The Good Food Institute

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I. **The Good Food Institute:** Creating a world where alternative proteins are no longer alternative

The Good Food Institute is a nonprofit think tank and international network of organizations accelerating alternative protein innovation to make the global food system better for the planet, people, and animals. To review some of our specific successes, please see our 2023 annual review. To sign up to receive GFI's various newsletters, including our monthly highlights, please visit gfi.org/newsletters.

A. The external costs of industrial animal agriculture

Animal agriculture uses vast quantities of land and other resources and contributes significantly to climate change, problems that will worsen as global demand for animal products increases steadily through 2050. Animal agriculture uses eighty percent of agricultural land (cite); requires more than 1.25 billion metric tonnes of feed crops for farm animals (cite, cite); requires 77% of the global soy crop, mostly to feed chickens, pigs, and farmed fish (cite); causes one-fifth of direct climate emissions (cite)[1]; and causes the plurality of methane emissions—from ruminant digestion alone—which is roughly the same as oil and gas emissions combined (cite). Animal agriculture also contributes significantly to antibiotic resistance and pandemic risk (cite).

Animal agriculture is predicted to rise inexorably through 2050, with the most conservative predictions suggesting at least a 60% rise through 2050 (cite). If this happens, Paris climate targets will be impossible to meet (cite).

B. Alternative Proteins: Definition & Theory of Change

To reimagine our food system, we must reimagine protein. For the past nine years, GFI has championed alternative proteins as the solution to meet the skyrocketing demand for meat while staying within planetary boundaries. "Alternative proteins" is a term of art that describes foods that are "produced to provide the sensory experience and

[1] This does not include seafood, which likely tacks on another 2 percent (cite).

nutrition of animal meat" – but using plants, fermentation, or cellular agriculture (Center for Strategic & International Studies).[2]

- Plant-based meat is produced directly from plants and is composed of protein, fat, vitamins, minerals, and water—just like animal-based meat.
- Cultivated meat is produced directly from animal cells. It is identical to animal meat at the cellular level, providing the same nutritional profile as conventionally produced meat. It is animal meat grown outside an animal.
- Fermentation is a flexible process for using microorganisms to produce alternative proteins. In addition to being products themselves, ingredients made with fermentation can be used for plant-based or cultivated products.

If we can make products that taste the same or better and cost the same or less than conventional animal products, while emitting substantially fewer GHG emissions and using a fraction of the land and water, they will be able to win in the marketplace. This is akin to the theory of change of renewable energy and electric vehicles: Instead of (or in addition to) trying to convince consumers to use less energy, drive less, or eat less meat, we can change how energy is produced, cars are powered, and meat is made. We take great encouragement from the "rapid reductions in the price of solar power and batteries, [which] illustrate the potential of innovation" (cite).

As an international network of organizations powered by philanthropy, GFI is uniquely positioned to accelerate alternative proteins by catalyzing and growing the entire field, creating a world where alternative proteins are no longer alternative.

II. GFI's key programs: SciTech, Policy, and Corporate Engagement

GFI has three programmatic departments: Science and Technology, Policy, and Corporate Engagement. Our Communications department serves as a force multiplier, taking the work of these programmatic departments into key spheres of influence. Our international affiliates (Asia Pacific, Brazil, Europe, India, Israel, and Japan) work closely with the team in the U.S. to scale and localize our programs globally.

A. Science and technology

The mission of GFI's Science and Technology (SciTech) department is to catalyze scientific advances to accelerate alternative proteins' path toward sensory, price, and scale parity with conventional meat. GFI's scientists and research ecosystem-builders are the global experts on plant-based proteins, microbial fermentation, and cultivated meat and work to ensure that (1) a roadmap exists for each, (2) the best scientists and entrepreneurs are engaged in R&D and innovation, and (3) significant funds are dedicated to accelerating the transition of the global food system.

[2] "Alternative proteins" do not include animal feed or insects for human food. The former is not for human food at all, and the latter involves convincing consumers to eat insects; it does not involve turning insects into something indistinguishable from conventional animal meat.

Our SciTech department accomplishes these tasks through three principal activities:

Analysis: identifying and forecasting knowledge gaps to direct research efforts and resources toward the most critical solutions

GFI's SciTech team conducts detailed technical analyses of the alternative protein sector, including identifying and articulating major technical challenges, forecasting growth bottlenecks, and evaluating the major drivers for cost and environmental impact. GFI shares the findings through white papers, peer-reviewed journal articles, public webinars, and stakeholder-targeted factsheets with actionable recommendations. All these analyses are published through our website as open-access, heavily publicized, and continually updated resources.

We seek to reveal research and commercialization opportunities that address knowledge gaps or white space in the commercial landscape. GFI identifies researchers and entrepreneurs in academia and industry with the skill sets and expertise to address these opportunities and supports their exploration by launching new research projects or commercial ventures.

GFI's website provides detailed technical explainers on the science behind the alternative protein production platforms of plant-based proteins, fermentation, and cultivated meat. The Alternative Protein Literature Library contains all of the most relevant publications, patents, and theses in the alternative protein field. Our report on production requirements for a successful plant-based meat industry underscores the vast level of investment needed in open access R&D and estimates the infrastructure and raw material targets the plant-based meat industry must meet to satisfy anticipated global market demand by 2030.

A 2024 analysis by GFI and Highland Economics describes the land use efficiency and restoration opportunities of diversifying American protein sources with alternative proteins to help achieve U.S. climate and biodiversity goals. In 2023, GFI and Bright Green Partners released a joint report on plant-based meat manufacturing capacity analysis and pathways for expansion. This analysis quantifies the existing global plant-based meat manufacturing landscape and evaluates the most feasible options for expanding capacity to meet future demand. GFI also worked with Integration Consulting to launch the fermentation manufacturing capacity analysis, which describes the global fermentation-derived product manufacturing landscape and strategies to effectively scale manufacturing capabilities to meet future demand. GFI published a robust sidestream analysis that identifies commodity crop "waste" that can become inputs for alternative protein production, leading to lower costs and better environmental metrics.

GFI's cultivated meat research tools directory is a central location for species-specific research tools, reagents, assays, protocols, genome sequences, and service providers. In 2023, GFI published a cultivated meat growth factor cost and volume analysis on

the projected volumes of growth factors by 2030, suitable production cost targets, and regulatory considerations. In 2021, GFI released the first-ever LCA and TEA of cultivated meat that leveraged models built using NDA-protected data from over a dozen industry partners. CE Delft and GFI published an updated, ex-ante version assessment (LCA) in The International Journal of LCA in 2023.

Our open-access plant-based meat manufacturing guide provides an in-depth review of extrusion for the production of plant-based meat, as well as a directory for ingredients, pilot facilities, and co-manufacturers. We've published critically important plant-based deep dives on crop development, ingredient optimization, and end-product formulation and manufacturing that play an important role for academics and industry professionals looking to accelerate the plant-based protein landscape. Additionally, our analysis of culture medium costs and production volumes includes an in-depth cost reduction analysis for cell culture media, and our cultivated meat deep dive series is an exhaustively cited collection of articles delving into the technical advances and considerations of all aspects of cultivated meat. Finally, our life cycle assessment (LCA) guide for alternative protein manufacturers provides a standardized approach to undertaking LCAs and offers insight into commissioning and overseeing the development of LCAs, as well as interpreting and leveraging their results to highlight their products' environmental benefits.

To support alternative seafood innovation, we maintain and continually improve the open-access resource PISCES/ATLAS, which contains two interlinked databases. The first database, PISCES (Phylogenetic Index of Seafood CharactEriStics), contains detailed species-level characterization data to assist alternative seafood makers in the quest to make products that match their conventional counterparts. The second database, ATLAS (ArcheType Library for Alternative Seafood), is a prioritization tool for alternative seafood archetypes, containing data on sustainability, human health, animal welfare, and market size. We also fund key projects in cell line development, characterization, and cell culture media. GFI partnered with Kerafast to establish a repository of cell lines relevant to cultivated meat and seafood to streamline the process of sharing cells and reduce duplicated efforts.

GFI also performs literature reviews and industry interviews on an ongoing basis to remain current with advances in the field and in related but distinct disciplines with relevance to alternative proteins, such as advances in biomedicine that are translatable to cultivated meat. The SciTech team works with our Communications department to disseminate our findings through webinars, blogs, interviews, and other relevant channels. Our goal is to generate awareness in the scientific community and foster a better understanding of the technological challenges and opportunities within the alternative protein field.

These efforts enable both GFI and scientists around the globe to understand the state of the science and engineering involved in innovative alternatives to animal products and to direct further R&D accordingly. Because scientific knowledge transcends

political boundaries, our activities are global by nature, and we work closely with our international affiliates to ensure that our programs reach talent and ideas anywhere in the world. This work is designed to inspire more scientists to devote their vocational lives to these fields and to minimize duplicative work.

Research funding: mobilizing funding to address knowledge gaps and recruit new investigators, with a strict counterfactual lens for direct funding

GFI's support was the catalyst that allowed us to go from an idea to proof-of-concept. The grant funding, mentorship, and networking support have been invaluable and enabled us to achieve the crucial first steps in bringing a brand-new alternative protein source to market.

—Beth Zotter, CEO of Umaro Foods

In November 2021, ClimateWorks Foundation and the UK Government funded a Global Innovation Needs Assessment on protein diversity that concluded we need $4.4 billion globally in public R&D funding and $5.7 billion in public commercialization funding *every year* to unlock the full benefits of alternative proteins. Yet GFI estimates that *all-time* investment through 2023 amounts to just $1.67 billion across both R&D and commercialization.

The SciTech team works to mobilize additional funding for alternative proteins through three primary activities: 1) directly seeding new research through strategic deployment of GFI's Research Grant Program; 2) catalyzing government funding of alternative protein research by de-risking high-impact research topics and educating government agencies about research gaps; and 3) supporting researchers from around the world in applying for alternative protein research grants, connecting them with ideas, collaborators, and funding opportunities.

Since the launch of GFI's own research grant program in 2018, we have funded approximately $21 million in funding across 118 projects in 21 countries. We catalyze grantee collaborations through organized online grantee events and expand the alternative protein scientific knowledge base through the amplification of research results, talks, and publications from GFI grantees.

Leveraging SciTech's analyses, technical expertise, and industry connections, GFI's grantees are uniquely positioned to identify critical technical barriers and white space research areas that will accelerate the plant-based, fermentation, and cultivated meat industries. The grant support provided through GFI's research program is resulting in many significant positive impacts, including:

- Our funded researchers publish high-quality, peer-reviewed journal articles that establish plant-based and cellular agriculture as robust areas for further scientific inquiry and inspire more top scientists to dedicate their labs and careers to these pursuits. Based on data from Dimensions.ai, there are 172

publications resulting from GFI's research grant program, and an additional 33 publications acknowledge GFI support. These additional publications are papers that may be authored by GFI scientists, be funded through other GFI mechanisms, or list GFI scientists as key collaborators.
- Startups and established companies use the research to develop, produce, and sell high-quality products.
- With the concerted work of GFI's SciTech team, universities create alternative protein training programs and research institutes as these fields become more developed.

Many GFI grantees have secured follow-on public grants due to the initial success of their seed-funded research provided by GFI's Research Grant Program. In 2020, UC Davis received a $3.55 million grant from the National Science Foundation (NSF) for cultivated meat research.

GFI's grant enabled my lab to break ground in cultivated meat research and formulate a plan to address critical industry challenges. This resulted in millions of additional funds directed toward interdisciplinary research and training at UC Davis.

—Dr. David Block, professor and chair, UC Davis

In 2021, the U.S. Department of Agriculture (USDA) invested $10 million to create a center for excellence in cellular agriculture at Tufts University, the USDA's first significant investment into cultivated meat and the U.S. government's largest to date. Tufts Professor David Kaplan, the lead investigator on the grant, is a GFI grantee. GFI grantee Girish Ganjyal at Washington State University received a $595,120 grant from the USDA for plant-based meat research. In November 2022 GFI became a founding member of the new Cellular Agriculture Consortium at Tufts University, launched to join forces to overcome fundamental technical challenges, develop standards, and share knowledge in a way that advances the industry as a whole.

In 2022, GFI grantee Amy Rowat at UCLA received a $604,907 grant from the USDA and a 5-year $995,498 grant from the NSF, both for cultivated meat research. GFI grantees at UMass Amherst received a $596,050 grant from the USDA for plant-based meat research. In 2024, 2021 grantee Frederico Ferreira of the Institute Superior Tecnico, Lisbon, secured approximately $7.6 million USD through a new Horizon Europe cross-sector consortium award to advance research in cultivated meat and seafood.

In addition to de-risking high-impact alternative protein research topics, the SciTech team educates funding agencies about the state of alternative protein science. We advise government agencies on current technical challenges facing alternative proteins, serve as grant proposal reviewers for non-GFI funding programs, and help develop alternative protein funding priorities. We engage in this work with government agencies such as the USDA; NSF; NASA; A*STAR; the Israeli Ministry of Innovation,

Science, and Technology; the Foundation for Food and Agriculture (FFAR); and the European Institute for Innovation and Technology (EIT) Food.

The SciTech team also supports the scientists and entrepreneurs who are applying for these research grant opportunities. GFI's global alternative protein funding dashboard illustrates the rate at which governments are investing in the alternative protein sector. Users can quickly slice and filter research funding data by country, year, and technology platform. GFI's Research Funding Database, a global repository of public and private grants identified as having a high propensity for alternative protein R&D, provides a range of opportunities for scientists seeking support for their alternative protein research. To date, we have provided direct support to more than 50 researchers on alternative protein research-focused grant proposals, including three multi-institutional, multi-million dollar research center proposals. These activities aim to increase the number of funding agencies providing grant opportunities focused on advancing plant-based and cultivated meat and the likelihood of success by researchers applying for these grants.

In January 2024, the National Science Foundation has launched Catalyzing Across Sectors to Advance the Bioeconomy (CASA-Bio)—an ambitious effort that brings together scientists from government, industry, and nonprofit organizations to create a unified strategy to advance the U.S. bioeconomy. The initiative, launched in response to President Biden's Executive Order on Advanced Biotechnology and Biomanufacturing, includes alternative proteins as one of four agricultural subthemes. Two other subthemes are also relevant to alternative proteins: one on creating value from waste carbon for a circular bioeconomy and another related to biomanufacturing, bioreactors, and scale-up. GFI's SciTech team has played a key role in CASA-Bio synthesis meetings, orchestrating workshops to draft five-year R&D roadmaps for several areas, including Protein Diversification for Food, Health, and Environment, to support the U.S. bioeconomy.

Also in 2024, following a rigorous global review conducted in partnership with GFI to identify research institutions best suited to address the major challenges and opportunities in alternative proteins, the Bezos Earth Fund launched three Bezos Centers for Sustainable Protein at North Carolina State University, Imperial College London, and the National University of Singapore. These $30 million investments signal a significant step forward in alternative protein science and address the critical need to diversify the global protein supply chain.

Community-building: creating a robust scientific ecosystem and talent pipeline, equipping scientists at all career levels to enter the field

GFI is focused on moving the most successful tissue engineers, synthetic biologists, plant biologists, and others into alternative protein technologies—as founders of new and transformative startups; as employees at plant-based and cultivated meat companies; and as doctoral students, post-docs, and group leaders at top universities.

To this end, GFI reaches out to premier universities and professional associations for science and engineering across the globe. We encourage researchers at these institutions to use their expertise for innovative alternative protein research projects. Our subject matter experts deliver presentations in classes, departmental symposia, and conferences to markedly increase the number and caliber of scientists and entrepreneurs in these sectors. Online, we create community spaces and tools (such as the GFIdeas community and the collaborative researcher directory) that enable scientists and entrepreneurs to collaborate—which in turn broadens the range of innovation in both academia and the private sector. For these audiences, we curate seminars that illuminate recent scientific advancements and highlight career pathways to help them stay up-to-date on how best to meaningfully contribute to this field.

Our global student group program, the Alt Protein Project (APP) includes more than 600 members active at over 70 top research universities across 21 countries and 6 continents. The APP is an action-oriented program designed to help students engage their peers and faculty on the subject of alternative proteins, advocate for alternative protein research and curricula, conduct their own scientific research, and launch their own businesses. In parallel to increasing the level of alternative protein activity on campus, these groups provide a steady stream of easily identifiable talent for the alternative protein industry. This diverse community of undergraduate and graduate students studying a wide range of disciplines, from synthetic biology and mechanical engineering to philosophy and computer science, allows for a rich exchange of ideas, cultural perspectives, and expertise. GFI hosts annual APP Global Student Symposiums, bringing student leaders from across the globe to meet industry pioneers, participate in workshops, and connect with fellow APP leaders. Student leaders present their upcoming initiatives, share insights, and lay the groundwork for future chapter collaborations.

Since we started the program in 2020, GFI's Alt Protein Project has successfully seeded alternative protein research and educational programs at universities around the globe. Students have developed new courses at Stanford, UNC Chapel Hill, and Johns Hopkins, sparked new research projects at institutions like Wageningen and CU Boulder, and seeded the alternative protein workforce with much-needed technical talent. Program alumni have gone on to join Upside Foods, Rebellyous Foods, Beyond Meat, Ingredion, Redefine Meat, and numerous other alternative protein companies.

In 2022, our team launched a new training program, a five-week curriculum designed to equip student leaders with the resources, knowledge, and inspiration they need to be effective change agents for advancing alternative protein initiatives on their campuses. We also launched our resource hub, which contains detailed strategic planning resources and how-to guides for advancing each of our five programmatic objectives: education, research, innovation, awareness, and community. This open-access set of resources is available to student movement-builders around the

world, equipping them with the information they need to turn their universities into engines for alternative protein innovation.

In collaboration with universities and companies, we are developing on-campus and online courses to educate students, scientists, and engineers about the technical foundations of meat made from plants, animal cells, and microbes. We have helped launch over a dozen alternative protein courses at institutions like UC Berkeley, the Technion, the Federal University of Paraná, and Nanyang Technological University. Our curriculum repository and course database lower barriers to access for educators seeking to bring alternative proteins into the classroom and provide stakeholders with a global map of the alternative protein educational landscape. For a broader reach, we released a free massive open online course that has attracted participation from more than 10,000 unique registrants from at least 115 countries since its 2019 launch.

Ensuring a diverse, inclusive, and equitable industry is tantamount to the success of alternative proteins. In 2023, GFI conducted listening sessions that engaged scientists, engineers, and entrepreneurs who identify as Black, Indigenous, or persons of color (BIPOC). These listening sessions revealed several common experiences and resource needs that cut across disciplines and identities. Stemming from these sessions, we launched a needs assessment on building an inclusive alternative protein workforce. This report reviews the challenges faced by scholars from underrepresented and minoritized groups and describes opportunities for GFI and its partners to transform their career experiences.

Private sector consultation & education

In collaboration with our Corporate Engagement department, GFI's scientists also work closely with leading food industry partners to scout technologies that address barriers to bringing alternative proteins to market. The SciTech team develops relationships with major food manufacturers and ingredient suppliers to determine their needs. Thus, the team serves as a bridge to food innovation and biotechnology incubators with unique insight into plant-based and cellular agriculture technologies.

We also work closely with entrepreneurs developing companies not directly influenced by the insights of our Solutions Database work. In this capacity, GFI provides technical and commercial information, information about public funding opportunities, and access to external experts to aid in the scientific development of their products.

B. Policy

Policy decisions can be the difference between success and failure for alternative proteins. Governments can incentivize incumbent industries through funding and protectionist regulation, or they can accelerate innovation and make launching new businesses and products easier. GFI's theory of change is based on the idea that consumers will choose alternative proteins when they are as inexpensive, delicious,

nutritious, and ubiquitous as animal products. **GFI's Policy department** exists to ensure that governments do not impose hurdles that drive up the costs of or prevent access to these foods and that public support is devoted to accelerating progress in alternative proteins.

Governments should support alternative proteins for many of the reasons that they support conventional agriculture and for the same reasons they support other climate and global health science and policies, from renewable energy and electric vehicles to vaccine development and pandemic prevention. We advocate for public investment in alternative protein research, development, and commercialization ($10 billion per year), fairness in the regulatory sphere, and freedom to use language consumers understand on product labels. In 2023, our global teams successfully advocated for tens of millions of dollars in public investment in alternative protein research, championed alternative proteins to government leaders and agencies, celebrated historic victories in our regulatory work, and rallied bold action to accelerate support for alternative proteins as a critical piece of the climate change mitigation puzzle. GFI's annual State of Global Policy Report tracks and analyzes public investments in alternative proteins and regulatory progress on bringing them to market. Abridged versions of the report are available in French, Italian, Japanese, Korean, and Spanish.

Leveraging government resources to accelerate progress

We have a long way to go to achieve parity between alternative proteins and conventional meat. Public funding represents the biggest gap by far. Governments have directed very little funding to support alternative protein research. By our estimate, the U.S. government spends 100x more on research that props up industrial animal agriculture than on alternative protein research.

Our Policy department works collaboratively with our SciTech department to leverage government resources to accelerate research to advance alternative proteins. We meet with congressional offices, state legislators, federal agencies, and the White House to communicate the vital need for public research funding to speed progress for alternative proteins.

In March 2023, after months of work from GFI and our partners showcasing the opportunities and challenges facing alternative proteins, the White House Office of Science and Technology Policy (OSTP) released a report entitled Bold Goals for U.S. Biotechnology and Biomanufacturing, which paves the way for substantial future public support for the alternative protein sector across the U.S. Federal Government. The report combines extensive goals and recommendations from five executive agencies to create a broad vision for the American bioeconomy. Both the USDA and the Department of Energy identified alternative proteins as a key theme of the future of biotechnology and made recommendations to support alternative protein research and development, commercialization, scale-up, and public-private partnerships.

GFI submitted appropriations-report language requests for seven consecutive years, beginning with the fiscal year 2018, to key members of Congress, asking them to include language that would direct agencies to fund research on alternative proteins. In 2020, 2021, 2022, and 2023, we rallied an impressive array of allies, including Unilever United States and The Kraft Heinz Company, to sign a letter of support for our legislative efforts.

In 2021, House Appropriations Chair Rosa DeLauro called for "parity in research funding for alternative proteins, a compelling option for addressing agricultural emissions." In December 2021, eleven House members requested $50 million of American Rescue Plan Act funding for open-access alternative protein research and asked that the White House prioritize alternative proteins in its 2023 budget request to Congress. The Members wrote that alternative proteins "can improve the sustainability and resiliency of our food systems" and that government support "will create new economic opportunities for American farmers, new benefits for consumers, and help reduce agricultural emissions." In 2022, GFI and our lobbyists worked with California Assemblymember Ash Kalra and several California-based alternative protein companies to secure $5 million for alternative protein R&D at three University of California campuses: Berkeley, Davis, and Los Angeles. At the time of the announcement, this was the largest amount a state legislature had ever set aside for this purpose. Grantees from GFI's research grant program are at all three of the California universities, and their GFI-catalyzed work made this milestone possible.

GFI briefed staff from 22 Democratic congressional offices and the House Committee on Education and Labor at the U.S. House of Representatives Sustainable Energy and Environment Coalition on alternative proteins in January 2022. We asked for support for our upcoming requests for research funding and highlighted companies in the staffers' districts to localize the issue. As a result, a bipartisan group of lawmakers reached an appropriations agreement for fiscal year 2023 that included $5.5 million for the USDA to conduct alternative protein research. In the summer of 2023, after the House Appropriations Committee drafted an agricultural appropriations bill (H.R. 4368) for fiscal year 2024 that maintained the previous year's $5.5 million in funding, five House Members submitted amendments to defund alternative protein research or drastically cut funding. GFI quickly pushed back against these harmful amendments, coordinating with legislators and partners, and succeeded in preventing their direct advancement.

Starting early 2023, in anticipation of the 2023 Farm Bill, GFI engaged with congressional staff and others to advocate for key legislative recommendations, including enhancing focus on alternative protein R&D within USDA and recognizing research centers for alternative protein innovation. In August 2023, following close collaboration with GFI, Rep. Julia Brownley introduced the PROTEIN Act (H.R. 5097), a historic piece of legislation that would increase R&D and commercialization efforts focused on alternative proteins. Its initiatives include establishing centers of

excellence and creating programs to promote workforce development and manufacturing capabilities.

In 2020, GFI urged the House Committee on Science, Space, and Technology, the Senate Democrats' Special Committee on the Climate Crisis, and the White House OSTP to establish an interagency Alternative Protein Initiative modeled after the National Nanotechnology Initiative. We worked with Breakthrough Energy, Bill Gates' organization, to position alternative proteins as a critical strategy component to achieve net-zero emissions in their federal climate policy playbook. In 2023, GFI hosted a webinar featuring the Department of Energy Industrial Efficiency and Decarbonization Office (IEDO) that provided an overview of the Department of Energy (DOE) offices, a deeper look at the stages of commercialization that each office funds, and a preview of an upcoming funding opportunity.

In August 2023, Illinois Governor JB Pritzker signed into law legislation establishing the Alternative Protein Innovation Task Force, to which GFI's CEO Ilya Sheyman was named a delegate. This is the first standalone legislation promoting alternative proteins to become law in the United States and follows several discussions between GFI and Illinois public officials on the need for public funding for alternative protein research and development. The task force has supported the Illinois Fermentation and Biomanufacturing (iFAB) technology hub at the University of Illinois Urbana-Champaign, which the Biden Administration recently designated as one of the nation's 31 new Tech Hubs to boost innovation and workforce development. GFI is supporting the hub's endeavor, which seeks to scale precision fermentation to convert underutilized corn feedstocks into high-value, customized alternative proteins, food ingredients, materials, chemicals, and more. In May 2024, Illinois approved $5 million to expand iFAB research. In a similar vein, several California state legislators formed the Alternative Proteins Working Group which supports alternative protein research, development, and commercialization in the state.

In 2024, GFI celebrated the passage of a U.S. federal spending bill that increases funding for alternative protein research at the USDA's Agricultural Research Service (ARS), benefitting ARS research in Arkansas, Louisiana, North Carolina, Wyoming, and several other states.

GFI's Policy team publishes a monthly Hill-facing newsletter, Protein Innovation Nation, to keep congressional offices informed of progress at home and in other parts of the country year-round.

Removing hurdles to alternative proteins

GFI advocates for a clear and efficient path to market for cultivated meat and fermented ingredients and a level playing field for plant-based meat. We are developing the safety roadmap for regulators to ensure global harmonization and consumer safety and confidence. In coordination with companies in this space, we

testify at hearings and submit comments that respond to regulators' questions about cultivated meat's safety and fair labeling. In November of 2022, the FDA officially gave the green light to a cultivated meat product for the very first time. UPSIDE Foods completed the FDA's rigorous review for its cultivated chicken as part of the agency's pre-market review process, laying the groundwork for cultivated products to be sold in the United States. GFI's voice and perspective were infused in the major media coverage of the FDA's evaluation, including NPR, the *Washington Post*, *TIME*, *Wall Street Journal*, *Popular Science*, and the *New York Times*.

In June 2023, in a defining moment for the future of our food system, cultivated meat was approved for sale in the United States. Representing the biggest milestone in GFI's history (and one we've been working toward since our founding in 2016), Upside Foods and GOOD Meat both cleared the final regulatory hurdle to sell cultivated meat in the United States. Thanks to our strong relationships with both companies and the media, GFI's perspective was included in most of the top media stories covering the news, including CNN Business, Canada's Global News, NPR's flagship All Things Considered, APM's Marketplace, *The New York Times*, *Time Magazine*, *Inc.*, and more. Similarly, GFI Europe's press release in German, which highlights other countries' risk of missing out on the industry, netted GFI quotes in much of the German media coverage, including *Handelsblatt*, *WirtschaftsWoche*, and *Tagesspiegel*.

Mindful that opposition to technology presents a challenge to innovation, GFI develops relationships with nonprofit organizations from various disciplines to familiarize them with cultivated meat and address their concerns. In 2019, we established a policy office in Washington, DC, which serves as our campaign headquarters and provides an ideal setting for meeting with nonprofit sector leaders. GFI is uniquely qualified to engage the nonprofit community and drive support for our policy priorities.

We also work with federal food agencies, members of Congress, and state legislatures to support commonsense labeling rules to keep the playing field level for alternative proteins. We regularly lobby Congress in opposition to labeling restrictions and oppose state legislation intended to censor plant-based labels. In 2021, GFI and a handful of companies that make plant-based meat played a major role in defeating three label censorship bills, including two in Texas.

GFI uses strategic litigation to prevent the government from imposing unnecessary restrictions on the labels of alternative proteins. In 2021, USDA denied a 2018 petition from the U.S. Cattlemen's Association urging the agency to censor meat and beef terms on plant-based and cultivated meat product labels. The agency's reasoning echoed our arguments in a comment we filed on behalf of GFI and seven private companies. In 2022, Tofurky, represented by GFI, the Animal Legal Defense Fund, and the American Civil Liberties Union, secured a federal court order finding an Arkansas food label censorship law unconstitutional and permanently blocking enforcement of the law against Tofurky for its use of terms like "sausage" and "burger" when accompanied by terms like "vegan" or "plant-based." The court rejected the state's position that "the

simple use of the word 'burger,' 'ham,' or 'sausage' leaves the typical consumer confused," finding that "such a position requires the assumption that a reasonable consumer will disregard all other words found on the label." GFI and ALDF helped Tofurky secure another win in 2022 when a federal district court declared Louisiana's label censorship law unconstitutional on First Amendment grounds and enjoined the state from enforcing it. Although the Fifth Circuit Court of Appeals reversed this decision in 2023, it did so by holding that labelers must intentionally mislead consumers to violate the law. The appellate court found that phrases like "plant-based sausage" and "ham-style roast" on Tofurky's labels are not misleading and are protected by the First Amendment.

Throughout 2024, we strategically deployed resources to respond to proposals and bills to ban cultivated meat or censor alternative protein labels. Most notably, Florida passed a bill to ban cultivated meat—albeit one that included a critical carveout to still allow for research and development. GFI worked to coordinate with legislators and industry stakeholders there and elsewhere to amend proposals and engage alternative protein leaders to testify to advance solutions that align with free markets, innovation, and job creation.

Shaping global regulatory developments

Governance of food spans geographic boundaries. Global regulatory bodies set standards that impact all populations, and the actions of the most influential countries often act as the template for others. GFI works at both the multinational and national levels to ensure global regulations enable a thriving alternative protein sector.

The Codex Alimentarius ("Food Code") Commission, which sets global standards for food safety and labeling, added alternative proteins to the 2022 agenda and published a submission from GFI. The submission established GFI as a subject matter expert and invited the United Nations Food and Agriculture Organization (FAO) and World Health Organization (WHO) to call on us to provide technical assistance and introduce them to companies and scientists in this sector. GFI has remained involved in Codex's work on issues relating to alternative proteins, including by engaging the industry to weigh in on a 2023 proposal to the Codex committee on nutrition that suggested the development of potentially restrictive nutritional content guidelines targeting plant-based and fermentation-derived proteins.

GFI delegates join leaders from around the world at the United Nation's annual climate conference, COP, to rally bold action to accelerate support for alternative proteins as a critical piece of the climate change mitigation puzzle. At the 2023 COP28 in Dubai, team members from our U.S., India, Brazil, and Asia Pacific teams hosted and spoke on panels, attended alternative protein-focused workshops, and met with key influencers in climate policy from all over the world. In previous years, GFI co-organized a historic, first-of-its-kind cultivated meat dinner for global leaders, served as one of nine co-hosts of the first-ever Food Systems Pavilion, and co-organized private gatherings

of negotiators and United Nations officials. GFI policy experts also attend the annual climate negotiations in Bonn, Germany, which serve as critical negotiations ahead of COP. In 2024, GFI co-hosted a dinner with the Alliance of Bioversity International and CIAT, the Jeremy Coller Foundation, and ProVeg, an official side event focused on alternative proteins in the Global South, and a press conference on climate finance and protein diversification.

In 2022, GFI scientists were among 24 cultivated meat safety experts from 15 countries who gathered for a 3.5-day meeting convened by FAO, in collaboration with WHO, to establish a formative document on hazard identification for cultivated meat production. The experts, who spanned the public and private sectors, held a productive discussion and will provide much-needed public information on safety concerns in cultivated meat. GFI Brazil worked with academic and industry partners in 2023 to publish a Hazard Analysis and Critical Control Points (HACCP) food safety study for cultivated meat production, which helps lay the foundation for the new technology in Brazil and includes a detailed flowchart of the cultivated meat production process.

In May 2023, GFI team members elevated the role of alternative proteins in climate-smart agriculture and food system innovation at the Agriculture Innovation Mission for Climate Summit. GFI partnered with the Farm Animal Investment Risk and Return Initiative (FAIRR), Climate Advisers, the UN Foundation, ProVeg, and ClimateWorks Foundation to organize a private ministerial dinner (supported by the governments of Brazil & the Netherlands) for high-level governmental officials to discuss the climate and food security benefits of alternative proteins.

C. Corporate Engagement

Our corporate engagement work seeks to accelerate the growth of alternative proteins in the private sector. **GFI's Corporate Engagement department** works to replicate past market transformations by showing companies of all sizes, from startups to multinational corporations, how alternatives to animal products can be profitable while meeting environmental, social, and governance goals.

We analyze the market, uncover consumer insights, identify whitespace opportunities, provide advice, make industry connections, and build communities. We work to drive investment, accelerate innovation, and scale the supply chain so alternative proteins can be as accessible, affordable, and delicious as conventional animal products. We educate and empower companies in all stages of the supply chain.

Industry-leading consumer and market research

GFI ensures that startups, established companies, and policy authorities have access to objective and impactful research to aid their understanding of consumers. By conducting our own studies and coordinating the research of other academics and NGOs, GFI ensures that truthful and actionable information is available to support

marketing and communication efforts, product and package development, and policy guidance.

GFI conducts annual market and industry analyses to understand the rapidly growing plant-based, fermentation, and cultivated industries:

- Annual State of the Industry Reports are published for the plant-based, fermentation, and cultivated sectors to help all industry stakeholders get a comprehensive view of the progress made from the perspective of sales and investments as well as opportunities that still exist.
- Our annual analysis of SPINS retail sales data shows the size and growth of the U.S. retail plant-based food market.
- Our Consumer Insights help stakeholders identify and understand current and potential consumers for alternative proteins. We collect and share information about demographics, adoption, perceptions, acceptance, motivations, barriers, and category language.

To provide these growing sectors with actionable insights, we have also conducted primary research studies in partnership with external researchers as well as commissioned a variety of studies from external data providers to publish research.

As sales have decelerated in the plant-based sector, GFI is exploring opportunities to further catalyze consumer demand, including consumer education campaigns and key market and consumer research to support downstream marketing and education.

Startup and entrepreneur support

Emerging companies are vital to establishing a thriving alternative protein ecosystem across the globe. Startups, however, often face significant challenges related to scaling up complex technologies, securing considerable funding, and recruiting highly specialized talent. Complicating matters further, alternative protein companies must also educate investors and consumers, manage intense competition, and navigate regulatory hurdles. The startup space has evolved to include companies across all pillars working throughout the value chain (i.e., CPGs, ingredients, strain optimization and discovery, scaffolding, bioreactors, and emerging CDMOs).

To help alternative proteins succeed in the marketplace, we accelerate the growth of the startup ecosystem by working with entrepreneurs, startups, and established companies. We provide guidance, open-access resources, and industry connections to remove barriers to commercialization. We also help startups with regulatory issues, media coverage, and scientific questions.

In 2022, we launched new programs, including a GFI Mentor Program to connect startups and entrepreneurs with subject matter experts who can offer guidance around multiple aspects of launch and scale, and an Entrepreneur-in-Residence Program to provide deep support to an entrepreneur founding a company that will widely benefit

the alternative protein space and develop a case study to educate other potential entrepreneurs.

Engaging with investors

The amount of money invested in alternative proteins has grown to over $13 billion as of the end of 2022. Growth accelerated rapidly in 2019-2021 but slowed meaningfully in 2022 amid a generally challenging economic and investment environment across sectors. While alternative proteins are increasingly being recognized as a critical climate solution, the dollars invested in alternative proteins are a drop in the bucket compared to other sectors like renewable energy and electric vehicles that aim to address the world's most pressing challenges. Investors are getting more familiar with alternative proteins, but many remain on the sidelines as they worry about short-term growth prospects, are influenced by negative headlines, and struggle to understand the industry and how to approach investing in it. Therefore, there is high counterfactual impact potential in GFI engaging with the institutional investors who have meaningful capacity to scale the industry.

The Corporate Engagement team's work with investors has primarily consisted of:

- Conducting outreach to educate investors on the financial and impact-driven opportunities.
- Creating open-access investor resources, including an investor newsletter, an investor directory, a fundraising database, and a list of industry consultants.
- Engaging in projects to support investor-driven industry growth, such as supporting the formation of a growth-stage investor group by a partner NGO or working as a knowledge partner with investment banks like Barclays and Bank of America to host alternative protein conferences and integrate alternative proteins into existing event programming.
- Strengthening the connection between ESG investing and alternative proteins, including an ESG and impact measurement framework for alternative proteins and an LCA best practices guide.

Engaging with corporate stakeholders

GFI's work enables food industry partners to develop and bring to market alternative protein products that are as accessible, affordable, and delicious as conventional meat, eggs, and dairy. We help consumer packaged goods (CPG) companies, large meat and food companies, and alternative protein companies to see the market opportunity, identify product and category white spaces, understand the consumer, accelerate innovation, and scale the supply chain. We provide guidance to:

- Entrepreneurs and startups seeking to bring their ideas to market and accelerate growth.
- Large food and meat corporations developing and bringing to market the next generation of alternative protein products.
- Ingredient companies creating the next generation of alternative protein

ingredients and optimizing raw materials, inputs, and functional additives.
- Suppliers creating the next generation of ingredients and inputs, processing services, and other enabling technologies.
- Equipment manufacturers developing and commercializing equipment optimized for alternative protein production at scale.

We prefer to work under NDA so confidentiality requirements are clear.

Expanding access & accelerating growth

Our Corporate Engagement department has developed relationships with executives at many of the top restaurants across the country to increase the quality, quantity, and promotion of their plant-based entrées. We have engaged in direct outreach and attended conferences for restaurant professionals. To make the transition to plant-based entrées easier, we have created a webpage with guidance for successfully promoting plant-based menu items and offer introductions to product manufacturers.

We work with food retailers to identify and implement best practices for growing plant-based food sales, including strategies for assortment, own-brand product development, merchandising, and marketing. We've provided guidance to many of the top U.S. food retailers.

GFI purchases annual foodservice sales data and consumer research and publishes a landmark report. This data enhances our ability to support foodservice companies launch and sell new alternative protien dishes.

The vast majority of the more than 200 pounds of meat the average American consumes every year is bought at the grocery store. To accelerate the shift towards alternative proteins at retail, GFI works with retailers to educate them on the potential pathways to increase sales of alternative proteins, including:
- Expanding their plant-based assortments.
- Developing compelling private-label product lines.
- Merchandising products adjacent to where the animal-based products are shelved.
- Using recommended marketing and promotional tactics across channels to appeal to the largest consumer segments.
- Understanding the expanding technology and innovation landscape so retailers can act as partners in introducing consumers to fermentation-derived and cultivated meat in the future, and ensuring their product standards allow these ingredients.

GFI's supply chain efforts seek to help supply keep pace with and drive demand by supporting interventions that scale the production of alternative protein products and upstream inputs as well as improve the sensory quality, variety, functionality, and price of end products.

- We analyze the key challenges and whitespace opportunities within each segment of the value chain and share those insights via our open-access Solutions Database and Innovation Priorities pages.
- We complete research projects on high-value topics to support needed initiatives, including research into infrastructure capital sourcing, production volume modeling, demand modeling and forecasting, ingredient and end-product scaling, industrial B2B sales channels, facility/equipment leasing, cost analyses, techno-economic assessments, total addressable market analyses, and more.
- We conduct outreach to large-scale incumbent suppliers and innovative startup challengers who provide B2B supply-side products and services to the alternative protein industry, including commodities traders, ingredient/input processors and suppliers, equipment (eg. extruders, bioreactors, etc.) suppliers, infrastructure investors, manufacturers, and contract manufacturers.

Driving engagement via newsletters

Corporate Engagement's monthly Alternative Protein Opportunity (APO) newsletter goes out to over 13,000 food industry executives including retailers, manufacturers, investors, entrepreneurs, and foodservice companies. The newsletter allows CE to continue to be a thought leader in the food industry and keep in touch with our audiences; we highlight consumer and market research, distribution, partnership, and facility updates, policy updates (with contribution from the Policy team), recommended reading and watching, and events and opportunities.

A monthly GFIdeas newsletter goes out to over 2,200 entrepreneurs and scientists in the alternative protein community. While the APO is focused on industry news, this newsletter highlights opportunities for people already involved in the industry. Content includes GFI events, grant applications, government support opportunities (e.g. loans or grants from the USDA), competitions, new scientific papers, and a sampling of open roles from our jobs board.

An investor newsletter goes out quarterly to a list of around 8,000 investors. We feature an analysis of investment data over the last quarter along with investment news and resources.

III. Communications

GFI's Communications department ensures that GFI is a global thought leader and trusted source of data and insights across the field of alternative proteins and throughout the adjacent fields of climate, global health, biodiversity, and sustainable food systems. The team serves as a go-to partner for the media, mission-aligned organizations, and a wide variety of stakeholders working to accelerate and mainstream plant-based and cellular agriculture.

The department elevates the expertise of GFI staff and works across the organization to publish and disseminate original research and reports, secure high-profile media coverage, convene and promote community- and capacity-building events, and thoughtfully engage media and influencers across the private, public, and civil society sectors to position alternative proteins as a key solution for a better food future.

Growing GFI's status as a publishing powerhouse

GFI's website is the go-to resource for anyone interested in learning more about or getting involved in the success of this burgeoning field. All of the resources discussed in the above programmatic sections are housed on the website, and our blog acts as the editorial heartbeat of GFI's work and a news service for developments in alternative protein innovation. GFI.org is, essentially, a very well-curated wiki for the entire alternative protein endeavor. In 2024, GFI began including commentary on the state of alternative proteins from GFI subject matter experts on Substack.

Establishing GFI as a thought leader

Traditional media coverage is vital to all GFI goals, as it creates excitement among key target communities, reaches potential donors, and influences investors to put more money into critical technologies. It also pressures legislators and regulators to take action, influences corporations to add and promote plant-based products, and provides meaningful social media content.

The media team within our Communications department works strategically to develop and enhance the reputation of GFI representatives as thought leaders and subject matter experts and to build GFI's presence in key science and top-tier media through a variety of tactics. These include issuing media statements in response to breaking news, creating press advisories and releases to promote GFI's programmatic work, and pitching op-eds written by our experts to top science and general media outlets.

In addition, the media team responds to dozens of inquiries weekly and takes a targeted approach to building trustworthy relationships with key media voices. In all cases, the team leverages earned media across GFI's owned media channels as well.

GFI's media presence has included stories by the *New York Times, CBS News,* the *Wall Street Journal,* CNN, CNBC, the BBC, the Economist, and TIME (to name just a few). In 2021, CNN published an op-ed co-authored by CEO Bruce Friedrich that argued that the climate community should go all-in on government policy to support alternative proteins. The piece remained on CNN's home page for multiple days and was shared at least four times with CNN's 54.9 million Twitter followers. TIME Magazine quoted Bruce extensively in an 8-page spread on the potential of the cultivated meat industry to feed a growing global population sustainably in the publication's climate-focused double-issue.

The Communications team also manages GFI speaker invitations, from the *Wall Street Journal*'s Global Food Forum to Future Food Tech to SXSW to TED. Bruce's TED Talk was TED's most viewed talk the week it went live in May 2019. Views now total 2.4 million, with translations into dozens of languages. The highly-ranked *Making Sense* podcast, which boasts one million downloads per episode and is hosted by philosopher and author Sam Harris, hosted Bruce for an in-depth discussion. More impactful still, the *TED Radio Hour*, one of the top 10 U.S. podcasts, extended our reach to millions more when it featured Bruce and his talk on the climate episode, which aired on more than 600 radio stations. In December 2021, Bruce and former Senior VP of Science & Technology Liz Specht, Ph.D., spoke at the 7th annual *Financial Times* Global Food Systems Summit, which had approximately 500 live viewers from over 60 countries.

Engaging with global changemakers and think tanks

In 2023, the Center for Strategic and International Studies (CSIS) released an in-depth report on the strategic importance of alternative proteins. The 4,900-word report calls for more government support for alternative proteins to address food security, global health, climate change, food systems resilience, and global competitiveness. Bruce spoke at the CSIS launch event for the report, which also featured former National Security Council official Matt Spence, Carnegie Endowment for International Peace fellow Jon Bateman, and Schmidt Futures scientist Genevieve Croft.

In 2023, the United Nations Environment Programme (UNEP) released a landmark report focusing on alternative proteins as a tool to slash food system emissions. GFI worked with UNEP on this report from its point of conception and supplied three co-authors and three co-reviewers. Additionally, the commission convened by Nobel Laureate in economics Michael Kremer to support food systems innovations that will address climate and food security released a policy brief supporting alternative proteins. GFI teams submitted multiple briefs and responses to Kremer's team in the lead-up to the report, which credits GFI's input. In 2022, *Foreign Policy* published an article by Founder & President Bruce Friedrich and Climate Advisers CEO Nigel Purvis on the need for governments to support alternative proteins for climate mitigation and food security. The piece was previewed on the cover of its fall magazine and shared repeatedly with its more than 1 million Twitter followers. GFI and Climate Advisers also published a new white paper about alternative proteins as a food security priority. The same year, Lead Scientist Claire Bomkamp, Ph.D., and former GFI fellow, Eileen McNamara, Ph.D., co-authored a piece in *Nature Food* outlining the opportunity that cultivated meat presents to make meat without contributing to antibiotic resistance. *Nature Food* also published an essay by Bruce that outlines GFI's theory of change.

GFI was selected as an alternative proteins scoping partner for the Bezos Earth Fund in 2023 to support research to catalyze the development of alternative proteins. Specifically, the Earth Fund chose to support key elements including policy, consumer, and market roadmaps to spur and sustain growth in specific geographies and foundational, open-access research grants to solve some of the most pressing R&D

challenges in the sector. GFI leadership and affiliates worked closely with the Earth Fund to develop an action plan for engagement and investment in key geographies and joined Earth Fund leadership in high-profile meetings and events with governments, industry, academia, and civil society. GFI leadership joined an Earth Fund Climate Week convening to discuss the transformative role of sustainable proteins in bolstering food security and tackling the massive emissions from agriculture. In April 2024, the Bezos Earth Fund announced a new $100 million AI for Climate Nature Challenge, that, among others, prompts the question, "How can we feed the growing population without hurting the environment?" Alternative proteins are featured as one of the first focus areas of the challenge, highlighting the growing focus on alternative proteins as a critical solution in the climate space.

Leveraging social media for maximum influence

Our social media has become increasingly sophisticated and targeted, with a presence on Twitter, LinkedIn, and Instagram. In particular, GFI leverages its social media platforms to reach and engage journalists and influencers, the academic/researcher community, policy staffers, entrepreneurs, and corporate food executives.

Convening industry leaders, innovators, and facilitators

GFI fosters collaboration across the alternative protein sector and builds bridges to stakeholders who are critical to propelling the sector forward. We host and attend conferences around the world where our leadership and guidance can accelerate progress. GFI's Good Food Conference (GFC) has brought together scientists, entrepreneurs, investors, policymakers, and companies working on alternative protein technologies. The program presents cutting-edge research, strategies, and insights for industry growth and perspectives on regulatory issues.

Following a remote conference in 2022, the GFC returned to San Francisco in 2023 and attracted more than 1,200 attendees at a critical moment for our sector. Attendees heard from two members of Congress, the USDA, the Department of Energy, and multiple state elected officials about the importance of U.S. public investment in alternative proteins R&D. Some of the largest meat and food companies in the world spoke about the importance of alternative proteins to incumbent industry, including ADM, Cargill, CP Foods, Givaudan, and MISTA. Scientists from around the world discussed breakthroughs in alternative protein scientific discovery and the most important areas for further focus.

Participating in the 2023 Good Food Conference was a transformative experience for me. The sense of community and shared passion among attendees, including industry leaders and academics, was truly inspiring. Conversations among students led to the initiation of a regional European project, bringing like-minded individuals from different universities together to plan events and further our mission in the field of alternative proteins.

—Mariel Alem Fonseca, The Cambridge Alt Protein Project

IV. Global presence & impact: The Good Food Institute is seven different high-impact organizations united around one global mission.

GFI operates affiliate organizations in six key countries and regions: Asia Pacific, Brazil, Europe, India, Israel, and Japan. These affiliates have built their national and regional teams by hiring experienced food scientists, policy experts, food industry veterans, and communications professionals.

GFI's Executive department works closely with GFI's affiliates to ensure coordination across regions. This enables each affiliate to leverage the most successful efforts of all teams. Affiliates and GFI U.S. focus on the same three strategic areas: science and technology, policy, and corporate engagement.

A. Asia Pacific (APAC)

One of the fastest-growing regions on Earth for alternative proteins, Asia Pacific has enormous production opportunities and governments that are beginning to make significant investments in food innovation.

"No organization is doing more to build out the scientific ecosystem in Asia than GFI. I have seen first-hand how their collaborative work with the Singapore government has accelerated support for vital research and guided investments toward the highest-impact areas. Reimagining Asia's protein supply is a colossal project, but GFI's work puts it within our grasp."

—Prof. William Chen
Director of Food Science & Technology at Nanyang Technological University
Director of the Singapore Agri-Food Innovation Lab

Building an alternative protein ecosystem

Asia Pacific holds wide-ranging comparative advantages in the alternative protein space. Our team focuses on stimulating significant infrastructure investment and installation to ensure that global cost-competitiveness and supply of major ingredients and end-products across all alternative protein categories are benefiting from Asian countries' capabilities for scale.

Our team is also focused on building, deepening, and leveraging networks and collaborative partnerships with major institutions, including Singapore's national science agency (A*STAR), the Singapore Food Agency, multilateral organizations like the World Health Organization and World Economic Forum, and funders such as Temasek—a global investment company owned by the Singapore government—to achieve our goals across a vast geography. As an indicator of our growing influence, the

Singapore Prime Minister's Office has invited GFI APAC to co-create the city-state's COP pavilions on food and innovation for each of the past three years.

Starting in 2022, GFI APAC helped co-organize the first Global Agri-Food Scientific Symposium, which has since become an annual gathering as part of Singapore International Agri-Food Week (SIAW) that brings together leading alternative protein scientists and connects them to like-minded industry partners. In 2023, GFI APAC and the APAC Society for Cellular Agriculture launched the APAC Regulatory Coordination Forum at the Singapore Food Agency's annual regulatory roundtable, which is also part of SIAW. A memorandum of understanding was then signed to align participating organizations around the goal of coordinating regulatory frameworks for novel foods. Signatories from Australia, China, India, Indonesia, Israel, Japan, Malaysia, Singapore, and South Korea are now unified in their mission to streamline approval processes and reduce alternative protein trade barriers across the world's most populous region.

Our team also led two presentations at the 2023 Global Summit on the Future of Future Food, convened by Thailand's National Center for Genetic Engineering and Biotechnology and the United Kingdom's Institute for Global Food Security. Their session on developments in the alternative protein sector highlighted alternative proteins as a food security and climate solution, while a session on regulatory developments emphasized the urgency for increased public funding for alternative protein science and scaling.

In early 2024, in the first-ever authoritative decision on the matter, Singapore's Islamic Council ruled that cultivated meat can be halal, as long as it adheres to certain requirements. This critical decision came after more than a year of deliberations by the council, during which GFI APAC scientists and policy experts provided numerous technical presentations about the process of cultivating meat from animal cells.

Creating resources that fill crucial knowledge gaps

GFI APAC's website represents the broad range of work conducted by our growing programmatic teams. It includes a first-of-its-kind webpage that documents the support available to alternative protein startups from the Singapore government. This important tool allows startups to find relevant resources with the option to search by "need" (e.g., bringing in foreign talent, upstream R&D funding, etc.) or by "development stage" (pilot stage, internationally commercialized, etc.). The GFI APAC website also hosts our State of the Industry Report for Asia Pacific (PDF), which covers public and private investments, the R&D ecosystem, product development, and market insights.

Producing and sharing such reports and resources is key to our strategy. Our report on cell line development and utilization trends in the cultivated meat industry, for instance, identified top challenges and knowledge gaps in need of resolution to enhance the availability of suitable cell lines and enable cost-effective and large-scale

manufacturing of cultivated meat. Insights from this report were also featured in the renowned scientific journal *Trends in Cell Biology*. Similarly, our report on *The Untapped Potential of Mung Beans for Alternative Proteins* offers a roadmap for resolving complex supply-chain challenges and overcoming decades of R&D neglect to unlock an underutilized plant protein.

In 2024, GFI APAC released a first-of-its-kind consumer perception study on plant-based meat in Southeast Asia, which showed that above all else, cost is the biggest barrier to widespread regional market adoption. Among consumer segments that expressed high interest in eating plant-based meat, up to three-quarters said they would buy it at price parity with conventional meat. But if plant-based meat manages to achieve a price 20 percent lower than conventional meat, more than 80 percent of *all* consumers would buy it, including about half of those who would otherwise reject it. Conversely, if plant-based meat is priced 20 percent higher than conventional meat, there are huge drop-offs in interest among everyone except the most enthusiastic consumers. Research by GFI APAC has shown that the average plant-based meat product price in our region is currently 35 percent higher compared to its conventional counterpart, which illustrates just how many potential consumers are withholding their purchases until prices come down.

Raising the alternative protein industry's profile

As Asia's leading alternative protein think tank, GFI APAC's experts are on speed dial for reporters and editors at many of the continent's most influential newspapers, including the *Straits Times*, *Nikkei*, and *South China Morning Post*—newspapers of record in Singapore, Japan, and Hong Kong, respectively. Since the rest of the world is also eager to find out what's happening in Asia, our spokespeople have been featured by major global media outlets, including the *Economist,* the *New York Times*, the *Guardian*, *Financial Times*, BBC World Service, CNBC International, *Nature*, and CNN.

GFI APAC's relationships with top universities and institutional partners have also enabled us to break new ground when it comes to talent cultivation. We successfully launched the first undergraduate- and graduate-level university modules on alternative proteins in Southeast Asia at two of Asia's top universities, Nanyang Technological University and the National University of Singapore. We then worked with a coalition of universities and private companies to develop a work-study program aimed at training participants for careers in Singapore's fast-growing plant-based meat industry. In 2024, we also launched a first-of-its-kind career map for plant-based meat development and manufacturing. The website includes job archetypes for specific positions within Singapore's workforce and details on work-training programs available to help upskill recent graduates and mid-career professionals. A few months later, GFI delivered a keynote presentation at Singapore's 2024 Food Manufacturing Career Fair, attended by the Minister of State for Manpower and leaders from top polytechnic institutes.

Outside of Southeast Asia, GFI APAC works closely with its independent strategic partners at GFI Consultancy (GFIC), which does mission-aligned work in mainland China, Asia's largest economy. For example, in 2024, GFI APAC joined forces with the Singapore Institute of Food and Biotechnology Innovation (SIFBI), the China-based Suzhou Research Institute, and GFIC to co-organize a bilateral scientific symposium between Chinese and Singaporean alternative protein researchers. The historic event was held in a hybrid format, drawing more than 60 participants from academia, research institutes, industry, and government agencies. Together, participants explored recent advancements in the alternative protein ecosystem, with an emphasis on innovations in efficient manufacturing, novel ingredients like yeast protein and cultivated fish fat, and the nutritional profiles of plant-based and cultivated meats. The conference also identified regulatory harmonization, manufacturing scale-up, and talent development programs as top priorities in both countries, showcasing a shared commitment to revolutionizing the alternative protein landscape.

In 2024, GFIC released a China Plant-based Meat Supply Chain report highlighting a tenfold capacity increase in China's plant-based meat industry from 2019 to 2023. The report emphasizes China's pivotal role in the global plant-based protein landscape, providing an industrial-level analysis and identifying value chain opportunities. GFIC also published an article about alternative proteins in *Enterprise Reform and Development*, a monthly magazine under China's National Development and Reform Commission, as part of a six-article feature on food and agriculture. GFIC's contribution frames alternative proteins as a key element of the global bioeconomy with significant economic and sustainability benefits. GFIC's insights have additionally been covered by Bloomberg, CGTN, CNBC, China Business Network, China Food Newspaper, Sixth Tone, Xinmin Net, and many other local media outlets.

B. Brazil

GFI is a great partner. A great source of knowledge, research, and consumer understanding. Two studies conducted exclusively with Brazilian consumers were central to the design of our strategy. We believe that it has always been and will continue to be a very relevant partnership to us to fulfill our purpose of democratizing access to plant-based protein.

—Camille Lau, Marketing Director & CMO, Plant-Based Nutrition at Seara/JBS

Shifting Brazil's research ecosystem to alternative proteins

Brazil's robust scientific ecosystem focuses on agricultural R&D. Instead of building infrastructure from scratch, GFI Brazil prioritizes informing and exciting scientists and producers about alternative proteins within the existing infrastructure. In 2021, our team initiated the Biomes Program, supported by the Climate and Land Use Alliance. The program aims to support the alternative protein market by developing products and ingredients through native species from the Amazon and Cerrado biomes. GFI Brazil also signed a Cooperation Agreement with the Secretariat of Economic

Development, Science, Technology, and Innovation of the State of Amazonas. This work has expanded over the past three years thanks to additional grants from other philanthropic organizations, including the JBS Fund for the Amazon. In June 2023, researchers from the first edition of the Biomes Program presented their results at a pitch event attended by investors and stakeholders from major ingredient and manufacturing industries. GFI Brazil's Biomes Program webpage showcases the first three editions of the program, giving an in-depth look at the program's completed research projects as well as overviews of new projects in development.

In 2020, GFI Brazil partnered with the Federal University of Paraná to offer the country's first university course on cultivated meat, "Introduction to Cellular Animal Science." Additionally, in 2022, one of the top research universities in Latin America signed an agreement with GFI Brazil to collaborate on a broad research initiative focused on domestic crops to catalog the crops' protein structures and evaluate their potential application in plant-based meat products.

GFI Brazil also promotes GFI's competitive research grant program across the entire plant-based research sector. In 2021 alone, 34 Brazilian research teams submitted proposals to the program, and seven projects from five institutions were selected. In 2023, one of those projects funded by GFI's Research Grant Program and developed by the Brazilian Agricultural Research Corporation (Embrapa), a state-owned research corporation affiliated with the Brazilian Ministry of Agriculture, presented a prototype of cultivated chicken. News of the development was featured in at least 40 media outlets, including *Forbes* and *Globo Rural*.

Reinforcing relationships with Brazilian ministries

Another of GFI Brazil's top priorities is to develop relationships with the country's executive departments of science, technology, and agriculture, as well as Embrapa. The team has repeatedly met with these agencies, working with high-level contacts to secure public funding for alternative proteins and create an advantageous regulatory environment for the industry. In 2022, the Ministry of Science, Technology, and Innovation sought out GFI's expertise on two requests for proposals to fund alternative protein research and development—for the first time in the country's history. Thanks to GFI Brazil's years of working with the Brazilian government, the Brazilian Innovation Agency set a historic precedent of investing in alternative proteins, paving the way for more significant future investment. In the same year, after nearly two years of advocacy by GFI Brazil and our partners at the Brazilian Association of Bioinnovation, Brazil's federal government updated its Industrialized Products Tax (IPI) to remove taxes levied on plant-based milks. This removed a key barrier to achieving price parity with animal-based dairy.

In 2023, GFI Brazil worked with academic and industry partners to publish a Hazard Analysis and Critical Control Points (HACCP) food safety study for cultivated meat production. The study helps lay the foundation for the new technology in Brazil and

includes a detailed flowchart of the cultivated meat production process. GFI Brazil also hosted a lunch at the headquarters of the Ministry of Science and Technology for the Secretary of Special and Strategic Programs and her staff, who then held a workshop on alternative proteins for government officials, parliamentarians, and researchers.

GFI Brazil held critical meetings with key members of the Brazilian Congress, one of whom took part in President Lula's transition team and agreed to be our legislative ambassador to the Lula government. The new President's strong commitment to protecting the environment provides an excellent opportunity for the government to champion alternative protein development. GFI Brazil spoke at a public hearing at the Environment and Sustainable Development Committee of the House of Representatives in Brazil about the potential of alternative proteins to mitigate climate degradation and boost the economy. Following the hearing, representatives from the Ministry of Health approached GFI Brazil to discuss alternative proteins' potential to mitigate zoonoses.

GFI has been essential in helping us understand the alternative proteins market. The Ministry of Science has been working closely with GFI for three years. Based on this, we are inserting alternative proteins into public policies.

—Bruno Cesar Prosdocimi, general coordinator of Science for Bioeconomy at the Ministry of Science, Technology and Innovation

GFI Brazil designed the first regulatory study on alternative proteins for the Brazilian market, carried out by the Institute of Food Technology. They also formed a working group with trade organizations at the Brazilian Association of Bioinnovation (ABBI), which further boosts their lobbying activities and provides direct access to a large group of representatives and senators. In 2024, GFI Brazil participated in two workshops designed to support innovation in the alternative protein market, organized by Embrapa and the Brazilian Ministry of Agriculture and Livestock (MAPA). The workshops gathered company representatives and researchers to discuss the development of a national database on plant-based products, with sessions focused on ingredients, ingredient suppliers, plant-based product formulation, and packaging.

In 2024, GFI Brazil organized an inaugural Workshop on Alternative Protein Studies in collaboration with the Brazilian Ministry of Science, Innovation, and Technology. The virtual event, broadcast on the Ministry's YouTube channel, featured five lectures covering plant-based, cultivated, and fermentation-derived technologies and included a discussion on the quality and safety of alternative meat products.

Building the alternative protein industry

Brazil is home to the largest meat company and the largest ground beef company in the world. It also has a robust entrepreneurial ecosystem and significant venture capital. Tapping into this meat industry expertise and strong venture capital environment is another pillar of our strategic plan.

At the beginning of its activities in Brazil, GFI used to advise both incumbent food and meat companies and pioneering startups, helping them launch their first plant-based meat products. They were the principal alternative protein advisors on product plans, suppliers, and strategies for some of the world's largest food and meat companies. They supported the creation of Brazil's first plant-based meat company, Fazenda Futuro, and helped them launch the fantastically popular Futuro Burger. Within five months of operation, Fazenda Futuro was valued at $100 million. Following its engagement with JBS, the world's top meat producer, the company announced an investment of $100 million into acquiring a cultivated meat company in Spain and building a cultivated meat research center in Brazil. JBS went on to publish an article in Brazil's largest financial newspaper stating that alternative proteins are among the company's key strategies for the future of food.

GFI Brazil presented at the 2022 FAO roundtable on cultivated meat and the future of food security meeting in Tel Aviv, co-hosted by FAO and the Israeli Ministry of Health. Participants included food system leaders from the United States, Israel, China, Brazil, the United Kingdom, and Australia who shared their cultivated meat production processes, discussed cultivated food safety, and reviewed strategies for communicating with future consumers.

In 2023, GFI Brazil had a strong presence at the Food Ingredients South America event in São Paulo, the largest fair of additives and ingredients in South America. Team members participated in panels focused on alternative protein opportunities, consumer perceptions, regulatory outlooks, and the upcycling of native plant species.

In a push to reach new audiences across Latin America, GFI Brazil publishes some of its main studies and reports, like its annual report, in three languages—English, Spanish, and Portuguese.

Expanding our startup and investor network

Although the Brazilian innovation ecosystem is not as developed as those of the United States or other advanced industrialized countries, our work with startups, entrepreneurs, and investors has greatly accelerated Brazil's alternative protein market. We began 2019 with fewer than 15 startups in our network and fewer than three influential investors. By 2022, we had connected and supported 62 startups or entrepreneurs and collaborated with 38 investors interested in the sector.

We have collaborated with Insper, Latin America's highest-profile business university, on several projects, including adapting the guide for GFI startups in Brazil, which saw 750 downloads within two months of publication.

In addition to these initiatives, GFI was the first organization to involve Brazilian investors in the sector. A significant achievement was our help in setting up the ENFINI

fund with PWR Group, which invested in companies such as Fazenda Futuro, Blue Nalu, Memphis Meats, and others.

In 2023, GFI Brazil began mapping and connecting the Brazilian innovation ecosystem with alternative proteins. Eleven local innovation ecosystems were identified as technological hubs of reference for the alternative protein sector, and GFI Brazil introduced the potential of alternative proteins to various laboratories, R&D centers, incubators and accelerators, technology parks, and more within these regions. Four of the identified local innovation ecosystems are already developing advanced initiatives with GFI Brazil, including events to engage researchers, meetups for university and industry networking, and acceleration programs that include alternative proteins in their investment strategy.

C. Europe

Hosting enormous scientific and commercial talent, including five of the world's top 10 universities, Europe has a critical influence on global trade, migration, policy development, and thought leadership.

The first UK parliamentary reception dedicated to cultivated meat – which I sponsored and which was co-hosted by GFI Europe – served to inform and inspire a significant number of MPs from across all parties about the potential of alternative proteins for this country and wider society. GFI Europe has a rational, clear, expert voice in calling for government action to advance alternative protein policy and the type of collaborative, practical approach that policymakers welcome and appreciate.

—Anthony Browne, Member of Parliament (UK)

Driving millions of euros into alternative protein R&D

The European Union and its constituent governments spend tens of billions of euros on research every year. Almost none goes to alternative protein R&D. Targeted lobbying for more government funding could deliver an enormous impact. A top strategic priority for GFI Europe is driving more public funding into alternative protein research.

Following extensive meetings and technical conversations with GFI Europe in 2021, the UK's National Food Strategy (NFS) recommended that the government invest £125 million in alternative protein research. While this recommendation was a huge step forward, it wasn't a guarantee that funds would be directed toward the highest impact alternative protein R&D. After the NFS report was issued, GFI Europe focused on building relationships with the teams responsible for shaping the government's response to the recommendations. In June of 2022, the UK government published its official response to the 2021 recommendations, and the GFI Europe team was delighted to see that their efforts had been successful. The Government Food Strategy states that "the government will keep the UK at the front of this growing and innovative sector by supporting alternative protein research and innovation," including plans "to

invest over £120 million in research across the food system." In 2023, GFI Europe published a UK-focused report on sustainable proteins. The report is a deep-dive review of public research and development, private sector activity, and potential future industry clusters. Among the recommendations is a call for the government to invest £390 million in research and development by 2030.

In 2022, GFI and the European Institute of Innovation and Technology (EIT) Food launched a €100,000 Cultivated Meat Challenge to find innovative approaches to reducing the cost of cell culture media (and thus bringing down the cost of cultivated meat). The Challenge winners received prizes of €100,000 each, with additional funding available to support commercializing their ideas over the following three years. GFI Europe intends to build on this in the coming years, urging that dramatically more of the forthcoming €80 billion Horizon Europe R&D program be spent on alternative proteins. In 2023, GFI Europe coordinated the final draft and executive summary of EIT Food's Protein Diversification Think-Tank's policy brief Accelerating Protein Diversification for Europe, which was launched at EIT Food's flagship conference and shared during a panel with the European Commission's agriculture and research directorates. In 2024, GFI Europe worked with EIT Food to convene a roundtable on farming and alternative proteins, with participants spanning farming, large and small companies, NGOs, think tanks, investors, and governments. GFI Europe senior policy manager Ellie Walden presented the GFI Europe-commissioned Green Alliance report, which found that such a shift could enable 21% of farmland across 10 European countries to be used to expand regenerative agriculture, restore nature and boost domestic food production.

GFI Europe also shaped the R&D priorities of the UK Research and Innovation (UKRI) national funding agency, resulting in an official report adopting our precise scientific recommendations and goals. UKRI's Biotechnology and Biological Sciences Research Council (BBSRC) allocated £20 million to alternative protein research and invited GFI Europe to co-lead a workshop on how to best direct the funds. In December 2022, UKRI announced a £16 million call dedicated to alternative proteins, and in August 2023, the BBSRC and Innovate UK followed up that effort with a five-year, £15 million investment for the development of an Alternative Proteins Innovation and Knowledge Centre that will support collaborative research partnerships between businesses and academic researchers. In 2024, the UK government committed to investing a further £15 million in the NAPIC innovation hub to accelerate the commercialization of plant-based, cultivated, and fermentation-made foods.

In 2021, GFI Europe scientists and policy experts convened a session on cultivated meat with 11 officials from the European Commission, including representatives from the Joint Research Centre (JRC) and the European Food Safety Authority who were keen to learn about cultivated meat's potential impact on jobs, farmers, consumers, electricity demand, and the market for conventional meat.

GFI Europe engaged with the UK's National Food Strategy Team through a series of meetings, technical conversations, recommendations, and a tailor-made roundtable ahead of their 2021 publication of The Plan, the first wide-ranging review of the UK's food system in 75 years. In their report, the Food Strategy Team recommended £50 million for an alternative protein 'cluster' for scientists and entrepreneurs and £75 million in startup funding. A follow-on 2022 UK government report included three references to "ensuring the UK is at the forefront" of alternative proteins after GFI Europe presented policy recommendations to members of the UK Cabinet Office's Brexit Opportunities Unit. GFI Europe then co-hosted a parliamentary reception dedicated to cultivated meat at the UK Parliament to call for greater investment in cultivated meat research and a more collaborative regulatory process. In attendance were 39 parliamentarians, two senior officials from the Food Standards Agency, and a range of government officials. In 2023, we published a menu of policy options for UK R&D to advance research and commercialization of sustainable proteins in the UK, which sets out why and how the UK government should invest in open-access research to capitalize on the potential of plant-based foods, cultivated meat, and fermentation.

GFI Europe also played a key role in embedding alternative proteins in the European Union's Farm to Fork Strategy, its policy roadmap for creating a more sustainable European food system by 2050. In the leadup to its release, GFI Europe engaged extensively with a broad group of stakeholders, met with officials, offered public feedback, and submitted a letter from NGOs, companies, and academics to the EU president. The Farm to Fork Strategy now explicitly mentions plant-based meat, microbe-based meat, and other alternatives to conventional meat as a research focus area under its Horizon Europe program.

In 2023, following engagement by GFI Europe, the German Bundestag committed to spending 38 million euros on protein transition in the country. The adopted measures will amend Germany's protein crop strategy to focus on proteins primarily for human nutrition rather than animal feed, create a "Proteins of the Future" competence center to develop a comprehensive protein strategy for Germany, and allocate 10 million euros to advance alternative protein production and processing methods. The measures will also support farmers who want to move away from animal agriculture and enter into the production chain for alternative proteins.

In 2024, GFI Europe was an official knowledge partner of the Bioprocessing Summit Europe in Barcelona, an event that brings together hundreds of bioprocessing scientists from across Europe, for its first Alternative Protein Production track. The inaugural sub-tracks on cultivated meat and precision fermentation highlighted synergies between alternative protein manufacturing technologies and the bioprocessing sector. GFI Europe led a featured presentation on cultivated meat trends, challenges, and opportunities and chaired a session on upstream production in precision fermentation.

Leading the opposition to label censorship

GFI Europe has been instrumental in organizing efforts to fight restrictive labeling proposals for plant-based meat and dairy products. Coordinated lobbying by GFI Europe, like-minded nonprofits, and a plant-based industry association prompted the European Parliament's agriculture committee to revisit its proposals. After nearly 12 months of work, the European Parliament voted in October 2020 to reject an amendment that would have banned terms such as "burger" or "sausage" on the labels of non-animal products and thus severely undermine producers' ability to market plant-based meat across Europe.

We also coordinated a joint letter against proposals to expand EU labeling restrictions on plant-based dairy, collecting signatures from 21 nongovernmental organizations, including Greenpeace and the World Wildlife Fund. We used the letter to secure meetings with contacts from the 27 European Union governments who remain undecided or are in favor of the new restrictions, supported targeted activities to put pressure on their governments, and signed the multistakeholder letter coordinated by the European Alliance for Plant-based Food. EU leaders eventually abandoned plans to introduce these unprecedented restrictions.

With the growing success of the sector, we continue to face growing threats of blocking alternative proteins' path to market, most notably recently in Italy. The GFI team continues to engage with policymakers and demonstrate that the passing of such laws would shut down the economic potential of this nascent field, hold back scientific progress and climate mitigation efforts, and limit consumer choice.

GFI Europe also factored heavily in persuading a UK House of Lords committee to urge the UK government to formally oppose label censorship for alternative protein products. The committee explicitly cited evidence from GFI Europe in its recommendations.

Rallying allies by co-founding the European Alliance for Plant-Based Foods

To increase the power of plant-based foods in Brussels, GFI Europe co-founded the European Alliance for Plant-based Foods (EAPF), a multiple-stakeholder platform for companies, NGOs, think tanks, and academic institutions to promote plant-based-food policy at the EU level through direct political outreach and stakeholder engagement in Brussels. GFI Europe sits on the EAPF steering committee and has successfully argued for opening membership to mainstream food manufacturers who will be important allies in our engagement efforts.

Shaping Europe's public conversation on alternative proteins

GFI Europe's website (also available in Spanish) is tailored to inspire audiences across the continent to seize the opportunities of alternative proteins to create local jobs, tackle climate change, and feed a growing population with sustainable proteins.

GFI Europe joined the Climate Innovation Hub in 2021 and established alternative proteins as a key plank in its food and land-use area. This feeds directly into the goal of bringing agriculture into the climate change debate and positioning alternative proteins as a solution. The Hub is a coalition of more than 18 NGOs, think tanks, consultancies, and business coalitions advocating for innovation and public R&D as a key policy area to achieve the EU climate goals.

We continue to shape opinions in favor of alternative proteins in Europe through presentations and media appearances. We helped generate a powerful *New Scientist* article and editorial making the case for public investment in cultivated meat R&D. In 2022 at IFFA, the world's largest meat industry trade fair, GFI ensured alternative proteins were a central theme of this influential gathering for the first time. The team hosted guided tours, gave presentations, and facilitated many new connections that generated significant interest in alternative proteins from both exhibitors and visitors. For many companies at IFFA, the event was their first chance to learn about the alternative protein sector, and GFI Europe has been invited to partner IFFA for their next event in 2025 where alternative proteins will be even more integrated.

We were delighted to partner with GFI Europe to develop alternative proteins into one of the core (and fastest growing) segments of IFFA—the world's largest meat industry trade fair. GFI Europe's experts inspired our attendees from the established food industries about the exciting potential of plant-based and cultivated meat, their talks and tours generate a lot of enthusiasm to accelerate the development and scale-up of these sectors.

— Johannes Schmid-Wiedersheim, Director of IFFA

In 2023, GFI Europe published the first State of the Industry report for Germany (summary in English), providing an overview of Germany's commercial and scientific alternative protein ecosystem and describing the need for political action.

D. India

Our partnership and engagement with GFI India has been invaluable in terms of helping us to better understand the alternative proteins industry.

—Sanjay Laud, managing director, ADM Nutrition (India)

Stewarding research and development

Encompassing a large part of the world's supply chain and manufacturing capacity, India has a deep scientific talent pool and a government committed to creating good jobs across the country, opportunities for farmers, and creative solutions to problems of rural malnutrition. India is home to many world-class agricultural and biotechnology universities, as well as a deep talent pool.

GFI India works with scientists and universities to stimulate alternative protein R&D. In 2019, GFI India collaborated with the Centre for Cellular and Molecular Biology and the National Research Centre on Meat to write and present a proposal for cultivated meat research to the Government of India Department of Biotechnology. The project drew $640,000 in funding, the largest grant for cultivated meat research anywhere in the world at the time. GFI India also drove the formation of the Centre of Excellence in Cellular Agriculture at the Institute of Chemical Technology Mumbai, the world's first government-mandated research center for cultivated meat and fermentation.

GFI India is conducting economic and environmental analyses of the potential of the alternative protein sector in India over the next decade. We have secured partnerships from key government and nonprofit organizations including the central government think tank NITI Aayog, WRI, Food and Land Use Coalition, and KPMG to participate in and amplify the results of these seminal studies. GFI India also initiated conversations to launch coursework and research projects at eight Indian Institutes of Technology.

GFI India's strategic analysis of the algal protein value chain (the first of several planned strategic analyses spanning protein sources and technologies such as extrusion) laid out more than 40 opportunities across industry, science, and policy for advancing algal protein as an input for the alternative protein sector. This research inspired a member of the Government of India's investment facilitation organization Invest India to officially recommend alternative proteins as a potential area of focus to the Government of India Department of Fisheries.

In 2021, GFI India developed a cultivated meat report in partnership with Invest India, the Indian government's investment promotion agency. The report focused on the state of technological development for cultivated meat globally and policy recommendations for India to become a bio-manufacturing hub for the industry. The report was presented to India's Ministry of Animal Husbandry.

GFI India collaborated with India's national investment promotion and facilitation agency, Invest India, to co-author the report Cultivated Meat: Key Opportunities and Recommendations for India. This first-of-its-kind report provides an overview of the technical and market landscapes of cultivated meat with policy recommendations.

Driving government support

In 2023, GFI India's continued engagement with the Government of India led to the inclusion of alternative proteins as one of six key priorities for its Ministry of Science and Technology. GFI India will continue to work closely with the Ministry's Department of Biotechnology to analyze alternative protein gaps, challenges, and opportunities that India is best positioned to address and build a strategic roadmap to ensure that India will be an alternative protein global leader.

Following close engagements with the Department of Biotechnology (DBT), in August 2023 the Government of India announced the formation of the 'Sectoral Expert Committee on Biomanufacturing: Smart Proteins' and GFI India was appointed as one of the industry experts and invited to participate in all subgroups. To draft their *'Biomanufacturing Policy*,' a national-level strategic roadmap for the sector, DBT invited inputs from our team on the current state of affairs, specific challenges, and future strategies for the alternative protein sector.

In 2023, GFI India curated a Smart Protein Pavilion at World Food India, a global event hosted by the Ministry of Food Processing Industries to facilitate partnerships between Indian and international businesses and investors. GFI India also moderated a conference panel discussion on alternative proteins as a climate solution to secure a just food supply.

In 2024, GFI India's work with the Ministry of Science and Technology, Government of India, led to the inclusion of alternative proteins as a focal area in the latest U.S. National Science Foundation and Indian Department of Biotechnology call for proposals for collaborative research. The team then collaborated with the Ministry of Science and Technology to help shape the Regulatory Conclave on Smart Proteins in New Delhi, a significant event for advancing regulatory frameworks for smart proteins. The gathering, which included top food safety and food processing officials, was a direct result of the team's ongoing collaboration with the Ministry's Department of Biotechnology and Biotechnology Industry Research Assistance Council. During the event, GFI India presented safety and regulatory recommendations for smart proteins, emphasizing their importance in biomanufacturing policy.

Building an innovation ecosystem

With a proven track record in scaling private industry affordably, India is key to developing the global alternative protein ecosystem. GFI India works to build partnerships, educate and inspire entrepreneurs and scientists to enter the industry, and increase pioneering companies' chances of success. We launched the annual India Smart Protein Innovation Challenge to address the talent bottleneck in the sector and have trained hundreds of students and young professionals in the business, science, and policy of alternative protein and accelerated go-to-market for dozens of new innovators and startup hopefuls through its one-of-its-kind, comprehensive programming. Participants have hailed from 116 cities, 25 states, and 590 colleges across India. A slate of government and industry partners, from the Government of India's technology transfer initiative to venture capital funds Omnivore and BRINC.

In 2021, GFI India initiated conversations for a Memorandum of Understanding with the Government of India Council of Scientific and Industrial Research (CSIR), an apex body controlling 38 academic and research institutions with a 2021 budget of $880m (similar to Brazil's Embrapa). The agreement influences coursework, research projects, and research centers at relevant labs and universities. The team separately initiated

conversations to launch coursework and research projects at 8 Indian Institutes of Technology, which kicked off in the fall of 2021.

GFI India hosts the GFIdeas India online community and webinar series, attracting hundreds of members from the corporate, scientific, and entrepreneurial worlds. As community members, these innovators gain access to GFI India's resources, including market reports, consumer research, and databases of vendors and collaborators. The team also hosts monthly knowledge-sharing webinars featuring the likes of AAK India and Big Idea Ventures at which thousands of attendees have learned key lessons on the science and business of alternative proteins. The GFIdeas India community holds networking events across major cities such as Bengaluru, Mumbai, and Delhi.

In 2024, GFI India played a key role in launching two new alternative protein innovation centers in Bangalore: IKP Knowledge Park's Centre for Smart Protein and Sustainable Material Innovation and the Alternative Proteins Innovation Center's (APIC) integrated research and manufacturing facility. GFI India also released a report on the incubation ecosystem co-authored with IKP Knowledge Park and initiated a Memorandum of Understanding with APIC to accelerate the alternative protein sector.

Raising the alternative protein industry's profile

GFI India's annual three-day Smart Protein Summit pushes forward urgent action across science, business, and policy stakeholders and decision-makers within the Indian alternative protein, or "smart protein," sector. In an effort to build a National Mission for Smart Protein, GFI India has designed the Summit to serve as a novel platform that highlights the industry's untapped potential, furthers progress, and lays out how the sector is poised to become a key pillar of India's new green economy. The 2022 event attracted a total of 745 participants across India who joined for intensive programming and mentorship on the business, science, and path to market for alternative proteins. By connecting hundreds of young leaders with potential partners and resources, the Challenge is creating pathways for new talent to enter the field and power the transition to a more sustainable food future.

In 2023 GFI India launched its first State of the Industry Report, a deep dive into progress, developments, and whitespaces that provides a comprehensive assessment of the alternative protein industry in India. The report is based on comprehensive research and due diligence conducted in close collaboration with stakeholders across industry, science, and policy who are deeply involved with the sector. From plant-based delights to cutting-edge fermentation technologies, this report offers an insider's look at how this sector is revolutionizing access to protein and food security.

Providing hands-on support for entrepreneurs

GFI India's team advises and supports dozens of plant-based, cultivated, and fermentation-derived meat, egg, and dairy entrepreneurs. These include Genelia and

Riteish Deshmukh, a high-profile Bollywood political couple whose new company, Imagine Meats, is already generating great interest in and awareness of the industry. GFI India's team was critical to the formation and launch of this company, supporting it with key partnerships for product development, manufacturing, and distribution.

Thank you GFI India. We couldn't have done this without you – a dream that all started at the Good Food Institute conference. Thank you for making the dream of Imagine Meats turn into a reality.

—Genelia Deshmukh, co-founder, Imagine Meats

E. Israel

With world-class academic institutions and scientists, a startup-boosting business culture that champions innovation, and a supportive government, Israel offers a unique ecosystem for the rapid development of alternative proteins.

In close collaboration with the Good Food Institute Israel, the Israel Innovation Authority has recently opened new funding tracks tailored specifically to local start-ups and mature companies developing innovative technologies in the alternative protein space. Beyond the financial backing offered to selected companies to fund their R&D efforts, these tracks include a wide array of resources and partnerships with leading researchers in academia, and local and global food producers to help accelerate innovation.

—The Jerusalem Post

Positioning alt proteins as one of the government's top national priorities

With support from leading consulting firms TASC and Ernest and Young, GFI Israel developed a national alternative protein policy plan that was reviewed with the Prime Minister's Office, Ministry of Economy, Ministry of Environmental Protection, Ministry of Agriculture, and Ministry of Foreign Affairs. In 2022, out of 14 opportunities identified, a committee of 17 ministers and high-ranking officials ranked foodtech and alternative proteins as Israel's second-most important R&D priority. The Israeli Ministry of Innovation, Science, and Technology plans to distribute over $52 million a year in research grants and undertake a national foodtech policy plan, with GFI Israel's Alternative Proteins National Policy Plan as the principal roadmap.

In partnership with the Ministry of Foreign Affairs, GFI Israel expanded collaborations with Israeli embassies by providing specialized training for ambassadors and economic attachés. This initiative creates new opportunities for the Israeli ecosystem while positioning alternative proteins as a key component of Israel's global value proposition. Thanks to GFI Israel's efforts, alternative proteins were prominently featured as one of Israel's top climate technologies at the country's first-ever national pavilion at COP27 in November 2022.

In May 2023, GFI Israel collaborated with the Ministry to showcase alternative protein startups to embassies and representatives from multilateral organizations. As part of this effort, our team introduced a Diplomatic Toolkit, offering valuable insights into the alternative protein sector and highlighting opportunities for bilateral cooperation.

GFI Israel actively facilitates international partnerships and opportunities. In September 2023, we organized a global "government meet & greet" with policymakers from across the globe at the Good Food Conference in collaboration with the Israeli Consulate General to the Pacific Northwest. Following strategic consultations with GFI Israel, the Israeli Ministry of Innovation, Science, and Technology launched a bilateral funding program with the UK in July 2024, selecting alternative proteins as one of four focus areas, offering early-stage grants of up to £200,000 for each collaborative research project, with a potential total of £1.8 million.

In July 2023, GFI Israel hosted a plenary session on alternative proteins and food security at the 51st Annual Conference for Science and the Environment. Building on this momentum, GFI Israel led a similar session at the 52nd Annual Conference in September 2024. Over the past few years, particularly between these two conferences, GFI Israel has played a prominent role in key events and media, advancing the conversation on the role of alternative proteins in food security.
Amid rising awareness of food security challenges, the Ministry of Agriculture and Food Security is spearheading an interministerial team in 2024 to develop a national food security plan. As a strategic adviser to three key working groups, GFI Israel is actively working to ensure that alternative proteins are included and prioritized in these efforts.

In May 2024, the World Economic Forum, in partnership with GFI Israel, the Israeli Center for the Fourth Industrial Revolution, and the Israel Innovation Authority, published a report emphasizing "the essential role governments play in propelling progress in alternative proteins." The report underscores alternative protein as a pivotal solution for building resilient global food systems and demonstrates how investment in the sector can drive economic growth and innovation, create new jobs, and stimulate the global bioeconomy.

In October 2024, in partnership with Deloitte, GFI Israel released a comprehensive guide for governments worldwide on adopting national action plans for alternative proteins. The framework is designed for policy officials, food alliances, NGOs, and sustainability-focused groups, all of whom can play a pivotal role in shaping these strategies. This guide can be implemented either as a standalone approach or integrated into existing agrifood or bioeconomy initiatives.

Increasing government funding

GFI Israel and the Israeli Innovation Authority (IIA) collaborate to facilitate international strategic partnerships and unlock public funding opportunities for alternative protein companies. Following a major hearing organized by GFI Israel in

April 2022, the Israeli government approved an $18 million grant from the IIA to establish a cross-sectoral Cultivated Meat Consortium, bringing together 14 leading cultivated meat companies and 10 top academic institutes to develop advanced and scalable technology for cultivated meat through the exchange of ideas between academia and the industry.

In December 2022, the IIA committed another $14 million to R&D infrastructure for fermentation, a vital part of the alternative protein industry, leading to the June 2024 launch of YDLabs, a new pilot-scale manufacturing facility for precision fermentation startups. This milestone stemmed from GFI Israel's extensive advocacy, emerging from the roadmap detailed in our Alternative Proteins National Policy Plan. In 2023, based on GFI Israel's workforce survey, the IIA also issued a NIS 36 million (~$9.73 million) Request for Proposals to develop workforce training programs in several fields including AI, bio-convergence, and food tech with an emphasis on alternative proteins. Additionally, in June 2024, the IIA, prompted by GFI Israel, launched a ~$1 million call for proposals focused on alternative proteins, aiming to foster innovation through startup and food industry manufacturer partnerships.

For three consecutive years, the Israeli Ministries of Innovation and Agriculture have partnered with GFI Israel to launch dedicated grants focused on alternative protein research, with GFI and government scientists co-selecting projects. This demonstrates a steadfast commitment to advancing alternative protein technologies and enables GFI Israel to direct government funding toward the most impactful and innovative research areas. With all parties matching funds from public funding and GFI's generous donors, over $3 million has been allocated to more than 30 research projects over the past three years. In February 2024, the Israeli Higher Education Council announced a five-year climate-focused open call of $125 million to support research centers, scholarships, and grants that explicitly recognized and incorporated alternative proteins into the funding scheme.

Advancing academic research

GFI Israel launched an alternative protein academic course for undergraduate and graduate students at the Faculty of Agriculture in The Hebrew University of Jerusalem for advanced biochemistry and food sciences, featuring alternative protein pioneers like Mark Post and Atze Jan Van Der Goot. In 2021, the course expanded to Tel Aviv and Ben Gurion Universities, while, inspired by our course, the Technion – Israel Institute of Technology developed its own course with GFI's support. By January 2024, GFI's "Introduction to Alternative Proteins" workshop was incorporated into the Ministry of Education's online resource available for high school science educators nationwide, aiming to spark interest among science-savvy high school students, encouraging them to explore and potentially specialize in alternative proteins in their future academic pursuits.

In October 2022, GFI Israel co-organized academic conferences focused on establishing alternative proteins-focused research centers at the Technion and Hebrew Universities, each attracting hundreds of participants with representation from 120 different companies, as well as government officials, representatives from technology transfer offices, and more. By January 2023, the Technion committed $20 million, in partnership with GFI Israel, to launch the world's first Sustainable Protein Research Center. This was the first major research center grant that included plant-based meat alongside cultivated meat, and will allow over 30 researchers from 10 different departments to engage in multi-disciplinary alternative proteins research, commercialization, and entrepreneurship.

Creating a go-to-market for alternative protein innovation

Israel leads the world in startups per capita and is quickly becoming a global hub for alternative protein research and innovation. GFI Israel is dedicated to building on this momentum and focusing on venture creation by connecting and supporting innovators, providing expert technical opinions to high-impact startups, and offering resources and counseling to incubators, venture capitalists, and entrepreneurs.

GFI Israel's latest Israel State of Alternative Protein Innovation Report reviewed the nation’s alternative protein ecosystem and highlighted the nation’s ranking as second globally in alternative protein investments, representing 15% of global funding. GFI Israel also helps facilitate networking opportunities and the exploration of potential collaborations, allowing startups to connect with manufacturing companies and industry leaders to connect with leading academic researchers, as well as orchestrating exclusive events worldwide that give insight into different regulatory environments, showcase Israeli innovation, and connect entrepreneurs with prominent global industry leaders, investors, and stakeholders. GFI Israel engages with the largest Israeli food manufacturers to make alternative proteins a key component of their strategies, delivering workshops to their senior management teams. One CEO praised GFI as “an eternal fountain of knowledge and connections” and directed his team to maximize the relationship with our team in Israel.

With GFI Israel's support, the IIA and the Food Safety Authority collaborated on a joint pilot program with four alternative protein companies to establish regulatory pathways and safety criteria for novel proteins. In April 2023, this effort led to the groundbreaking regulatory approval of precision fermentation company Remilk, allowing it to market its non-animal dairy products to Israeli consumers. Additionally, following years of GFI Israel’s advocacy with key stakeholders in the Department of Food Risk Assessment at the Israeli Ministry of Health, the Israel Innovation Authority, and the Prime Minister’s Office, Israeli startup Aleph Farms received pre-market approval for its cultivated beef in January 2024, making Israel the first country to greenlight cultivated beef, after the U.S. and Singapore's approval of cultivated chicken.

F. Japan and Korea

We are expanding our presence in Asia with the launch of new affiliate teams. In October 2024, GFI Japan became the sixth global affiliate of GFI. A top priority for GFI Japan is to advocate for increased government investment in R&D and commercialization, particularly within the national bioeconomy strategy. The team will also assist local regulators in creating a clear pathway for cultivated meat to enter the market, strengthen connections between Japan's 'future food' companies and their international counterparts, provide timely translations of relevant reports and resources, and foster collaborations between Japanese research institutions and global alternative protein scientists.

With its strong innovation ecosystem and strong government support for the bioeconomy, South Korea is also primed to become a key player in the global alternative protein sector. Work is underway to establish a seventh GFI affiliate in South Korea by 2025.

V. Culture, transparency, and strategy

Setting strategy

GFI works exclusively on projects with a huge impact: helping establish scientific centers focused on alternative proteins can, with each new launch, effectively double (or more) GFI's impact. Involving new NGOs, stopping bad bills and creating good regulatory structures, producing life cycle and techno-economic analyses, publishing new reports and peer review publications—all of this has a massive and broad global impact, and these are the sorts of endeavors that characterize our work.

Our goal-setting system defines four layers of prioritization:

- Pillars establish GFI's five strategic focal areas: the research ecosystem, the public sector, the private sector, thought leadership, and organizational strength.
- Objectives define GFI's top focus areas and are written as future outcomes.
- Key results are specific, time-bound, measurable targets that demonstrate the organization's progress toward an objective.
- Actions are the tactical projects required to achieve key results. Departments collaboratively collate action plans in support of these goals.

Fostering a culture of happiness and support

Of GFI's five organizational pillars, the final and most foundational one states that GFI "maintains operational excellence and a great culture." We take the work of Daniel Pink in his book *Drive* seriously. Pink asserts that the secret to high performance and satisfaction—at work, at school, and at home—is the fulfillment of the deeply human need to direct our own lives, to learn and create, and to do better by ourselves and our world: autonomy, mastery, and purpose. That's what GFI strives to deliver. We

encourage feedback to ensure that all team members are as happy and vocationally fulfilled as possible.

All GFI team members are encouraged to unplug:

- Everyone is urged to take “deep work” days and block their Tuesdays and Fridays for individual work time and internal projects. Team members are encouraged to limit or turn off email during scheduled deep work times.
- Everyone who can is urged to turn off email for most of the day and instead schedule times to respond.
- Every four months we clear our calendars of any meetings and pause on sending emails for a full ‘Deep Work Week’ to allow team members to reflect on our progress and develop work plans for the coming months.

We are a mostly remote team, so we make an extra effort to build in regular times to share updates, solicit advice, and bond:

- Each week we host an all-staff video conference to share initiative updates, go over operational best practices, discuss ways to improve our organization, and hear updates from the program areas.
- To foster bonding, we have virtual happy hours, a cooking club, a culture club, a DEI discussion series, an appreciation program, a sunshine committee for team members who have suffered a loss, meditation mornings, an onboarding buddy program for new staff, and remote office simulations.
- We have two employee resource groups that meet at least once per month. Proud at GFI, our LGBTQ+ affinity group, is a designated safe space for LGBTQ+, questioning, gender-expansive, and allied employees to connect and share experiences. The Overall Well-being League (O.W.L.) is GFI’s mental health, general health, and overall well-being affinity group that provides a designated space for employees to connect, learn about, and discuss relevant health and well-being topics and challenges.
- On Fridays, we compile a weekly report that includes highlights from team members’ week and an optional section for sharing personal updates.

Ensuring team satisfaction

In our April 2024 anonymous team survey, 98% of respondents indicated that they are “proud to work for GFI,” and 97% of respondents agreed with the statement “I would recommend GFI as a great place to work.” Responses to “What are some things we are doing great?” have included these direct quotes:

- “I have never had a better manager than I do here at GFI. My manager checks in frequently about my career aspirations & always has my back when I want to pursue a project, opportunity, or process change.”
- “I believe deeply in GFI's mission and theory of change. GFI is well-positioned as a think tank and catalyst to advance alternative proteins via Policy, Corporate Engagement, and SciTech, which will have (and has had) positive impacts on

people, animals, and the climate. I am proud to work at GFI and believe that taking a systems-level approach to advancing alt. proteins is the most scalable solution to addressing the externalities of industrial animal agriculture."
- "Authentically focus on the highest impact work while fostering a workplace of true collaboration, respect, inquisitiveness, and a dedication to continuous process improvement."
- "People have autonomy over their roles and the grassroots planning means that people know how their work contributes to GFI's mission. GFI also has a funny, quirky, supportive, amazing culture where people can feel a true sense of belonging."
- "GFI is genuinely the best place I've worked and, almost three years in, has only gotten better year after year."

Ensuring transparency

GFI is committed to transparency, starting with the FAQ and compensation policy that we share with all job applicants. Additionally, much of GFI's work is detailed on our blog and in the resources section of our website. Every GFI department creates a monthly report, and GFI's executive team curates and distributes monthly highlights to anyone who would like to receive them. By allowing free and open access to all our resources, including scientific white papers and industry data, we eliminate duplicative efforts and accelerate the work of new industry entrants.

VI. Conclusion

The entire GFI team is committed to securing GFI's place among the world's most cost-effective nonprofit organizations; we strive to focus all donations from our global community of supporters on maximum mission impact.

Climate charity evaluator Giving Green selected GFI as one of the top five charities for climate impact after a rigorous deep dive into our theory of change, programs, impact, and leadership. Here's how Giving Green describes their evaluations:

"Giving Green is a guide for individuals and businesses to make more effective climate giving decisions. We help you find evidence-based, cost-effective, and high-leverage organizations that maximize the impact of your climate donations. We are a team of climate scientists, economists, and impact evaluation experts with decades of experience working at the intersection of evidence-based policy and the environment. We spend thousands of hours reviewing the studies, crunching the numbers, and interviewing the experts, so you don't have to."

GFI is also one of Charity Navigator's top four charities for climate impact. Charity Navigator conducted due diligence on Giving Green and found them to be so well-researched that they now use Giving Green's charity recommendations.

As of September 2024, our team comprises:

- Just over 110 professionals in the United States and 115 team members across our five independent international affiliates.
- An advisory council of 38 high-profile, highly respected leaders in their fields.
- A slate of top-notch pro bono lawyers.
- A constant rotation of talented interns and fellows.

Meet the team at gfi.org/our-team.

We warmly welcome your partnership in creating a sustainable, secure, and just food system. Please contact philanthropy@gfi.org to get involved.