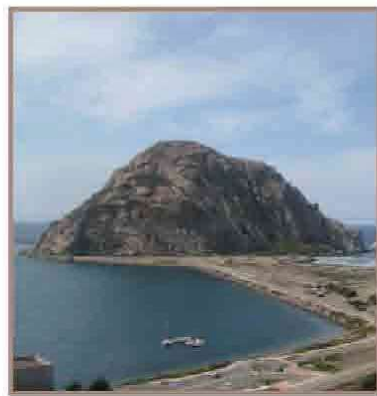
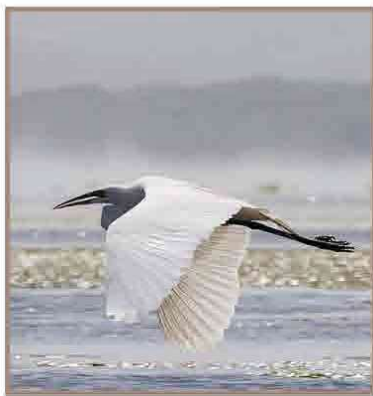


# THE PLANT

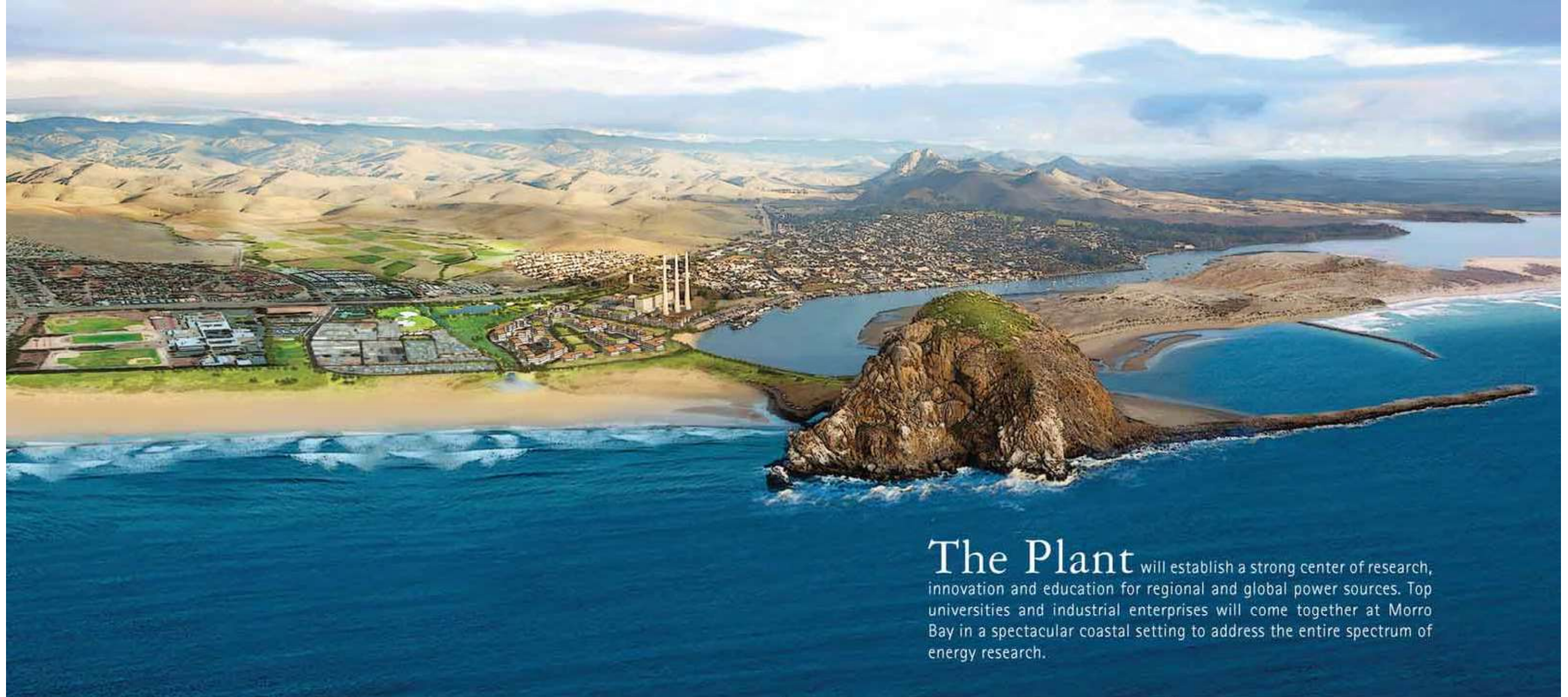
MORRO BAY, CALIFORNIA



VARIOUS MB PHOTOS BY  
MIKE BAIRD [www.flickr.com/photos/mikebaird](http://www.flickr.com/photos/mikebaird)

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**The Plant** will establish a strong center of research, innovation and education for regional and global power sources. Top universities and industrial enterprises will come together at Morro Bay in a spectacular coastal setting to address the entire spectrum of energy research.





A NEW KIND OF RESEARCH FACILITY

# FINDING SYNERGIES BETWEEN EDUCATION AND THE PRIVATE SECTOR

## POST GRADUATE EDUCATION IN SUSTAINABLE ENERGY

The potential of a revitalized Morro Bay Power Plant is based upon setting up a development framework and strategy to sponsor productive relationships between like-minded institutions. The vision is to provide a platform for exploring high-performance infrastructure systems and their relationships to the environment. Realistic concepts for safe, affordable and environmentally sound energy production is one of the most critical challenges the world faces today. This is indivisible from the commitment to environmental protection and other sustainable development.

To facilitate this vision, it will be necessary to develop strong centers of research, innovation and education linked to cost-effective regional and global sources of power. The creation of these technologies through innovation and knowledge through research and education are major factors in a global market. This facility will cover the entire spectrum of energy research through cooperation and participation by a network of high ranking universities and strong industrial and non-profit enterprises.

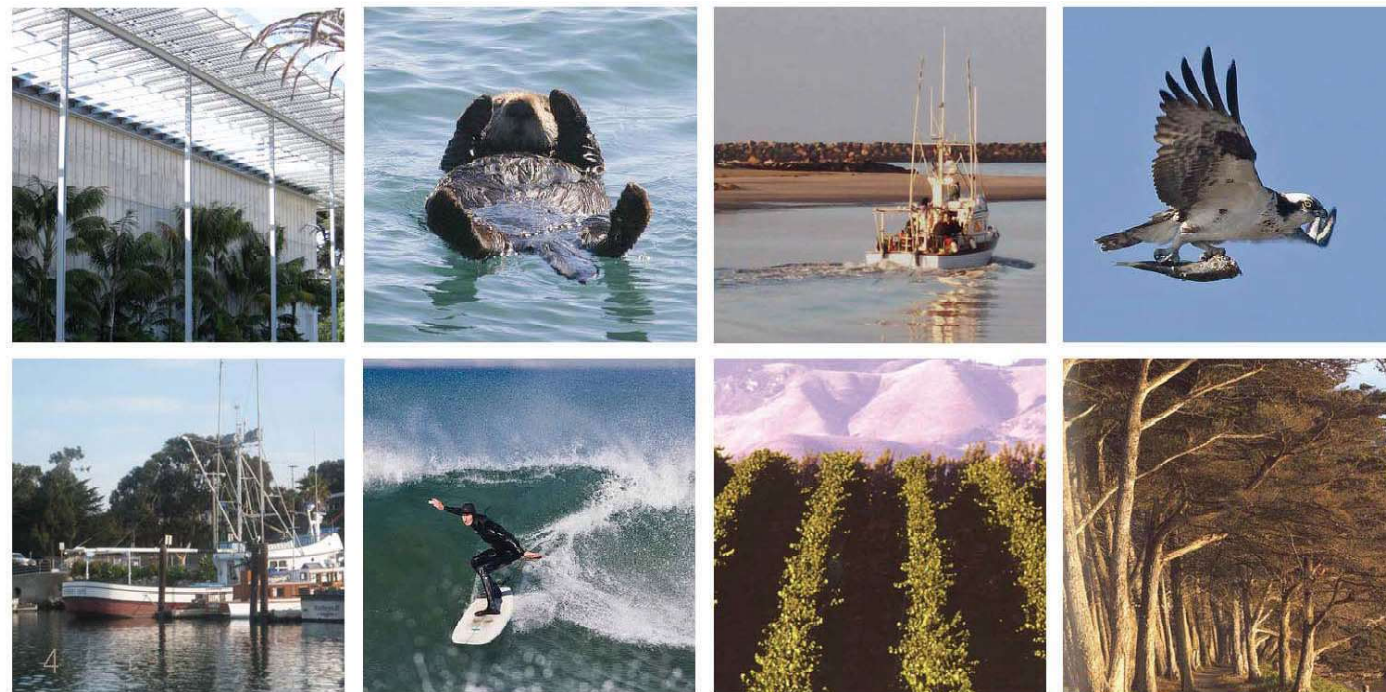
Renewable energies as well as traditional power production and their related industries are beginning to face harsh

competition from each other and emerging markets. Morro Bay's close link to the regional energy business will be an essential part of the program to ensure quality research and take into account the needs of this evolving industry.

Participating member universities and institutions will provide a broad spectrum of graduate education, in order to train and develop a network of experts in America and extending around the world. This new platform will also seek to establish a relationship between universities and related industry to create a foundation for industrial competitiveness and to open up career opportunities for new graduates.

Each on-site organization will be based on "build to suit" long term renewable leaseholds. Each participating institution will be built per the member's facility specifications. A Letter of Intent (LOI) will be needed to begin dialog and the first step for participation. Ecobaun will provide all technical and legal coordination.

THERE WILL BE A LIMITED NUMBER OF  
PARTICIPATING INSTITUTIONS ON THIS SITE.



## UNIVERSITY AND RESEARCH FACILITIES

Legend

- 1 UC Davis
- 2 UC Berkeley
- 3 UCSF
- 4 Stanford University
- 5 San Jose State
- 6 UC Santa Cruz
- 7 Naval Postgraduate School, Monterey
- 8 Cal Poly, San Luis Obispo
- 9 UC Santa Barbara
- 10 California Institute of Technology
- 11 UCLA
- 12 USC
- 13 Salk Institute
- 14 Scripps
- 15 UC San Diego
- Major Roadway
- Proposed High Speed Rail Line
- City
- Park/Mountain Range





# OPPORTUNITY

## THE GRID MAY BE SMART, BUT WILL IT ALSO BE GREEN?

The push is on to make the nation's aging electricity grid smarter, so it can handle growing demand for electricity. Many assume that a smart grid will also be a green grid — delivering clean electricity and helping to address climate change. But that's not necessarily so.

Giving the grid a brain doesn't necessarily mean it will make green decisions. Likewise, the big push to expand the electric grid into areas rich in renewable energy doesn't guarantee that the new, improved grid will be more climate-friendly.

Smart grid technology means several kinds of innovations. One is that both customers and utilities will be able to monitor electric use, minute by minute. Steve Nadel, who runs a nonprofit called the American Council for an Energy-Efficient Economy, says information alone doesn't make the smart grid green.

"As a friend of mine says, a smart grid needs smart programs needs smart rates," Nadel says.

Smart programs could, for example, help people see how they're using electricity so they can find painless ways to conserve. And smart rates could create incentives for people to save electricity, by charging more at some times and less at others. In principle, cheaper energy should encourage environmentally friendly objectives. But Nadel says not all smart grid experiments make green sense.

"Some utilities have programs to encourage nighttime lighting," Nadel says. "Gee, make your house look beautiful. Make it more secure. Light up like Times Square or something. That's an example. And don't worry, it's only 2 cents a kilowatt-hour. We'll give you a special nighttime discount."

In some cases, people use not only more energy, but dirtier energy, too. That's because in some parts of the country, nighttime electricity often comes from coal-fired power plants. They're usually the cheapest source, so they are used first. When demand is higher during the day, the additional electricity is more likely to come from cleaner natural gas. So in parts of the country that rely heavily on coal power, nighttime energy means dirtier energy.

Nadel says the good news is that smart grid pilot programs so far have largely encouraged conservation.

"Some of them have saved quite a bit of energy," he says. "Some have built some load. The devil is always in the details."

Details also bedevil another feature of the expanded, smarter grid — new transmission lines. In California, San Diego Gas and Electric has been pushing to build a major new power line into the neighboring Imperial Valley. The utility has been selling the idea in part on its environmental benefits.

But California Public Utilities Commissioner Dian Grueneich is skeptical.

"Anybody who's proposing a transmission line in the United States these days is going to claim it's going to be used for renewable — it's going to be a 'green' line because that's mom and apple pie," Grueneich says.

During the public utilities commission's hearings about whether to approve the Sunrise power line, San Diego Gas and Electric said the project would bring huge amounts of clean solar and geothermal energy into San Diego.

The utility was basing its arguments on clean energy sources it hopes will be developed in the Imperial Valley in the coming years. But Grueneich says hopes and aspirations are a lot different from legally binding commitments.

"Existing contracts that SDG&E had signed from this area, the Imperial Valley, would only fill up 20 percent of the line," she says. "And that means the other 80 percent of the power that flows over this line could easily — would likely — flow from coal-fired power plants elsewhere in the Western United States."

The commission voted to approve the line, anyway. Grueneich cast the only "no" vote.

She says this sort of debate is likely to play out nationwide as power companies bid to string new lines while expanding and strengthening the electric grid. Power company investors will make a profit no matter what kind of electricity the lines carry. So Grueneich favors new laws requiring power companies to buy a lot of green electricity.

"This isn't rocket science. We don't need to develop whole new technologies," she says. "We aren't making bets on will we be able to develop a whole new way of doing things. It's just really being serious. If we're going to spend this money and call something green, let's make sure it happens."

And that comes down to politics. Indeed, bills are winding their way through Congress that would help ensure that the smart grid is also green.

— Richard Harris

Article by Richard Harris, from:

Re-Envisioning Electricity in the U.S. Series - NPR

The electricity grid is a marvel of reliability, but, in many ways, a throwback to century-old technology. And for a future with more computers and gizmos of every kind — and more power from renewable sources — the grid is going to need some major work.

<http://www.npr.org/templates/story/story.php?storyId=103415232>



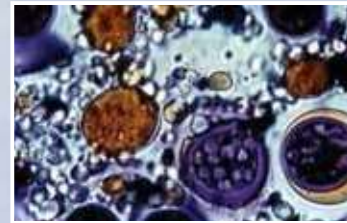
## WHAT IS THE FUTURE OF RENEWABLE ENERGY?



# ALTERNATIVE ENERGY AND RESEARCH OPPORTUNITIES IN THE MORRO BAY REGION



Wind



Algae Biodiesel



Tidal



Solar



Marine Ecosystem Restoration



Geothermal



Kinetic wave



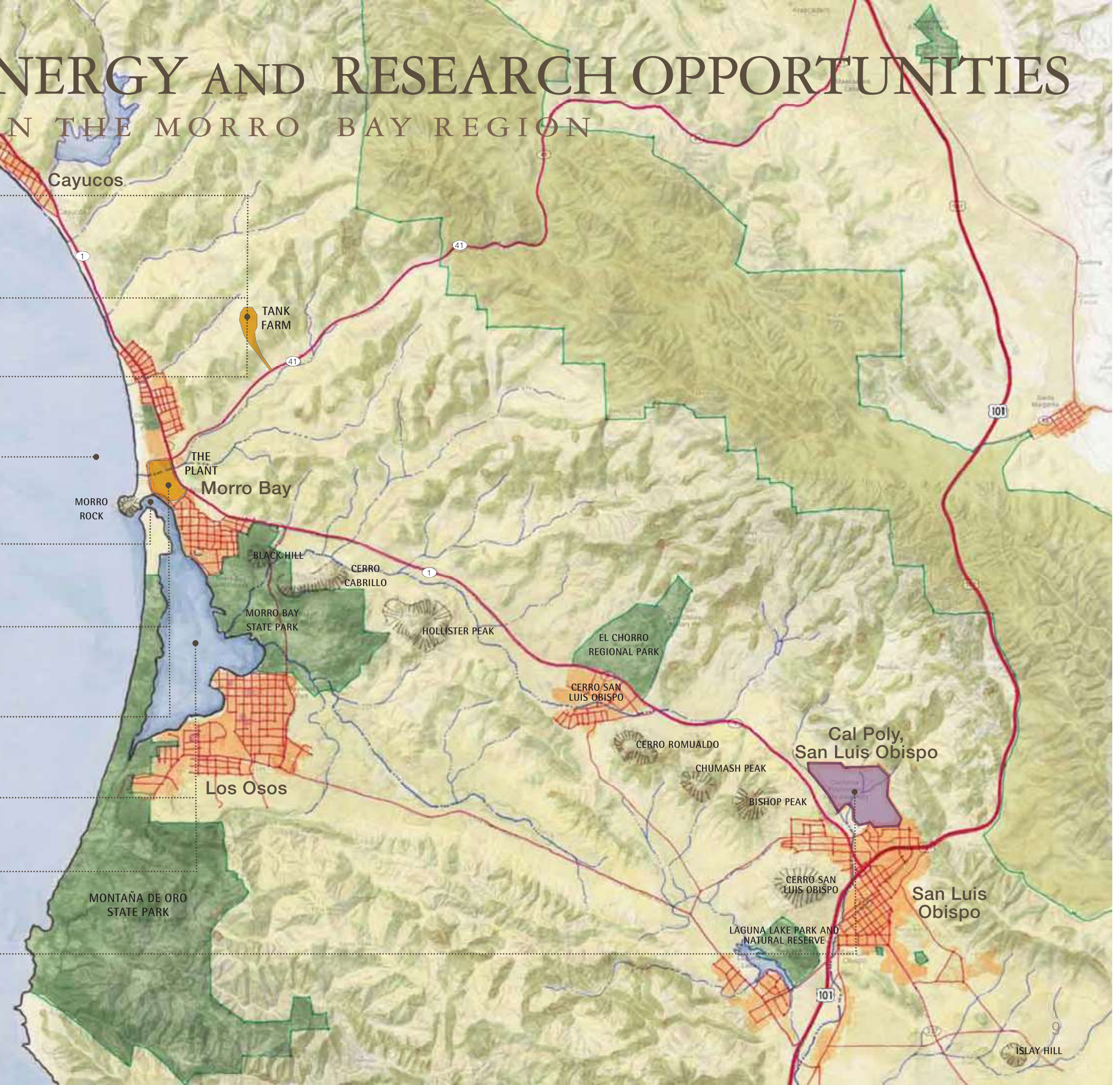
Desalination



Coastal Habitat



Aquatic Science Partnerships





# INTEGRATION

## OF THE PLANT

Situated at the foot of windy coastal foothills, on the shores of the Pacific, beneath plentiful California sun and atop some of the country's richest geothermal potential, the 12 million cubic foot plant will become the shell for studying and developing advanced power systems to harness the potentials of wind, wave, tidal, solar and geothermal energies; incubating innovation in energy production with the potential to not only supply its own power demand, but to sell clean power to Morro Bay and the region beyond through the existing distribution network.

Utilizing the most advanced technologies available, the project will capitalize on the efficiencies of desalinization of brackish water. Coupled with research and innovation advanced here, the desalinization plant will be expanded into a vital source of water for the Morro Bay community as a whole. Natural waste water processes synched with the adjacent riparian area will recharge the aquifer and enhance animal and human habitats.

The reimagination of the Morro Bay power plant as an epicenter of "green energy" will trigger a sense of purpose throughout the region, but will be felt most acutely in the neighborhoods nearby. The new research campus will help transform our perception of the massive plant structure and iconic smoke stacks into agents of education and investigation.







It is a given that all of the buildings that comprise this exciting facility will be high-performing green buildings. From an investment standpoint, the most important goal should be to establish a framework that maximizes the benefit of those buildings. **High Performance Infrastructure**, sustainably integrating roadway, sidewalks, sub-grade systems, stormwater management, street lighting, public furniture, and landscaped areas that fall within the public right-of-way. Taken together, these systems are at the core of sustainable land development, complementing and extending the potential impact of "green" building and neighborhood planning throughout the project and positively affecting the Morro Bay as a whole.

## THE PLANT MASTER PLAN

# SUSTAINABLE FRAMEWORK

We are creating a flexible framework for development that optimizes the potentials of the site for infrastructure, urbanism, architecture, open space, recreation, and real estate values. This flexible framework will serve to knit a social whole of the myriad uses and users that make up a diverse center of investigation and education.

Comprehensive, whole system infrastructure planning is integral to the master planning process, not separate "engineering" design. In creating an international model for development, the design team is focussed on multiple scales:

- **Approach to the land**, maximizing ecological connections, responsible integration with regional growth patterns, a positive tipping of the jobs/housing balance for the region, and significant deterrent to suburban sprawl. This is the "reinvigorate the center of a region" strategy.
- **Appropriate development** pattern for the land that reconnects the fractured pattern of Morro Bay, maximizes walkability and positive social interaction among residents, including a mixed-use structure reinforced by a transect model for development at a variety of densities that make transit solutions feasible, and a meaningful integration of human and natural ecologies.
- **Integrated systems** that reinforce the development pattern including high performance infrastructure, high performance buildings, an interconnected open space and park network, on and off-site public transit systems, multi-generational educational, employment, residential, retail, health and wellness, and recreational opportunities.

## HIGH PERFORMANCE INFRASTRUCTURE STRATEGIES FOR MORRO BAY

Existing Condition

Project Goal

STRATEGIES FOR MORRO BAY

General Approach	No Awareness or Inattention	Focus on use: Demand Reduction & Resource Efficiency	Focus on Source or Supply: Renewables	Systems Thinking, Integration & Continual Improvement	Zero Impact or Regenerative State
Health & Safety	Contaminated site	Environmental remediation	Added vegetation for air quality, site etc.	Air quality monitoring	Healthy soils & air; full protection against risks
Site Design & Land Use	Mono-functional zoning	Compact, dense layout designed for pedestrians & bikes	Oriented to harmonize with elements	Open space preservation, mixture of uses	Self-sufficient Village
Transportation	Auto-centric	Shift from autos to walking, biking, and public transport is primary mode	Sustainable transport offered, powered by zero emission vehicles	Integrated transport systems with dedicated source of funding	Zero emissions transport/parking transformed into other uses
Energy	Energy profligate	Energy efficient, bioclimatic architecture	Preferential energy sourcing	Energy integration and carbon assessment	Carbon-positive
Landscaping & Biodiversity	Water consuming, non-natives	Respect the Bay and watershed	Native vegetation	Creation of wetland	Repair Adjacent Ecosystems
Water & Wastewater	Water profligate, stormwater discharge without treatment	Reduce water consumption and site imperviousness	Provide sustainable water supply with low embodied energy	Closed loop system on stormwater, use of rainwater maximized	Live within annual water budget for site, 100% infiltration
Solid Waste	All waste sent off site	Reduction of construction waste	100% recycle collection, composting in site	Waste to energy strategies	Zero waste
Materials	High embodied energy, non-renewables	Reuse of buildings and construction waste	Use of renewables, recycled, non-toxic, materials	Policies practiced by staff account for embodied energy, Production of food and materials	Cradle to cradle in closed loop





# PRECEDENTS

## UNIVERSITY PARK, Cambridge

An MIT-Forest City joint venture mixed-use development of office and laboratory buildings that are home to several biotechnology companies, residential developments, retail areas, parks and open space. MIT continues to own the land, Forest City holds long-term leases.



## TATE MODERN, London

The galleries are housed in the former Bankside Power Station, which was originally designed by Sir Giles Gilbert Scott, the architect of Battersea Power Station, and built in two stages between 1947 and 1963. The power station closed in 1981. The building was converted by architects Herzog & de Meuron and contractors Carillion, after which it stood at 99m tall. The history of the site as well as information about the conversion was the basis for a 2008 documentary Architects Herzog and de Meuron: Alchemy of Building & Tate Modern. The southern third of the building was retained by the French power company EDF Energy as an electrical substation (in 2006, the company released half of this holding).



## SALK INSTITUTE, California

The Salk Institute for Biological Studies is a premier independent, non-profit, scientific research institute located in La Jolla, California. The institute consistently ranks among the top institutions in the US in terms of research output and quality in the life sciences. In 2004, the Times Higher Education Supplement ranked Salk as the world's top biomedicine research institute, and in 2009 it was ranked number one globally by ScienceWatch in the neuroscience and behavior areas. It was founded in 1960 by Jonas Salk, the developer of the polio vaccine. Among the founding consultants were Jacob Bronowski and Francis Crick. The institute employs 1200 researchers in 70 research groups and focuses its research in three areas: Molecular Biology and Genetics; Neurosciences; and Plant Biology.



## Bo01, Malmo, Sweden

An exemplary mixed-use, hyper-sustainable community triggers the re-development of a degraded waterfront district.

## OERSTAD, Copenhagen

Mixed-use development adjacent to central Copenhagen that integrates IT University, commercial and residential into a fabric of open space, transit and significant new investments in cultural facilities. Higher density neighborhoods afford extensive natural open space.



## SCRIPPS INSTITUTE, California

Scripps Research is a leader in the discovery and application of biomedical breakthroughs that improve human health and is the world's largest independent non-profit biomedical research facility. The Institute has become internationally recognized for its basic research into immunology, molecular and cellular biology, chemistry, neurosciences, autoimmune diseases, cardiovascular diseases, virology and synthetic vaccine development.



## CAL ACADEMY, California

The California Academy of Sciences is one of the largest museums of natural history in the World. Remodeled in 2008, it is located in Golden Gate Park in San Francisco, California. The Academy began in 1853 as a learned society and still carries out a large amount of original research, with exhibits and education becoming significant endeavours in the 20th century. The Academy conducts research in a number of fields, largely but not exclusively branches of biology: anthropology, marine biology, botany, entomology, herpetology, ichthyology, invertebrate zoology, mammalogy and ornithology.



## EDEN PROJECT, England

A visitor attraction that focuses on education of the interrelationship of plants and people. Includes greenhouses that recreate several biomes. Relies on only rainwater and wind energy, and is the largest paid tourist attraction in Britain.