Good Food Institute

POLICY BRIEF
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Contract Development and Manufacturing Organizations for Food and Agriculture Biotechnology Development

Contract Development and Manufacturing Organizations (CDMOs) provide pilot-scale infrastructure and professional services to help startups and scientists create new bio-based products and develop commercial production techniques. Publicly-funded CDMOs specializing in biotechnology for food production can create jobs, boost technological readiness, and provide outsized support to American farmers, innovators, and consumers.

The United States leads in biotechnology and biomanufacturing

The food biotechnology industry promises economic, national security, and public health benefits to the United States. These benefits can be gained faster and more competitively through smart investments by policymakers and business leaders, accelerating economic growth. Efficient, targeted support that will prompt self-sustaining momentum is critical to the United States' continued leadership.

Contract development and manufacturing organizations (CDMOs) lease small- to medium-scale production capacity to startups and researchers. These organizations reduce the need for small businesses to build individual, costly pilot- and demonstration-scale production facilities, reducing the cost of biotechnology research and entrepreneurship and encouraging more innovation.

CDMOs can also lease equipment to public and private researchers, including those at universities and public research organizations, helping them reach findings more quickly and at a lower cost. Public CDMOs can collaborate with regional employers, educators, and policymakers on training programs and apprenticeships, building the local workforce and developing the surrounding region into an entrepreneurial hub.

Several countries, including the United States, have funded the construction and founding of public CDMOs for biotechnology (see "Case studies"). These examples show that CDMOs can quickly earn back the initial investment and become financially self-sustaining in addition to their strategic and economic benefits. Policymakers should establish CDMOs to enhance domestic technological capabilities and boost economic growth.

Case study: The United States Department of Commerce funded the country's first public CDMO in 2024 with a $51 million grant to kick-start the Illinois Fermentation and Agriculture Biomanufacturing (iFAB) Tech Hub at the University of Illinois Urbana-Champaign. iFAB will create enough pilot manufacturing capacity to test 60 new technologies per year. Project members also coordinated with the private sector to upgrade commercial-scale facilities and crop refinement capacity in the immediate vicinity.

Biomanufacturing's economic impact on Central Illinois as a result of iFAB's founding is likely to be between $10 to 20 billion. The Tech Hub will track job growth, workforce training, company formation, and entrepreneurial activity associated with its operation as it develops. To read more about iFAB, see "Case studies," page 7.

Recommendations for U.S. policymakers

Federal and state policymakers should establish CDMOs specializing in food production through biotechnology, combining several priority technologies and resources to maximize regional benefits:

Priority technologies

- Precision fermentation.
- Gas fermentation.
- Biomass fermentation.
- Cultivated meat & ingredients.
- Plant-based protein innovation.
- 3D-printing and texturization.

Priority resources

- Agricultural sidestreams, e.g., soy meal, corn DDGS, brewer's spent grain, and corn stover.
- Commodities and cover crops, e.g., corn, soy, canola, yellow peas, and other pulses.
- Gaseous sidestreams and feedstocks, e.g., carbon dioxide, methane, and ammonia.

Capacity & Specifications

- **Prioritize pilot, demonstration, and smaller commercial-scale bioreactors and processing equipment**, given the number of companies operating at those stages and the general availability of bench-scale capacity.
- **Include flexible upstream and downstream processing equipment** to allow for full in-house production and testing.
- **Provide resources to hire full-time specialists and equipment operators** and fund apprenticeship and fellowship programs to cultivate new talent.
- **Ensure that facilities are food-grade and eligible to receive a USDA grant of inspection** if needed, allowing commercial operations to run simultaneously to feasibility testing.

Investment

The CDMOs analyzed under "Case Studies" required $25 to 50 million in up-front public investment with the possibility of recouping this outlay and becoming self-sustaining. One CDMO reported breaking even after just one year of operation and earning back the full investment in several years, all while catalyzing significantly more private investment. To take advantage of regional specialties and needs, policymakers should allocate funding for multiple CDMOs, each focusing on a particular priority technology and supporting the local economy through specific crop feedstock utilization and employment opportunities.

Recommendation

GFI recommends that policymakers identify multiple agricultural hubs for siting CDMOs and match needs for commercialization space in particular technologies with available resource and workforce development profiles. The United States can support many different CDMOs, each serving a geographically and economically unique region and specializing in a strategic technology, which can be funded by governments or economic development offices at the federal, state, and/or municipal levels. Policymakers should survey existing manufacturing and workforce development programs for opportunities to implement these recommendations; for example, at least one of the BioMade pilot centers should be food-focused and include some of the noted areas of interest.

Strategic and economic benefits of public CDMOs in food biotechnologies

Agricultural biotechnologies such as plant protein innovation, precision fermentation, and cell cultivation offer a wide variety of strategic and economic benefits to U.S. governments. These technologies strengthen food supply chains while requiring fewer resources, and they help meet the challenges of international competition, global trade disruptions, and food insecurity. CDMOs for agricultural biotechnology would not only increase the number and quality of new food products offered to consumers but would also provide strategic benefits for economic growth, agricultural resilience, and national security.

Jobs

One private CDMO under construction in Richmond, Indiana, is expected to create 45 to 195 well-paying manufacturing jobs and 133 to 577 additional jobs in the local community, creating permanent employment opportunities in a town situated at the nexus of the Rust Belt and corn country.

> *"This type of company and industry is a perfect fit for the Hoosier state given Indiana's strong agriculture and manufacturing sectors... We love to see innovative new technologies creating quality jobs and career pathways for both today's and tomorrow's workforce."*
>
> Indiana Governor Eric Holcomb (R)

CDMOs not only create jobs in the growing food biomanufacturing industry but also ease labor shortages experienced by young startups and create a more stable job market for technicians and specialists. In addition to the high costs of equipment and real estate, startups face high costs and limited availability when it comes to qualified experts who can operate such equipment. Trade and specialization programs for food technology operation are few and far between, and hiring full-time, high-salaried staff to operate this equipment can strain the volatile nature of startup funding.

CDMOs alleviate this labor shortage by offering technical expertise on the same short-term, reduced-cost nature as production capacity, while providing stable, full-time employment to the staff themselves. CDMOs often offer the services of in-house specialists alongside use of equipment and laboratory space. This reduces the cost of labor for startups and improves job stability for operators in the food technology space, while helping startups and researchers overcome technical hurdles more quickly and creating a shared knowledge base in the CDMO.

As stable, long-term workplaces with shared staff involvement over many projects and leases, CDMOs can cultivate skilled workforces through fellowships, training programs, and collaborations with public and private institutions. In this way, CDMOs not only meet the existing need for labor in biotechnology but can also spur the growth necessary for a scaled-up, mature sector.

Case study: The iFAB Tech Hub (page 7) will oversee three initiatives to build a local workforce in biomanufacturing: two local colleges will work with industry members to map a relevant curriculum, the Illinois Manufacturing Excellence Center will establish a biomanufacturing apprenticeship program through the Department of Labor, and the Illinois Agri-Food Workforce Initiative will develop a K-12 curriculum to expose students to career opportunities in biomanufacturing.

What's the difference between a CDMO and a CMO?

Contract development and manufacturing organizations (CDMOs) provide a broad range of services related to ingredient and product development, including process development, scale up, and manufacturing. Contract manufacturing organizations (CMOs) are more common and focus solely on demonstration – and commercial-scale manufacturing activities. They are not generally involved in early-stage development work.

For more information on co-manufacturing in the food biotechnology sector, see GFI's "Funding the Build" analysis.

Investment and sector growth

Like many emerging technologies, startups in the food technology sector face the "valley of death"—the period between initial research and commercial operations in which funding is limited but capital expenditures are high. Many startups that have promising ideas are not able to purchase and operate expensive bioreactors and other equipment necessary to test products at commercial scale. These startups risk going out of business before their products can reach consumers.

CDMOs can increase the private capital available to food technology startups without government intervention. Access to early-stage equipment through a CDMO provides startups the opportunity to validate their approaches faster and at a lower cost, helping to build investor confidence, attract the funding needed to eventually build self-owned facilities, and secure contracts with large-scale contract manufacturing organizations.

CDMOs catalyze private investment by providing proof of the broader technologies' commercial viability at various scales, increasing investor trust in the sector as a whole. As investors observe the scale up process and gain experience in which products and technologies are likely to succeed, they can more confidently and efficiently navigate the young sector.

Regional development

CDMOs benefit the entire surrounding region, especially agricultural communities supplying ingredients and labor, universities conducting research and training new workforces, and employers seeking alumni of the CDMO's fellowship programs and partnerships. Because these CDMOs exist to develop ingredients and technologies that specifically benefit their home regions, they increase the likelihood that breakthrough products are made with local resources and workforces and that successful companies permanently set up shop in their communities.

CDMOs can also help create a circular economy, which boosts farm incomes, reduces waste, and improves the amount of nutrition attainable on a regional basis. By developing new uses for sidestreams from local crop production, such as by using corn stover or brewer's spent grain to create higher-value foods, CDMOs located in specific agricultural regions can create new sources of income for local farmers. GFI analysis has found that 13 of the most common sidestreams across every U.S. agricultural region have promise in food biomanufacturing.

Case study: The iFAB Tech Hub in Central Illinois (page 7) is specifically designed to boost local crop markets by using them in new biotechnologies, with local corn and soy farmers' and refiners' organizations serving on the Hub's founding consortium. By using Central Illinois' main crops as a feedstock in their research and product trials, iFAB is encouraging the use of these crops in customers' formulations. Additionally, the Tech Hub intends to draw talented entrepreneurs from other regions by providing a workforce, resources, and scientific expertise, incentivizing company formation and headquartering in the local community.

Opportunity: Agricultural communities across the United States specialize in everything from amaranth to yams, and many of these crops or their sidestreams show potential for use as protein sources, feedstocks, or sugars in new biotechnologies. CDMOs located near farming communities can investigate and encourage the use of these agricultural materials in biomanufacturing, building new markets for U.S. farmers. Further, as food and agricultural biotechnologies continue to grow, the need for local workforces will grow as well. Having multiple CDMOs across the United States will ensure that the benefits of economic growth are captured evenly across many regions.

Accelerating innovation

CDMOs provide researchers and entrepreneurs with better access to equipment and therefore increase the amount and speed of research. When academic and government researchers can use the exact equipment used by startups—for far less than the cost of constructing and maintaining this equipment independently—they can conduct research immediately useful to industry and government. For example, university researchers seeking to find a use for a specific commodity in biotechnology could test potential ingredients in the same bioreactors that startups are using to develop their own products, increasing the likelihood that their findings lead to those startups using the commodity and benefiting the local economy.

Increased access to these facilities for startups and private researchers also allows a greater variety of prototypes and products, including those that may not initially garner the support of increasingly risk-averse private investors. Giving more startups the opportunity to prototype and scale their new products means more opportunities for transformational breakthroughs. Access to food-grade facilities also gives startups earlier opportunities to test ingredients and formulations with prospective customers, enabling the development of better products and driving higher demand.

Supporting key American industries

The United States is the world leader in biotechnology research and industry, but bold investments from other countries threaten this position on the world stage. China has already overtaken the United States in annual agricultural research, and recent investments in biotechnology have led to Chinese companies becoming key players in the young industry. The United States federal and state governments can support American biotechnology companies by creating public CDMOs, which will utilize the services of domestic manufacturers of bioreactors, monitoring equipment, software, and other essential components all while promoting the agricultural biotechnology sector.

Opportunity: Both the iFAB Tech Hub and the private CDMO in Indiana specialize in precision fermentation, a promising field in which biotechnology is used to make specific ingredients and compounds. However, the food and agriculture biotechnology sector comprises countless technologies that can be accelerated, from gas fermentation to cell cultivation to 3D printing, which can use very different ingredients, equipment, and skills. The establishment of multiple CDMOs focusing on different key technologies is essential to ensuring continued leadership across the entire food biotechnology sector.

Optimize government expenditures

Because public CDMOs can be financially self-sustaining and motivate significant private investment, these organizations are among the most efficient and impactful tools for boosting domestic industry. CDMOs can further save taxpayers money by reducing the need for government researchers to secure their own equipment and by reducing the number of private facilities that receive funding through tax breaks, loan guarantees, or other government granting mechanisms.

Public CDMOs can increase the cost efficiency of equipment by offering services on a sliding scale to public-interest researchers and organizations, increasing access to equipment for not only promising startups but also scientists and subject matter experts. This can reduce the cost of crucial biotechnology research in nutrition, medicine, and other related fields, ensuring government grants for breakthrough research can go much further.

Regulatory compliance

Food products are highly regulated for safety and compliance with state and federal laws, and the process for certifying new food manufacturing facilities can be lengthy. Even startups that successfully fund and build facilities for testing products at various scales may be frustrated by an inability to sell what they produce along the way, removing a potentially vital source of revenue and consumer feedback.

CDMOs can secure regulatory grants of inspection and consistent oversight as a single facility, allowing lessees to consume, share, and sell food products that meet all other applicable legal requirements and that are otherwise generally recognized as safe. This not only increases opportunities for revenue and consumer feedback but also increases the variety of products available on the market, which helps increase uptake and competitiveness.

CDMOs can also assist companies seeking regulatory clearance using the expertise and shared knowledge of CDMO staff to advise startups on regulatory processes and timelines. This kind of expertise can be essential to getting regulatory approval in a timely and efficient manner, increasing the likelihood that companies ultimately succeed in selling products on the market.

Conclusion

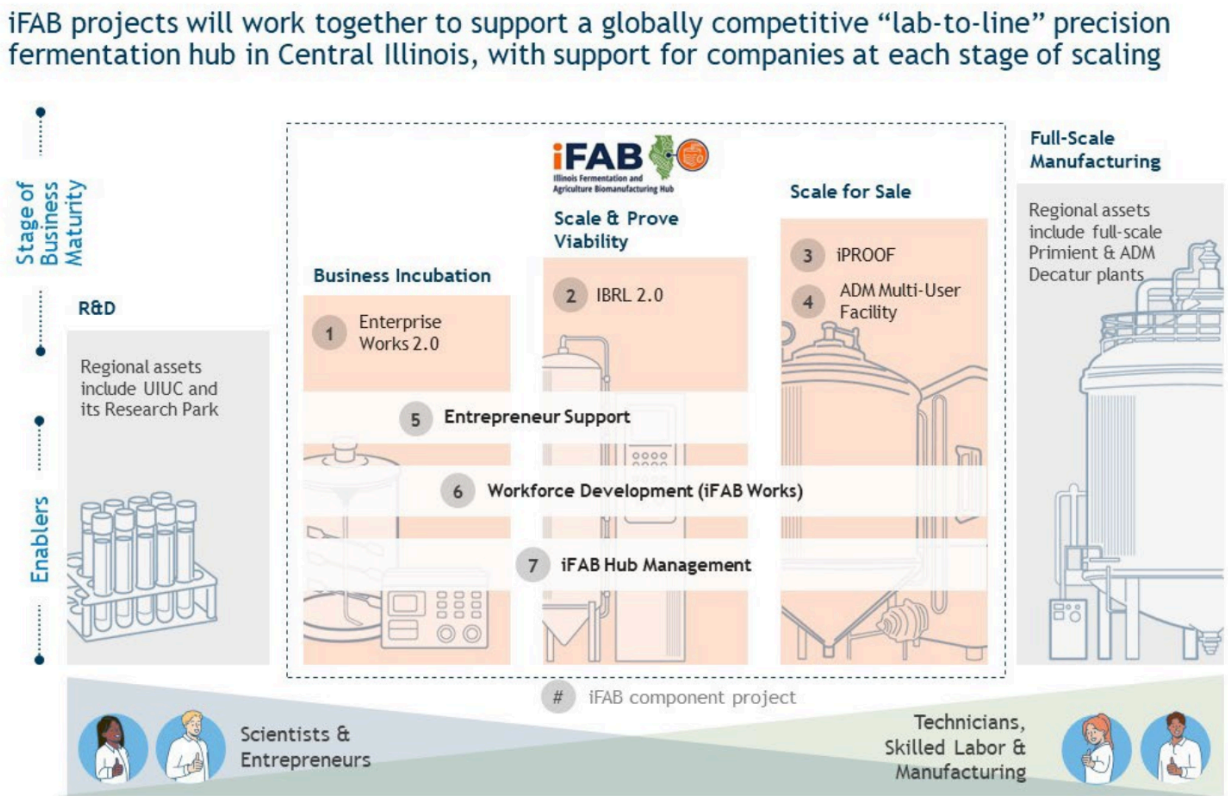
The food biotechnology business ecosystem is growing, but it is constrained by limited access to high-cost equipment and specialist expertise. Publicly-funded CDMOs directly alleviate shortages in these areas while creating jobs, supporting local economies, accelerating research, and providing self-sustaining benefits across the entire sector with limited government influence. Governments in the United States and abroad have invested in CDMOs that are directly benefiting their domestic research and entrepreneurial ecosystems. Policymakers in the United States should establish multiple public CDMOs to strengthen domestic competitiveness, create jobs, and improve the likelihood that new food products will deliver broad benefits to consumers.

Case studies

United States

Illinois Fermentation and Agriculture Biomanufacturing (iFAB) Hub

The United States government funded its first publicly-funded CDMO in mid-2024 with a $51 million grant to found the Illinois Fermentation and Agriculture Biomanufacturing (iFAB) Hub at the University of Illinois Urbana-Champaign. Among other projects, iFAB will create manufacturing space at pilot scale and two stages of demonstration scale in a location with access to both pre-commercialization laboratory space and commercial-scale facilities within a 51-mile radius.



"There are currently significant lab-to-market bottlenecks in the precision fermentation industry. Demand far exceeds capacity for pilot- (~1,000L) and demonstration-scale (~20,000-75,000L) fermenters, which is exacerbated by the absence of a trained workforce and the prohibitive cost of independent equipment ownership.

"The iFAB consortium has developed an integrated path to clear these bottlenecks: addressing capacity constraints, supporting new venture creation, and expanding the skilled workforce to meet talent demands."

Illinois Fermentation and Agriculture Biomanufacturing (iFAB) Hub: Overarching Narrative

Partners

- **Higher Education:** Parkland College, Richland Community College, University of Illinois Urbana-Champaign.
- **Industry Firms:** Archer Daniels Midland (ADM), Boston Bioprocess, Primient, Synonym Bio, Clarkson Grain Company, Serra Ventures, gener8tor.
- **Industry Groups:** Corn Refiners Association, Illinois Soybean Association, Illinois Manufacturers' Association.
- **Governments:** State of Illinois, City of Champaign, City of Decatur, Champaign County, Macon County, Piatt County.
- **Economic Development Organizations:** Champaign County Economic Development Corporation, Economic Development Corporation of Decatur-Macon County, Intersect Illinois.
- **Labor Organizations:** Decatur Building & Construction Trades, AFL-CIO, East Central Illinois Building and Construction Trades Council, UA Plumbers & Pipefitters Local 149, United Steel Workers Local 837.
- **Workforce Training Organizations:** Workforce Investment Solutions (Decatur WIOA), Champaign County Regional Planning Commission (Champaign WIOA).
- **Organization that Engages Underserved Populations:** Illinois AgriFood Alliance (ILAFA).
- **Venture Development Organization:** University of Illinois Research Park, LLC.
- **Manufacturing Extension Center:** Illinois Manufacturing Excellence Center (IMEC).

Specifications

- New building for small business incubation.
- Expansion of pilot testing space to 17,421 liters.
- New early demonstration scale testing facility with four 1,500L and two 13,000L fermenters.
- Upgrades to ADM's BioProducts facility to support 75,000L fermentation capacity.

Services offered

- Access to pilot and demonstration-scale bioreactors.
- Entrepreneurship programming and support services.
- Workforce development programming in collaboration with labor and educational organizations.

Funding

$51 million from the Department of Commerce's Economic Development Administration (EDA), with public and private co-investment of around $680 million, including private-sector upgrades to existing facilities in the area and state government support for siting and industry growth.

iFAB is a strong start to the United States' continued leadership in precision fermentation, but opportunities abound to ensure that the U.S. remains a leader across the food and agriculture biotechnology space.

Europe

Bio-Base Europe Pilot Plant (BBEPP)

BBEPP is an independent, public CDMO that operates fermentation equipment from bench to demonstration scale. Founded with regional development funds, BBEPP became self-sustaining in its first year of operation and is now staffed by around 150 full-time personnel. BBEPP partners with startups and researchers to develop fermentation processes for alternative proteins, materials, fuels, and more.

Location

Ghent, Belgium

Summary

"Bio Base Europe Pilot Plant is an independent, state-of-the-art facility that operates from a laboratory level to a multi-ton scale. Bio Base Europe Pilot Plant is a service provider for process development, scale-up and custom manufacturing of biobased products and processes." (bbeu.org)

History

- 2008: "The INTERREG Flanders-Netherlands project 'Bio Base Europe' kicks off. The budget foresees €13 million [USD ~$19 million] for the conversion of an old fire station into a state-of-the-art pilot facility. On the Flemish side the project was co-financed by Flanders, the Province of East-Flanders and the City of Ghent. On the Dutch side, the project was co-financed by the Dutch Ministry of Economic Affairs, the Province of Zeeland, Zeeland Seaports, ROC Westerschelde and Delta NV."
- 2013: The facility went online in stages starting in 2010 and fully opened in 2013. The facility financially broke even in the first year of operation.
- 2017-19: BBEPP received roughly €9.4 million [~$9.9 million] to scale up operations "co-funded through the ERDF project 'IMPACT' by the European Regional Development Fund, Flanders, the Province of East-Flanders and the City of Ghent." The new process hall went online in 2018, and BBEPP added six new 150L fermenters in 2019.

Services

- Supports private companies in testing their processes at all scales in complete confidentiality.
- Additionally, BBEPP is currently engaged in over 30 public-private partnerships including several pertaining to food biotechnology specifically, such as a project to scale up cultivated foie gras.
- Developing the technology behind new food innovation is considered a key part of BBEPP operations. From their webpage on Technology development:

  "At Bio Base Europe Pilot Plant, different innovative technologies are being developed within the R&D Department to access a wide range of sustainable products from a variety of industrial feedstocks. These technologies are researched at low TRL (Technology Readiness Level) and involve advanced fermentation and separation processes such as in situ product recovery."

  "BBEPP has also gained high experience and expertise in the field of gas fermentation, where industrial CO2 emissions can be converted into a variety of valuable bioproducts such as biofuels, bioplastics and biomaterials. Furthermore, through the development of sustainable production strategies towards alternative proteins and cultured meat, BBEPP has been able to contribute to the global protein transition and the shift towards a more sustainable bioeconomy."

Specifications

Over 100 full-time staff, including engineers and scientists. “Since its establishment in 2008, the Bio Base Europe Pilot Plant has grown into a mature organisation employing 140+ dynamic and engaged staff members.”

Funding

An estimated €23 million (~$25 million) in funding for facility construction (see History section), unknown total through ongoing public-private partnerships. Per the website, the facility has been self-sustaining through private contracts.

Partners/Members

“From 2013 to 2020, Bio Base Europe Pilot Plant successfully conducted more than 450 bilateral (private) projects with over 150 different small, medium and large sized companies. Along with private, bilateral projects, Bio Base Europe Pilot Plant is currently involved in many consortium-based projects.”

Singapore

Singapore’s food technology CDMOs can be divided into three units: the original Food Tech Innovation Center, which provides bench-scale laboratory space and pilot-scale equipment, and two demonstration-scale CDMOs focused on plant-based and fermented products, in partnership with German food manufacturer Cremer and U.S. food giant Archer Daniels Midland (ADM) respectively. All three components are co-owned and operated by Nurasa, a wholly owned company of Temasek, Singapore’s sovereign wealth fund; Nurasa was founded in 2021 specifically to build and operate them.

Food Tech Innovation Centre (FTIC) (pilot scale)

Partners

Nurasa (Formerly Asia Sustainable Foods Platform, a spinoff from Temasek, Singapore’s sovereign wealth fund), A*STAR’s Singapore Institute of Food and Biotechnology Innovation (SIFBI), ScaleUp Bio.

Specifications

- 3,840 sq m food-grade pilot facility, in which startups can both perform feasibility testing and manufacture products for commercial sale.
- Three types of pilot-scale equipment: high-moisture extruder (HME) at 60kg/hr, submerged microbial and precision fermentation, with bioreactors ranging from 10L to 100L, and high pressure processing.

Services offered

- Dedicated Benchtop Space in a Bio-Safety Level 2 Lab.
- Eight private lab spaces available (intended for pre-seed companies).
- Coworking Hub, demonstration and test kitchens, and event spaces.
- Research on nutrition, sensory qualities, and consumer acceptance.
- Regulatory and safety assessment advisories for members via its Future Ready Food Safety Hub.

Funding

Original commitment was “over S$30 million [~$22 million] over the next three years” from Temasek and A*STAR (both government-affiliated entities).

Members

The first announced partner was NextGen Foods, maker of Tindle chicken and other products, who set up their global R&D and innovation center in FTIC. (Temasek, 2021)

Cremer Sustainable Foods Facility (demonstration-scale)

History

In July 2022, Cremer Sustainable Foods, a joint venture company between the Asia Sustainable Foods Platform and Cremer, opened their new 11,000-square-foot CDMO facility in Singapore.

Partners

Nurasa, Cremer.

Specifications

- 11,000 sq ft food-grade facility.
- High-moisture extrusion equipment, a technologically-advanced method of producing meat-like texture in plant-based protein, with the capacity to extrude "1,300 tons of plant-based products each year, the equivalent of about 4.3 million chicken breasts."

Services

- Use of high-moisture extrusion facilities.
- Members retain all intellectual property from products and processes developed in the facility.
- The facility is certified food-grade, allowing partners to sell products directly from the facility during feasibility testing (subject to the products being already generally recognized as safe and meeting any other applicable legal requirements).

Funding/Members

Unknown

ScaleUp Bio Facility at FTIC (demonstration facility)

The ScaleUp Bio facility at the Food Tech Innovation Centre was created as an add-on to FTIC to support demonstration-scale production of precision fermentation products in 2023. ScaleUp Bio is a joint venture between Nurasa and American food company ADM.

Partners

Nurasa, Archer Daniels Midland.

Specifications

- ~2,300 square meter facility.
- Up to 10,000L of precision fermentation capacity and associated downstream processing equipment.

Services

- End-to-end CDMO services from lab to market, including business and technical advisory, industry partnerships, and investor access.
- Members retain all intellectual property.
- The facility is certified food-grade, allowing partners to sell products directly from the facility during feasibility testing (subject to the products being already generally recognized as safe and meeting any other applicable legal requirements).

Funding

Unknown, supported by the Singapore Economic Development Board (EDB) and ADM Ventures.

Members

Unknown

Israel

Toward the end of 2022, the Israeli Innovation Authority launched a NIS 50 million (~$13.8 million) request for proposals for precision fermentation infrastructure, citing the importance of locating factories in Israel, with the hope that increasing test facility space would speed the regulatory process and increase confidence in the sector's market growth potential.

> *"The established fermentation facility will include equipment, skilled human resources specialized in fermentation and food, services enabling fermentation at pilot and demo scales, separation and purification services, analytics, assistance in food regulation, and more. This will enable infrastructure customers from Israel and around the world to conduct fermentation at various volumes, conduct economic feasibility experiments, produce small-scale batches for potential customers, establish a regulatory dossier, and even create small trading batches.*
>
> *Taking a broader perspective, this will prevent brain drain and preserve the vast knowledge existing in Israel today, and encourage companies to move from the development stage to production, thus maintaining Israel's relative strength in the field of alternative proteins and fermentation."*

History

The request for proposals detailing necessary specifications and services was published in December 2022. In June 2023 the IIA announced the selection of a proposal from YDLabs to construct the designated CDMO.

Services

(per the published request for proposals)

- Use of designated equipment and its operation by skilled personnel.
- Available to Israeli companies and research institutions.

Funding

Up to NIS 50 million (~$13.8 million) for facility construction.

Partners/Members

Facility under construction by YDLabs.

Specifications

- Precision fermentation production volumes of 10 to 20,000L
  - Pilot scale (10-1000L)
  - Demonstration scale ("small, semi-industrial, serial production for fermentation volumes of 1,000 to 20,000 litres.")
- The facility must be food-grade and "include all peripheral infrastructures necessary for supporting fermentation processes (upstream) and the downstream process (DSP) on a scale that will be detailed by the applicant."
- Includes "steam infrastructure, cooling systems/heat exchanges, water-purifying system, waste management, etc.

About GFI

The Good Food Institute is a 501(c)(3) nonprofit working internationally to make alternative proteins like plant-based and cultivated meat delicious, affordable, and accessible. GFI advances open-access research, mobilizes resources and talent, and empowers partners across the food system to create a sustainable, secure, and just protein supply. GFI is funded entirely by private philanthropic support.