

[planning] [design] [landscape architecture] [entitlement] [mapping/presentations]

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California Energy Commission

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Mr. Erik Stokes

CALIFORNIA ENERGY COMMISSION

1516 Ninth Street, MS-43

Sacramento, CA 95814

E-mail: Erik.Stokes@energy.ca.gov

Subject: Concept Discussion of GIS-Based EPIC Innovation Clusters, and the Innovation Cluster Management Tool (ICMT).

Dear Mr. Stokes:

I am writing as a follow-up to the submission of Forma Companies, Inc.'s comments during the EPIC August 17th comment period.

We have given considerable thought regarding how best to meet the stated EPIC goals, including:

1. Ratepayer and societal benefits;
2. AB 32/Executive Order S-3-05 compliance;
3. Loading Order compliance;
4. Low emission vehicles/transportation;
5. Safe, reliable and affordable energy services;
6. Economic development; and
7. Efficient use of ratepayer funds

We recognize the complexity of this program from its inception, and the need to use the allocated funds wisely, in order to draw much larger supporting funds from either the public or private sector. They must have confidence in the overall management and targeted deliverables from the EPIC program, and a way to monitor ongoing activities as a gateway to their involvement.

Therefore, we have focused on innovation clusters as our way of helping the California Energy Commission (CEC) accomplish these goals.

As you know, in our commentary document, we submitted a concept statewide "innovation clusters" map. Our work and comments were in response to the innovation clusters panel, PowerPoint references and other supporting document on the subject by Pacific Gas & Electric Company.

Since presenting that initial concept drawing, our team of innovation cluster concept developers has spent considerable time further exploring the use of Geographic Information Systems (GIS) in innovation cluster visualization management.

Through that process, we are working on the development of a copyrighted Innovation Cluster Management Tool (ICMT), which can be of use to the California Energy Commission in the management and success of the EPIC program.

We have augmented our own research and capabilities, through day-long discussions with top representatives of the California Community College Districts workforce training and manufacturing training centers. The objective of these meetings was to determine the usefulness of our ICMT to the university research and training community, specific to research, demonstration and deployment of renewable energy technology.

Therefore, for your review, we have provided some preliminary graphics depicting our concepts for California renewable energy innovation clusters. I will send you an updated, hard copy of the original poster and I enclose a protected link to a concept test version for your review and comment, to be found at:

<http://formfiles.com/cccco/>

We believe GIS provides a very efficient way to accomplish the objectives of the Innovation Cluster Concept. Based on FORMA's extensive experience in complex GIS-related assignments spanning the past twenty years, our ICMT should be able to comprehensively inventory and manage the data from the following sources:

- (1) All renewable energy projects in the State of California (ARRA, USDOE, NSF, USDOD, investor-owned utility, university research, private sector, etc.), to which EPIC funds might be linked for the purposes of research and demonstration. Specific GIS icons would be assigned to these projects, and each icon would be linked to project data files (spreadsheets, word documents, and even on-line links to computer automated design (CAD) files.
- (2) All institutions, companies, and facilities where renewable energy technology activities are being conducted, including universities, colleges and their individual programs and departments, private facilities, and individual researchers in the field.
- (3) Funding sources, including private venture capital, and the projects in which they are involved, public sources of funds, and other resources.

These are only a few of the key types of data available for integration into the ICMT.

Collectively, this data yields a robust look at the State of California, and allows the formation and support of existing innovation clusters, and others in the future.

Via its associated web portal, the ICMT would allow individual researchers within the State to collaborate with each other, to share data files, access to funding and markets. The engineering industry, extremely strong in California, can use the ICMT to support EPIC projects from the technical standpoint. California's globally leading renewable energy equipment suppliers will use the ICMT to contact firms involved in EPIC testing, and supply equipment for projects.

The Forma team would also outreach to GIS developers and centers of research around the state, such as UCSB's Geography Department, to co-develop and apply a range of supporting geospatial analytical tools for California's innovation clusters. There could potentially be an entire California industry built around the GIS-

related products for innovation clusters, which should dramatically increase California's productivity, starting with breakthroughs in the field of renewable energy technology.

The investment community will be able to identify promising projects at an early stage, and support them financially. This is particularly important as while the CEC's \$162 million per year is a very large amount of money, it is a small percentage of the funds required to build a new renewable energy technology industry in California.

We believe that our ICMT will prove a valuable tool to the CEC in accomplishing its critical stated goals, and in really making a difference in the complex challenges facing our society such as climate change.

Therefore, we would appreciate your direction in how to present a formal proposal to the CEC for funding of this Innovation Cluster Management Tool (ICMT). We believe that this type of project will comply with the EPIC funding guidelines for "Facilitation", for which \$15 million per year is budgeted. We are already in the processing of obtaining matching funds for any future funding from the CEC.

Therefore, our intent with this correspondence is to lay the groundwork for a discussion with you on this subject, and also to request that in your current programming efforts, funds can be programmed for this purpose. Should there be the opportunity of a sole source funding from the California Energy Commission, we would be pleased to work within those guidelines, and bring matching funds to bear to get the Innovation Cluster Management Tool into full development in time for the release of the full EPIC funds in 2013.

We would welcome the opportunity to meet with you at your offices in Sacramento, or to invite you to the Forma facilities in Costa Mesa, California.

I will call you later this week for further discussion on this subject. My telephone number is 714 673-6200 and email is Chris@formacompanies.com.

I very much appreciate your consideration of these ideas, and also that they are proprietary to the Forma Companies and our team.

Sincerely,

FORMA Group of Companies

A handwritten signature in black ink that reads "Chris Lee". The signature is written in a cursive, flowing style.

Chris Lee
Senior Vice President

**USE OF GIS-BASED “INNOVATION CLUSTER MANAGEMENT TOOLS”™
TO SUPPORT THE CALIFORNIA ENERGY COMMISSION E.P.I.C.
RENEWABLE ENERGY TECHNOLOGY PROGRAM**

Authors:

Chris Lee
FORMA Companies/FORMA Systems

William Lyte
Technoplex, Inc.

Introduction

The California Energy Commission (CEC) has established a \$1.4+ billion renewable energy technology, in order to further the research, demonstration, and availability of such technologies.

Among the objectives of the program are:

- Ratepayer and societal benefits
- AB 32/Executive Order ___ Compliance
- Loading Order Compliance
- Low emission vehicles/transportation
- Safe, reliable and affordable energy services
- Economic development
- Efficient use of ratepayer funds

It is the intent of the authors of this white paper to meet all these objectives in development and use of the ***Innovation Cluster Management Tool*** (ICMT), described below.

During the program planning, the use of “Innovation Clusters” was suggested to leverage the State’s expenditure, and involve California’s public and private sector resources in the growth of this critical renewable energy technology industry.

A common definition of an “Innovation Cluster” is:

“Groupings of independent undertakings — innovative start-ups, small, medium and large undertakings as well as research organizations — operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster. “

To assist the Commission during its earliest EPIC programming phases, FORMA Companies, a global planning organization, and Technoplex, Inc., (FORMA/Technoplex) specializing in innovation clusters, have conceptualized and are in the process of developing a beta version of a GIS-based “Innovation Cluster Management Tool”. The ICMT will allow the identification, analysis, and linkage for economic growth of technological resources in the State of California. The ICMT has immediate application worldwide, due to FORMA’s close working relationship with ESRI, a global developer of GIS products, and the fact that the key building blocks of innovation (colleges and universities, research institutions, industry among them), similar around the world, can be clearly mapped in GIS.

Statewide Renewable Energy Technology Innovation Clusters Overview

Initially, the FORMA-Technoplex team developed a preliminary example of a statewide cluster display graphic for the California Energy Commission. It identified and located, for representation purposes, a number of key existing clusters, or hubs of energy-related technology activity, including:

- Solar Energy
- Water/Energy
- Geothermal Energy
- Bio-Energy
- Wind Energy
- Petroleum-related renewable energy
- Marine Energy
- Maritime/Intermodal renewable energy
- Rail/Transportation renewable energy

There are certainly other types of renewable energy technology clusters. This was prepared for the purposes of an initial demonstration graphic. In addition, certain innovation clusters, such as wave energy or bio-energy, would have multiple locations throughout the State.

Detailed Discussion of Three Innovation Clusters

In conceptualizing this Innovation Cluster Management Tool, FORMA/Technoplex moved beyond the initial location of technical resources into three clusters of energy-themed innovation activity.

- Marine Energy
- Ports/Intermodal
- Water/Energy

Each was mapped as a cluster using FORMA's GIS resources. These three Innovation Clusters are for representation purposes only. There could be multiple clusters overlapping in the same city, based on different types of technology. There could also be similar clusters in different parts of the State, and the resources of these clusters could then be evaluated with the powerful GIS tools. A detailed summary of the capabilities of GIS is included below, and examples of tools which can be realized in further development of this ***Innovation Cluster Management Tool***.

- 1. Marine Energy Innovation Cluster.** Marine energy is a major resource in California, with its 840-mile coastline, and excellent wave and offshore wind potential. Therefore, considerable research and business activity is underway in California to establish marine energy demonstration locations. The candidate Marine Energy Innovation Cluster encompasses the Santa Barbara area, where U.S. Department of Energy-funded offshore wind projects are being proposed, staged from existing offshore oil rigs. University of California at Santa Barbara is extremely active in marine energy research.

In Ventura, the U.S. Navy's NAVFAC Engineering Service Center (ESC) is the worldwide center of the Navy's ocean wave energy research, with major marine engineering firms located there as well. California State University Channel Islands, a partner in the CSU Council on Ocean Affairs, Science and Technology (CSU COAST) with its 200 marine researchers statewide, is located in Marine Energy Innovation Cluster. Four regional community colleges, key hubs in job training

for the State's marine energy industry, are located in the cluster – Santa Barbara City College, Ventura College, Moorpark College and College of the Canyons.

- 2. Port/Intermodal Innovation Cluster.** The Ports of Los Angeles and Long Beach, and their intermodal partners such as the shipping, trucking and railroad industry, are world leaders in sustainable practices, including renewable energy technology. This port complex, the largest in the U.S., spent \$2 billion on such measures, including a fleet of 8,500 electric and other clean trucks, including the TransPower Electric Truck funded by the California Energy Commission, on-dock electrification to connect visiting ships to shorepower (now mandated statewide), hybrid tug boats, wind power systems, and other innovations. The Ports established a \$15 million Technology Advancement Program (TAP), the Port Tech L.A. technology incubator, and these measures are now being considered by many ports around the world.

The local universities are actively involved in the Port/Intermodal Innovation Cluster. A globally significant marine research project, including one of the world's largest wave tanks, is being planned at the City Dock #1 facility at the Port of Los Angeles. The primary university organization involved there is the Southern California Marine Institute (SCMI), which includes seven California State University campuses, as well as USC, UCLA, and Occidental college marine researchers. Four major universities, CSU Long Beach, Loyola Marymount University, Harbor Community College, and Long Beach City College, are all extremely active in the Maritime/Intermodal Innovation Cluster, including training programs for port-related jobs.

- 3. Water/Energy Innovation Cluster.** The third innovation cluster demonstrated in this Innovation Cluster Management Tool Demonstration is in the San Gabriel Valley inland from downtown Los Angeles. The San Gabriel Valley and Inland Empire are both included as part of this Innovation Cluster, as they have been traditional hubs of technology innovation for nearly 100 years. The Pasadena area is home to the California Institute of Technology and NASA/JPL, from which during a 1990s technology program (the Pasadena Technoplex), more than 200 technology companies were created. The eastern San Gabriel Valley is home to many universities, such as the Claremont Colleges, CSU Pomona and the University of La Verne, and global water technology firms such as Rainbird Corporation.

The Water/Energy Innovation Cluster has begun to rapidly evolve under the auspices of the University of La Verne, which has partnered with the Metropolitan Water District La Verne Water Quality Laboratory for the review and potential commercialization of water-related technologies. These have been showcased since 2010 in the La Verne Water Technology Conferences, and now through the planned La Verne Water Institute.

Increasingly, water and energy have become the primary focus, as water supply, transportation, treatment and distribution is one of the largest uses of energy in California (and nationally). Therefore, U.S. Congressman Joe Baca, (D) San Bernardino, a member of the House Agriculture Committee, is now championing the establishment of water and energy technology resources within the San Gabriel Valley and Inland Empire. The Inland Empire universities, such as U.C. Riverside, CSU San Bernardino, and University of Redlands, will be all be involved in this innovation cluster.

Geographic Information System (GIS) as a Planning Tool for Innovation Clusters.

GIS systems now dominate the world of planning, principally pioneered and sold by the ESRI Company of Redlands, California. Their ARCView software has become the platform of choice for development of many thousands of GIS applications globally, including the Innovation Cluster Management Tool.

In conceptualizing a GIS system, a new user would think of all the things to be shown on a graphic display, to whatever level of detail desired. For example, a town could be shown, with its city hall, roads, rivers, and stop signs. Each of these, and thousands more items in any location, can be electronically added or deleted with the keystroke of a computer. GIS and GPS are closely associated, so a new item not already on a map can be added and precisely located.

Within the Innovation Cluster planning arena, one might look at a university, or group of universities, in proximity to its local industry, whether large companies, or single entrepreneurs. Within the university, the GIS could identify individual priority departments, such as mechanical and electrical engineering, physics, and specialized training departments, electric vehicle maintenance, for example, precisely where they are located. Detailed information can be shown on each mapped element, such as the research projects, including those of the California Energy Commission, federal funded energy projects, and renewable energy systems installed on the buildings. Other GIS layers could show all the projects within the particular location, or cluster-wide, or statewide, funded by particular venture capitalist. There is certainly the opportunity to call forth information on all the researchers, whether in the public or private sector, working on a particular energy technology, batteries, fuel cells, solar systems, and their location.

From there, with their agreement, the efforts of these researchers could be linked by GIS-related specialty tools. Their productivity could be enhanced by GIS-linked analysis tools, to yield a real time evaluation of the status of the EPIC projects, should that be desirable.

These tools and methodologies are readily available, and can be used to great success by FORMA's skilled GIS planners, working closely with the innovation cluster specialists of Technoplex.

Summary Comments

We appreciate the opportunity to present this white paper for the review of the California Energy Commission, and look forward to further dialogue on this important project.

About the Authors

William F. Lyte, Technoplex, Inc. Mr. Lyte began his career with a series of global California engineering firms, including Tetra Tech, Brown & Caldwell, and Kennedy/Jenks Consultants. Through work at the California ports, he gained deep knowledge in the port and intermodal sector. He has served for ten years on the board of the California Marine and Intermodal Transportation System Advisory Council (CALMITSAC), representing the American Council of Engineering Companies (ACEC) and their 1,200 California firms. He founded and chaired CALMITSAC's technology committee.

Mr. Lyte became deeply involved in the establishment of innovation clusters in 1990, when he was retained by the City of Pasadena to launch a program with Caltech, JPL and other institutions, focused on sustainable technology. The resulting Pasadena Technoplex has since yielded hundreds of firms in the internet, biomedical, homeland security, optical devices, environmental, renewable energy, and other sectors. Mr. Lyte was appointed to chair the County of Los Angeles's Business Technology Center

incubator, which then became a model for Port Tech L.A., an incubator Mr. Lyte initiated in 1999. Through work on satellite-based federal transportation research projects, Mr. Lyte increasingly focused on the establishment of an innovation cluster at the Los Angeles ports. This was outlined in his 2007 paper, "Building a Maritime Technology Cluster at the San Pedro Bay Ports." This maritime/intermodal innovation cluster model has since been reviewed by the U.S. Department of Transportation's Maritime Administration for use at all U.S. ports.

Most recently, through a consulting project with the Metropolitan Water District, Mr. Lyte became involved with the University of La Verne, resulting in the focus on water and energy, including the La Verne Water Technology Conferences. As an advisor to the Government of Western Australia, he began working with an Australian ocean wave energy firm, Protean Energy, Ltd. Over the past four years, he has been working with the global ocean wave energy industry to establish California as a center of marine renewable energy, with a network of associated marine energy innovation clusters along the California coast.

Chris Lee, Senior Vice President, FORMA/FORMA Systems

Mr. Lee brings to FORMA and FORMA Systems diverse experience in the field of large-scale resource management. In the last 20 years at FORMA, Mr. Lee has managed some of the most complex entitlement and design projects in California involving: community development design and resource management; development regulations and policy analysis; governmental liaison and processing; environmental analysis; and authorship of major entitlement documents.

He is a specialist in general, area, and specific plans as well as an innovator in implementing GIS into these planning applications. Chris has been involved in meshing the technologies to create some of the best graphic and visual simulations in the planning field. FORMA System's projects have won numerous awards from environmental organizations stressing innovative planning and design solutions to complex environmental issues.

Mr. Lee has been at the forefront of the use of new digital technologies in the planning field to provide documents, graphics, and simulations that depict future scenarios of implementation of the plan. He is a 'hands-on' manager that has been involved in numerous public workshops and community forums to work out solutions to complex issues.

FORMA Systems was awarded the *GIS & Multimedia Design Award, ESRI, 2003 for iView* (Intranet Flash Application) Community Redevelopment Agency, City of Los Angeles.

CALIFORNIA ENERGY COMMISSION INNOVATION CLUSTER CONCEPT

presented by CALIFORNIA COMMUNITY COLLEGE SYSTEM

Regional Clusters (Sample)

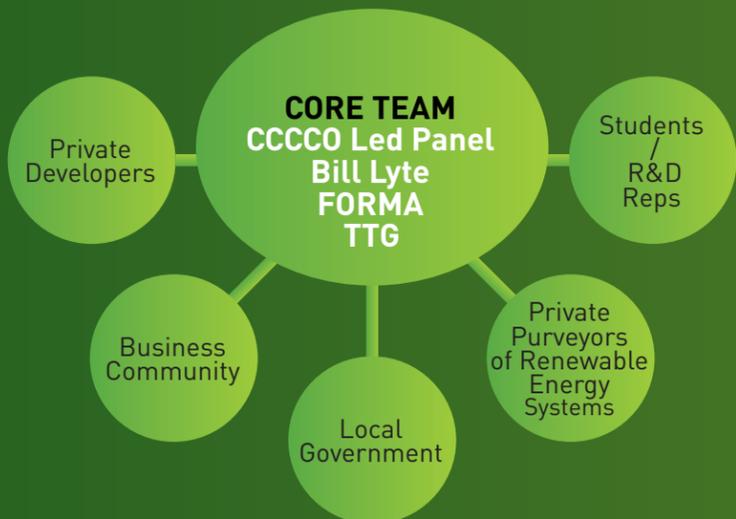
Innovation Cluster Core Study Themes



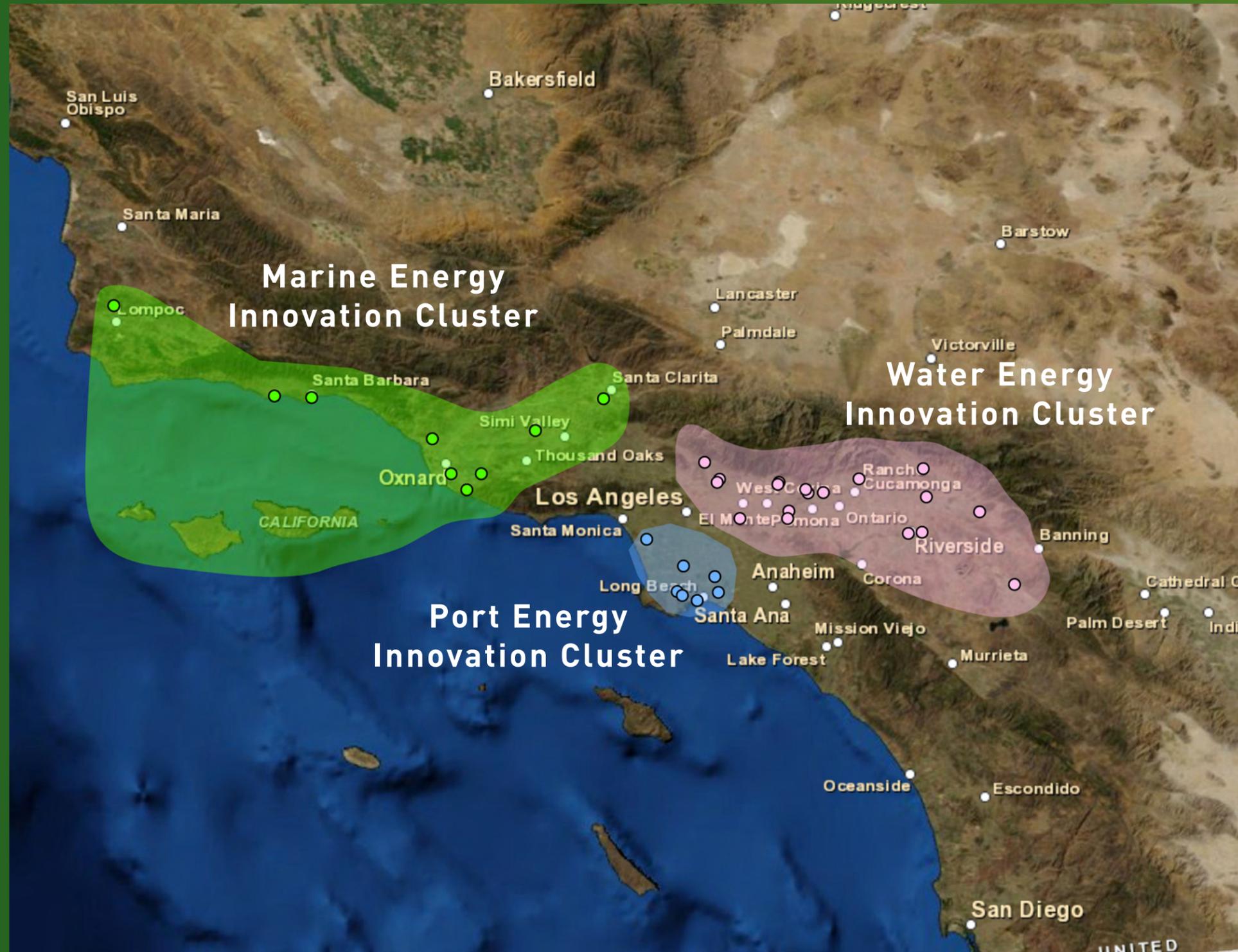
- Host College Site**
- UCSB
 - SBCC
- Contributing Colleges**
- Ventura College
 - Moorpark College
 - College of the Canyons
 - Oxnard College
 - CSU Cahannel Islands

- Solar
- Water Technology
- Geothermal
- Biomass
- Biomass
- Wind
- Oil
- Marine Energy
- Maritime Technology
- Rail/Transportation

Innovation Cluster Concept



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Marine Energy

INNOVATION CLUSTER

Water Energy

INNOVATION CLUSTER

Port Energy

INNOVATION CLUSTER



Marine Energy Innovation Cluster

Core Team

HOSTS

UC Santa Barbara

<http://www.ucsb.edu/>

Santa Barbara City College

<http://www.sbccc.ca.us/>

Participants

Ventura College

<http://www.venturacollege.edu/>

Moorpark College

<http://www.moorparkcollege.edu/>

Oxnard College

<http://www.oxnardcollege.edu/>

College of the Canyons

<http://www.canyons.edu/>

CSU Channel Islands

<http://www.csuci.edu/>

Naval Base Ventura County

<http://www.cnvc.navy.mil/ventura/index.htm>

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Water Energy Innovation Cluster

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Citrus College
<http://www.citruscollege.edu/>

Rio Hondo Community College
<http://www.riohondo.edu/>

Mt. San Antonio College
<http://www.mtsac.edu/>

Chaffey College
<http://www.chaffey.edu>

San Bernardino Valley College
<http://www.valleycollege.edu/>

Riverside City College
<http://www.rcc.edu/>

Crafton Hills College
<http://www.craftonhills.edu>

Mt. San Jacinto College
<http://www.msjc.edu/>

CSU San Bernardino
<http://www.csusb.edu/>

UC Riverside
<http://www.ucr.edu/>

Claremont Colleges
<http://www.claremont.edu/>

California Institute of Technology
<http://www.caltech.edu/>

Azusa Pacific University
<http://www.apu.edu/>

NASA Jet Propulsion Laboratory
<http://www.jpl.nasa.gov/>

MWD La Verne Research Laboratory
<http://www.mwdh2o.com/mwdh2o/pages/yourwater/plants/weymouth01.html>