



**North San Joaquin Valley  
Circular Bioeconomy  
Activation Plan  
THRIVE**

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# Target Sector Strategy – Brief Overview

## Summary: Circular Bioeconomy Sector Activation Plan

The goal of this sector activation plan is to take critical steps to firmly establish the North San Joaquin Valley as a world leader in circular bioeconomy innovation, developing a cluster of bioindustrial manufacturing industry activities that create quality jobs and make sustainable use of local resources and diverse waste-streams.

This activation will not only help jump-start a high wage sector in the North San Joaquin Valley but will also help accelerate environmental solutions in the region and statewide such as reducing greenhouse gas emissions, improving soil health, and supporting local water and air quality.

## Overview of sector (from NSJV Strategic Plan 8/20/2024)

The Bioeconomy represents the segment of the economy based on products, services, and processes that come from biological resources (for example, plants and microorganisms). This broad sector spans many industries and product categories that use biology and biotechnology to create valuable products from renewable organic materials (biomass). This growing industry plays an increasingly critical role in our environmental future, national security, and global economy, with a forecasted economic impact of \$4 trillion over the next 20 years.

The term “circular” emphasizes sustainable manufacturing practices and solutions that limit waste and strengthen environmental sustainability by repurposing biomass residues that come from existing activities, such as agricultural production, food processing, and municipal waste processing.

In the circular bioeconomy, materials that would otherwise be wasted serve as inputs to create products and materials that are used and reused as long as possible, without drawing down limited resources or generating wastes that are disposed into the atmosphere, landfills, or rivers, lakes, and oceans.

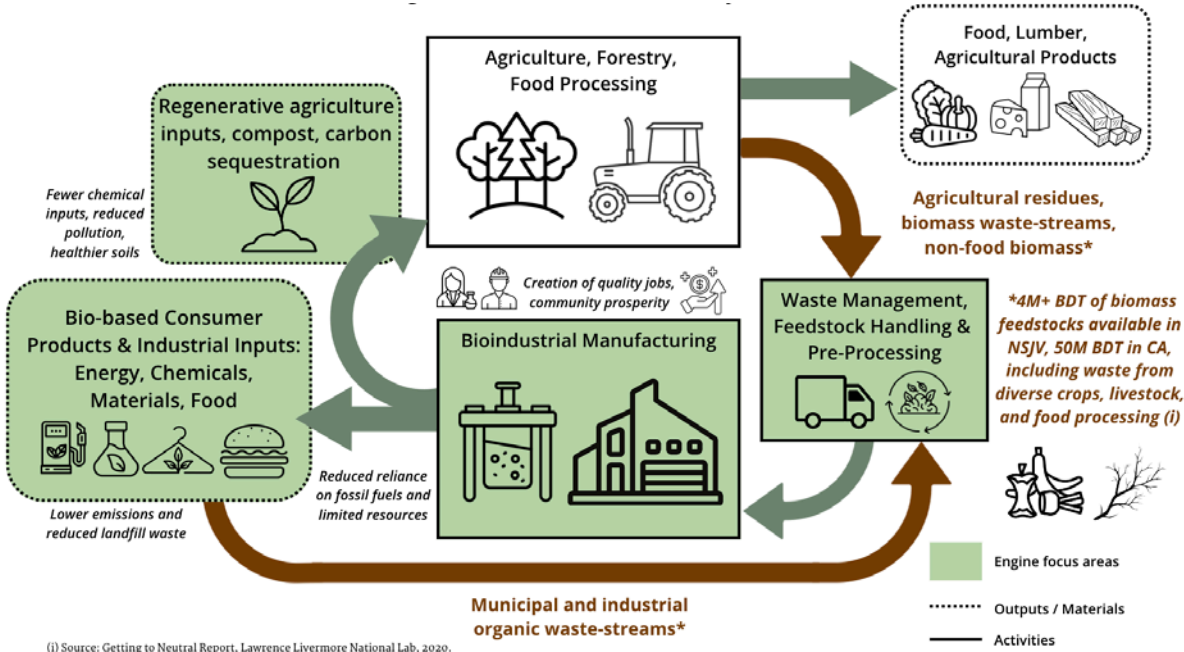
Bioindustrial manufacturing uses biotechnology and bioengineering to produce non-medical or non-pharmaceutical bio-based products including bio-based energy, chemicals, materials, food, agricultural products, and other goods.

Overall, the Circular Bioeconomy represents many types of activities, innovations, and technologies that use the power of biology to create useful products and reduce waste.

The following is a visualization of the Circular Bioeconomy and the proposed strategic approach of the NSJV circular bioeconomy strategy. As is evident in the diagram below, the goal is to connect lab-scale R&D to the region’s diverse feedstocks and increase the technology readiness level of projects that use these diverse biomass feedstocks and biomanufacturing operations in order to reach commercial scale

production. This will enable both an integrated innovation pipeline and the demonstration of a circular bioeconomy model.

**Circular Bioeconomy Model**



Based on an initial estimate, the bioindustrial manufacturing segment of the local bioeconomy alone represents about 1% of all NSJV employment, just 8,200 jobs.<sup>1</sup> This is a count of jobs located at bioindustrial manufacturing companies in the region that *could be or have the potential to be* performing bioindustrial manufacturing. It is not a reflection of the entire bioeconomy as that also includes major inputs (from agriculture, food manufacturing and other sources). As explained further in Appendix 4B, there is no current source or census that provides a complete list of all the manufacturers in the region (or country) doing confirmed bioindustrial manufacturing.

The 8,200 jobs also include some jobs that are included in the other three priority sectors of the North Valley THRIVE strategy.

**NSJV BIOINDUSTRIAL MANUFACTURING EMPLOYMENT**

<u>Total NSJV employment in bioindustrial manufacturing:</u>	<u>8,198</u>
Job totals also included in Advanced Manufacturing:	2,669
Job totals also included in Clean Energy:	693
Job totals also included in Carbon Management:	1
Remaining jobs that are exclusively Bioindustrial:	4,835

## Why was this sector prioritized?

The sector was prioritized based on a combination of national and global market factors, regional and statewide assets, regional and statewide financial and political support, the presence of existing cluster intermediary institutions ready to implement the work, and an existing body of strategies and initiatives which can be further advanced in the coming year and beyond. Below is more detail on these variables.

**Market factors:** Nationally and globally, the bioeconomy has potential for major growth. Bioindustrial manufacturing has a forecasted economic impact of \$4 trillion over the next 10 years. Since 2020, private companies have announced over \$20 billion in biomanufacturing investments across the US.

**National security benefits:** The industry's growth is not limited by global supply chains as feedstocks and inputs are localized (and significant available biomass is currently unused). The growth of the bioeconomy relies on local suppliers (biomass feedstocks and commodity inputs), which are generally near manufacturing. Feedstock comes from both major population areas as well as natural and working lands (for example agriculture, forests).

**Regional benefits:** Growing the circular bioeconomy in the North San Joaquin Valley is critical to support the region's economic diversification. The region's agriculture and food processing sectors face an uncertain future, and the circular bioeconomy provides an opportunity for the region to move into higher-value added activities (ie from extraction into regeneration and production). Changes in the agricultural economy may lead to fewer total agricultural jobs in the future (ie such as from changes in groundwater management). Incorporating principles of circularity in the bioeconomy – and other regional sectors – will also improve environmental and economic outcomes as more of the region's industries are able to shift to a regenerative and circular economic model (ie capturing waste and using that to power nearby firms while also reducing or eliminating harmful pollution). The bioeconomy industry can also provide high quality jobs for local residents through the talent pipeline actions described in this activation plan.

**Statewide assets:** The Circular Bioeconomy sits at the intersections of biotechnology, manufacturing, and agriculture. California leads the nation in all three, as the most agriculturally productive state, with the largest share of manufacturing activity, and boasting the United States' largest concentration of biotechnology firms and workforce.

**Regional assets:** Within California, the North San Joaquin Valley is well-positioned for the bioeconomy due to access to abundant and diverse feedstocks (from agriculture, forests, municipal solid waste- an estimated 4 million BDT ("bone dry tons") per year of total waste biomass in 2045.), large-scale agricultural production, existing infrastructure (both manufacturing and existing transportation and logistics), proximity to markets and driving-distance to a leading hub of biotech innovation, and access to capital and talent (especially in manufacturing and biotechnology). The region is a premier location for bioproduct start-ups (some nurtured in the Bay Area) who wish to scale production beyond a lab setting and take advantage of the combination of abundant feedstock, manufacturing talent, and a large grower/food processor customer base.

**State political alignment:** Supporting the growth of the circular bioeconomy advances key state goals in climate (GHG reduction), equity (quality jobs in disinvested communities), and economy (economic diversification).

**Financial support:** The region's current initiative to grow this industry – the BioEconomy, Agriculture, and Manufacturing (BEAM) Initiative has received \$10 million from Stanislaus County funding through ARPA and \$15 million in other state and federal public and philanthropic grant funding. Grant funds include a \$1M National Science Foundation Regional Innovation Engine Development Award to support development of a \$160 million NSF grant proposal, and a \$3.6 million CA Jobs First Pilot Grant. The region also has received a \$30 million venture capital commitment to support biocircular startups in the NSJV over the coming decade.

**Regional institutions and existing work to leverage:** The region has an existing and growing cluster intermediary organization - BEAM Circular - whose stated mission is to advance the bio-circular economy in rural agricultural regions. (See more on BEAM in the Operating Structure section). The region has also collaborated to form the Circular Bioeconomy Innovation Collaborative (CBIO Collaborative), which has received NSF support to address the national need for leadership in bioindustrial manufacturing. CBIO is driven by a coalition of industry, academic, government, investor, and community groups across the region.

## Overview of Tactics/Strategies for this Activation Plan

The Strategic Plan in Fall 2024 included four broad strategies. These four strategies inform the approach taken in this Activation Plan. The focus of this Activation Plan is to identify the most promising Tactics and Tasks within each strategy area to advance. These four strategies are:

- Nurture Innovation
- Translate Innovation into Industry
- Build an Inclusive Bioeconomy Talent Pipeline
- Establish and Expand Community-Centered Sector Support Systems, including a Sector Intermediary

### ***Bioeconomy Strategy 1: Nurture Innovation***

The goal of this strategy is to establish the NSJV as a leading region for circular bioeconomy R&D, strengthening regional innovation capacity while unlocking technologies and models that support the sustainable use of local resources. Through coordinated multi-sector collaboration, the NSJV will create a regional innovation ecosystem that:

- advances high impact innovation to enable the circular bioeconomy.
- facilitates scale-up and translation of innovations to industrial scales.
- is inclusive, connected, and collaborative.

- grounds research in regional industry and community values, concerns, and needs; and
- promotes sustainability, human and environmental health, and economic and social benefits.

The **core tactic to achieve this strategy is to realize and implement the governance model of the CBIO Collaborative** with tasks such as developing new platform technologies that enable use of more diverse and regionally available waste-streams as feedstocks for bioproducts, coordination of focus groups and review panels for innovators to test ideas, establishing a resource and data hub to support R&D activities, funding seed grants, and increasing access to feedstock samples and farmer/grower/waste originator expertise.

The core problem this strategy and tactic responds to is the disconnect between the innovations coming from world-leading biotechnology and bioengineering experts in the Northern California megaregion and the realities of the San Joaquin Valley, including the food system and the context of the farmers who are the feedstock suppliers and customers of bio-based agricultural products. While local farmers and food processors are interested in reducing waste and capturing higher value for byproducts, they are disconnected from R&D. At the same time, there are opportunities for the region to build local capacity to lead and participate in cutting-edge bioeconomy innovation given the NSJV's unique positioning and assets, driving high wage job growth in research and development related activities.

The CBIO collaborative is designed to help fill this disconnect and CBIO partners worked together to design a shared governance structure that engages an active and coordinated network of diverse collaborators to form a robust ecosystem for regional innovation. CBIO working groups made up of diverse participants will enable joint project development and steer use-inspired R&D focus areas, shape strategies and partnerships for translation activities, enable workforce system coordination, and conduct ongoing community engagement activities.

## ***Bioeconomy Strategy 2: Translate Innovation into Industry***

The goal of this strategy is to create an enabling environment for attracting, commercializing, and scaling sustainable bioindustrial manufacturing activities, including through supportive infrastructure, supply chain advancement, and resources that support local businesses by improving access to capital and innovation.

Overall, this strategy focuses on investments that:

- Provide support and resources (for example, infrastructure, services, accelerator programs, funding, knowledge) to mature circular bioeconomy technologies and support the scale-up of biomanufacturing activities in the NSJV.
- Support reliable and efficient access to diverse feedstocks (specifically residues, co- and by-products, and wastes) from the region for use in commercial biomanufacturing processes.
- Attract, grow, and sustain circular bioeconomy development firms and talent including through regional infrastructure and site readiness.

The **primary tactic of this strategy is to establish the California Circular Bioeconomy Innovation Campus** in the region with a shared testbed facility that enables bioproduction firms to move from the lab to commercial manufacturing, filling a market gap and distinguishing the region as a global center of excellence for circular bioeconomy innovation that advance environmental benefits and community prosperity. The campus will include demonstration-scale fermentation capacity, processing equipment, laboratory space, and technical assistance, aiming to address the challenge of translating bio-based product innovation into commercialization and seize economic opportunities for the North San Joaquin Valley.

Another tactic in the strategy is to sustain and scale the region's new circular bioeconomy **accelerator program**, launched with support of CA Jobs First Pilot Grant, to attract and nurture later-stage bioeconomy startups in the North San Joaquin Valley (NSJV), thereby bolstering the local entrepreneurial ecosystem and enhancing the regional profile to attract employers and investors. The program is beginning with a preliminary pilot cohort, aiming to advance six startup companies and elevate the global profile of the NSJV.

Another related tactic is to establish the **regional economic development support systems** for bioeconomy business growth in the region. There are land use planning and related infrastructure needs to enable the industry growth in the appropriate locations regionally. Activities include overseeing **industrial land supply** and demand analysis and **site availability**, the targeted marketing of priority sites, and delivering **infrastructure for site readiness**. It could also include general **small business support**. These activities are needed for the bioeconomy but also provide benefit to multiple sectors.

A final area of focus is around **feedstock access, coordination, and aggregation**. This requires both digital and hard infrastructure, activities that could be done at a multi-county level (for example San Joaquin Valley) or even statewide. Other important statewide considerations include major policy initiatives that will directly impact the growth and availability of feedstocks and the bioeconomy writ large.

### ***Bioeconomy Strategy 3: Build an Inclusive Bioeconomy Talent Pipeline***

The region boasts a significant agriculture, logistics and manufacturing workforce. In fact, over a quarter of all workers come from these three job sectors. Still, workers will need additional skills development, educational institutions will need to calibrate to evolving industry needs, and, in some cases, employers will redefine occupational roles to better support bioeconomy opportunities.

The goal of this strategy is to catalyze a leading bioeconomy workforce development ecosystem that:

- Creates awareness among workers, training partners, and other stakeholders of high-quality jobs in the bioeconomy, and how to access them.
- Inspires future generations of diverse STEM and innovation leaders.
- Calibrates the public workforce system to meet emergent bioeconomy jobseeker and industry needs.
- Builds inclusive, equitable, and accessible pathways to high quality jobs.



- Efficiently transitions workers in existing agriculture, logistics, and manufacturing into new high-quality biocircular employment as these opportunities develop.
- Consistently coordinates workforce, industry, and training partners to quickly respond to opportunity.

The **core tactic to realize this strategy is to build connected pathways and a talent pipeline into the bioeconomy** from early career exposure through community college, technical and trades training options, and higher education.

Distinct, localized occupational opportunities in the bioeconomy are only now emerging in sizeable numbers. Additional analysis is needed to better understand the total potential number of jobs, occupational definitions, skills transferability, and best-practice training or educational models associated with preparing people for career success in the Circular Bioeconomy. Developing a better understanding of the industry job potential and converting that into local and regional policy action will be a focus area for North Valley THRIVE.

#### ***Bioeconomy Strategy 4: Establish and Expand Community-Centered Sector Support Systems, including a Sector Intermediary***

The goal of this strategy is to establish appropriate community support and engagement for the growth of the sector in a way that centers the diverse needs and perspectives of the region's residents, emphasizes climate commitments and circularity (that is using waste streams as feedstock), and prioritizes innovation. This requires both the presence of a sector intermediary and for existing (and/or new) organizations to take on related and complementary activities to nurture the industry's growth and adherence to key community values.

The **key tactic to realize this strategy is to expand the sector-building intermediary** - BEAM Circular - that will serve as a "center of gravity" for regional bioeconomy activities to coordinate strategy delivery, including informing public policy decisions, integrating local communities into bioeconomy sector development activities, and helping deliver direct economic and environmental benefits to local communities from the growth of the circular bioeconomy.

A separate tactic is for North Valley THRIVE to provide additional community engagement related to the circular bioeconomy. This could include partnering with existing entities to augment the community, civic, and public sector engagement on economic development broadly, including for the bioeconomy. One task would be to facilitate **community benefits agreements** for major projects and related investments. It is critical that such a role be outside of the sector intermediary such that the community benefits process is defined more directly through a trusted community institution where the community defines specific community benefits initiatives (such as around standards, projects, and governance).

# Operating Structure to Organize and Execute

## Overview

The approach to the organizational model for this sector strategy is to leverage existing institutions, organizations, and collaboratives working to support the bioeconomy in the North San Joaquin Valley region. There is not an intent to create a new and separate governance structure for the implementation of the sector strategy and activation plan. The key entities currently involved include:

- *North Valley THRIVE*: Regional Convener for CA Jobs First and the entity focused on establishing and maintaining and long-term regional vision for equitable growth across numerous strategic sectors in the region.
- *BEAM Circular*: Sector intermediary currently leading initiatives and programs in support of a circular approach to the growth of the bioeconomy. BEAM is a co-lead of CBIO Collaborative.
- *UC Merced and Lawrence Berkeley National Lab*: The region's UC campus and nearby National Lab are co-leading the CBIO Collaborative with BEAM Circular (see more information below).
- *Community Colleges and other higher education institutions*: In addition to UC Merced, Modesto Junior College is one of the co-leads of CBIO. Other critical partners in the implementation of the strategy include University of the Pacific, California State University Stanislaus, and other community colleges.
- *Regional economic development and business organizations*: The Manufacturers Council of the Central Valley serves as a co-lead for CBIO. In addition, there are partners across county-level economic development groups and employer groups such as farm bureaus and farming organizations, as well as chambers of commerce, community development corporations (CDCs), small business development centers (SBDCs), community development financial institutions (CDFIs), and community financial institutions (CFIs). Most of these organizations have been partners in THRIVE and participants in CBIO.
- *Labor unions and community based organizations*: There are dozens of local and regional CBOs as well as numerous key labor organizations who have been core partners in THRIVE and participants in CBIO and will continue to be important parts of the implementation of this activation plan.
- *The region's three workforce development boards*: The public sector workforce training ecosystem that will be critical in advancing and implementing the talent pipeline and other workforce initiatives. They have also been partners thus far and will be even more critical in the further shift to implementation.

## **The role of CBIO: The Central Valley Circular Bioeconomy Innovation Engine**

The primary organization model for executing the sector strategy and linking these groups in a focus on the circular bioeconomy is the Circular Bioeconomy Innovation Collaborative (or CBIO).

Over the past two years, CBIO has engaged hundreds of partners and community members in development of a shared strategic plan and governance structure to advance the region's leadership in circular bioeconomy innovation and bioindustrial manufacturing industry development. That plan is now ready for implementation.

CBIO is co-led by a Core Management Team that includes leadership from BEAM Circular, UC Merced, the Advanced Biofuels and Bioproducts Process Development Unit (ABPDU) at Lawrence Berkeley National Laboratory (LBNL), Modesto Junior College, and the Manufacturers Council of the Central Valley.

CBIO is governed by a Leadership Council of 25 members that includes representatives from each of the region's three community colleges and 4-year universities; North Valley THRIVE; other economic development agencies in the region; and representatives from business, labor, and community organizations. Dozens of additional partners contribute to guiding and shaping activities through Steering Committees.

The CBIO Collaborative is made up of a broad coalition of members (over 80 registered as of January 2025). CBIO members include local and state government agencies; agriculture, manufacturing, and biotechnology industry partners; capital investors; regional community colleges, P-12 education organizations, and universities; workforce development institutions; non-profit community and environmental organizations; research laboratories; and labor organizations.

The following provides more information on the five co-leads of the CBIO collaborative, each of which will remain a critical part of the organizational support for the ongoing growth of the sector.

### **(1) Cluster intermediary organization: BEAM Circular**

The region has an existing and growing cluster intermediary organization - BEAM Circular - whose mission is to advance economic prosperity and environmental solutions by unlocking the power of communities in agricultural regions to lead and benefit from the circular bioeconomy.

BEAM Circular coordinates cross-sector partners to advance the BEAM Initiative (BEAM stands for "BioEconomy, Agriculture, and Manufacturing"). BEAM serves as a hub for the circular bioeconomy in California's agricultural heartland and manages a portfolio of public and private projects designed to scale the most promising innovations in bioindustrial manufacturing and to advance solutions that support economic and environmental outcomes for local communities. BEAM facilitates strategic planning, program delivery, and community engagement to ensure inclusive and sustainable outcomes, while also providing resources and support to organizations, educators, businesses, and government agencies involved in the circular bioeconomy. Through direct community engagement and collaborative governance, BEAM Circular works to center local communities and partner with a diverse range of stakeholders to oversee and implement regional bioeconomy development efforts.

The BEAM Initiative is prepared to support this industry's takeoff in the NSJV and statewide, and has secured \$55+ million from private, federal, state, and local sources over its first 2 years. This includes \$10 million from Stanislaus County funding through ARPA, \$15 million in other public and philanthropic grant funding, and a \$30 million venture capital commitment to support biocircular startups in the NSJV over the coming decade.

Grant funds include a \$1M National Science Foundation Regional Innovation Engine Development Award to support development of a \$160 million NSF grant proposal to develop CBIO Collaborative, a diverse, cross-sector coalition of partners that BEAM Circular supports to collaborative shape and drive the development of a Regional Innovation Engine that will secure the NSJV as a global leader in circular bioeconomy innovation and bioindustrial manufacturing scale-up that delivers economic and environmental benefits to local communities.

## **(2) University of California, Merced**

UC Merced is a Minority-Serving Institution with research and practice strengths in business ecosystems, bio-based products, sustainable materials, regenerative agriculture, innovation practice, and other areas of multidisciplinary research and development. UC Merced is a co-lead of the CBIO initiative and brings experienced leadership of multidisciplinary research and development teams, and provide expertise in value-creating service systems, in renewable energy and biomass conversion, and in innovation cultures and managerial practice.

## **(3) Lawrence Berkeley National Laboratory (LBNL)**

LBNL is a national leader supporting the science and scale-up of bio-based fuels, chemicals, and materials and houses the **Advanced Biofuels and Bioproducts Process Development Unit (ABPDU)**. ABPDU provides a key de-risking step for bioprocess scale-up, both for the local innovation hub as well as biomanufacturing companies and researchers across the country and internationally. ABPDU uses its position in the National Lab system to strategize around solving deep technical challenges in scale-up, such as variability in feedstock performance, culture heterogeneity, downstream process development, gas fermentation, data frameworks for advanced modeling and security, and more.

## **(4) Modesto Junior College (MJC)**

MJC brings significant expertise and resources to support workforce development in the circular bioeconomy. They offer over 60 programs across agriculture, STEM, and manufacturing. These programs are accessible to students throughout the NSJV, ensuring a robust pipeline of skilled professionals. MJC is deeply committed to expanding bioeconomy-focused programs, with active engagement in local and regional sector development activities as well as at the national level through membership in BioMADE. By contributing leadership for the CBIO Workforce Development efforts, MJC will work closely with industry and other community colleges, universities, and training providers represented in the Workforce Development Steering Committee to ensure that CBIO activates a dynamic workforce pipeline that evolves in response to industry demands.

## **(5) Manufacturers Council of the Central Valley (MCCV)**

MCCV represents some of the largest manufacturing and food processing companies in the Central Valley. As the Industry Engagement Lead, MCCV will serve as a vital liaison to local manufacturers, connecting across industries to understand their evolving needs and turning innovation into practical and scalable solutions. Their leadership ensures that industry perspectives remain central to the CBIO initiatives, driving innovation and supporting a dynamic, sustainable, regional ecosystem.

# Resourcing Across the Strategy

## Total costs summary

The total costs of the strategy as written are \$435 million. Of this, the largest amount is for the proposed Circular Bioeconomy Innovation Campus, at \$350 million total (including \$5 million in predevelopment costs which is the near-term priority). The total amount secured thus far for the all the tactics is approximately \$25 million, with additional amounts in commitments from private investors.

There is currently a total gap of over \$410 million. The gap for the predevelopment funding for the Circular Bioeconomy Innovation Campus is approximately \$3.6 million (based on having raised over \$1.4 million already).

*Note: These amounts above do not include the \$30 million in commitment from Reservoir Ventures (formerly HawkTower) for investments into biocircular start-ups in the North San Joaquin Valley over the coming decade. While those funds will help realize the vision of the broad sector strategy, they are not included as a key cost item in the budget as they are not a specific activity of the activation plan.*

Bioeconomy Strategy 1	High-End Estimate	Secured	Sources	Gap remaining
Innovation Engine/CBIO Collaborative	\$16,000,000	\$1,476,163	Stanislaus County & National Science Foundation	\$14,523,837

Bioeconomy Strategy 2	High-End Estimate	Secured	Source	Gap remaining
Circular Bioeconomy Innovation Campus	\$350,000,000 (\$5 million of this is for pre-development)	\$1,432,980 (all of this is for pre-development)	Stanislaus County & Vanguard National	\$348,567,020
Accelerator program	\$15,000,000	\$500,000	California Jobs First	\$14,500,000
Bioproducts Value Chain Technical Assistance Vouchers	\$1,500,000	\$400,000	California Jobs First	\$1,100,000
Knowledge Transfer Programs & Innovation Vouchers	\$3,000,000	\$600,000	California Jobs First	\$2,400,000
Matching Grants and Application Assistance for Commercialization Funds	\$3,000,000	\$900,000	Stanislaus County & California Jobs First	\$2,100,000

Anchor Firms Development Fund - Targeted Incentives for Large Employers	\$15,000,000	\$2,000,000	Stanislaus County	\$13,000,000
Feedstock access development	\$10,000,000	\$ 9,700,000	Schmidt Sciences	\$300,000
Wet labs and facilities fund	\$5,000,000	\$1,500,000	Stanislaus County	\$3,500,000

Bioeconomy Strategy 3	High-End Estimate	Secured	Source	Gap remaining
Bioeconomy Workforce Development Fund	\$4,000,000	\$1,255,000	Stanislaus County & CALIFORNIA JOBS FIRST	\$2,745,000

Bioeconomy Strategy 4	High-End Estimate	Secured	Source	Gap remaining
BEAM Fellows	\$1,000,000	\$250,000	Stanislaus County	\$750,000
BEAM Circular (Sector Intermediary)	\$12,000,000	\$5,688,643	Stanislaus County, CALIFORNIA JOBS FIRST, Various Private Philanthropic Sources	\$6,311,357

### Source of funding for resources secured

- \$10 million Stanislaus County allocation of its American Rescue Plan Act (ARPA) funds to advance the Stanislaus 2030 Traded Sector Development Strategy
- \$3.6 million Economic Development Pilot Grant from the CA Economic Development Department through the CA Jobs First program.
- \$1 million National Science Foundation Regional Innovation Engine Development Award (co-led by UC Merced, BEAM Circular, and Lawrence Berkeley National Laboratory) to support proposal development for a \$160 million NSF investment in the region's circular bioeconomy innovation ecosystem. The coalition of partners driving this effort is called the CBIO Collaborative.
- \$11.2 million in private philanthropic support, including from Schmidt Sciences, Beard Land Improvement Company, Vanguard Charitable, San Joaquin Community Foundation, Silicon Valley Community Foundation, Almond Board of California, and other sponsors.

- \$30 million commitment from Reservoir (formerly Hawk Tower) over the next 10 years for investments for early-stage startups developing bio-based innovations from ag by-products in the North San Joaquin Valley.

### **Current Gap and Strategy to Close It**

As noted above, there is a gap of \$410 million to meet the overall vision of this sector strategy. The partners in this activation plan seek to close the remaining funding gap by pursuing a blended capital stack that combines both public and private sources, including but not limited to federal, state, and local government grants, private philanthropic contributions, corporate sponsorships, zero- to low-interest loans.

The team is already pursuing each of these.

Additionally, the joint team from CBIO has been selected as a semi-finalist in a \$160 million National Science Foundation (NSF) Engines award, which would be deployed over a decade beginning in 2026 if successful. (Note: The investment gap outlined above focuses on targets for the next 3 years.) Being named a semi-finalist enhances the region's credibility and positions the region to attract further investments from both public and private sectors into the bioeconomy. This diversified approach allows the region to access a wide array of financial support to implement the key tactics in this action plan.



# Goals and Metrics Across the Strategy

## General outcomes

There are several broad outcomes of this work. They include:

1. *Establish a world-leading ecosystem for circular bioeconomy innovation in the NSJV* to advance bioindustrial manufacturing and the sustainable use of diverse waste streams. Unlike other regions nationally, the North SJ Valley has the potential to unlock underutilized biomass feedstocks—agricultural byproducts, food processing waste, forestry residues, and other organic materials. Overall, the activities in the sector strategy will accelerate the transition to a net-zero carbon economy through advancement of bio-enabled climate solutions.
2. *Enable a more resilient and sustainable food and agriculture system* by reducing waste, enabling regenerative practices, and creating new value opportunities for local farmers and food producers. This includes repurposing organic waste into products such as bio-based fertilizers and soil amendments, supporting regenerative agricultural practices that improve soil health and biodiversity. These actions will also improve environmental and public health outcomes among vulnerable local communities.
3. *Advance environmental sustainability and climate change mitigation* through reducing greenhouse gas emissions. By converting agricultural residues, food processing waste, and other organic waste streams into high-value bio-based products, the sector strategy implementation will prevent methane emissions from landfills and reduce the need for fossil-fuel-based production methods. Diverse biomass feedstocks will also reduce reliance on fossil fuels and petroleum-based products. This will contribute to national and global efforts to mitigate climate change, while supporting the transition to a low-carbon economy.

## Specific sector-level outcomes and metrics

More specific sector-level outcomes include:

- Growth of jobs in our regional bioeconomy, specifically in bioindustrial manufacturing.
- An increase in the median salaries of locally-available bioeconomy jobs, helping to address the region's shortage of jobs that pay family-sustaining wages.
- An increase in entrepreneurship and innovation capacity in the region, measured through new company formations, new patents, and investment capital flows into local ventures.
- A decrease in emissions from waste sources including the region's agricultural and manufacturing activities.

## **Shorter-term measures**

The following are several Shorter-term measures to track shorter-term progress towards desired sector-level outcomes. They include:

- 2 year milestones
  - Advance the “technology readiness level” (TRL) of one feedstock agnostic conversion technology.
  - Advance the TRL of one feedstock specific conversion technology.
  - Demonstrate a process from waste material to purified product at pilot scale.
- 5 year milestones
  - Have one feedstock agnostic conversion technology operating at pilot scale and coordinating samples to users of output.
  - Have one feedstock specific conversion technology operating at pilot scale and coordinating samples to users of output.
  - Develop a process from waste material to purified product to production scale with demonstrated customer offtake.
  - Have a portfolio of at least five conversion technologies that have been researched and developed or sunsetted by CBIO.
  - Have portfolio of three agriculture input products that have been field tested.

## **Expectations for reporting progress**

The institutions in the region will need to report progress on both sector-wide metrics as well as more tactical near-term activities. The sector-wide analysis will need to be conducted and maintained by an enduring institution (such as the Center for Business and Policy Research). The metrics more related to details within the sector will come from partners in the CBIO collaborative (such as “Advance the “technology readiness level” (TRL) of one feedstock agnostic conversion technology”).

The expectations are that these goals and individual metrics will be made readily available and public to all such that they can be easily used for sharing with the media, investors, public agencies, or the public.

# Dependencies and Challenges

The cornerstone tactic of the entire activation plan strategy is the creation of the **Circular Bioeconomy Innovation Campus**, which has risks associated with raising funds and project delivery.

But there are also risks associated with growth of the bioindustrial manufacturing industry overall and the competitiveness of individual bioeconomy firms that grow.

Some of these risks are from market forces and cost pressures external to the region. Others are political and regulatory risks which are both within the region but more often at the state level.

The following are some of these risks identified at a high level and ways the strategy will mitigate these risks:

**Risk 1: Permitting and Entitlements.** State and local permitting and entitlement risk is the single biggest risk to growing the bioeconomy in California. To get a project off the ground requires going through CEQA and securing timely approvals from CARB. The approval processes required through CEQA and CARB do not exist in other states. This is in part why the Innovation Campus remains a key strategic play for the state as it would provide a clear and approved growth pathway for firms looking to scale (who would otherwise have to go through CEQA and secure permits on their own for each new facility).

**Risk 2: Funding.** There is a risk to fully raise the capital stack necessary to begin/complete construction of the Innovation Campus as well as fully secure funding for the remaining gaps across tactics. The partners have begun building the capital stack but will need to determine when they have secured sufficient capital to begin construction. Diversification of sources of capital across public and private investors as well as the potential for international partnerships is one way to mitigate the risks associated with securing sufficient funding. Uncertainty around the reliability of Federal funding remains a particular risk.

**Risk 3: Infrastructure.** There is a risk to fully deliver the needed infrastructure to support the campus and the industry overall. This includes access to reliable water, sewer, and electricity. In particular, electricity costs and reliability are a major risk across California and one of the reasons the state is less competitive in capturing manufacturing industries relative to other states. Mitigating this risk will involve working closely with existing utility providers and identifying the places in the region with existing infrastructure to support industry growth.

**Risk 4: Political support.** Local/regional political support is critical to the growth of the sector. Political support is also contingent on building a diverse cross-sector coalition to support the industry's growth in a responsible way and for mitigating potential conflicts or concerns. This includes identifying a location for the campus as well as mitigating potential impacts such as from truck movement to gather feedstock or from specific impacts associated with the operations of bioindustrial facilities. Mitigating this risk will involve working in deep partnership with the range of political voices and

organizations across the region and being transparent about both impacts, opportunities, and tradeoffs.

**Risk 5: Feedstock availability and aggregation.** There have long been challenges with the aggregation of biomass feedstock. While this strategy identifies specific actions to overcome those, there is a risk that these are not sufficient to provide an ongoing and enduring supply of feedstock for the industry (and for the Innovation Campus and companies that locate there). Working across regions (that is with the Sierra and Central San Joaquin Valley) is one way to mitigate this risk.

**Risk 6: Market risks.** The market risks include the cost of developing products for consumers and the likely ongoing competition from fossil fuel based products (which is shaped by state and federal policy). Many of the bioeconomy products have not yet reached cost parity with fossil fuel sourced products. Improvements to production processes within bioeconomy firms will help with cost parity. In the near term, this risk can be mitigated identifying early adopter markets (sometimes governments) willing to (at least initially) pay a cost premium for a product produced through a circular economy process.

# Appendix: Activation Plan Tactic Workplans

## *Bioeconomy Strategy 1: Nurture Innovation*

### Tactic 1.1: Formalize and institutionalize the CBIO Collaborative

a. Purpose: The overall goal of the strategy to “Nurture Innovation” is to establish the NSJV as a leading region for circular bioeconomy R&D. This involves strengthening regional innovation capacity and unlocking technologies and models that support the sustainable use of local resources. The strategy seeks to create a regional innovation ecosystem that:

- Advances high-impact innovation to enable the circular bioeconomy.
- Facilitates scale-up and translation of innovations to industrial scales.
- Is inclusive, connected, and collaborative.
- Grounds research in regional industry and community values, concerns, and needs.
- Promotes sustainability, human and environmental health, and economic and social benefits.

b. Program Design: Key design factors to formalize and institutionalize the CBIO Collaborative include the following:

- Developing new platform technologies to utilize diverse, regionally available waste streams as feedstocks for bioproducts.
- Coordinating focus groups and review panels to test innovations with farmers, food producers, customers, and local communities.
- Establishing a resource and data hub to support R&D, including grant writing assistance, access to a feedstock database and repository, and test farms.
- Funding seed grants to support innovative projects.

- Increasing access to feedstock samples and leveraging the expertise of farmers, growers, and waste originators.

c. Team:

- Lead Organization: CBIO Collaborative (BEAM Circular, ABPDU, UC Merced, Modesto Junior College, Manufacturers Council of the Central Valley (MCCV))
- Partners: Regional farmers, growers, industry stakeholders, community representatives, local universities, and research institutions.
- Collaborative Governance Structure: To be implemented by mid-2025, establishing a framework for coordinated multi-sector collaboration.

d. Costs:

- Operating Costs: Facilities for research, equipment for feedstock analysis, and staffing for resource hub management. Total budget proposed as \$16,000,000.
- Program-Specific Costs:
  - Funding for seed grants and internships.
  - Resources for developing platform technologies and establishing the feedstock database.
- Potential Funding Sources:
  - National Science Foundation (NSF) grant, including the Regional Innovation Engine proposal.
  - State and local economic development funds.
  - Private sector partnerships and investments.

e. Potential Metrics:

- Number of new technologies developed and scaled.
- Participation in focus groups and stakeholder review panels.
- Volume of feedstock samples analyzed and utilized.

- Grant funding secured and allocated.

Tasks	Responsible Party	Timeline
Task 1: <b>Develop and test platform technologies</b> that enable use of more diverse and regionally available waste-streams as feedstocks for bioproducts. The development of these new processes will enable biomanufacturing at scale. The goal is to generate technologies and research that advance the circular bioeconomy in the NSJV and beyond.	BEAM Circular with CBIO partners	2025–2027
Task 2: Establish and coordinate <b>focus groups and review panels</b> for innovators to test ideas with farmers, food producers, customers, and local communities. The goal is to connect R&D to community values, and industry and market needs through continued feedback on projects.	BEAM Circular with CBIO partners	Ongoing, beginning in 2025
Task 3: Establish and operationalize a <b>resource and data hub</b> to support R&D activities. This could include support for grant writing, accessing funding, feedstock database, feedstock repository of physical samples, access to test farms, etc.	BEAM Circular with CBIO partners	Launch by 2026
Task 4: <b>Develop an R&amp;D Prioritization Matrix</b> available for use by all collaborators that includes considerations of technical feasibility, DEIA, community benefits, environmental impact, circularity, and a regional strategic R&D plan. The goal is to provide strategic guidance for circular bioeconomy R&D that embodies the shared mission and vision of local collaborators.	BEAM Circular with CBIO partners	Launch by 2026
Task 5: Provide <b>access to R&amp;D opportunities</b> to students and trainees in the region such as through collecting data on existing projects; matching opportunities to paid internships (through Workforce Development); non-traditional research opportunities.	WIBs + BEAM Circular	Ongoing, start in 2026
Task 6: Establish <b>research incentives</b> to drive innovations. These include seed grants, access to feedstock samples and farmer/grower/waste originator expertise, access to pilot and scale-up resources and facilities, access to regional community and the CBIO network. These research incentives also address shared problems, opportunities, and gaps in the industry and community.	BEAM Circular with CBIO partners	Years 1 to 3; potentially beyond

## ***Bioeconomy Strategy 2: Translate Innovation into Industry***

The goal of this strategy is to create an enabling environment for attracting, commercializing, and scaling sustainable bioindustrial manufacturing activities in the NSJV. This strategy emphasizes investments in infrastructure, supply chain advancement, and business resources to support innovation, enabling local firms to access capital and scale their operations. Key outcomes include fostering a robust bioeconomy ecosystem, ensuring reliable access to feedstocks, and sustaining bioeconomy development firms and talent.

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### **Tactic 2.1: Establish an Innovation Campus**

a. Purpose: Develop a shared testbed facility to enable bioproduction firms to transition from the lab to commercial manufacturing. This campus will bridge the gap between laboratory-scale research and full-scale production, fostering innovation and economic development.

b. Program Design:

- Provide access to advanced bioreactors, fermentation systems, and downstream processing equipment to enable process testing and refinement.
- Support real-world feedstock testing, ensuring technologies are adaptable to diverse biomass sources in the NSJV.
- Facilitate process optimization and scalability at pilot and demonstration scales to lower costs and improve efficiency.
- Offer a community visitor center, meeting spaces, and wet labs integrated with workforce training activities.
- Encourage collaboration among academic researchers, industry stakeholders, and local communities.

c. Team:

- Lead Organization: BEAM Circular
- Partners: CBIO Collaborative, Stanislaus County, local universities, and regional innovation partners.



d. Costs:

- Predevelopment costs: \$5 million. Secured: \$1.43M for pre-development. Gap: \$3.57M).
- Capital financing / construction and start-up costs: ~\$345M. None of this is secured.

e. Potential Metrics:

- Securing key percentages of the capital stack.
- Number of firms utilizing the testbed facility per year.
- Number of firms who utilize the facility who transition to long-term commercial operations in the region.
- Number of technologies transitioned from pilot to commercial scale.
- Volume and diversity of feedstocks processed.
- Number of collaborative R&D projects and partnerships.
- Number of jobs created in the region by companies that utilize the facility to scale their technologies.

Tasks	Responsible Party	Timeline
Task 1: Finalize the design and complete the pre-development phase for the Innovation Campus. This includes raising the additional \$3.6 million to cover site selection and review, full planning and engineering documents, permitting and entitlements, and formation of the legal entity to build and manage the campus.	BEAM Circular with CBIO partners Partners: Local economic development entities especially on site selection and entitlements.	2025
Task 2: Continue the capital campaign to secure complete resources for the construction of the Innovation Campus.	BEAM Circular with CBIO partners	Ongoing throughout 2025 and 2026.
Task 3: Begin construction and phase-in demonstration-scale facilities.	BEAM Circular with Construction and Operations Team	Launch in 2026
Task 4: Develop operational frameworks and support services for campus users.	BEAM Circular with Campus Operations Management	2026 to 2028

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## Tactic 2.2: Launch & Scale Incubator and Accelerator Programs As Robust Support Systems for Commercialization, Entrepreneurship, and Business Capacity-Building

a. Purpose: To provide a range of support services and facilities that support local entrepreneurship capacity and the scale-up and commercialization of circular bioeconomy innovations, ensuring that use-inspired research is translated into market-ready products and processes, that the region can attract top start-ups, and that local businesses can be developed and thrive.

b. Program Design:

- Develop and deploy programs and resources with multiple partners and service providers across the region, with additional technical assistance providers engaged from beyond the region to enhance local access to best-in-class capacity and networks for growth.
- Leverage existing programs that are working well (such as the existing Circular Accelerator, operated in collaboration with leading accelerator program gener8tor).

Connect startups with support, available space, investors, venture capital, and corporate partners to help build the financial infrastructure needed to scale biomanufacturing technologies.

- Ensure the programs help create a pathway to economic viability and commercial readiness for emerging technologies and entrepreneurs, ensuring that bio-based innovations are successfully brought to market while building regional entrepreneurship capacity and local wealth-building opportunities.

c. Team:

- Lead Organization: BEAM Circular, supported by its Business and Economic Development staff, will coordinate outreach, marketing, and communication strategies, including to conduct an RFP for projects and programs.
- Partners: Various CBIO partners and local small business / entrepreneurship support providers will ensure that businesses and entrepreneurs are able to access and navigate the growing range of resources available. The Circular Bioeconomy Accelerator will continue to be grown and operated by gener8tor.

d. Costs:

- Total: \$15M (Secured: \$500K; Remaining: \$14.5M).

e. Potential Metrics:

- Number of startups and early stage entrepreneurs supported through the accelerator program and ecosystem of incubator activities.
- Total funding secured by participating startups and entrepreneurs.
- Cost efficiencies (cost per startup) for the programs.
- Number of technologies successfully commercialized.

Tasks	Responsible Party	Timeline
<p>Task 1: <b>Design and implement the pilot cohort of the Circular Bioeconomy Accelerator program.</b> This accelerator program delivers capital, coaching, and connections to help startups grow into high-value companies with scalable infrastructure. The program has an inaugural set of six startups – chosen from a highly competitive pool of 90 applicants, indicating a strong pipeline and demand for this program to continue to develop and scale in future years. Additional actions will help to further develop this program and integrate it with the broader ecosystem, including collaboration on start-up showcase and pitch events that involve other accelerator and incubator programs from across the region and bioeconomy sector.</p>	<p>BEAM Circular with Accelerator Program Leadership (gener8tor)</p>	<p>Began in 2024. Continuing in 2025.</p>
<p>Task 2: <b>Develop Targeted Incubator Facilities and Programs for Entrepreneurs.</b> The region currently lacks a robust ecosystem of programs and resources available to support early-stage entrepreneurs, critical to support the commercialization of technology, business formation and growth, capital attraction, and development of entrepreneurial talent. In the Nascent Phase, this may include collaboration with The Reservoir or other incubator partners to launch a shared incubator and wet lab tailored to biocircular startups, which may also serve other priority sectors in the region; working with university partners to develop bioeconomy-targeted programming</p>	<p>BEAM Circular in partnership with CBIO partners and local incubators, universities, and service providers</p>	<p>Beginning in 2025</p>

<p>and strategic plans for effective utilization of Innovation Centers that exist or are being developed at institutions across the region; and expanding partnerships with entrepreneurship programs across the Northern California megaregion for coordinated referrals, resource stacking, and deal flow.</p>		
<p>Task 3: Issue RFP to identify an expert partner to conduct comprehensive market mapping and opportunity analysis in the Nascent Stage to design and prepare to launch a targeted Venture Studio in the region. This Venture Studio will form new ventures to commercialize priority technologies that are ripe for translation into the market to solve known industry challenges and needs.</p>	<p>BEAM Circular will issue the RFP</p>	<p>2026</p>
<p>Task 4: Establish and provide a coordinated and robust suite of consulting, assistance, and other capacity-building resources for firms in the growing regional bioeconomy.</p>	<p>CBIO and members/partners. CBIO will engage with regional small business service and resource providers, including Small Business Development Centers, San Joaquin iHub, Chambers of Commerce, as well as leading state and national technical assistance providers including Larta Institute and California Manufacturing Technology Consulting.</p>	<p>Begin in 2025</p>
<p>Task 5: Provide business development workshops and technical support. CBIO Collaborative will offer its members and collaborators regular and high-quality opportunities for networking and facilitated introductions to prospective partners, helping innovators and manufacturers identify supply- and demand-side market opportunities, connect with potential customers, and secure funding for scaling their operations.</p>	<p>CBIO Collaborative with Mentorship and Technical Assistance Coordinators</p>	<p>2025 to 2026.</p>

## Tactic 2.3: Build Regional Economic Development Support Systems

a. Purpose: Enable bioeconomy business growth by addressing land use planning, infrastructure, and small business support needs.

b. Program Design:

- Conduct industrial land supply and demand analysis to identify gaps and prioritize site development.
- Target marketing for high-priority sites to attract bioeconomy firms.
- Enhance site readiness infrastructure, including utilities and transportation links.
- Provide general support for small businesses to enhance their capacity for bioeconomy participation.

c. Team:

- Lead Organization: Regional Economic Development Team
- Partners: Stanislaus County, local governments, and economic development agencies.

d. Costs:

- Total: \$15M (Secured: \$2M; Remaining: \$13M).

e. Potential Metrics:

- Number of industrial sites marketed and developed.
- Volume of infrastructure improvements completed.
- Number of small businesses supported.
- Number of bioeconomy firms who tour sites and eventually choose to locate and expand.

Tasks	Responsible Party	Timeline
Task 1: Maintain and update a comprehensive analysis of industrial land supply and demand in the NSJV.	North Valley THRIVE and local/regional land use planners	Began in 2024. Continuing in 2025.
Task 2: Develop marketing strategies and materials for priority sites.	North Valley THRIVE and local/regional economic development partners.	Launch in 2025 and continue through 2026.
Task 3: Implement infrastructure upgrades to prepare sites for bioeconomy use.	Infrastructure Development Coordinator	2026 to 2028.

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## Tactic 2.4: Develop Feedstock Coordination and Access Infrastructure

a. Purpose: Create a robust feedstock supply chain by developing digital and physical infrastructure to support coordination, aggregation, and access.

b. Program Design:

- Build a digital marketplace to connect feedstock suppliers and users.
- Develop a feedstock characterization portal for standardized testing and data sharing.
- Invest in physical infrastructure for feedstock transportation, storage, and processing.
- Promote community wealth-building models by engaging local entrepreneurs in feedstock management.

c. Team:

- Lead Organization: Feedstock Coordination Team

- Partners: Schmidt Sciences, regional growers, CBIO Collaborative, and local businesses.

d. Costs:

- Total: \$10M (Secured: \$9.7M; Remaining: \$300K).

e. Potential Metrics:

- Number of suppliers and buyers connected through the digital marketplace.
- Volume of feedstocks characterized and processed.
- Infrastructure investments made for feedstock logistics.

Tasks	Responsible Party	Timeline
Task 1: Design and implement the digital feedstock marketplace and characterization portal.	Digital Infrastructure Development Team	Launch by 2026.
Task 2: Establish regional hubs for feedstock storage and processing.	Feedstock Logistics Coordinator	2026 to 2026.
Task 3: Develop training programs for community entrepreneurs in feedstock supply chain roles.	Community Engagement and Training Team	2026 to 2027.

### ***Bioeconomy Strategy 3: Build an Inclusive Bioeconomy Talent Pipeline***

Overview and Purpose: The goal of this strategy is to catalyze a leading bioeconomy workforce development ecosystem that creates awareness of high-quality jobs in the bioeconomy, inspires future generations of diverse STEM and innovation leaders, builds inclusive, equitable, and accessible pathways to high quality jobs, empowers diverse local talent with skills to thrive in the bioeconomy; and evolves capabilities with emerging industry needs.

Tactic 3.1: Create equitable access to education and training pathways into the bioeconomy mapped to new federal standards.

a. Purpose: Inspire and recruit the next generation of bioeconomy leaders while building clear pathways to good jobs in the NSJV's emerging bioeconomy as well as create access from adjacent Agriculture and Manufacturing roles to bioeconomy jobs as these opportunities grow in the region, especially as jobs become automated in the region's legacy industries.

b. Program Design:

- Supporting STEM- and bioeconomy-related professional development for K-12 educators and create access to industry mentorships and internships in the bioeconomy, with a particular focus on traditionally disinvested communities and underrepresented populations in STEM fields.
- Expose P-12 students, youth transitioning from High School, and community college students to the bioeconomy and providing them with the skills and knowledge needed to pursue higher education and technical training opportunities.
- Create accessible career pathways into the bioeconomy for the region's workforce, especially given how the NSJV is home to a population that has historically faced limited access to high-quality, well-paying jobs. With high poverty and unemployment rates, this workforce development tactic must engage and recruit individuals from underrepresented and underserved communities.
- By creating accessible, inclusive career pathways, these tactics will ensure that local residents are able to participate in and benefit from the growth of the bioeconomy, creating new opportunities for economic mobility in the NSJV.



- Partner with educational institutions to launch and evolve industry-aligned coursework and developing stackable certificates that provide accessible pathways into high quality jobs and new degree programs for the bioeconomy. It includes subsidized programs, training stipends, and other financial support to remove financial barriers to education and training.
- Success requires a robust regional equity data dashboard to track supply and demand. This data-driven approach allows workforce and education providers across the region to adapt as industry needs and pathways evolve.

c. Team:

- Lead Organization: CBIO Workforce Steering Committee
- Partners: Regional Workforce Investment Boards, Community Colleges, North Valley THRIVE, and other higher education.

d. Costs:

- Total: \$4 million (Secured: \$1.255 million; Gap \$2.745 million)

e. Potential Metrics:

- Number of jobs created: Measure the growth of jobs in bioindustrial manufacturing and related industries within the North San Joaquin Valley (NSJV).
- Workforce participation: Track the number of individuals who complete bioeconomy training programs or certifications (for example, through local colleges and workforce development initiatives).
- Wage growth: Measure the increase in median salaries for bioeconomy-related jobs to assess the rise of family-sustaining employment opportunities in the region.
- Diversity in employment: Track the percentage of minority, low-income, and historically underrepresented groups employed in bioeconomy sectors.
- Skill enhancement: Measure the number of partnerships between educational institutions and bioindustrial employers that offer internships, apprenticeships, and training.

- Each of the region's higher education institutions has launched or adopted a new strategy, program, coursework, or commitment related to bioeconomy by 2026.
- Establish 4 new paid internship / work-based learning employer partnerships by end of 2026.

Tasks	Responsible Party	Timeline
<p>Task 1: <b>Establish “Bridge to Bioeconomy” training programs for upskilling and reskilling incumbent workers.</b> Action steps include collaborating with regional initiatives and organizations that strengthen the talent pipeline for critical roles in manufacturing and agriculture industries that intersect with required capabilities in the growing bioeconomy.</p>	<p><i>Lead:</i> CBIO Workforce Steering Committee and partners in workforce development. <i>Partner:</i> NVT, BEAM Circular, Stanislaus 2030, Volt Institute, MCCV</p>	<p>2025–2027</p>
<p>Task 2: <b>Launch inclusive and equitable Bioeconomy Early Career Exposure programs in STEM and the bioeconomy.</b> This includes <b>P-12 STEM Programs, where CBIO</b> will partner with local school districts to introduce bioeconomy-related STEM curricula. BioTechBuilder and Bioscience Core Skills Institute microcredentials will expose students to the practical applications of science and technology in bioindustrial manufacturing. Additionally, CBIO will create new education pathways from high school to community colleges and four-year universities, allowing students to continue their STEM education and enter bioeconomy-related degree programs. These pathways will include mentorship, internships, and dual enrollment opportunities, providing students with practical experience in bioeconomy fields. By investing in STEM education and creating clear pathways to higher education, CBIO will ensure a steady pipeline of talent and set students up for career pathways into the bioeconomy.</p>	<p><i>Lead:</i> CBIO Workforce Steering Committee, coordinated by BEAM Circular <i>Partners:</i> UC Merced and CSU Stanislaus and MJC. In the initial stages UC and CSU will hold biotechnology summer camps to give college biotech experience for high school students with strong STEM preparation. <u>MJC</u> will also provide bioindustry career learning opportunities for first-generation and low-income community college students.</p>	<p>Ongoing, beginning 2025</p>

<p>Task 3: Establish inclusive career pathways into the bioeconomy. This <b>includes Work-Based Learning Experiences</b> (research assistantships in engineering, mentored biomanufacturing research projects and apprenticeships, biomass analysis internships, pilot industry internships and co-ops, industry-aligned engineering design challenges, and job shadows), <b>apprenticeships and On-the-Job Training</b> (for example allow individuals to gain practical experience while earning wages, making career transitions more accessible for individuals from diverse backgrounds, <b>Regionally Integrated Engineering Pipeline</b> (seamless and integrated transitions for engineering students from community colleges to four year institutions).</p>	<p><i>Lead:</i> CBIO Workforce Steering Committee, coordinated by BEAM Circular <i>Partner:</i> K-12, UC Merced, MJC, WDSC</p>	<p>Launch by 2026</p>
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## ***Bioeconomy Strategy 4: Establish and Expand Community-Centered Sector Support Systems, including a Sector Intermediary***

The goal of this strategy is to establish appropriate community support and engagement for the growth of the sector in a way that centers the diverse needs and perspectives of the region's residents, emphasizes climate commitments and circularity (that is using waste streams as feedstock), and prioritizes innovation. This requires both the presence of a sector intermediary and for existing (and/or new) organizations to take on related and complementary activities to nurture the industry's growth and adherence to key community values.

### **Tactic 4.1: Expand the circular bioeconomy sector-building intermediary**

Purpose: The purpose of this is to establish a sector-building intermediary that will serve as a "center of gravity" for regional bioeconomy activities to coordinate strategy delivery.

#### **b. Program Design:**

- Leverage the existing circular bioeconomy in the North San Joaquin Valley. This role is currently being led by BEAM Circular.
- Some activities of the cluster intermediary entity involve attracting bioindustrial manufacturing firms and fostering cross-sector collaboration for economic prosperity and environmental solutions.
- This also includes management of various community engagement processes.
- It could also include establishing an organized space for industry discussion and feedback on policy topics, and for policymakers to learn about ways to support the circular bioeconomy.

#### **c. Team:**

- Lead Organization: BEAM Circular

#### **d. Costs:**

- Total: \$13 million. (Secured: Approximately \$6 million. Gap: \$7 million.)

e. Potential Metrics:

- Consistently meet the deliverables for the BEAM Initiative projects listed in this Activation Plan.
- Ensure that the NSJV region is represented at minimum at 4 annual industry events to recruit firms.
- Build relationships with 40 startups in the bioeconomy.
- Provide direct services to 20 firms in the bioeconomy.
- Maintain an active and updated website and conduct an annual conference in the community that brings together the diverse partners of the initiative and provides opportunities for connection, learning, and collaboration
- Engage over 1,000 community members and 50 organizations in the North San Joaquin Valley through inclusive community engagement events focused on outcomes for underserved populations.
- Hold a minimum of 1 public community informational event will be held every month in both English and Spanish.
- Provide assistance to Stanislaus County and local partners to navigate and pursue federal, state, and private capital for investment in BEAM Initiative projects and strategies

Tasks	Responsible Party	Timeline
Task 1: Prepare <b>marketing and communications activities</b> on behalf of the circular bioeconomy in the NSJV.	<i>Lead:</i> BEAM Circular <i>Partner:</i> Regional economic development organizations and North Valley THRIVE	2025–2027
Task 2: <b>Track and support regional alignment with emerging federal bioeconomy definitions and standards.</b> Enable ongoing refinement of regional metrics and industry development standards through participation in national bioeconomy industry networks and policy conversations; build local awareness of and capacity to align with evolving industry standards.	<i>Lead:</i> BEAM Circular <i>Partner:</i> Regional economic development organizations and North Valley THRIVE	Ongoing, beginning 2025

<p>Task 3: <b>Advocate to the State of California for an ongoing tracking and monitoring of the bioeconomy statewide and regionally.</b> Given the importance of the sector for the state’s climate goals and economic development potential across rural and metropolitan regions, the State of California should undertake an ongoing monitoring and studying of the bioeconomy to track employment. This may be comparable to how the Federal DOE conducts a clean energy jobs analysis annually.</p>	<p><i>Lead:</i> BEAM Circular <i>Partner:</i> North Valley THRIVE</p>	<p>Launch by 2026</p>
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**Tactic 4.2: Develop and implement specific community-centered public policies to enable the inclusive and sustainable expansion of the sector.**

- Purpose: Integrate local communities into bioeconomy sector development activities, policies, and decisions; and ensure that activities deliver direct economic and environmental benefits to local communities and advance community prosperity.

**b. Program Design:**

- Partner with existing entities to augment the community, civic, and public sector engagement on economic development broadly, including for the bioeconomy.
- It is critical that such a role be outside of the sector intermediary such that the community benefits process is defined more directly through a trusted community institution where the community defines specific community benefits initiatives (such as around standards, projects, and governance).
- Implement inclusive community engagement activities that involve local communities in oversight and decision making.
- Ensure consistent information sharing and transparency. This could include providing consistent information and support to community members about the bioeconomy strategy, industry science, and local impacts, as well as maintaining a broad range of information channels including information sessions, workshops, and online educational materials in multiple languages.

- Increase Local Circular Bioeconomy Knowledge and Capacity-Building. This could include working with researchers and community members to develop broader regional story about NSJV and its economy and how bioeconomy fits in.
- Engage community-based organizations in formal partnerships and convening stakeholder and community focus groups to provide feedback on and advise ongoing activities in the bioeconomy strategy to ensure they meet community needs.
- Secure input from local community members, including recommendations regarding best practices and a set of specific strategies for community benefit advancement opportunities.
- Inclusive engagement activities will follow best practices for ensuring access, such as holding events with options in multiple languages, participant compensation, childcare support, and other interventions to ensure events are inclusive.
- Convene the key people to develop a vision/approach to manage funds to identify community level projects, inform public policy decisions, and facilitate collaboration across multiple sectors and regional institutions.

c. Team:

- Lead Organization: North Valley THRIVE.
- Partners: Edge Collaborative, BEAM Circular.

d. Costs:

- Total: Still to be determined

e. Potential Metrics:

- Establish a Community Engagement Committee that collaborates with the CBIO Steering Committee (which has 12 members and was just launched). The NVT Community Engagement Committee should focus regionwide and also on the wide range of industries.
- Community benefits strategy developed with the support of Steering Committee of North Valley THRIVE.

Tasks	Responsible Party	Timeline
<p>Task 1: <b>Prepare research on local and regional government policies</b>, infrastructure planning, regulatory considerations, incentives criteria, and best practices (for example local zoning/permitting options) that affect the circular bioeconomy.</p>	<p><i>Lead:</i> North Valley THRIVE <i>Partner:</i> BEAM Circular</p>	<p>2025</p>
<p>Task 2: Bring in <b>advisor at the regional scale to support and demonstrate principles of circularity</b> with a focus on applying circularity in site selection, within firms, industries, as well as for cities and communities. This would coincide with activities, programming, and communications that enable local community members to understand the circular bioeconomy and see themselves as active participants and beneficiaries in this growing sector. This could also include investing in local community projects that demonstrate the potential of circularity. Note that this task is broader than the circular bioeconomy as principles and application of circularity could be demonstrated across the region's strategic sectors. For example, the region could pilot the location of any industrial or energy intensive activity (for example a data center) in an industrial symbiosis zones (ie where it can exchange waste and resources with nearby industries) that has onsite clean energy generated power, captures the server heat and uses it for an industrial process or converting back to electricity, as well as making use of other principles of circularity (including building materials, and end of lifecycle thinking).</p>	<p><i>Lead:</i> North Valley THRIVE <i>Partner:</i> BEAM Circular</p>	<p>Beginning 2025</p>
<p>Task 3: <b>Work on behalf of an inclusive set of stakeholders to develop innovation in Community Benefits models.</b> This could include researching, developing, and launching innovative community benefit models and funding mechanisms based on best practices that deliver community wealth-building and investment opportunities to local neighborhoods as industry grows (for example, community-owned assets such as a Community Benefits Fund that can be used for community-directed projects).</p>	<p><i>Lead:</i> North Valley THRIVE <i>Partner:</i> CBIO Community Steering Committee, BEAM Circular and Edge Collaborative</p>	<p>Launch by 2026</p>