subjects such as biofuels, crop research, and urban agriculture.
 - c. [Conservation Innovation Grants](#): “Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production.”
8. Indiana
- a. [Digital Innovation in Agri-Food Systems Lab](#): “We develop entrepreneurs and ideas to create and fund high-value startup companies for the agri-food industry.”
 - b. [Indiana Economic Development Corporation](#): A public private partnership and manages many initiatives, including performance-based tax credits, workforce training grants, innovation and entrepreneurship resources, public infrastructure assistance, and talent attraction and retention efforts.
9. North Carolina
- a. [NC Food Innovation Lab](#): Incubator assisting in the food product development process for both startups and established companies.

- b. [North Carolina Agricultural and Technical State University](#): Very recently received grant for agricultural innovation center. “The center’s primary goal will be to increase the number of successful agricultural businesses through tailored training and incubation of startups.”
- c. [NC AgVentures Grant Program](#): Provides grants to North Carolina family farms, and community organizations such farmer associations and farm co-ops to develop new and innovative agricultural projects which will increase farm profits.

10. Wisconsin

- a. [Wisconsin Crop Innovation Center](#): Wisconsin Crop Innovation Center is a public crop biotechnology service and research center. WCIC aims to serve as an incubator for agricultural improvement.
- b. [Sustainable Agriculture Research & Education Grants](#): The SARE program provides 6 categories of competitive grants to support work in sustainable agriculture.

Appendix C: Challenges and Opportunities of Startup Clients

There are several challenges or gaps as Quantis continues to engage startups, beyond the obvious budget and cost barriers. For example, interviewees were concerned that the typical consulting deliverables, like static reports and PowerPoint presentations, are too “old-school” to keep up with startup pace. Multiple interviewees mentioned that startups are often more interested in dynamic tools that they can keep using as their businesses grow and change. However, we also learned that during a recent strategic development process, Quantis leadership explicitly decided *against* moving toward a software as a service model. Quantis is not interested in creating tools for clients to use on their own. Rather, leadership decided that Quantis’ future would focus on deep relationship building and more holistic business strategy consulting services. This limits the options for what a “slimmed down” version of Quantis’ services could look like.

Additionally, interviewees reported that most staff lack knowledge about investment cycles, investor information needs, and startup market mechanisms. Many of Quantis’ existing startup clients engage Quantis’ services to improve their ability to communicate their sustainability value and strategy to investors. Quantis has interviewed investors in the U.S. to gain a better understanding of that audience, but the internal consensus is that the investor audience is a sector Quantis needs further research to better understand. Given how important investor expectations are to startups, Quantis will be better able to serve its clients if staff have some familiarity with startup fundraising processes.

- [Start-ups are willing to pay for technical environmental consulting services](#)

Given that many interviewees found value in working with an environmental consulting company, respondents expressed a near-unanimous willingness to pay for their services. With this, though, interviewees shared a preference for a one-off payment for service fees depending on company needs at the time—in contrast to a subscription-based service plan. Additionally, all start-ups noted that they are unwilling to pay in equity, to avoid equity dilution.

- [Start-ups are willing to share publicly available intellectual property \(IP\)](#)

All start-ups were agreeable to the notion of sharing IP with environmental consulting firms if it helped to improve outcomes and company support, but only IP that is publicly available. Interviewees noted that public patents and published company data would be available for consultants to use, but that “trade secrets” were off-limits. Some start-ups did note, however, that they were agreeable to full disclosure only if robust non-disclosure agreements (NDAs) were put in place.

- [Startups experience significant barriers to seeking technical environmental consulting services](#)

Despite the enthusiasm with which start-ups were willing to engage with environmental consultants, all interviewees expressed little to no capacity for hiring and working with said support. The interviewed start-ups cited three main barriers to contracting technical environmental consultants: cost, time, and limited staff. Interviewees noted that due to the early stages of their start-ups, and despite the essential nature of environmental consulting services, their engagement with such services are cost prohibited, and requires time and workers that they do not have at their expense. As such, the interviewees also noted that due to these barriers, their companies would fulfill their environmental consulting by either outsourcing when needed, hiring new staff, or foregoing the service altogether.

Appendix D: Interview questions asked to Quantis and start-ups

Quantis Internal Interview Questions:

1. Tell us a little more about what you do, day to day?
 - a. Have you ever worked with start-ups at Quantis or in a previous job that you had? How has that experience shaped your approach to your work?
 - i. Follow up: if they've worked with start-ups, what kind of services have they offered?
2. What value do you think Quantis can bring to start-ups? Have you thought about how Quantis can help start-ups?
 - a. What opportunities do you see in your work currently to do so?
 - b. What skills and capacity do you think Quantis would need to acquire to pursue these opportunities?
3. Do you think it's important for Quantis to pursue opportunities to bring more start-ups into its business model? Why or why not?
 - a. How do you think Quantis should strategically engage with start-ups?
 - b. What potential challenges or complications do you anticipate?
 - c. Do you think this should be a top priority, or are there other growth areas that you would prioritize more?
4. What disruptive technologies or business models are you aware of or are you thinking about in your field?
 - a. What ideas do you have, even if you haven't seen direct evidence of them yet?
 - b. Follow-up: referencing potential business models that have been identified in the interview—do you think there is strategic value in Quantis changing their business model in this way?
5. Is there anything else you'd like to share about this topic?

Start-Up External Interview questions

1. Please provide a brief overview of your company.
2. What value do you believe a technical environmental consulting firm could provide to you?
 - a. What barriers do you experience or anticipate in working with such firms?
 - b. In what areas do you need support? What needs do you have that aren't currently being met by existing products/services?



- c. How else might you fill this need if a consultant didn't provide this service?
 - d. What is your willingness to pay for these services? Would you be willing to pay in equity?
- 3. How do technical environmental services compare to your other service needs?
 - a. What is your internal capacity to do this kind of work?
 - b. How much value do you feel investors place on technical environmental engagement?
 - c. Are environmental services relevant to your business case and/or your mission case?
- 4. What kind of relationship would you be interested in forming with an environmental consultant?
(For example, a one-off, payment for services relationship or a long-term partnership?)
 - a. Would you be willing to share IP and technical information with a consultant if this would improve their ability to support you?



Appendix E: References

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