

California's North State

Regional Clusters of Opportunity

May 2011

Cultivating Economic Growth, Job Creation and Career Pathways

Serving Counties of:

Butte, Del Norte, Lassen, Modoc, Nevada,
Plumas, Shasta, Sierra, Siskiyou,
Tehama and Trinity

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Introduction

California's North State Region

California's North State is one of the largest regions in California covering over 39,388 square miles. The NoRTEC region is larger than 6 states combined.

The region includes eleven counties stretching from Pacific Ocean/Oregon border east to the Oregon/Nevada border, covering most of the Sierra Nevada territory and northern Sacramento Valley. The region represents a little over 25% of California's geographic area.



The North State region is predominantly rural, with some areas considered “remote rural”. There are only two population hubs (over 50,000), City of Chico and City of Redding – most incorporated cities are under 25,000 and many unincorporated areas have populations under 500.

The region has traditionally been a resource-based area, timber, fishing and agriculture. As these industries have declined over the years, growth and diversity have begun to change the landscape particularly in the two population hubs. Redding has emerged as a regional medical hub and the City of Chico, with the presence of CSU, Chico, the only University serving the North State, has emerged as information technology region. Even with these emergence of growing sectors, the base economy for most of the North State is still in timber and agriculture.

Opportunity for jobs and economic diversity is in clean energy, healthcare, alternative fuels and vehicles, niche bioeconomy markets, ag-related products and information technology.

Northern Rural Training & Employment Consortium (NoRTEC)

The North State region is defined by the service territory of the Northern Rural Training & Employment Consortium (NoRTEC). NoRTEC is a Joint Powers Agreement (JPA) of the 11 counties in North State - Butte, Del Norte, Lassen, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Tehama and Trinity. NoRTEC administers the federal Workforce Investment Act for the 11 counties. A Governing Board and Workforce Investment Board (WIB) oversee NoRTEC’s programs and initiatives.

NoRTEC’s core services are funded through the federal Workforce Investment Act, allocated to the State Labor Agency and then disbursed to WIBs throughout California. There are five One-Stop Employment Centers with offices in the 11 counties which administer the *core services* of the Workforce Investment Act:

- Employer & Business Services
- Job Seeker Services
- Youth Services
- Community Programs & Resources
- Children & Family

NoRTEC’s philosophy for services has been ***business first***; serving business will lead to job creation and workforce development skills development for those jobs.

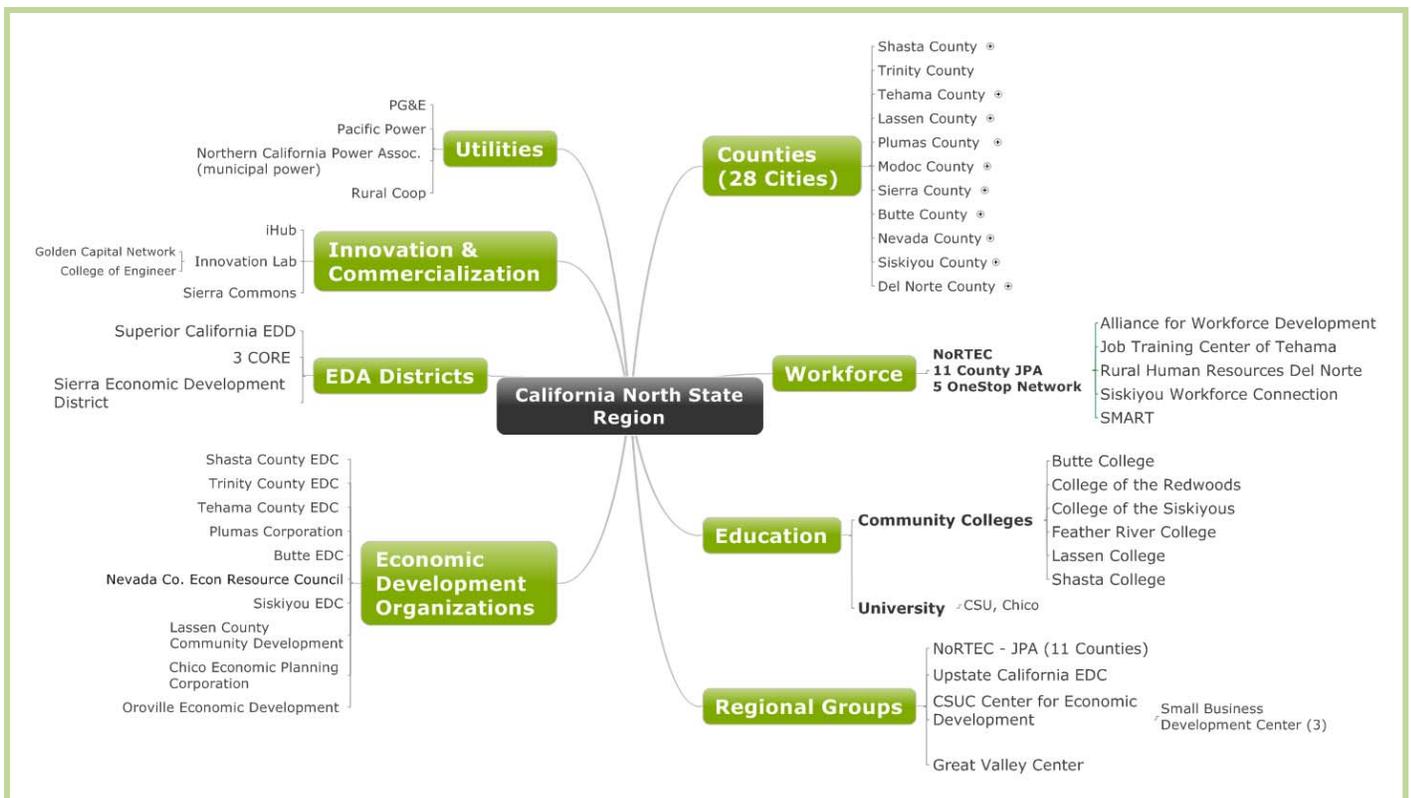
Network of Education, Workforce, Economic Development

As the only regional JPA, NoRTEC has often led initiatives to facilitate opportunity and change - supplementing services and funding through competitive applications to state and federal agencies and partnering with numerous education and economic development entities throughout the North State.

NoRTEC uses **six guiding principles** to determine involvement in new initiatives:

1. Will the initiative create new jobs?
2. Will the initiative serve dislocated workers?
3. Will the initiative provide Career Pathway Training?
4. Will the initiative assist business growth in key industry sectors?
5. Will the initiative stimulate economic recovery and growth?
6. Will the initiative create collaboration and leverage resources?

In addition to NoRTEC and the OneStop Employment Centers, the North State network includes CSU Chico, six Community Colleges, four Economic Development Districts, 10 economic development organizations, three SBDC Centers, five utilities and numerous community-based organizations working with businesses.



Regional Clusters of Opportunity Initiative

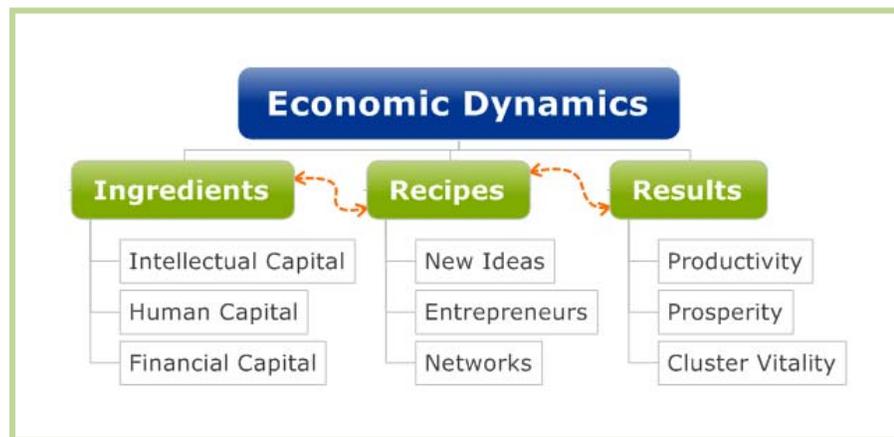
Through the Regional Clusters of Opportunity Initiative with the focus on potential economic opportunity and business needs, the education, workforce and economic development entities began collaborating on initiatives that could lead to long-term change:

1. Create career pathways in new renewable energy fields,
1. Clean-energy and green product deployment,
2. Access to capital and resources,
3. Accelerate technology transfer and commercialization.

The Regional Clusters of Opportunity Project provided the opportunity to focus on key clusters throughout the region.

Project Outcomes Supporting the Clusters of Opportunity

Early in the process innovation, entrepreneurship and access to capital were identified as key elements to transforming the economy:



The Cluster of Opportunity project became an action-oriented process.

Given the high unemployment rates faced in the North State and the need for economic transformation, as key strategies were identified that would lead to jobs and economic growth, the Cluster of Opportunity Team seized opportunities to develop key projects in support of cluster development.

Sample Project Outcomes:

Identified Need	Action
Support for Innovation	<p>California iHub designation from the Governor’s Office of Economic Development.</p> <p>Launched the Innovation Lab, partnership with business, CSU, Chico and Golden Capital Network to accelerate technology development and access venture capital; seeded by Governor Green Innovation Challenge Grant.</p>
Create Clean Energy Career Pathways	<p>Received California Clean Energy grants, partnership with Community Colleges, Builder’s Exchange and Energy Efficiency Training Academy to develop career pathways in clean energy deployment.</p> <p>Partnered with private business on new solar thermal technology development, approval and a pilot test training program.</p>
Address needs of closed Biomass Facilities	<p>Partnered with USDA Rural Development to create a collaboration of North State organizations to address and identify strategies and solutions to re-opening 1-2 of the closed 9 facilities.</p>
Provide Entrepreneurship Training in remote rural regions	<p>Received a new pilot program grant from USDA, RMAPS, to develop a “Beyond Booth Camp” mentoring program with small businesses.</p>
Create certified training for alternative fuel technologies	<p>Partnering with a private business to deploy new fuel technologies, secured an AB118 California Energy Commission grant to train the company’s incumbent workers as well as mechanics, AES graduate students, first responders and fleet managers in alternative fuel technologies, propane installations (recently approved by CARB) and hybrid electric.</p>
Create a consistent method to measure economic and training Impact	<p>To measure both economic and training impact of initiative, create NoRTEC Economic Assessment Model for each of the 11 counties in the region. This allows local One Stop, and their partners, to measure the fiscal impact of initiatives as well as individual business impacts.</p>
Track business progress	<p>Launched North State Executive Pulse system to track and coordinate outreach efforts among the network.</p>

Regional Clusters of Opportunity Project

Economic prosperity for the North State is driven by **export oriented businesses** (locally made products sold outside the region, bringing in new dollars); **population driven businesses** (local market demand) and creating **career pathways** for local workforce.



Regional cluster-based strategies delves deeper into specific clusters – how they operate, how they grow, identifies their value chain with other industries and their opportunities for future growth – whether serving the local market or an external “export” market.

Cluster-based strategies have proven to result in improved economic performance of businesses and improved job quality vital to the long-term sustainability of a region. With the identification of cluster opportunities and needs, the role of the public sector is to support the growth and success of the clusters through investments in education, workforce skills, research and technology, infrastructure, and regulation.

The Clusters of Opportunity Project focused on three economic clusters:

Sector	Reason for Selecting Sector
1. Green Sector	The Green Sector is an emerging sector for the region. In 2009 a Renewable Electricity Production Report was prepared by Dr. David Gallo, CSU, Chico which estimated over a 10-year period over 4,000 jobs could be created, annual income could reach \$1.6 billion and the North State would exceed the required 33% renewable energy portfolio through a focused effort on energy efficiency and renewable energy production.
2. Alternative Fuels & Vehicles	Alternative Fuels and Vehicles, another emerging industry, was considered a niche of the Green Sector with a focus on biodiesel production. Biodiesel production from crop feedstock aligned with agriculture nature of the North State. Local jurisdictions also had goals to reduce vehicle emissions. Goal was to identify potential opportunities to grow this sector.
3. Allied Health Sector	Health Care is an existing and mature cluster with presence across the region. Through previous work under a WIRED grant, projected growth of the Health Care Industry, health care reform and issues plaguing hospitals and care centers in the North State drove the selection of this cluster to identify opportunities for job growth.

These sectors in the North State have the potential - *with strategic actions and investment* – to result in business growth and job creation.

Through CEO Roundtables, the project “engaged” industry at the local level to better understand the dynamics of the industry clusters in the North State and identified priorities, opportunities and actions to grow the sectors in the North State.

With a strong industry-driven partnership identified opportunities and investments needed to make the North State competitive. By coordinating workforce, education, economic development and other systems, resources were leveraged toward the goals of the industries at the local level.

Purpose was to create a collaboration more responsive to industry demand than traditional services, problem-solution oriented, not program oriented; address needs interdependently, not independently; and work with employers in an industry collectively, not as individual firms.

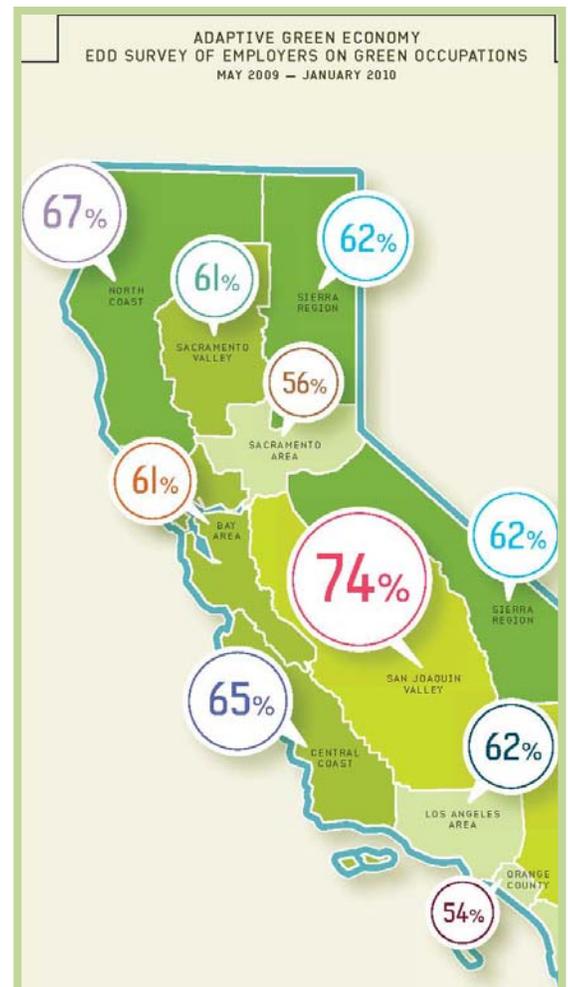
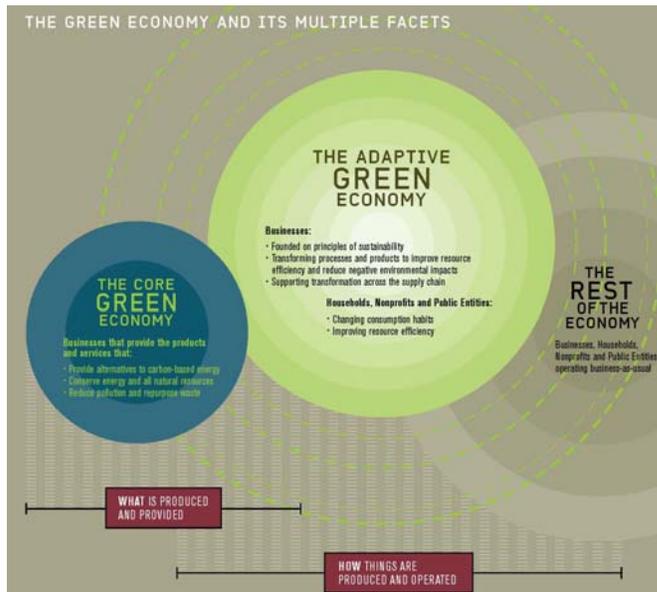
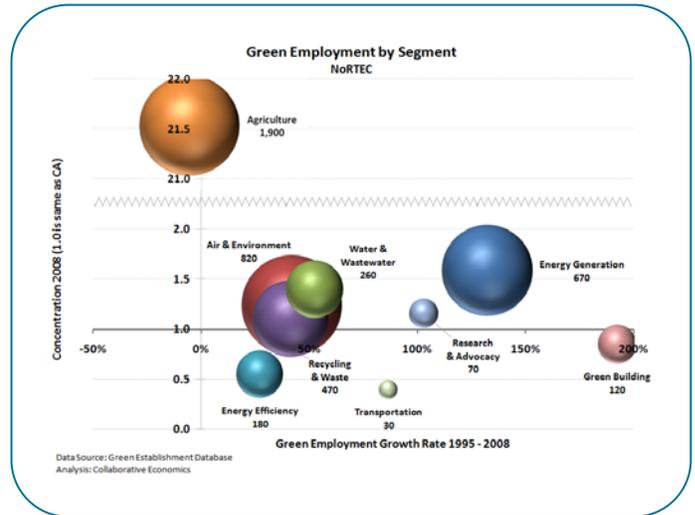
Cluster Data

Data was a key element of the project to understand the strength and diversity of the industry clusters across the region¹.

For the North State, the emerging “green” sector is still relatively small but growing. The *Many Shades of Green, 2011 Report* by NEXT 10 further defined the green economy as:

Core Green – producers and providers

Adaptive Green – founded on principles of sustainability and using sustainable practices



The North State as noted in the California Adaptive Green Economy map (right) has a larger “adaptive green” sector than a Core Green sector. Although the Core Green is small, it is growing with production on new renewable energy projects, fuels and recycled products. The growth of the adaptive green sector will also drive demand for more products and services.

¹ Appendix - LMID NoRTEC Region Profile & Cluster Data, 2011

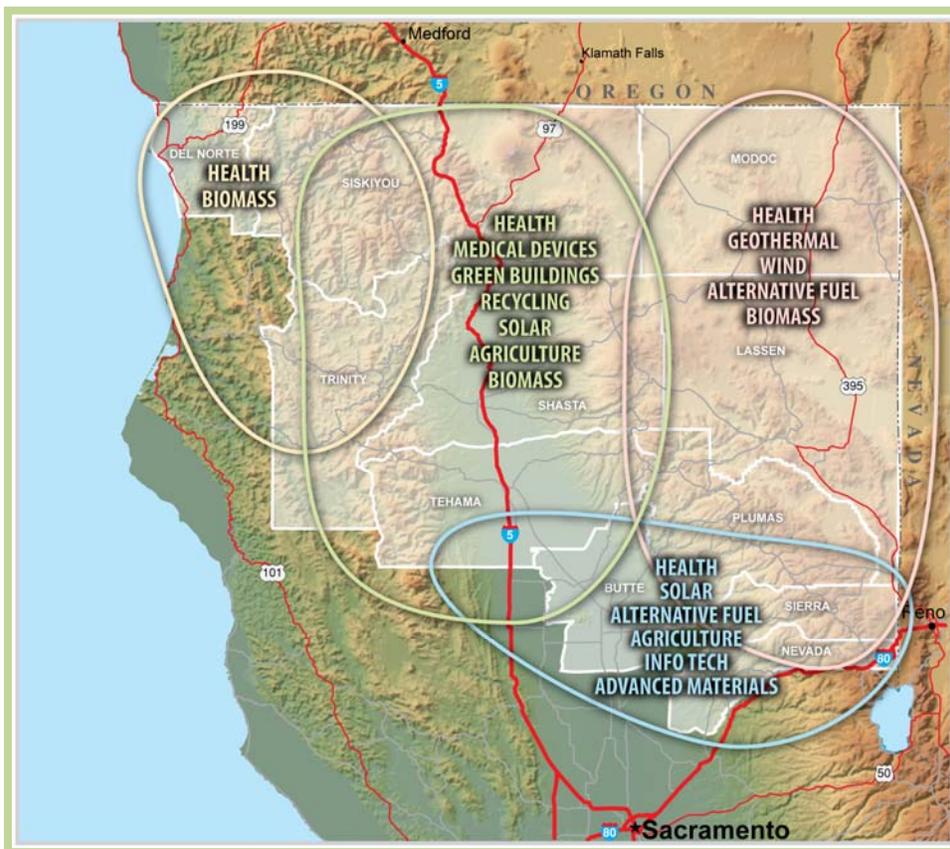
Sub-regional Context

Given the geographic diversity of the region, there are sub-regional economic conditions and characteristics to consider when developing a cluster-based strategy. For this project, through the NoRTEC One-stop employment center network, each conducted local CEO meetings with industries in the health, green and if any, in the alternative fuel sectors. LMID also prepared individual county cluster analysis (Appendix²)

The map below shows priority sectors and emerging sectors across the region. There are convergent sectors particularly in the clean energy with sub-regions focused on different technologies across the region. Health Sector is a priority in each sub-region, but dealing with different issues and opportunities, such as, the remote rural locations and clinics. There is also convergence in the health sector with information technology.

Regional Challenges

- Rural and remote rural setting,
- Predominantly a traditional resource-based region with declining sectors,
- No “critical mass” of a sector,
- Over 95% of the businesses have less than 10 employees, and
- Limited resources to build alignment across the region.



² Appendix – LMID County Profiles and Cluster Analysis, May 2011

North State Clusters of Opportunity Action Plan

To create transformational change in the North State there will need to be continuing efforts among government, education, workforce, economic development and other community-based organizations. In addition to cluster CEO roundtables, roundtables were held with the North Far North Regional Consortium of Community Colleges and with the economic development organizations of the North State.

A share vision was drafted at the Workforce/Economic Development Roundtable along with priorities to achieve North State Economic Competitiveness (*see chart following*).

North State – California’s Emerging Innovation Hub

Create a regional and global business climate by fostering a culture of entrepreneurship, innovation and collaboration.

Regional Goals

I. Leverage Limited Resources for Positive Change.

- Strategy 1: Form a non-profit to align with the NoRTEC JPA to continue building collaborative network of organizations, service providers, local jurisdictions and private businesses to implement strategic change.
- Strategy 2: Build strategic capacity throughout the region by jointly leveraging expertise and applying for funds from various resources, state, federal and private entities, to support cluster development and job creation initiatives.
- Strategy 3: Develop new strategies and mechanisms to build sustainability into initiatives throughout the region.

II. Bolster Economic Competitiveness of the Region.

- Strategy 1: Continue to implement and support programs and services to promote Entrepreneurship and Innovation as a core characteristic of the North State.
- Strategy 2: Focus on talent and workforce development through career pathway models and job training which address specific occupational needs of North State businesses.
- Strategy 3: Working with partner organizations to ensure businesses can easily access resources to grow their businesses.

**Priorities to Achieve North State Economic Competitiveness
Workforce & Economic Development Roundtable
November 18, 2010**

Manufacturing Corridor	Education / Workforce and Career Pathways	Regulatory
<ul style="list-style-type: none"> • Create a manufacturing corridor that is competitive • Become the most globally-connected rural region in the U.S. • Regional plans and policies to encourage and attract manufacturing businesses and energy/sustainable businesses 	<ul style="list-style-type: none"> • Bring more high quality training programs to the region that will create high income career pathways • Champion higher education attainment; pre-school to college • Develop skilled workforce to support clusters • Build strong workforce aligned with industry needs 	<ul style="list-style-type: none"> • Control regulation and align policies for promotion of growth • Reduce excessive industrial regulation (especially AB32) • Develop and enhance access to markets for industry • Remove barriers, show a united effort for renewable energy / ag
Marketing	Resource Development	Tourism
<ul style="list-style-type: none"> • A clear industry brand that industry wants to be a part of (e.g. Silicon Valley) • Identify, train, and equip marketing teams to present the opportunities and advantages of basing a business in the North State region • Put all our budgets together 	<ul style="list-style-type: none"> • Government coordination; identify roles, responsibilities, funding sources available at local level; work toward coordinating government efforts at county level; and ultimately regionally • Soft and hard infrastructure • Collaborate on joint funding applications 	<ul style="list-style-type: none"> • Value added products and tourism • Improve knowledge and infrastructure to attract outside dollars • Market our local ag products, organic
Business Development	Communication and Collaboration	Sector Strategies
<ul style="list-style-type: none"> • Entrepreneurs; focus on young entrepreneurs, provide mentors and help them grow • Identify entrepreneurs to increase products and jobs • Business retention • Back to basics – retain and expand existing employers • Grow or recruit a game changing economic difference maker • Build a meaningful and resource-rich system to support and grow local entrepreneurs • Support development of a regional financing network with existing E.D. lenders 	<ul style="list-style-type: none"> • Improve coordination of regional workforce development and career pathways • Greater communication and interaction between governance, workforce development, and economic development partners so we are working together to enhance business and community development • Align and lead regional initiatives • Create a business to business regional network for access to resources, information, materials, and supplies • Communicate and collaborate on retention, expansion, attraction opportunities 	<ul style="list-style-type: none"> • Symmetrical / Common focus • Focus strategy development with market concentration • Define and agree on what creates jobs • Identify / create base industries to export products / services outside the region • Create an export base • Transportation system innovation; mode shift center from truck to rail, vice versa • High speed rail cars to trains and high dollar goods movement

Key Cluster Goals, Strategies & Action Plans

The next sections address goals, strategies and actions for the three key clusters of opportunity sectors: Green, Alternative Fuel & Vehicles and Health.

The *Technical Assistance Framework* was used as a “progress-at-a-glance” guide for each cluster using the six stages of development to track progress with each cluster. As will be noted in the sector-specific action plans, we have only scratched the surface with cluster-based strategy. There is still much to do to continue the efforts to achieve sustainable results.

Framework “Progress-at-a-Glance” Guide:

Sector:	
Data-Driven Decision Making	Make effective use of labor market, industry and occupational trends, assessment data and other information critical to guiding investment.
Employer Engagement	Engage employers in providing insights into industry and workforce needs, becoming partners in design, implementation and investment of resources.
Partnership Building	Identify and secure a broad range of partners needed to implement.
Leveraging Resources	Leverage local, state, federal and private sector resources to increase the impacts.
Policy Alignment	Align and connect education, workforce and economic development, government and other policies to improve outcomes.
Continuum of Participant Support	An interconnected continuum of processes and services that enable effective workforce delivery.
Sustainable Systems Change	Integrate implementation of all six factors for long-term and on-going systems change for public and private partners.

FRAMEWORK
Six Stages of Development

- 0: Not a priority
- 1: Recognizing the Need
- 2: Making Specific Plans
- 3: Implementing Specific Strategies
- 4: Pursuing a Comprehensive Approach
- 5: Adopting a Sustainable Model

Key Cluster: Green Sector³

Goal: Create economic growth and systematic change by accelerating green practices, innovation, technology transfer and commercialization.

Cluster Progress-at-a-Glance	
Cluster: Green Sector	
Data-Driven Decision Making	<p>Early data was used to indicate the most significant clusters in the North State of the 15 Green Sectors – energy and agriculture. More recent data is being developed by LMID, which includes findings from LMID’s Green Survey. Early key findings:</p> <ul style="list-style-type: none"> • 8,700 individuals performing green work at least part time with “natural and sustainable product manufacturing the largest category followed by the energy sector. • Green jobs are more concentrated in the NoRTEC region than any other region in the State. • Businesses with staff that produce green products or services favor on-the-job training, vendor training, and in-house classroom training to prepare current workers to perform green activities. • Costs of implementation, economic conditions and government policies/regulations are barriers to implementing green practices. • Regarding business resources, firms prefer information about specific actions to cost-effectively reduce greenhouse gas emission (GHG), financing options and success stories of how other firms accomplished implementing green practices. <p>As this sector grows in the North State with deployment of renewable energy projects and green practice initiatives, additional data will need to be analyzed to track progress and emerging niches.</p> <p>Although the initial assumption for this sector was renewable energy production and energy efficiency deployment, the data (which is also supported by employer engagement) has clearly shown the North State to be more active in the “Adaptive Green Sector” than the “Core Green Sector.”</p>
Employer Engagement	<p>Employer engagement included a regional CEO Roundtable with diverse companies involved in the green sector – from solar providers, manufacturers of solar thermal products, recycling development companies to Walmart Distribution Center. CEO Roundtables were hosted by the OneStop Network in each of the five sub regions.</p> <ul style="list-style-type: none"> • Employer engagement needs to continue at the local level to bring partners – education, workforce and local government – together with business to address needs and opportunities. • Continue to address the access to capital needs of small, start-up and mid-market

³ Appendix – 15 Green Segments

	companies in the North State.
Partnership Building	<p>Through the employer engagement process, manufacturers identified a need in “accessing University expertise and talent” for product validation, testing and commercialization. CSU, Chico Colleges of Engineering, Ag and Business had typically not been actively engaged in business partnerships, even though CSU has a Center for Economic Development which is focused on small business development.</p> <p>Through a network of education (CSU, Chico and Community Colleges), workforce and economic development, a team developed a grant application for the Governor’s Green Innovation Challenge Grant – a key component was to create an Innovation Lab where manufacturers could have direct access to the College of Engineering through its Sustainable Manufacturing Program.</p> <p>The Innovation Lab opened in December 2010 with a formal Grand Opening showcasing 19 start-up and mid-market companies with new product developments.</p> <ul style="list-style-type: none"> • Sustainability of the Innovation Lab is a key priority to 1) delivering services to manufacturers in the North State and 2) building credibility that education, workforce and economic development resources can deliver results. • Success with businesses will build sustainability for the Innovation Lab.
Leveraging Resources	<p>Green is a priority in the North State – local jurisdictions, utilities, institutions and private business. Many of the local jurisdictions have “green,” climate action, or sustainability plans written into their General Plans (most not implemented because of lack of funding).</p> <p>A challenge for the North State is lack of “one-entity” coordination in applying for funding resources for priority projects – planning or physical projects. NoRTEC and the OneStop Network took the lead in applying for several grants to begin seeding action-oriented green projects:</p> <ul style="list-style-type: none"> California Clean Energy Grants – 1A and 2A Pathways Out of Poverty CEC Energy Efficiency Community Block Grant USDA Rural Development Assistance Green Innovation Challenge Grant USDA Rural RMAPS Grant (new program) USDA RCDI (waiting awarded approval) PG&E Innovation Lab Grant PG&E Innovator Pilot Grant (waiting awarded approval) <p>In addition to grant awards, funds were leveraged with the City of Chico funding support for the Innovation Lab and over \$500M in commitments of in-kind time and expertise from private businesses.</p> <ul style="list-style-type: none"> • Key to leveraging resources will be achieving a collaborative network of organizations throughout the North State involved in the cluster-based strategies.
Continuum of Participant Support	<p>Education and workforce development are fully engaged in creating clean energy, building career pathways, and recruiting participants.</p> <ul style="list-style-type: none"> • A challenge is creating jobs for the trained participants.

Policy Alignment	<p>Challenges for the various industries in the green sector are financing and regulations.</p> <ul style="list-style-type: none"> • Consistency for permitting solar is needed, it is being addressed at the State level and could be implemented locally once developed. • Local counties were very interested in the PACE financing for residential solar installations.
Sustainable Systems Change	<p>The Adaptive Green Sector is relatively large in the North State as compared to other areas in California, representing 3.4 percent of the total workforce who are working more than 50 percent of their time in a green. These businesses represent early adopters of green practices.</p> <ul style="list-style-type: none"> • Given the expertise available in the region and the local jurisdictions' policies, through strategic outreach of services and programs, the Adaptive Green Sector could grow substantially over the next few years.
Performance Measures	<ul style="list-style-type: none"> • Number of employees working in the Core Green and Adaptive Green Sector. • Number of employees working more than 50 percent or more of their time in a green job. • Economic growth of the sector. • Renewable energy installation (residential and utility scale). • Green business certificates. • Sustainability assessments. • Re-institution of a financing program for residential clean energy installation (PACE, on-bill financing). • Adoption of consistent solar permitting.
Outcomes	<p>Outcomes achieved to date:</p> <ul style="list-style-type: none"> • Received \$11 million in grant funding to seed clean energy and green projects (partial ARRA funding). • Launched the Innovation Lab. • Received IHub (Innovation Hub) designation from the Governor's Office of Economic Development. • Over 600 people trained in Clean Energy and Green Building. • 70 jobs created.

Strategic Implementation

1. Continue to build the synergy generated with the **Innovation Lab** to scale business growth through access to capital and specialized expertise and accelerate technology transfer and commercialization.
2. Collaborate with cities/counties to implement local “green” strategies and programs, energy deployment plans, workforce training and development of career pathways.
3. Assist businesses with technology development and commercialization.

Cluster Highlights

North State Innovation Lab & iHub Designation

In June 2010 a network of workforce, economic development and education partners, led by Northern Rural Training & Employment Consortium (NoRTEC) applied for and received one of six California Governor’s Innovation Challenge grants.

In October 2010 the California Governor’s Office of Economic Development (GoED) designated the region as a California iHub (Innovation Hub), the first rural iHub in California. The designation is the first in recognizing the North State as an “*emerging innovation region.*”

Anchoring the iHub and the cornerstone of the Challenge Grant is the **Innovation Lab**, a collaboration of Golden Capital Network and California State University Chico. The Lab is located at the Hegan Lane Business Park in Chico.

The purpose of the Lab is to target existing mid-market businesses that are developing new products, typically vertically aligned with their business model, and start-ups with innovative concepts and assist them with product commercialization, capital, and company growth.

Early results since July 2010 include:

- 5 companies are working through proof of concept stage
- 27 companies are in the Business Portfolio all at different stages of growth
- Launching California’s first propane and electric hybrid vehicle training program with Transfer Flow through a grant awarded by the California Energy Commission, efforts could result in 30 new jobs

Strategic Implementation Action Steps

Strategy 1: Continue to build the synergy generated with the Innovation Lab to scale business growth through access to capital and specialized expertise and accelerate technology transfer and commercialization.

Action Steps	<ol style="list-style-type: none"> 1. Create and showcase successful business projects to the business community throughout the North State to organically grow a reputation for service delivery of scaling and launching businesses. 2. Create business-to-business networks through physical forums and electronic tools, such as, Linked-In Groups. 3. Continue to identify capital resources – traditional, government funded, non-traditional and venture capital – for local business to access. 4. Implement new services in Manufacturing Sustainability Assessment (CSU Chico). 5. Launch a new Sustainability Manager Certificate training program (curriculum in development). 6. Connect businesses to other entrepreneur resources and programs throughout the region.
Responsible Parties	Innovation Lab – Golden Capital Network and CSU Chico Support – Workforce Development, Community College, North Valley LEAN Group
Resources	Green Innovation Challenge Grant PG&E Grant (potential) Innovation Lab Team is working on a sustainability plan – sponsorship, rent and client equity
Timeline	June 2012 – June 2013

Strategy 2: Collaborate with cities and counties to implement local “green” strategies and programs, energy deployment plans, workforce training, and develop career pathways.

Action Steps	<ol style="list-style-type: none"> 1. Conduct meetings with counties and cities to understand their policies and priorities for the green sector. 2. Work with counties interested in PACE financing program once it is re-established or a new program is put in place; work with utilities on deployment of “on-bill” financing. 3. Assist the northeastern sub-region with USDA Biomass Utilization project. 4. Access funding to provide specialized training or to send participants to specialized training such as boiler technicians, smart meter/smart grid, and energy efficiency. 5. Assist communities launch Green Certificate programs. 6. Assist in disseminating and facilitating information regarding standardized solar permitting.
Responsible Parties	NoRTEC and OneStop Employment Network (as it relates to the sub region), collaborate with economic development entities
Resources	To Be Determined
Timeline	To Be Determined

Strategy 3: Assist businesses with technology development and commercialization.

Action Steps	<ol style="list-style-type: none">1. Offer Proof of Concept services at the Innovation Lab (CSU Chico) for testing and validating new product development such as new solar thermal roof application.2. Provide technical assistance to faculty and students to accelerate technology transfer.3. Establish a CSU Chico Challenge Team to work with recycle firms and identify materials that could be developed into secondary products.4. Provide technical expertise in advanced materials and polymer technologies.5. Coordinate with USDA ATIP program on available research ready for commercialization; connect with businesses that may be interested in taking it to market.
Responsible Parties	Innovation Lab, CSU Chico, College of Engineering and Sustainability Manufacturing
Resources	Green Innovation Challenge Grant Apply for federal program funding
Timeline	June 2011 – June 2013

Key Cluster: Alternative Fuel and Vehicles

Goal: Promote the development and deployment of alternative fuels and vehicles and other products that directly reduce greenhouse gas emissions creating jobs and economic wealth.

Cluster Progress-at-a-Glance	
Cluster: Alternative Fuel & Vehicles	
Data-Driven Decision Making	<p>As an emerging niche market of the green sector, data for this cluster is very difficult to obtain and may have to be gathered through means other than LMID statistical data. The sector includes key participants such as Air Quality Management Districts, municipal public works, transportation departments, and fleet managers for private firms.</p> <ul style="list-style-type: none"> • Primary data needs to be completed.
Employer Engagement	<p>Employer engagement has begun with a few companies in alternative fuels – biodiesel sector and alternative vehicles – vehicle equipment and conversions. These are companies working on leading edge technologies and that have the greatest opportunity for company and job growth in the North State.</p> <ul style="list-style-type: none"> • This engagement has only scratched the surface for the region. Additional outreach in every county will need to be conducted to engage companies that are 1) producing products for alternative fuel or vehicles, including ag crop farmers and 2) potential users of alternative fuel or vehicles and their specific needs.
Partnership Building	<p>Partners in this sector that recognize the need to create strategies around development and deployment have been identified. The partners have not yet been engaged in action planning and commitment to the initiative.</p> <ul style="list-style-type: none"> • Partnership engagement would be a key element in Phase II.
Leveraging Resources	<p>Working with California Energy Commission (CEC) and their Workforce Development program grant, secured a \$500,000 training grant for training and certifying employees in Alternative Vehicle and Fuels – Propane. Propane Autogas is an old technology but just recently ROUSH has received CARB approval for retrofitting 2009-2011 light-medium duty trucks and vans to propane powered vehicles. This alternative fuel is a cost effective and efficient alternative fuel solution for fleet deployment. Also worked with CEC on propane infrastructure needs for the North State.</p> <ul style="list-style-type: none"> • To implement a successful sector strategy, additional funds will need to be invested. Working with various resources to identify funds and interested parties to engage in the sector development.
Continuum of Participant Support	<p>Working with employers to identify specific occupational and training needs. The Alternative Vehicle and Fuel training program is first being targeted to the TFI’s employees (60) and being promoted to other companies in the industry and automotive field. All One Stops are offering it to participants.</p> <ul style="list-style-type: none"> • Engage community colleges and ROP programs in training and align to their classes.

<p>Policy Alignment</p>	<p>Reduction of greenhouse gas emission (GHG) is a key goal of this initiative. Reducing GHG is also a priority for local jurisdictions, often written into the General Plan and is definitely of interest to Air Quality Management Districts which are responsible for “clean air.”</p> <ul style="list-style-type: none"> • Outreach to local jurisdictions and Air Quality Management Districts (AQMD) has been minimal to this point. Next phase would involve reviewing General Plan and current actions, meetings with AQMD regarding their initiatives, regulations and programs.
<p>Sustainable Systems Change</p>	<p>This sector is still in the development stage even though implementation has begun. Significantly more attention and involvement from both the private and public sector needs to happen before this sector can become “Sustainable.” With local and state emphasis on reducing GHG, this initiative is just emerging but will continue to be a priority as products, practices and regulations are adopted.</p> <ul style="list-style-type: none"> • Will continue to be a work-in-progress.
<p>Performance Measures</p>	<p>This sector can be measured by several indicators:</p> <ul style="list-style-type: none"> • Deployment of new technologies • Reduction of greenhouse gas emissions • New jobs created • Participants in training • Economic impact provided by business • Infrastructure investment • Local jurisdiction adoption of transportation/clean air initiatives
<p>Outcomes</p>	<p>Outcomes achieved to date:</p> <ul style="list-style-type: none"> • Received grant from California Energy Commission, AB 118 Alternative Fuel and Vehicle, for a Certificate Propane Conversion and Training with Transfer Flow Inc. All employees at company will be trained along with fleet managers, first responders, mechanics and other individuals interested in alternative fuels and propane. Company added five new employees prior to training. • Development of new technology – Diesel Particulate Filter for stationary motors. • Assisted biodiesel manufacturer with <i>Market Assessment and Introduction</i> to grow production of biodiesel to 20,000/gallons. Connected company to state and federal procurement of biodiesel. Selling ASTM-grade biodiesel to Sacramento market. Provided OJTs for office and production work. • Biodiesel equipment manufacturer located at Innovation Lab, entering M4G program to grow business. Hired one NEG employee. Created three new jobs since entering program.

Strategic Implementation

1. Become the West Coast National Alternative Fuels Training Center (NAFTC) for Propane and Propane Hybrid, certified by NAFTC.
2. Initiate a pilot Clean Cities Coalition that could be expanded to the region to deploy new alternative transportation fuels.
3. Continue to work with federal, state and local partners on infrastructure, financing, policies and incentives to accelerate deployment of technologies.
4. Connect businesses with resources to accelerate new product development and deployment.

Cluster Highlight

Project AB 118 – Alternative Fuel and Vehicle Training

Early in the engagement process with this niche market a unique “propane as an autogas” project developed.

CARB had recently approved ROUSH Cleantech’s propane autogas technology conversions for light and medium duty fleet trucks and vehicles. Transfer Flow Inc., a local fuel tank OEM and experienced provider for fuel systems, identified this has a market opportunity and solution for fleet vehicles. Conversions from gas to propane require a highly skilled and qualified workforce.

Working with California Energy Commission, Transfer Flow Inc., ROUSH, Ferrellgas, NoRTEC, Alliance for Workforce Development (OneStop) and the National Alternative Fuels Training Consortium, the region received an AB 118 Workforce Development Grant to implement an Alternative Fuel – Propane Conversion Training program.

Formal Announcement: May 26, 2011

Training Launch: Classes will begin June/July 2011 with a minimum of eight classes scheduled for incumbent workers, mechanics, dealerships, first responders and fleet managers.

Strategic Implementation Action Steps

Strategy 1: Become the West Coast National Alternative Fuels Training Center for Propane and Propane Hybrid, certified by NAFTC.

Action Steps	<ol style="list-style-type: none"> 1. Launch the first Alternative Fuel – Propane Conversion and Installation Program with NAFTC certification. 2. Attend NAFTC Beta-test propane training in Morgantown, West Virginia which will be added to the Alternative Fuel curriculum and ROUSH hands-on lab. 3. Promote the Alternative Fuel – Propane Conversion and Installation Program through educational briefings particularly with municipal entities and fleet managers, including vehicle loan program to test. 4. Create a working committee with CSU Chico, Community Colleges, ROP, and Workforce to formally establish a designated West Coast National Alternative Fuels Training Center through NAFTC.
Responsible Parties	Workforce Development and Education Transfer Flow Inc., ROUSH, Western Propane Gas Association
Resources	Training is being funded by AB 118. Additional funding will be required to implement the strategy. NoRTEC will seek additional funding for this initiative through AB 118/Workforce Development sources.
Timeline	June 2011 – December 2012

Strategy 2: Initiate a pilot Clean Cities Coalition, which could be expanded to the region, to deploy new alternative transportation fuels.

Action Steps	<ol style="list-style-type: none"> 1. Organize meetings with local jurisdictions and AQMD Districts to identify local plans to reduce GHG, municipal fleet usage of fuels and vehicles. Many of the jurisdictions have included transportation and reduction of GHG emissions in their General Plan. 2. Identify a pilot city to join U.S. Department of Energy (DOE) Clean Cities Coalition. The goal of Clean Cities is to <i>reduce petroleum use in transportation</i>. 3. Bring partners together to work with pilot city for implementation including, education, AQMD, county representatives, utilities, economic development, business and fleet managers. Utilize Clean Cities Toolbox to implement. Engage CSU Chico for internships to assist in development and implementation. 4. Identify other community projects that could contribute to adopting alternative fuel practices, such as, restaurant grease produced to ASTM-grad biodiesel.
Responsible Parties	Initially, Workforce Development and Pilot City
Resources	Resources are not currently available for the initiative. Through possible continuation of the RICO process work with Pilot City, county, local utilities and transportation authority to identify seed funding.
Timeline	July/August 2011 – June 2013

Strategy 3: Continue to work with federal, state and local partners on infrastructure, financing, policies and incentives to accelerate deployment of technologies.

Action Steps	<ol style="list-style-type: none"> 1. Create Alternative Fuel Centers throughout the North State, particularly along major transportation corridors (Interstate-5 and Highway 99). Coordinate meetings between various local jurisdiction departments, planning, transportation, AQMD, regarding the feasibility of launching pilot Alternative Fuel Centers which would house all available alternative fuels, e.g., propane, biodiesel, electric and other services. 2. Apply to CEC’s Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program Solicitation for propane infrastructure development in the North State. 3. Work with business partners, Western Propane Gas Association and the DOE Federal Energy Management Program to provide webcast(s) to introduce “Propane as an AutoGas” similar to the Federal Fleet Infrastructure and Electric Vehicles program. Promote Propane Conversions as a cost effective solution along with other alternative fuels and vehicles, e.g., electric. <ul style="list-style-type: none"> • Track DOE legislation for new Propane Fleet Infrastructure. • Discuss similar opportunity with CEC to California fleet managers, a webcast hosted by CEC. • Encourage California-based Federal fleet to convert portion of vehicles to propane. 4. Collaborate with alternative fuel and vehicle businesses to identify issues and needs that can be addressed by CARB and CEC, or which needs assistance through regulatory process, such as: <ul style="list-style-type: none"> • Change CARB EO and current incentives program to allow used/older vehicles (2008, 2009, and 2010) to be converted which would achieve immediate reduction in GHG. • Obtain CARB EO for Small Off Road Engine (SORE), engine certified for propane. • Propane vehicles destined for California use should be “converted” in California (incentivized).
Responsible Parties	Workforce and Economic Development form a committee to coordinate and manage initiative development.
Resources	Identify a source of funding to assist with planning and management.
Timeline	Summer 2011 – 2014

Strategy 4: Connect businesses with resources to accelerate new product development and deployment.

Action Steps	1. Expand the RICO Employer Engagement by identifying additional companies who may be involved in this niche sector but not on the radar screen. Create a committee to meet regularly on the needs and opportunities of the sector.
	2. Through the Innovation Lab, assist the emerging biodiesel equipment and production firms to deploy their products and technology as part of the Alternative Fuel and Vehicle Sector plan.
	3. Through the Innovation Lab, collaborate with CSU Chico to become the Western Propane Research Center aligned with the Training Center concept. CSU Chico could be the testing and validation center for new technologies. <ul style="list-style-type: none"> • Small off-road engine • Propane hybrid • Propane injected diesel engines • Propane tank for heavy-duty vehicles • Fuel pumps and filtration
	4. Actively track funding sources for infrastructure development and business development, distribute to local communities and businesses. Identify availability and potential for other source of funding for initiatives, e.g., Community Development Block Grant, USDA funding.
Responsible Parties	Economic Development Providers and Innovation Lab CSU Chico Alternative Fuel and Vehicle Committee
Resources	Resources will need to be secured to sustain the Innovation Lab and CSU Chico connection and resources to businesses.
Timeline	2011 – 2012 Continue to work with businesses to connect with resources at the Innovation Lab. Identify continued funding for this strategy.

Key Cluster: Allied Health

Goal: Assist the North State Health Industry stabilize and navigate through transformational changes due to health care reform.

Cluster Progress-at-a-Glance Cluster: Allied Health	
Data-Driven Decision Making	Health care, as an industry sector, is the largest employment sector in the North State and continues to grow and transform. However, Health Care and Allied Health is a mature industry and the big issues faced by this sector, particularly in rural areas, are policy-related issues driven by state and federal government.
Employer Engagement	<p>A regional Health Roundtable was held in Redding, CA with representatives from small hospitals, clinics, nurses, doctors' offices and health organizations. Each OneStop also held local roundtables to solicit input.</p> <ul style="list-style-type: none"> Continued engagement with this sector is needed. NoRTEC Executive Director is now attending the quarterly Hospital Council of Northern and Central California meetings. Community Colleges are extensively involved in the sector in the North State and a representative is a member of the California Health Workforce Council working on a statewide plan and career pathways model.
Partnership Building	Because this sector is a mature sector, partnerships have already been built and developed. Participants in this sector readily share information and best practices and work together to identify resources and develop joint applications for project funding.
Leveraging Resources	Workforce development and community colleges, along with local hospitals, work together to leverage resources to meet the needs of the health sector, such as, critical nurse training and health information technology. Approximately \$250,000 in funds has been leveraged for special trainings.
Continuum of Participant Support	Through the employer engagement a need was identified to begin marketing to K-12 schools earlier about careers in the health care field and to increase the pool of RN candidates.
Policy Alignment	Policies are the biggest issues facing this sector and will continue to be during the health care reform period.
Sustainable Systems Change	Given the health care reform, sustainable system change will be difficult to achieve for many years to come. For rural areas, keeping hospitals and clinics open is the biggest priority.
Performance Measures	<ul style="list-style-type: none"> Affected critical policy changes for the industry through assistance Number of participants enrolled/completing career pathways Number of customized trainings developed to meet the needs of the sector Number of new entrants in the labor pool Funding/financing obtained for rural hospitals
Outcomes	<ul style="list-style-type: none"> Health Information Technology Training, Oroville Hospital Critical Nurse and ER Nurse Training Del Norte County, Healthy Communities Initiative, funded by the California Endowment

Strategic Implementation

1. Help further rural hospitals' and clinics' policy agenda.
2. Provide training and career pathways that address rural health industry's workforce needs.

Cluster Highlights

Healthy Communities Initiative – Del Norte County

The California Endowment selected Del Norte to be designated as a “frontier” region to participate in its “Building Healthy Communities” program.

The goal of the California Endowment Healthy Communities Initiative is for communities to invest in deep and comprehensive prevention-oriented partnerships. Initiative Outcomes include:

1. All children have health coverage
2. Families have improved access to a healthy home that supports healthy behaviors
3. Health and family-focused human services shift resources toward prevention
4. Residents live in communities with health-promoting land-use, transportation and community development
5. Children and their families are safe from violence in their homes and neighborhoods
6. Communities support healthy youth development
7. Neighborhood and school environments support improved health and healthy behaviors
8. Community health improvements are linked to economic development
9. Health gaps for boys and young men of color are narrowed
10. California has a shared vision of community health

“The California Endowment envisions Del Norte as a future model of a healthy rural community.”

Strategic Implementation Action Steps

Strategy 1: Help further the rural hospitals and clinics' policy agenda.

Action Steps	<ol style="list-style-type: none"> 1. NoRTEC and Community College representatives continue to attend quarterly meetings of the Hospital Council of Northern and Central California, a hospital CEO forum, to engage directly with CEOs on issues where assistance can be provided. 2. Assist with alignment of resources and policies that help rural hospital become sustainable over time. 3. Utilize NoRTEC Governing Board of the 11 Board of Supervisors to help align rural policies around healthcare. 4. Disseminate information on the status of health industry and its relation to the local economy and job growth, i.e., the economic impact of the loss of medical facilities in terms of jobs, local revenues as well as unmet health care needs. 5. Promote case studies, such as the Healthy Communities Initiatives. 6. Work with sector and local legislators on state mandated policies that affect delivery of service, such as, changes in policies on medical payments. 7. Seek funding sources through federal and state programs and private foundations, for joint North State applications, such as health education programs.
Responsible Parties	NoRTEC, One Stop Network, Community Colleges Health Care Entities
Resources	To Be Determined
Timeline	Continuous

Strategy 2: Provide training and career pathways that address rural health industry's workforce needs.

Action Steps	<ol style="list-style-type: none"> 1. Continue to meet at the local level and regional level with hospitals and clinics to address their continuing/changing workforce needs. Also methods to increase community health/preventative care outreach and education programs. 2. Develop training provider agreements with rural clinics for clinical hours. 3. Collaborate to address the aging workforce replacements, identify key positions for replacement in next 2-5-10 years. 4. Continue educational partnerships – distance learning, HIT Training, short-term training for incumbent workers. 5. Target fund sources for, and in partnership with, Native American groups for training. 6. Identify funding sources for trainings, such as, HIT, upgrade employed nurses AND to BSN and MSN. Increase access to on-line RN and BN training.
Responsible Parties	NoRTEC, One Stop Network, Community Colleges Health Care Entities
Resources	To Be Determined
Timeline	Continuous

Appendix

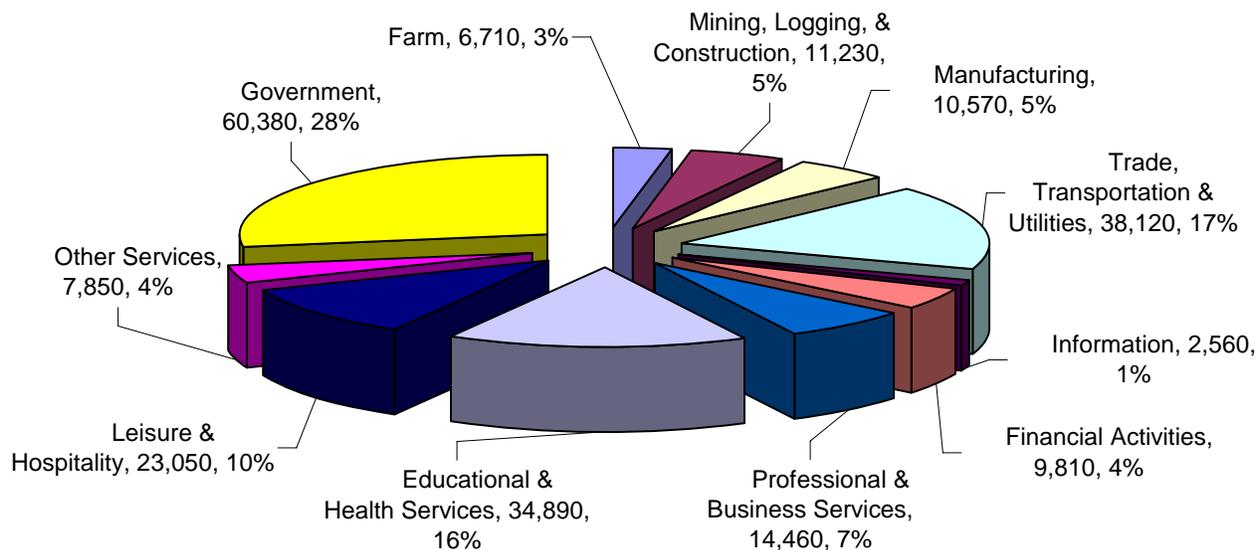
NoRTEC Industry Summary

Industry sectors represent general categories of economic activity. A sector is comprised of industries and firms that do similar work, make similar products, or provide similar services.

The following graph represents general categories of economic activity in the NoRTEC region in 2010. The largest industry sector was Government with 28 percent of the total employment, followed by Trade, Transportation and Utilities at 17 percent, and Educational and Health Services at 16 percent. Leisure and Hospitality comprised 10 percent of the employment in the region. The remaining industry sectors individually contributed seven percent or less of total employment.

NoRTEC 2010 Industry Employment

Total Annual Average Employment:

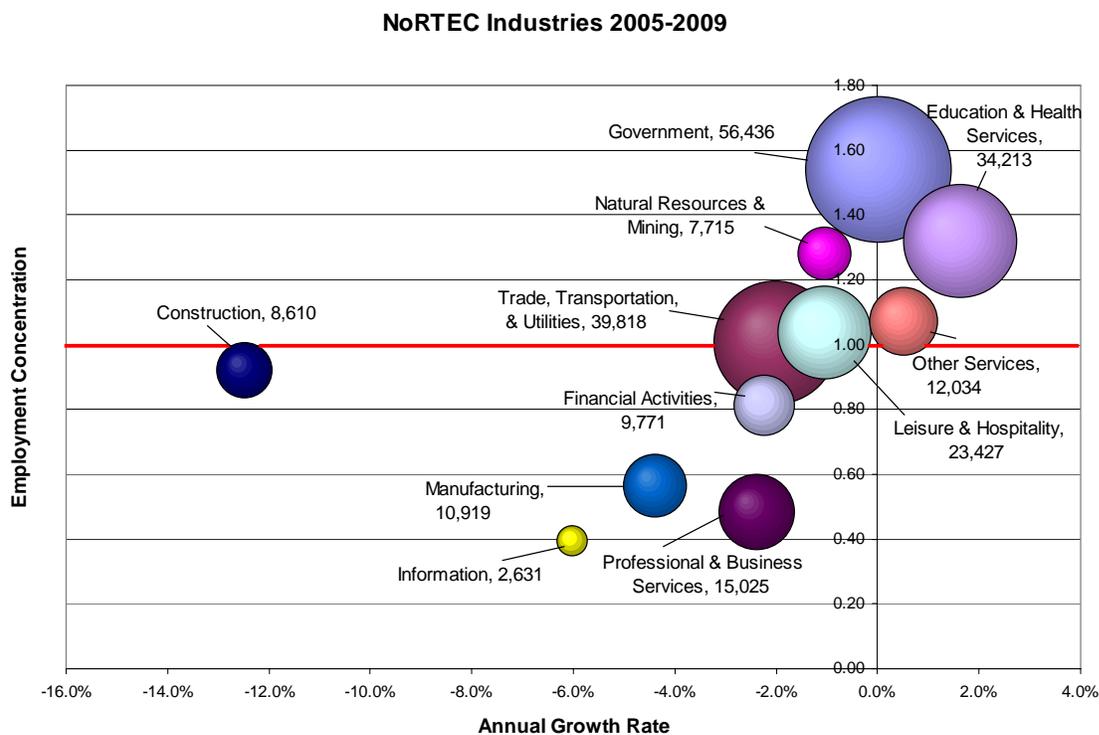


Source: EDD/LMID 2010 Industry Employment and Labor Force by Annual

Three factors are used to identify industry sectors in the region that have competitive advantage in this NoRTEC Industry Study for the period 2005 to 2009:

1. high employment concentration (referred to as a location quotient);
2. rapid annual rate of employment growth in the region; and
3. size of the industry sector.

A high employment concentration (location quotient above 1.25) indicates a specialization in the sector as compared to the California average, and fast relative employment growth highlights growing demand for those industries. The annual growth rate is computed as the compound annual growth rate, which describes the smoothed annualized gain of an industry over a given time period. Compound annual growth rate is used to determine growth industries or to compare the growth rates of two or more industries. The bubble chart below provides information on the region's industry sector growth during the study period and shows the industries size and concentration in 2009.



Source: EDD/LMID Quarterly Census of Employment and Wages

Interpreting the chart:

- The size of the bubble indicates the employment size (number of jobs).
- The horizontal axis indicates the annual growth rate or employment change over the four year period. Growth to the right on the graph is positive.
- The vertical axis indicates the concentration of an industry relative to the State. A concentration of 1.25 or higher indicates that the industry is much more heavily concentrated in the region than in the State.

Industries with a high concentration (greater than 1.25) and low employment growth are **mature industries** in the region. They represent industries that have a stronghold but have not recently experienced any significant growth.

Industries with high concentration and high employment growth are **growth industries** in the region. They represent industries that export their products or knowledge out of the region and may have a competitive advantage because they are more concentrated in this region than in other areas.

Industries with low concentration but high employment growth may be **emerging industries**. High employment growth indicates that the industry and its products are in demand. That demand is met with increased labor. These industries are likely growing due to the effects of maturing and growing industries, which have created a demand for industries that had not previously experienced much growth.

Industries with low concentration and employment loss are **declining industries**. Care should be taken to analyze declining industries to determine if economic and workforce development efforts may stem the decline or if the decline is based on factors inherent to the industry.

<p style="text-align: center;">Mature Industries</p>	<p style="text-align: center;">Growth Industries</p>
<p style="text-align: center;">Declining Industries</p>	<p style="text-align: center;">Emerging Industries</p>

Each of the eleven counties in the NoRTEC region makes a unique industry contribution and, when combined, they exhibit a diverse and interesting mix of industries that show growth, sustainability, and potential opportunities for new and expanding businesses. A comparative analysis was conducted to identify how each of the county’s industry sectors has performed over the study period (2005-2009) as compared to California. In addition, an analysis of the NoRTEC region showed that the **growth industries** represented in the combination of counties were Education and Health Services and Other Services. The single **emerging industry** in the region is Leisure and Hospitality, while Government, Trade, Transportation and Utilities, and Natural Resources were **mature industries**.

The table on page 5 is a summary of the mature, emerging, growth, and declining industries based on 2005-2009 county industry studies. The **mature industries** column shows the greatest number of counties represented in each industry. Leisure and Hospitality is seen as a mature industry in eight of 11 counties within NoRTEC. Both Government and Trade, Transportation and Utilities show in 7 counties, while Other Services has six counties listed. Four counties in the 11-county NoRTEC region had Construction and Natural Resources as mature industries and three counties had Manufacturing. These mature industries were able to maintain high employment concentration levels, yet due to the recession, experienced a declining or very low annual growth rate.

The **growth industries** column shows that the Education and Health Services industry was growing in eight of the 11 counties, Government grew in four counties, while Trade, Transportation and Utilities, and Natural Resources showed growth in two of the counties, and Other Services grew in a single county. The growth in these industries is consistent with the State and national trend, which also saw growth in the Education and Health Services sector.

In the **emerging industries** column, the Professional and Business Services industry is apparent in four counties. Education and Health Services and Other Services are both emerging in two of the NoRTEC counties, while Financial Services and Leisure and Hospitality are expected to emerge in one county. These industries show sustained positive growth throughout the recession period. The services and the products are in demand and the demand has been met with an increase in labor.

In the **declining industries** column, Financial declined in the eight of the 11 counties, while Information declined in seven counties. Declining industries experienced low employment concentration and low employment growth rate. Employment declines in employment the financial industry are consistent with the State and national trend. The information industry is constantly evolving as new technology and systems are developed.

Summary of the NoRTEC Counties Industry Studies

Mature Industries High employment concentration and low employment growth rate		Growth Industries High employment concentration and high employment growth rate		Emerging Industries Low employment concentration and high employment growth rate		Declining industries Low employment concentration and low employment growth rate	
Government	Butte Modoc Nevada Plumas Shasta Sierra Siskiyou	Government	Del Norte Lassen Tehama Trinity	Professional & Business Services	Del Norte Nevada Tehama Trinity	Financial	Del Norte Modoc Nevada Plumas Shasta Siskiyou Tehama Trinity
Leisure & Hospitality	Butte Del Norte Lassen Nevada Plumas Shasta Siskiyou Trinity	Education & Health Services	Butte Del Norte Lassen Nevada Shasta Sierra Siskiyou Tehama	Education & Health Services	Modoc Plumas	Information	Del Norte Lassen Nevada Shasta Siskiyou Tehama Trinity
Trade, Transportation & Utilities	Butte Del Norte Lassen Shasta Siskiyou Tehama Trinity	Trade, Transportation & Utilities	Modoc Tehama	Financial Services	Lassen	Construction	Butte Del Norte Lassen Siskiyou Tehama Trinity
Natural Resources	Del Norte Lassen Sierra Siskiyou	Natural Resources	Modoc Sierra	Leisure & Hospitality	Tehama	Manufacturing	Butte Del Norte Lassen Nevada Shasta Siskiyou
Other Services	Modoc Plumas Shasta Sierra Tehama Trinity	Other Services	Lassen	Other Services	Del Norte Siskiyou	Professional & Business Services	Butte Lassen Plumas Shasta Siskiyou
Construction	Nevada Plumas Shasta Sierra					Natural Resources	Nevada Plumas Shasta Trinity
Manufacturing	Plumas Tehama Trinity					Trade, Transportation & Utilities	Butte Nevada
						Education & Health Services	Trinity
						Leisure & Hospitality	Modoc
						Other Services	Nevada

15 Green Segments

The following is for reference of the 15 segments defined as “green”.

Green Segments	Example Industries
Agriculture	Bio-based materials; farm efficiency technologies; micro-irrigation systems; bio-remediation; non-toxic cleaners and natural pesticides. <i>Does not include organic, health food, or natural health products.</i>
Air & Environment	Air purification products and air filtration systems, energy efficient HVAC; universal gas detectors; multi-pollutant controls; fuel additives to increase efficiency and reduce toxic emissions.
Materials	Biodegradable materials derived from seed proteins; micro-fluidics technology for conducting biochemical reactions’ nano-materials; composite materials; thermal regulating fibers and fabrics; environmentally-friendly solvents; nano-technology components for electronics, sensor applications and energy storage; electro-chromic glass; thermoelectric materials.
Energy	<p>Energy Efficiency</p> <p>Energy management systems; systems that improve output of power generating plants; intelligent metering; solid state micro-refrigeration; control technology for HVAC systems; automated energy conservation networks.</p> <p>Energy Generation</p> <p>Distributed and renewable energy and conversion, including wind, solar/photovoltaic (PV), hydro/marine, biofuels, fuel cells, gasification technologies for biomass, and flywheel power systems.</p> <p>Energy Infrastructure</p> <p>Wireless networks to utilities for advanced metering, power quality monitoring and outage management; integrated electronic systems for the management of distributed power; demand response and energy management software.</p> <p>Energy Storage</p> <p>Batteries, e.g. thin film and rechargeable; power quality regulation; flywheels; electro-textiles.</p>
Manufacturing/Industrial	Advanced packaging; natural chemistry; sensors; smart construction materials; business process and data flow mapping tools; precision manufacturing instruments & fault detectors; chemical management services.
Recycling & Waste	Recycling technologies; waste treatment; internet marketplace for materials; hazardous waste remediation; bio-mimetic technology for advance metals separation and extraction.
Transportation	Hybrid vehicle technology; lighter materials for cars; smart logistics software; car-sharing; temperature pressure sensors to improve transportation fuel efficiency; telecommuting.
Water & Wastewater	Water recycling and ultra-filtration systems (e.g. UV membrane & ion exchange systems); sensors and automation systems; water utility sub-metering technology; desalination equipment.