North San Joaquin Valley Clean Energy Activation Plan

Submitted by North Valley THRIVE in partnership with BW Research Partnership

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Introduction

The primary goal of this activation plan is to generate more clean electricity within the region for use by consumers within the region. An abundance of clean and affordable electricity is an enabling resource—something that will help retain existing companies and attract new employers, fuel new sectors of the economy, and enable cutting-edge technologies in the region. The region will utilize an array of tools and technologies—including solar, battery storage, and onsite generation and microgrids, while exploring opportunities in hydrogen, carbon management, biofuels, enhanced geothermal, and potentially nuclear fission—to achieve this vision for the region.

Electricity is the lifeblood of every region's economy and residents. Affordable, clean, future-ready electricity is necessary to power NSJV's economy of the future and elevate residents' quality of life. More affordable clean energy will make the region more competitive to employers of all industries, but particularly those in many cutting-edge and energy intensive manufacturing sectors, including employers within the region's other priority sectors: Circular Bioeconomy and Advanced Manufacturing. Regional and statewide demand for electricity is poised to increase considerably from 2025 through 2040,[1] and electricity users are increasingly seeking power that is *cleaner* as well as more affordable. Simply put: affordable, clean, future-ready electricity is an essential ingredient to the future prosperity of the NSJV region.

However, electricity in the region is generally very expensive. Electricity rates through PG&E—the primary investor-owned electricity utility for much of the NSJV region—have gone up 124% over the past ten years. Electricity rates for a majority of industrial users in the region are about 30% higher than the statewide average, and more than 200% higher than the national average. While other providers of power—including community choice aggregators like AVA Community Energy and Turlock, Modesto, and Merced Irrigation Districts—can, and do, offer lower electricity costs, high and ever-rising electricity prices hurt residents, erode existing businesses' operating margins, and deter potential businesses throughout the region.

The NSJV region is a substantial net importer of electricity, generating about a third of the total electricity consumed in the region.[2] The NSJV's connection to an electricity grid that connects

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[1] Source: January 23, 2025, California Energy Commission https://www.rtoinsider.com/96383-cec-data-centers-demand-forecast/

[2] California Energy Commission, Electricity Consumption dashboard, Stanislaus, Merced, San Joaquin Counties (accessed June 2025)
https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-consumption-dashboards-0
California Energy Commission, QFER Power Plant Annual Generation dashboard, Stanislaus, Merced, San Joaquin Counties (accessed June 2025)
https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/quarterly-fuel-and-energy-report-qfer-1
data from power plants with a total nameplate capacity of 1MW or more that are located within California or within a control area with end users inside California.

much of the country means that electricity flows freely across county and state lines. Grid connectivity also means that the region's role as a net importer has no direct effect on electricity prices, however, the region's status as an electricity importer suggests that the region could use more affordable and clean electricity it produces within its own borders than it currently does, and potentially do this in a way that directly reduces electricity costs in the region.

Generating and using more affordable, clean, and future-ready electricity in the NSJV region brings two key benefits. First, through intentional strategy and innovative solutions, the generation and direct use of electricity within the region can support lower costs for current and future industrial, commercial, and residential electricity users. This can help keep money in ratepayers' wallets while also helping to make the region more attractive to prospective employers looking to site facilities within the region. Lower electricity costs are particularly appealing to employers within the regions' two other priority sectors, Advanced Manufacturing and Bioeconomy, which require relatively high usage rates of electricity. More affordable and clean electricity will also enhance the region's competitiveness in attracting employers. Lower cost clean electricity is a key enabler for capturing and developing economic opportunities across the Northern California megaregion and advancing a high-road economy built on resilience, innovation, and inclusion.

The second outcome of more affordable and clean electricity is that the region is better positioned to lead in the production and export of emerging clean technology commodities beyond electricity. These clean energy commodities—including hydrogen and carbon management—will be essential to meeting the state, national, and global climate goals, and present an opportunity for the region to sell traded products that bring money from outside of the region.

There are four key reasons why generating and using more affordable and clean electricity and building out a clean energy sector in the region is an apolitical unique opportunity for the NSJV region. These factors include unique natural advantages, growing market opportunity and momentum, and strong potential benefits to residents in the region.

- **Regional Strengths:** The NSJV region possesses numerous strengths that can be leveraged to foster growth in the clean energy sector. Its abundant sunlight supports efficient solar energy generation, while its distinct geologic formations offer long-term carbon storage potential for industrial and manufacturing activities. The region also contains large tracts of available land well suited for clean energy infrastructure, and institutions such as UC Merced's Energy Research Center are actively advancing cutting-edge clean energy technologies.

- **Market Opportunity:** Rapid declines in the cost of solar panels, batteries, and other clean energy components have increased the economic viability of clean energy projects. Solar, hydrogen, carbon management, and smart grid technologies are particularly well-suited to

the region, though other opportunities in nuclear and other technologies should be explored.

- **Emerging Momentum and Interest:** Many clean energy firms have already expressed interest in the NSJV region as a location for pilot projects and early-stage deployments. Existing hydrogen and carbon capture demonstration efforts signal growing confidence in the region's viability as a clean energy innovation hub and translation destination. The region also benefits from its proximity to other denser and more populous regions of California that need clean energy commodities such as hydrogen and carbon management to meet their climate goals.

- **Regional Benefits:** Expanding clean energy in the NSJV supports multiple benefits for the region, including reduced air pollution, diversified the local economies, and high-quality jobs. Clean energy infrastructure also provides a foundation for other sectors' growth and resilience, making it a strategic investment with impacts across the regional economy.

Generating more clean, affordable, and future-ready electricity is a goal that is also aligned with the four overarching themes identified through stakeholder engagement that was conducted during the development of the strategic plan. These themes shaped the strategies, tactics, and action steps discussed in this plan and will inform how progress is measured moving forward. These themes are:

1. **Leverage the region's unique advantages** to bring more clean energy deployment, innovation, and entrepreneurship to the region.
2. **Lower energy costs and improve grid reliability** for households and local industries.
3. **Create high road economic and employment opportunities** for residents and business in a decarbonized economy.
4. **Improve public health** by reducing pollution, enhancing air quality, and supporting healthier natural ecosystems.

Sector Background

Clean energy in the NSJV region is a sector that is both local-serving and traded. The technologies within the clean energy sector can reduce pollution, improve air quality, and create economic opportunities that attract external investment and bring high-quality, higher-wage jobs to the region. The scaling of the region's clean energy sector is a foundational component to addressing many obstacles—such as high electricity costs and local air pollution—facing the region. Strategic investment in this sector could position the NSJV region as a hub for innovation and clean energy production in addition to high quality job creation, increased investment in the region, and improved public health. As global and domestic demand for clean energy technologies accelerates, the NSJV's clean energy sector is expected to be a major driver of future job creation and investment in the region.

Our sector definition of clean energy includes renewable Electric Power Generation (EPG); Electric Power Transmission, Distribution, and Storage (TDS); Energy Efficiency, including Heating, Cooling and Building Envelope (HVAC); Fuels, including Extraction, Processing, Production, and Distribution; and Transportation, including alternative Motor Vehicles. This sector also includes the infrastructure and services required to support, implement, and maintain these clean energy systems, as well as the development and operations of carbon management technologies.

The clean energy sector represents a growing and vital part of the North San Joaquin Valley (NSJV[3]) economy, representing roughly two percent of total employment in 2024. More than half (55 percent) of the region's clean energy employment is within Traditional TDS, Traditional HVAC, and Solar Energy technologies, though this sector's potential extends beyond these technologies as costs for clean energy components decline and new markets, such as carbon management and hydrogen technologies, emerge. Additionally, California's "The 100 Percent Clean Energy Act of 2018" (SB 100), which requires all retail electricity to be from renewable energy and zero-carbon resources by 2045, will also continue to drive growth of the sector in its local-serving as well as its traded products.

[3]The North San Joaquin Valley region includes the counties of Merced, Stanislaus, and San Joaquin.

Overview of Strategies and Tactics

The region's 2024 Strategic Plan outlined five broad strategies across the clean energy sector. This Activation Plan builds on that foundation by identifying actionable and high-impact tactics and action steps the region can follow to scale its clean energy sector and more closely align with its guiding principles.

Clean Energy Strategy 1: Generate and Use More Solar, Hydrogen, and Carbon Management Technologies Throughout the Region

The NSJV region is well-positioned to lead a new wave of clean energy deployment with its abundant land, strong agricultural and industrial base, and growing energy demand across sectors. **This strategy consists of three tactics and is designed to expand the deployment of solar, hydrogen, and carbon management technologies across the NSJV region with a focus on ensuring local communities, businesses, and workers benefit from the resulting environmental and economic gains.**

The primary tactic under this strategy, Tactic 1.1, focuses on evaluating and prioritizing existing and future land use for clean energy opportunities. By conducting a comprehensive assessment of land suitability based on grid access, current land use, environmental constraints, proximity to energy demand, and community input, the region can better align clean energy investment and infrastructure decisions with the most viable and community-supported locations. This effort will be informed by direct engagement with residents, landowners, and businesses, ensuring that regional clean energy development reflects local priorities and helps build long-term support. Opportunities to integrate co-benefits, such as agrivoltaics and groundwater sustainability solutions, will also be explored as part of this broader land-use planning effort.

Tactic 1.2 aims to expand on-site clean energy generation, storage, and efficiency systems for large energy users, including manufacturers, logistics operators, and food processors. This includes activities like installing solar panels and battery storage on factory rooftops and incorporating energy efficiency measures into food manufacturing processes. Enabling more facilities to generate and manage their own energy on-site can reduce reliance on expensive grid electricity, improve energy resilience, and increase the competitiveness of key industries that drive the NSJV economy.

The final tactic, Tactic 1.3, focuses on expanding community-scale clean energy solutions that serve clusters of households and businesses in the region. This includes identifying sites for shared solar and storage systems, engaging with groups of interested energy off-takers, streamlining permitting, and convening local partners to design inclusive ownership or subscription models. Community-level projects can defray project costs, enable greater scale projects, and bring affordable electricity to employers and residents who may not have the physical space or personnel to own and operate an energy project on their property.

Clean Energy Strategy 2: Foster a Clean Energy Workforce System Comprised of Accessible High Road Opportunities

As the clean energy sector expands across the NSJV region, so too does the need for a skilled and job-ready workforce. This demand creates a strategic opportunity to build a clean energy workforce system rooted in high-road principles and job quality, defined by family-sustaining wages, strong benefits, safe working conditions, and clear pathways for advancement.[4] **This strategy outlines four targeted tactics to develop a strong and inclusive clean energy workforce, ensuring that the sector delivers long-term economic benefits to workers and communities throughout the NSJV**.

Tactic 2.1 addresses workforce shortages in high-priority, skilled occupations by expanding training pipelines, scaling apprenticeship programs, and strengthening alignment between training providers and employer needs. The region currently faces labor shortages in key clean energy occupations such as electricians, HVAC technicians, welders, and engineers, which are essential in the clean energy sector.[5] Efforts to address these shortages will require strong collaboration among education and training providers (e.g., unions, community colleges, etc.) and workforce boards to ensure training programs reflect current market demands and lead to high-road employment outcomes.

To further strengthen the workforce system, Tactic 2.2 supports the development of clear, accessible career pathways into clean energy jobs. Early exposure in K–12, job centers, and structured pre-apprenticeship and apprenticeship readiness programs helps residents build awareness of and eventually enter clean energy careers. Partnerships with community-based organizations and employers are essential to ensure that preparatory and remedial training programs reduce barriers to entry and that clean energy careers are accessible to residents of all backgrounds within the NSJV.

Tactic 2.3 complements this by expanding clean energy curricula across educational and training institutions. To maximize existing resources, clean energy curriculum must be additive or designed to complement and strengthen existing training so that workers enter the workforce with a diverse set of skills and abilities that allow them to work on projects throughout and beyond the clean energy sector. For example, an electrician may help install a solar array one day and help install an EV charging station the next day.

To ensure workforce development efforts result in quality, local employment, Tactic 2.4 recommends the region promote the use of high-road labor practices like project labor

[4] High-road principles and jobs are defined using the California Workforce Development Board's definition. Information on high-road principles can be found here: https://cwdb.ca.gov/initiatives/high-road-training-partnerships/.

[5] California Employment Development Department, OEWS Employment and Wage Statistics and Long-term Employment Projections. The research team compared historical employment growth (2012-2022) to projected employment growth (2022-2032) within the three-county region.

agreements, labor neutrality agreements, and local hire provisions. These practices help secure fair wages, benefits, and inclusive access to high quality training pathways and jobs in the region. To make it easier for public agencies and private developers to implement these practices consistently, the region may also explore the development of templated local hire and project labor agreement language for use in clean energy contracts.

Clean Energy Strategy 3: Coordinate and Connect Regional Clean Energy Planning Efforts

The expansion of clean energy technologies, along with rising demand for electricity, land, and workforce, requires coordinated planning and efforts that reach across city, county, and sectoral lines. **This strategy aims to ensure that clean energy planning and deployment is strategic, inclusive, and well-coordinated across jurisdictions.** This goal is advanced through four tactics that promote alignment across agencies, sectors, and communities.

Tactic 3.1 supports the identification of a regional coordinating body responsible for aligning planning efforts, workforce and economic development strategies, and community engagement across counties, cities, and North Valley THRIVE's other priority sectors. Whether embedded within an existing institution, such as a council of governments or clean energy collaborative, or newly established, this entity will serve as the backbone for long-term coordination, implementation, and funding alignment. It may also lead exploratory research into emerging technologies such as Small Modular Reactors using nuclear fission and enhanced geothermal.

Foundational to this coordination is a shared understanding of clean energy technologies among planners, local officials, utilities, and developers. Tactic 3.2 aims to create this shared understanding through facilitated learning sessions and technical briefings that can equip local decision-makers with the knowledge needed to effectively plan for infrastructure, land use, safety, and permitting tied to energy projects, including solar, hydrogen, and carbon management among other technologies. Educating public officials also enables better policy decisions and lays the groundwork for regional alignment.

Regional planning must also reflect the priorities and concerns of residents and businesses. Tactic 3.3 focuses on inclusive public engagement to identify community values and develop public-facing guidelines for clean energy projects. This process may be led by community-based organizations and supported by the central clean energy coordinating body, helping ensure that planning outcomes reflect community input and that local support is sustained over time.

Finally, long-term funding is essential to support the coordinating body and sustain its work. Tactic 3.4 addresses ways in which the region can secure long-term funding. Public and philanthropic capital can jumpstart a coordination effort, while new revenue models such as Climate Resilience Districts may offer a pathway for sustained investment.

Clean Energy Strategy 4: Support and Facilitate the Region's Clean Energy Innovation Ecosystem

The NSJV region has the opportunity not only to expand local deployment of clean energy technologies, but also to help shape the innovation, supply chains, and partnerships that will define the sector's future and the technologies that advance that future. To capitalize on this potential, the region must strengthen connections across county lines, industry clusters, and research ecosystems, which can enhance its competitiveness, attract investment, and accelerate the development of both a regionwide and statewide clean energy cluster. **This strategy consists of three tactics and prioritizes strengthening inter-regional collaboration to position the NSJV region in a central role for the state's clean energy deployment and innovation.**

Tactic 4.1 focuses on identifying and developing integrated clean energy supply chains across neighboring regions to the NSJV. Economic development agencies, universities, state and local governments, and startup accelerators, both within the region and outside of it, should collaborate to assess collective clean energy assets, map supply chain linkages and gaps, streamline regulatory pathways, and make strategic investments that will enable subsequent buildout of clean energy supply chains.

Tactic 4.2 aims to expand the region's role in clean energy research and development by facilitating partnerships among researchers, technology developers, and landowners to test and scale emerging technologies locally and responsibly. Under this tactic, the expansion of the region's role in clean energy research and development also seeks to ensure that innovation is paired with inclusive economic opportunity and supports entrepreneurs looking to quickly commercialize research and innovation into new products and/or services.

The tactics above support and align closely with the NSJV region's goal of becoming a 'translation destination.' Tactic 4.3 supports fostering innovation within and adjacent to the NSJV region and then bringing those innovations into the region for field testing and early commercialization, establishing the region's role within the state's growing clean energy innovation economy while also supporting higher value-added activities that bring high quality jobs and resources from outside the region.

Operating Structure

This activation plan seeks to leverage the existing strengths of the region's clean energy sector while developing interventions to mitigate its weaknesses. There are numerous organizations, many of which are listed below, that support or could support the NSJV region's clean energy sector. However, despite their individual expertise, these organizations often operate in siloes with limited interaction across sectors or jurisdictions. While these organizations are adept within their fields, this siloed ecosystem results in piecemeal advancement of the clean energy sector. Best practices, resources, and synergies often go unshared or unrealized. A lack of a central organizing body and champion of clean energy efforts means that even though these organizations are often striving towards similar goals, their efforts do not present a unified front.

The greatest challenge of the clean energy sector in the NSJV region is the lack of a central body and champion for all clean energy activities. Tactic 3.1 outlines the development of a regional organizing clean energy body that can coordinate efforts, build grassroots interest and political capital, and put forth a clean energy strategy for the region. The success of this body, however, will depend on its ability to collaborate with the organizations listed below, as well as others not yet engaged or identified in this activation plan. These organizations represent important stakeholders with whom the clean energy organizing body should engage and coordinate with to propel a unified clean energy sector in the NSJV region.

Workforce Development Boards and Labor Organizations: Workforce boards and labor organizations, including labor unions, are critical to scaling inclusive, high-road jobs in the clean energy sector. They deliver regionally tailored training programs, apprenticeships, and career services that align with industry demand and uphold strong labor standards. Their involvement helps ensure equitable access to quality jobs, especially for disadvantaged and underserved workers. Regional partners include the Merced, San Joaquin, and Stanislaus County Workforce Development Boards, the San Joaquin Valley Trades Council, the Valley Trades Council, North Valley Labor Federation, and local labor halls.

Economic Development Organizations: Economic development agencies play a central role in attracting, retaining, and growing clean energy businesses while aligning investments with workforce and land use strategies. These groups connect firms to incentives, financing, and infrastructure, making them essential to building a competitive clean energy sector. Key entities include city and county economic development departments, small business development centers, Stockton Impact Corps, as well as private public partnership organizations like Stanislaus 2030.

Educators and Training Providers: Education and training providers are crucial to bring into the clean energy sector in the region to ensure talent is prepared for high road opportunities created within the sector. Close partnerships between employers and educational institutions can ensure that training is hands-on, industry-informed, and accessible across high schools, community colleges, and universities. Regional partners include the California Renewable Energy Lab (CREL),

local apprenticeship providers, WE Will! Workforce + education, and UC Merced, CSU Stanislaus, community colleges such as Merced College, Modesto Junior College, and San Joaquin Delta College.

Innovation and Research Organizations: Collaboration among research institutions, higher education, clean energy developers, and startup firms is central to achieve the goal of a regional clean energy research network put forth in this activation plan. These institutions will conduct, fund, and commercialize research and development in clean energy technologies are a core part of this activation plan. Key regional organizations include UC Merced's Energy Research Institute, iHub San Joaquin, Stockton Venture Lab, the San Joaquin Angels Network, and the SEES Incubator at UC Merced. Additional nearby institutions just outside the NSJV region, such as national labs (e.g., Lawrence Livermore and Sandia) and other nearby higher education institutions, may also serve as valuable partners or models for successful research and commercialization strategies and reflect megaregional collaboration on clean energy research outlined in Tactic 4.2. Current and future researchers and entrepreneurs are also important collaborators and should primarily be recruited and contacted through the organizations identified.

Industry Partnerships and Associations: Industry-led partnerships help accelerate technology deployment by coordinating business needs, infrastructure, and workforce development across firms and sectors. These collaborations are especially valuable in areas like hydrogen, grid modernization, and transportation electrification, where shared investment and planning reduce risks and costs. Potential partners include industry coalitions or conveners like Chambers of Commerce, CALSTART, the California Hydrogen Business Council, and Stanislaus 2030.

Local and Regional Government and Organizations: Local governments are instrumental in enabling clean energy deployment through permitting, zoning, land use policy, and infrastructure planning. They also drive implementation of resilience and emissions strategies aligned with broader economic and equity goals. Key actors include land use and planning departments in San Joaquin, Merced, and Stanislaus Counties, the San Joaquin Regional Climate Collaborative, Merced County Association of Governments (MCAG), and Stanislaus Council of Governments (StanCOG).

Community and Environmental Organizations: Community and environmental organizations ensure that clean energy investments benefit historically underserved communities and reflect local priorities. These groups support inclusive outreach, improve public trust, and advance goals related to air quality, affordability, and ecological resilience. Local partners include the Edge Collaborative, the Greenlining Institute, Grid Alternatives, Valley Improvement Project, San Joaquin Valley Clean Energy Organization (SJVCEO), the Central California Rural Energy Network, and the San Joaquin Regional Climate Collaborative. Community organizations and institutions, such as the Jakara Movement, Youth Leadership Institute, Family Resource Center, Valley Onward, West Modesto Community Collaborative, and Community Foundation Merced may also support job seekers and communities better integrate into the clean energy economy.

Utilities and Power Providers: Utility and power providers are obvious stakeholders that will play a substantial role in the production of more affordable and clean electricity generation and use throughout the region. The NSJV has a range of electric power providers that vary by geography across the three counties. These stakeholders include PG&E, AVA Community Energy, and Turlock, Merced, and Modesto Irrigation Districts who provide power directly to retail consumers.

Resourcing Across the Strategy

The changes in the federal and state budgets mean that outside funding is likely to be much harder to secure in the next five years than it was in the preceding five years. This means organizations and initiatives—including those advancing the NJSV region's clean energy sector—will need to pursue multiple sources of funding and prioritize efforts to fund.

The following section highlights estimated costs to implement the actions detailed in this action plan. These estimates are conservative and meant to resemble the 'minimum' amounts needed to support these activation plan efforts. They are estimates meant to showcase the scale of funds needed and highlight which priorities—such as infrastructure construction—that require more extensive fund raising and planning.

Planning, Strategy, and Capacity for Implementation: Local, state, and even federal funds could combine to raise $1-$2 million per year for planning and additional capacity for implementation. These funds would support the clean energy convenor or staffing for clean energy work amidst the more general regional economic development body.

Collaborative Process, Outreach, and Engagement: Outreach and engagement could be funded through the clean energy convenor or additional staff support for clean energy work amidst the more general regional economic development body. A pool of $500,000 to $1 million per year in funds could ensure the region's clean energy ecosystem is regularly engaged and continues to develop. These funding needs may be higher in initial years as the sector convenor seeks to build trust and connective tissue from a baseline where this work has not been previously conducted.

Research and Development Support: Staffing and administrative support could help connect researchers with interested landowners or project developers. Costs to support a part-time staff could amount to less than $100,000 per year for the next five years.

Workforce Development Programs: The region's workforce ecosystem (including workforce development boards, unions, community colleges, vocational and technical schools) can likely leverage existing funding towards energy-related curriculum, but should seek to secure funds that are available going forward. The Trump administration has identified apprenticeships as a core part of workforce development, so federal funding for those types of programs may be available even in a scarcer funding environment.

Physical Infrastructure Investment: Electrical infrastructure—such as transmission and distribution—can enable higher levels of energy production and use in the region. These types of infrastructure projects are expensive. For example, distribution upgrades to a bus charging station in Bellota are estimated to cost between $20-$40 million. With costs of this magnitude, funds to support infrastructure projects must be substantial—ranging from $50-$100 million to directly impact project financing. Because this sum of money is most likely to come from state or federal sources, securing this amount of funding would require significant coordination, grant writing and

application navigation capacity which also in itself requires funding. Therefore, some of the funding for physical infrastructure should be dedicated towards staffing capacity to secure additional infrastructure funding.

Clean Energy Strategy Milestones

The four strategies in this activation plan have a series of short- (Years 1 and 2) and medium-term (Years 3 Through 5) milestones that will build towards a high road clean energy economy that generates more clean, affordable, and future ready electricity for the region. Below are the milestones, their anticipated completion dates, and the accompanying tactic(s) that they support.

Table 1: Clean Energy Strategy Milestones Timeline

Milestone	Duration	Year 1		Year 2		Year 3		Year 4		Year 5	
Conduct land use and priority site identification effort, including stakeholder engagement around specific sites (Tactic 1.1)	First 18 months										
Priority sites for clean energy activities are identified and featured via a public facing portal (Year 3, Tactic 1.1)	Year 3										
Organize efforts and leadership around onsite energy, storage, and efficiency technical assistance (Tactic 1.2)	First 12 months										
Construction begins for onsite energy, storage, and efficiency programs (Beginning Year 3, Tactic 1.2)	Beginning Year 3										
Business and community engagement to identify community scale solutions (Tactic 1.3)	First 18 months										
Project planning for a community-scale energy project (Tactic 1.3)	Year 3 & 4										
Construction begins for a community-scale energy project (Beginning Year 5, Tactic 1.3)	Beginning Year 5										
Engage trainers, employers, and industry to expand and refine training (First two years, Tactic 2.1)	First 2 years										

Milestone	Duration	Year 1		Year 2		Year 3		Year 4		Year 5	
Build clear and accessible clean energy career pathways into education and training institutions throughout the region (First two years, Tactic 2.2)	First 2 years										
Initiate cross-institutional curriculum alignment to equip the regional workforce for emerging demands in the clean energy sector. (First three years, Tactic 2.3)	First three years										
Clean energy curriculum is integrated across relevant programs throughout the region (Year 4, Tactic 2.3)	Year 4										
Finalized templated community benefit agreements and local worker agreements that municipalities and private entities can adopt (Tactic 2.4)	First 18 months										
Identify or stand up a regional body to coordinate clean energy activities (Tactic 3.1)	First 12 months										
Host clean energy technology information sessions for public officials and municipal leaders (Tactic 3.2)	First 12 months										
Gather and incorporate resident and business input into regional planning for energy infrastructure (First two years, Tactic 3.3)	First 2 years										
Finalize strategy for securing and maintaining funding for clean energy initiatives (Tactic 3.4)	First 12 months										
The clean energy convening organization secures state or federal funds to implement clean energy tactics in the region (Year 3, Tactic 3.4)	Year 3										
Establish an inter-regional clean energy innovation collaborative (End of Year 2, Tactic 4.1 and Tactic 4.2)	First 2 years										
Incorporate clean energy into translation destination strategies (First 18 months, Tactic 4.3)	First 18 months										

Dependencies and Challenges

The successful activation of this clean energy strategy requires coordinated implementation across jurisdictions, institutions, and industries. The region is well-positioned to grow its clean energy sector, though several challenges or risks could delay both immediate progress and longer-term activation. These challenges span permitting, financing, infrastructure, and governance, reflecting the structural and policy barriers that affect many clean energy projects across the state.

Key risks to activation and implementation, along with initial strategies the region may pursue to mitigate these risks, are outlined below.

Risk 1: Siting and Permitting

Lengthy and complex permitting timelines for clean energy projects can delay or completely deter development efforts. Project timelines can be further lengthened and complicated by the need to navigate multiple jurisdictions and the competition of other land uses such as agriculture, conservation, and recreation. Aligning siting efforts with industrial or underutilized lands early in the planning process can improve efficiency and reduce delays. Local jurisdictions can also help mitigate this risk by identifying priority zones for clean energy infrastructure and maintaining ongoing coordination with permitting agencies to address bottlenecks and clarify project timelines**. Strategy 1** directly addresses these challenges by encouraging local governments and planning departments to guide alignment, designate preferred siting areas, and streamline the permitting process.

Risk 2: Uncertain Federal Incentives

Many clean energy technologies and related infrastructure projects rely on federal tax credits and incentives for financial viability. The potential repeal or reduction of clean energy tax credits, such as the Investment Tax Credit and Production Tax Credit, would substantially reduce deployment momentum and make projects financially infeasible. To mitigate this risk, the region must actively monitor federal policy developments and prepare for the potential phaseout of these and other incentives. Additionally, reducing project costs and identifying and pursuing complementary state and regional funding sources can help reduce dependence on federal support and strengthen long-term financial resilience**. Tactic 3.4 under Strategy 3** focuses on advancing these funding strategies to ensure sustained progress in the region's clean energy sector.

Risk 3: Absence of a Regional Coordinating Entity

The region's lack of a singular and recognized entity to coordinate clean energy strategies weakens its ability to compete for funding, maintain momentum across stakeholders, and implement identified clean energy strategies and tactics effectively. The region will need to stand up or identify a coordinating body to guide strategy execution, convene cross-sector partners, track progress, and represent the region in broader region policy or funding discussions**. Tactic 3.1 under Strategy**

3 focuses on developing this regional coordination entity to ensure consistent leadership, coordination, and accountability in clean energy planning and implementation.

Risk 4: Grid Interconnection Delays
Delays in grid interconnection throughout the state pose a significant barrier to scaling clean energy deployment in the region. Contributing factors include increased interconnection requests, lack of transmission capacity and infrastructure, and interconnection process. Long queues and uncertainty about project timelines can affect financing, discourage investment, and evoke other delays. The region will need to monitor changes happening at the state and federal level, coordinate with utilities and regulatory agencies to understand queue status, advocate for priority upgrades, and identify sites with existing infrastructure to streamline connection. **Strategy 1** supports these efforts by decreasing reliance on projects requiring interconnection and thinking about regional energy infrastructure and projects strategically.

Risk 5: High Upfront Capital Costs
Clean energy projects require significant upfront investment even with federal, state, and regional incentives. This creates a significant barrier for small and medium-sized firms that often lack access to financing, technical expertise, or project development capacity. The region will need to focus efforts on promoting collaboration for shared infrastructure, expanding access to technical assistance, and identifying funding programs that can serve smaller businesses. These efforts will be achieved through **Tactics 1.2 and 1.3 under Strategy 1.**

Risk 6: Early-Stage Technologies
Early-stage technologies are inherently risky and costly; it takes time, learning-by-doing, and funding to drive down costs and de-risk technologies. For example, solar (even unsubsidized) is now the cheapest source of new energy generation, despite being one of the most expensive sources of energy only a few decades ago.[6] Several technologies—including hydrogen and carbon management—are still in their early stages, requiring entrepreneurs and investors to sink time and money into expensive projects that may fail. However, with the greater risk comes greater reward; if the NSJV region is home to a portfolio of hydrogen and carbon management talent and projects—some of which are destined to fail—the projects that do not fail will position the region as a first mover in these pivotal technologies. Being a first mover means the region is more likely to develop a first-in-its-kind cluster that propels the industry forward from an emerging technology into an established one, and as the technology advances, so too will the economic benefits to the region as the technologies and their exports commercialize and scale. The tactics under **Strategy 1 and Strategy 2** support derisking early technologies while ensuring that the appropriate guardrails exist to protect community health and interests.

Risk 7: Local Government Capacity Constraints

[6] https://www.iea.org/news/rapid-rollout-of-clean-technologies-makes-energy-cheaper-not-more-costly

A key risk to advancing a clean energy strategy in the NSJV is the limited capacity of local county and city staff to navigate the complex planning, policy, technological, and regulatory requirements associated with clean energy deployment. Without targeted support and capacity-building, local jurisdictions may face delays in permitting, difficulties integrating new technologies, and challenges aligning land use and infrastructure plans with state and federal clean energy goals, which would ultimately slow regional progress and diminish the effectiveness of public and private investments. Addressing this risk is central to **Strategy 3**, which views regional-scale coordination and resource-sharing in the clean energy sector as an opportunity to provide specialized expertise that would be cost-prohibitive for individual cities or counties to develop independently. Additionally, tackling these capacity constraints supports the goals of **Strategy 1 and Strategy 4**, which focus on advancing regional planning and policy alignment to ensure effective and equitable clean energy deployment.

Appendix: Activation Plan Tactic Workplans

The NSJV region is uniquely positioned to lead in clean energy deployment with its abundant land and geologic resources, strategic location, productive agricultural and industrial base, and growing innovation assets. These strengths offer a foundation for inclusive economic development and the creation of high-road jobs across the region. This activation plan outlines actionable, near-term steps within a broader, multi-year effort to scale the production and use of affordable, clean, and reliable energy and maximize local benefits.

The plan focuses on high-impact strategies and tactics designed to strengthen the clean energy workforce, accelerate technology adoption, expand innovation partnerships, and improve coordination across jurisdictions. While each strategy offers value on its own, their collective implementation will position the NSJV as a statewide model for how affordable, clean, and reliable energy can support a flourishing local economy and development of an advanced energy sector.

Achieving these outcomes will require sustained collaboration across San Joaquin, Merced, and Stanislaus counties, and the cities within, alongside engagement with workforce boards, labor unions, utilities, developers, energy users, community and environmental groups, research institutions, and economic development organizations. The following tables outline each strategy, its associated tactics and timeline, and the key stakeholders who can support implementation across the region.

Clean Energy Strategy 1: Generate and Use More Solar, Hydrogen, and Carbon Management Technologies Throughout the Region

This strategy focuses on accelerating the deployment of clean energy technologies across the region, particularly solar, hydrogen, and carbon management systems, though other clean energy generation technologies should be considered. A core tactic focuses on land-use planning and evaluation to align infrastructure and investment with the most viable and community-supported sites for clean energy generation. A complementary second tactic centers around helping energy users install more on-site generation, storage, and energy efficiency systems. A third tactic involves examining opportunities and building support for community-scale energy generation that can provide low-cost energy directly to a pool of diverse energy users. These complementary tactics are designed to reduce emissions and energy costs and strengthen energy self-sufficiency.

Potential Metrics:

- Measure the total installed capacity (in MW or GW for electricity or tons for carbon management) for clean energy technologies across the region, including solar, hydrogen, and carbon management.
- Track the annual electricity generation (in MWh or GWh) from clean energy sources in the region, disaggregated by technology (overall, solar, hydrogen, etc.).
- Count the number of new clean energy projects planned or installed annually in the region.
- Track the share of electricity generated by solar and hydrogen as a percentage of total electricity generation in the region.
- Monitor the average capital cost per installed MW of clean energy technologies, disaggregated by technology (overall, solar, hydrogen, etc.).

Table 2: Strategy 1 Tactical Workplan

Tactics	Key Partners and Roles	Timeline
Tactic 1.1: Evaluate Existing Land and Future Use for Clean Energy Opportunities This tactic aims to better position the NSJV region for more clean energy projects and activities by evaluating current land and infrastructure availability, building	**Clean energy project developers** to assess site feasibility and bring technical expertise on clean energy systems **Utility providers and Community Choice Aggregators** to evaluate infrastructure compatibility and grid connection needs	Within 18 months

partnerships with local governments, and identifying future siting opportunities for solar, hydrogen, carbon management infrastructure, and other energy related projects.	**Local governments, including Councils of Governments, planning departments, and chambers of commerce** to provide guidance on land use and permitting	
	Residents, landowners, and businesses to participate in planning and visioning processes	
	Technical assistance providers to support evaluations of energy potential and infrastructure suitability	
Tactic 1.2: Support More "On-Site" Clean Energy, Efficiency, Storage, and Carbon Management The purpose of this tactic is to help large energy users, such as manufacturers, logistics centers, and food processors, install on-site clean energy generation, efficiency, and storage systems. These systems can reduce reliance on utility and broader grid electricity, lower energy costs, and improve energy reliability for operations.	**High energy users** in the region will participate in audits, evaluate project feasibility, and implement on-site energy activities	Years 1 to 3 to assess opportunities and engage with energy users. Years 2 to 5 for project planning and construction.
	Utility providers and Community Choice Aggregators to support interconnection with the broader electrical grid	
	Local governments to aid in permitting and zoning coordination for energy-related projects and building upgrades	
	Energy auditing and technical assistance providers to conduct energy use evaluations, design implementation pathways, and support businesses through the upgrade process	
	Community organizations to be potential partners that support outreach efforts to residents and small businesses and share resources	
Tactic 1.3: Identify and Promote Opportunities for Community-Scale Solutions to Benefit Residents and Small Businesses The goal is to increase access to cleaner and more affordable energy for residents and businesses by identifying opportunities for, and eventually developing, community-scale energy generation projects.	**Local planning and zoning departments** to assess site compatibility and streamline permitting to support timely community-scale project development	First 18 months for engagement and identification of opportunities. Year 3 and beyond for project planning and construction.
	Utility providers and Community Choice Aggregators to help manage integration with local energy infrastructure	
	Energy auditing and technical service providers to assist in identifying sites and evaluating their technical and economic feasibility	
	Community-scale project developers to lead the design, development, and commissioning of projects	

Clean Energy Strategy 2: Foster a Clean Energy Workforce System Comprised of Accessible High Road Opportunities

This strategy focuses on building a clean energy workforce system anchored in high-road principles, ensuring that clean energy deployment in the region leads to jobs with strong wages, benefits, and advancement opportunities. The first tactic targets workforce shortages in priority occupations like electricians, HVAC technicians, welders, and engineers by expanding training pipelines, scaling apprenticeship programs, and aligning curriculum with employer needs.

The second tactic focuses on strengthening career pathways through early exposure, pre-apprenticeship and registered apprenticeship programs, while the third tactic highlights necessary additive clean energy curriculum integrated across training institutions. The fourth and final tactic promotes high-road labor practices, such as local hire provisions and project labor agreements, to lock in job quality and ensure that clean energy investments generate long-term, equitable economic opportunity for residents in the NSJV region.

Potential Metrics:

- Track the total number of energy and clean energy jobs within the region on an annual basis.
- Assess and track the job quality of energy and clean energy jobs within the region by analyzing wage distributions, required skill levels, and educational requirements in comparison to regional averages and living wage thresholds.
- Track the regional capacity of clean energy training and education programs, including the number of course offerings, registered apprenticeships, and awarded degrees or certificates.

Table 3: Strategy 2 Tactical Workplan

Tactics	Key Partners and Roles	Timeline
Tactic 2.1: Address Workforce Shortages in Key Clean Energy Occupations The purpose of this tactic is to develop a high road workforce that supports the region's deployment of	**Local workforce development boards** to support coordination between education and training providers **Labor unions and pre-apprenticeship/apprenticeship training providers** to expand training pipelines into skilled construction and technical trades	Years 1 to 2 for engaging and coordinating trainers and employers. Years 3 and beyond for implementing changes

clean energy technologies by addressing labor shortages in key occupations.	**Education Institutions**, including universities, community colleges, high schools, and adult education consortia (e.g., UC Merced, San Joaquin Delta College, etc.) to develop and deliver clean energy-aligned curriculum and credentials	to education and training
	Businesses and employers to define skill needs and offer on-the-job learning opportunities	
Tactic 2.2: Build and Promote Clear, Accessible Clean Energy Career Pathways The purpose of this tactic is to establish a clear and accessible system of clean energy career pathways that connect residents to job opportunities within the clean energy sector.	**Labor unions and apprenticeship training providers** will integrate clean energy awareness and technical preparation into their training programs	Years 1 to 2
	Education Institutions including, universities, community colleges, high schools, and adult education consortia will integrate clean energy awareness and technical preparation into their curriculum	
	Businesses and employers will offer on-the-job training opportunities such as internships and entry-level jobs linked to pathway programs	
	Local workforce development boards, job centers, and community-based organizations will support the education system in identifying and removing barriers to entry and navigating career pathway options	
Tactic 2.3: Integrate Additive Clean Energy Curriculum Across Institutions and Programs The purpose of this tactic is to align and expand curriculum development across institutions to prepare workers for the evolving needs of the region's clean energy sector.	**Local workforce development boards** to coordinate curriculum alignment efforts across training institutions and ensure that program offerings reflect regional employer demand for clean energy skills	Years 1 to 3
	Organizations aligning clean energy workforce development (e.g., Stan2030, California Renewable Energy Laboratory) can provide research and strategy frameworks to ensure curriculum efforts are coordinated across the workforce system	
	Labor unions and pre-apprenticeship/apprenticeship training providers to help embed clean energy skills and awareness into apprenticeship training programs	
	Education institutions, including universities, community colleges, high schools, and adult education	

	consortia to adapt and deliver clean energy-aligned courses and credentials	
Tactic 2.4: Lock in High Road Clean Energy Jobs The purpose of this tactic is to ensure that high-quality clean energy jobs are accessible to residents of the region.	**Local workforce development boards and economic development agencies** to support the inclusion of project labor agreements and labor neutrality agreements in clean energy projects, in addition to developing the templated local hire language	Year 1 and Beyond
	Labor unions and labor-management councils to lead negotiations and implementation of project labor agreements and community workforce agreements to ensure clean energy jobs offer strong wages, benefits, and structured training pathways for local workers.	

Clean Energy Strategy 3: Coordinate and Connect Regional Clean Energy Planning Efforts

This strategy focuses on strengthening regional alignment across jurisdictions and types of clean energy activities to ensure that development of the clean energy sector is strategic, inclusive, and community-supported. The first tactic establishes or designates a coordinating body to align clean energy planning, workforce development, and community engagement across cities, counties, and technology types. This coordinating body will serve as the backbone for long-term implementation and funding coordination, whether embedded in an existing organization or newly created to support regional needs. This coordinating body can also lead regional efforts to consider opportunities for emerging technologies, including Small Modular Reactors utilizing nuclear fission and enhanced geothermal.

The three other tactics are oriented towards knowledge sharing and gathering and incorporating community input. The second tactic focuses on facilitated learning sessions will equip local officials and planners with the technical understanding needed to guide infrastructure, land use, and permitting decisions for solar, hydrogen, and carbon management projects. The third tactic calls for public engagement, led in partnership with community-based organizations, ensures that residents and businesses shape regional priorities and planning outcomes. The fourth tactic calls for securing long-term funding to sustain coordination, with early support from public and philanthropic partners and longer-term models such as Climate Resilience Districts.

Potential Metrics:

- Count the number of inter-regional and mega-regional clean energy organizations the region is actively involved in.
- Monitor the number of inter-regional and mega-regional clean energy initiatives that the region contributes to or co-leads.
- Track the number of inter-regional and mega-regional public-private partnerships focused on clean energy.
- Track the number of coordinated meetings or convenings led or attended by regional stakeholders to advance shared clean energy goals.
- Measure clean energy sector contributions to the gross regional product (GRP) as an outcome of coordinated planning and investment.

Table 4: Strategy 3 Tactical Workplan

Tactics	Key Partners and Roles	Timeline
Tactic 3.1: Identify or Stand up a Regional Body to Coordinate Clean Energy Activities The purpose of this tactic is to establish or designate a regional coordinating body to ensure alignment and efficiency in clean energy planning, deployment, and community engagement.	**Councils of Governments** will provide cross-jurisdictional planning and policy coordination	Within 12 months
	Local and county governments will delegate convening power and long-term implementation oversight	
	Existing climate or energy collaboratives (e.g., San Joaquin Clean Energy Organization) will share lessons, tools, and convening strategies, and/or could play a role as the regional coordinating body	
Tactic 3.2: Educate Stakeholders on Clean Energy Technologies The purpose of this tactic is to create shared knowledge across stakeholders about clean energy technologies within the region to lay the foundation for coordination and connected regional planning.	**Clean energy developers and technology providers** will share technical expertise and communicate infrastructure needs	Within 12 months
	City and county planners will use the information to align zoning, land use, and permitting decisions with clean energy opportunities	
	Utility providers and energy infrastructure experts will offer insights on system integration, grid capacity, interconnection requirements, and safety considerations	

	Local elected officials and council members will use the information to inform decision-making on policy, permitting, and public investments related to clean energy	
	Local economic development agencies will help communicate the regional economic benefits of clean energy deployment to businesses	
	Local planning and zoning departments will evaluate and update planning processes and permitting to support clean energy siting and deployment	
Tactic 3.3: Gather and Incorporate Resident and Business Input into Regional Planning The purpose of this tactic is to ensure clean energy planning reflects community priorities and concerns, and results in regionally appropriate solutions that benefit residents and businesses.	**Community-based organizations** can lead outreach efforts to ensure diverse and representative resident voices are included	Within 24 months
	Local and county governments and regional planners will facilitate public participation and incorporate input into planning processes	
Tactic 3.4: Seek Long-Term Funding to Support Clean Energy Coordination Efforts The purpose of this tactic is to secure sustained resources for regional coordination and implementation of clean energy strategies over the long term.	**Regional planning bodies and local governments** will lead the pursuit of public and legislative funding opportunities	Years 1 to 5
	Public and philanthropic partners will provide flexible capital to pilot and scale regional coordination efforts	
	Community-based organizations will help identify funding needs aligned with community priorities	
	Economic development and workforce boards will align funding requests with regional economic and workforce needs	

Clean Energy Strategy 4: Support and Facilitate the Region's Clean Energy Innovation Ecosystem

This strategy aims to position the region as a clean energy innovation leader. The first tactic seeks to strengthen inter-regional collaboration. The second tactic highlights steps to build out connected supply chains across the state. The final tactic is focused on working with clean energy entrepreneurs and business owners to facilitate the clean energy sector's role within the NJSV's goal of becoming a "translation destination." By building on the region's emerging role as a "translation destination," the strategy supports efforts to attract investment, scale research, and accelerate deployment of new technologies.

Potential Metrics:

- Count the number of cross-regional partnerships or joint ventures.
- Track the range of clean energy technologies that are deployed or piloted within the region.
- Track the number of clean energy demonstration or pilot projects launched in the region, including those supported by university or industry partnerships.
- Measure the number of research and development (R&D) grants, public awards, or philanthropic investments awarded to local institutions for clean energy innovation.
- Measure clean energy sector contributions to the gross regional product (GRP).
- Track the number of clean energy patents filed annually within the region and megaregion.
- Count the number of clean energy startups operating or launched within the region.
- Measure early-stage investment in the region's clean energy sector, including venture capital, angel investment, and public seed funding.

Table 5: Strategy 4 Tactical Workplan

Tactics	Key Partners and Roles	Timeline
Tactic 4.1: Grow Inter-Regional Collaboration Around Clean Energy Innovation The purpose of this tactic is to grow regional competitiveness by supporting collaboration with nearby regions to strengthen shared clean energy innovation and supply chains networks.	**Clean energy developers and technology firms** will share deployment experience, innovation priorities, and supply chain needs across regions	Years 1 to 5
	Universities and research institutions will provide technical expertise, share applied research findings, and participate in innovation-focused partnerships	
	Local government and Councils of Governments will convene partners and support cross-jurisdictional planning and coordination	
Tactic 4.2: Boost the Region's Role in Clean Energy Research and Development The purpose of this tactic is to strengthen the region's role as a research, testing, demonstration, and scaling destination by strengthening partnerships between	**Regional businesses, researchers, utilities, and landowners** will serve as collaborators for clean energy pilot projects and testing grounds	Years 1 to 5
	Economic development organizations will promote the region as an innovation and testing hub and facilitate investment in R&D efforts	

researchers, businesses and entrepreneurs, and landowners to pilot, evaluate, and scale clean energy technologies.	**Clean energy developers and startup firms** will deploy and scale emerging technologies in the region	
Tactic 4.3: Position Clean Energy Technology Within the Translation Destination The purpose of this tactic is to align clean energy innovation with the region's emerging role as a "translation destination".	**Local governments and economic development agencies** will integrate clean energy into the region's translation destination strategy.	Years 1 to 3
	Local planning and zoning departments will streamline permitting or siting processes for clean energy technology testing and pilot projects	