

# REPORT



CALIFORNIA COUNCIL ON  
SCIENCE AND TECHNOLOGY

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"CCST: Science and Technology in the State's Interest"  
CCST is a nonprofit organization established in 1988 at  
the request of the California State Government. It is sponsored  
by the state's major postsecondary institutions, supported  
by California's federal laboratories and anchored  
by leading private-sector firms.  
CCST's mission is to improve S&T policy and application  
in California by proposing programs, conducting analyses,  
and recommending policies and initiatives that  
will maintain a vigorous economy and ensure  
California's technological leadership.

## CCST TO HELP PLAN STATE S&T STRATEGY

At the Governor's request, CCST has convened four task forces directed by industry leaders to help California respond to the National Academies report *Rising Above the Gathering Storm*. This October 2005 report contains a strong message that the nation's science and math education and economic environment need serious attention in order to safeguard the future prosperity of the nation.

"We are glad that the National Academies are emphasizing the importance of this message on a national scale," said CCST Council Chair Lawrence Papay. "CCST is working to bring the results of this report to California policymakers. The long-term economic consequences for our state are too significant for us not to make substantial progress on this issue."

"CCST is especially well positioned to help the state understand its capabilities and to recommend strategies to meet these goals," said Governor Schwarzenegger in his letter requesting CCST's assistance.

Each of the four task forces is focusing on one of the National Academies' main recommendations related to increasing the talent-pool, research base and business climate. (See page 2.)

Given the gubernatorial election in November 2006, there is an immediate opportunity to provide action plans to either the incumbent or new administration. To that end, this project was initiated as quickly as possible. In late September 2006, CCST presented its plans for California's response at the National Academies' Convocation on the Gathering Storm in Washington, DC, the task forces have been meeting through October, a final set of actionable items will be delivered to the Administration in December 2006, and CCST will maintain a catalytic role in rolling out the action plans in early 2007.

"I believe that with concerted effort by higher education, business, industry, CCST and its affiliates, California... will lead the nation in responding to the issues raised by the National Academies," said the Governor.

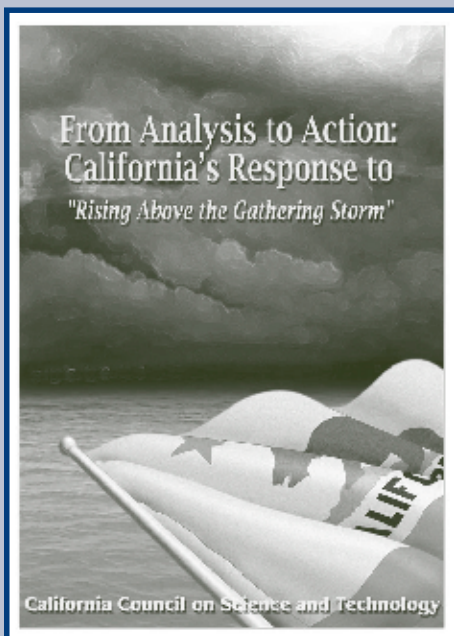
"CCST is especially well positioned to help the state understand its [S&T] capabilities and to recommend strategies to meet these goals."

**Governor Arnold  
Schwarzenegger**

The four task forces are identifying state assets and brainstorming about concrete actions that can be taken by government, business and industry, higher education, and federal laboratories in the state.

The goal is to prepare a list of "actionable" items prepared by representative constituencies of CCST that have short-term and long-term components.

Industry is the driver of the state's economy, and S&T workforce issues affect industry directly; it is for this reason that CCST, with connections to industry, education, and the federal funded laboratories, was considered appropriate to develop this response and bring industry leaders into the task forces.



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# GATHERING STORM TASK FORCES

In response to a request by Governor Arnold Schwarzenegger, the California Council on Science and Technology is assembling California's leaders in higher education, industry, and national laboratories to respond to critical needs toward keeping the state economically competitive, prosperous, and secure given the challenges of the 21<sup>st</sup> century. The four CEO-led task forces are addressing the following issues:

## K-12 Science and Mathematics Education

California must increase its talent pool and vastly improve K-12 science and mathematics education for all students.

- What kind of support do new science and mathematics teachers need to help them succeed early on and then to keep them in the profession?
- What sorts of programs need to be put in place to enhance student interest in science and mathematics, especially in the middle and high-school grades?
- What strategies are needed to recruit more undergraduates into science, technology, mathematics, and engineering fields?

Chair John E. Bryson, Edison International,

Vice Chair Stephen D. Bechtel, Jr., Bechtel Group, Inc.

James F. Albaugh, The Boeing Company

\*Bruce M. Alberts, Department of Biochemistry & Biophysics, UCSF

Gary Hart, Institute for Educational Reform, CSU Sacramento

\*Juliana Jones, Montera Middle School

\*Lawrence T. Papay, PQR, LLC

\*Karl S. Pister, University of California

\*James M. Rosser, CSU Los Angeles

Jeffrey Rudolph, California Science Center

Richard Stephens, The Boeing Company

## Best and Brightest in Science and Engineering

California must become the most attractive setting in which to study and perform research so that it can develop, recruit, and retain the best and brightest students, scientists, and engineers from within the United States and throughout the world.

- What can be learned from incentives offered in the post-Sputnik era for science and engineering?
- What strategies can California use to increase the number of students earning degrees in science, technology, engineering and mathematics?
- How can incentives spark an interest to study STEM fields in the currently underrepresented communities?

Chair Alexis Livanos, Northrop Grumman Space Technology

Bran Ferren, Applied Minds

Jane Hansen, HRP Systems

\*Miriam E. John, Sandia National Laboratories/CA

Peter Kaufman, Glenair Incorporated

\*David Martin, Jr., M.D., AvidBiotics Corporation

Elon Musk, Space X

Sally Ride, Sally Ride Science

James R. Wertz, Microcosm

Yannis C. Yortsos, University of Southern California

## Incentives for Innovation

Ensure that California is the premier place in the world to innovate. California must be the location of choice for innovators in industry.

- What policies could enable California to be the most competitive place in the world to innovate?
- What kind of research and development tax credits should California be offering or considering?
- How can intellectual property protection be enhanced to encourage innovation?

Chair Corey Goodman, Renovis, Inc.

Wayne Johnson, Hewlett-Packard Company

Regis Kelly, Institute of Quantitative Biomedical Research

\*C. Judson King, Center for Studies in Higher Education, UCB

\*William F. Miller, Stanford University

Carol Mimura, IP and Industry Research Alliances, UCB

Cherry Murray, Lawrence Livermore National Lab

Richard Newton, College of Engineering, UCB

Per F. Peterson, Department of Nuclear Energy, UCB

\*Karl S. Pister, University of California

\*George M. Scalise, Semiconductor Industry Association

Gajus Worthington, Fluidigm

## Sowing the Seeds Through Science and Engineering Research

California must sustain and strengthen its commitment to long-term research in critical areas that have the potential to be transformational and maintain the flow of ideas that fuel the economy, provide security, and enhance the quality of life.

- Should the state invest more in research in strategic areas?
- How can the state align its strategic investments with federal priorities and initiatives?
- How can the state serve as a model for allocating funds to support research on creative and risky research ideas?

Richard C. Atkinson, University of California

Julia Brown, Amylin Pharmaceuticals

Charles Elachi, Jet Propulsion Laboratory

Terry A. Michalske, Sandia National Laboratories

\*William F. Miller, Stanford University

\*Maxine L. Savitz, NAE

Larry Smarr, Cal IT<sup>2</sup>, UCSD

Julie Meier Wright, San Diego Economic Development Corporation

\* Affiliated with CCST

## HISPANIC COMMUNITY RESPONDS TO RISING ABOVE THE GATHERING STORM

The National Academies report has galvanized states across the nation to develop strategies for addressing the shortcomings in the science and technology sector. However, the report has also resonated strongly with other groups, including the Hispanic community.

The Hispanic community represents California's most rapidly growing population segment, but has long been underrepresented in science and technology fields. Hispanic students have lower high school completion rates than whites, and CCST's 2002 report *Critical Path Analysis of California's Science and Technology Education System* found that Hispanics comprised over 32% of the population, but only 10% of science and engineering baccalaureates granted in California.

"Hispanics have a serious shortfall in performing to their full potential," said Jaime Oaxaca, chairman of The Oaxaca Group and former member of the National Science Board. "While great strides have been made in science, technology, engineering and mathematics – primarily due to volunteer organizations – much more will have to be done to increase the numbers of graduates, especially at the postgraduate levels."

The Society of Hispanic Professional Engineers (SHPE) convened a group in Los Angeles that included industry and academic leaders who have worked to understand why some of the approaches being used in the Hispanic community to promote academic success and participation in the science and technology sector over the last 30 years have failed.

The Los Angeles group concluded that in order for Hispanics to contribute to the solution, SHPE must help create a new culture for the next generation in which Hispanic youths become aware of educational and career possibilities and are college-driven from a very young age. The priorities developed by the Los Angeles group are being considered by the national board of SHPE directors, which is seeking to develop a coordinated national response among its regional chapters.

"Finding a solution to this crisis is a huge undertaking," said Mitchell Suarez, who led the SHPE Los Angeles group. "We will lead the charge in Los Angeles and set an example for the rest of the nation."

# CAL TAC MEMBER GETS TASTE OF SPACE

The California Teacher Advisory Council (Cal TAC) is a group of expert K-12 teachers providing a valuable connection between the teaching community and the educational experts and policymakers who are shaping California's educational system. Cal TAC member Janet English provided this account of the Northrop Grumman Weightless Flights of Discovery, a program designed to inspire science teachers.

Compressed against the floor at 1.8 g's, I'm feeling almost twice the force of gravity. This 727 aircraft is going upward at a 45 degree angle and going 500 miles per hour. I'm lying down with my hands to my sides, and the g forces are enough to make my cheeks, my neck and all the skin around my body feel squished against the floor. We're in a parabolic flight pattern about 300 miles west of the coast of California where the pilot takes us in a series of ups and downs that will give us 25-second periods of weightlessness. In actuality, in moments we'll be in freefall, just like the astronauts in the space shuttle, and we'll feel what it's like to be away from Earth, without the force of gravity pulling us down, and how it affects how things move.

"Feet down. Coming out!" screams the crew.

Within seconds, the plane is level, I feel the force of gravity increasing, and as the plane ascends we're compressed against the floor once again at 1.8 g's.

This is one of five of Northrop Grumman's Weightless Flights of Discovery where a total of 240 teachers are treated to an experience of weightlessness. In this environment, we are given the opportunity to conduct experiments in micro gravity so we can use this experience, and these results, to help inspire students in our classrooms.

This is Northrop Grumman's idea and their belief in the value in inspiring teachers

because they believe teachers are the force to inspire students to pursue fields in science, technology, engineering and mathematics. If each teacher were to inspire 1,000 students, and only 10% of those students entered the fields of science and math, America would be a whole lot better off. Call it Sputnik 2, if you like, but without drastic changes in the number of students that passionately pursue science and engineering, America will absolutely not keep a competitive edge in the global market.

On just this one day teachers conducted demonstrations that included robots spinning like ice skaters, a slingshot, a pig that flew in a circle and an apparatus that mimicked motion on a space station.

This trip also changed our perceptions of what we considered "Normal." Our experience with gravity on Earth is an oddity, rather than the norm, in the universe.

Thanks to Northrop Grumman and the California Space Authority, there are now 40 teachers from Southern California who are returning to our schools to enlighten, to inspire and to enthuse our children about space, science, and engineering.

Inspiration and motivation come in many forms, but the quickest and deepest way to inspire anyone is to engage them in a genuinely inspiring experience.



Cal TAC member Janet English during her Northrop Grumman Weightless Flight of Discovery

## STATE CREATES TEACHER DATA SYSTEM

Governor Schwarzenegger has signed legislation that will enable the state, for the first time, to keep accurate track of its teacher workforce across all current data systems. The new law is a major step forward in meeting recommendations made both by CCST and the Center for the Future of Teaching and Learning (the Center).

SB 1614, introduced by California State Senator Joe Simitian, will create the California Longitudinal Teacher Integrated Data System (TDS), which will assign a unique identifier to each teacher currently working in California.

"This system will not be collecting any new data, but will be bringing together and synchronizing existing data collection sources in California," said Paula Mishima, education administrator of the California Department of Education. "The TDS will upload data from the Department of Education, the Employment Development Department, and the Commission on Teacher Credentialing, making the data much more accessible and useful to state leaders." Currently, the data collected by each of these agencies is maintained separately, and because they use different identification systems for the teachers, there is no easy way to track teacher supply and demand in the state.

California's lack of a comprehensive data system has frustrated policymakers and analysts for years, as it makes it impossible to obtain timely, accurate numbers on the teaching workforce. With over 300,000 teachers and more than 6 million students, California has the largest public education system in the

country; it is difficult for policymakers to know how many teachers are needed, and where, without clear data on the workforce. In 2002, CCST discussed the shortcomings of California's education-related data systems in its *Critical Path Analysis of California's Science and Technology Education System*, and recommended that the state make expanding its capacity to gather data one of its main education strategy goals. The Center also recommended this in its 2005 report *The Status of the Teaching Profession*.

"We are very pleased that California has taken this important step toward the more effective management of its teacher workforce as a whole," said Margaret Gaston, executive director of the Center, which has produced critical analysis that informed two other significant bills (SB 1209 and SB 1655) designed to enhance the supply of qualified teachers by streamlining the credentialing process, improving support and incentives for new and experienced teachers, and help low-performing schools hire the best teachers.

CCST and the Center have been collaborating on a critical path analysis of California's science and math teacher shortage, an area identified as crucial to the state's overall science and technology workforce development by CCST, and as one of the areas of greatest need by the Center. The study, scheduled for completion later in 2006, will define and quantify the science and math workforce and skills gap and identify appropriate strategies for California to enhance its production of science and math teachers.

"This system ... will be bringing together and synchronizing existing data collection sources in California ... making the data much more accessible and useful to state leaders."

*Paula Mishima*  
Education Administrator  
California Department of Education

# CAPITOL HAPPENINGS

CCST's mission is to focus California's science and technology talent on important policy issues facing the state. However, there is little communication back to the S&T community on what is happening in the legislative and executive branches of state government that could impact, or be impacted by science and technology. "Capitol Happenings" is a section of the CCST Report that provides a brief summary and update on what is going on in state government, be it new action from the Governor's Office, legislative committees or new legislation. Material for this article was contributed by Gus Koehler, principal consultant of Time Structures.

## S&T LEGISLATION UPDATES

### SCIENCE AND MATH ED GET BOOST

Senate Bill 1209 has been signed into law, which aims to increase the supply of teachers and reduce the inequitable assignment of the state's least experienced, least qualified teachers to schools in low-income neighborhoods serving predominately minority students. The legislation removes barriers to entry into the teaching profession, provides training and support to new teachers, and offers incentives to encourage veteran teachers to serve as mentors in high need schools. The legislation also seeks to streamline hiring and broaden compensation practices.

#### CHAPTERED AND SIGNED BY GOVERNOR

**AB 937 (Wyland)** Authorizes the governing board of a school district to designate a credentialed teacher as a science coach for other teachers at each elementary school, or provide staff development to teachers, to develop, coordinate, and provide instruction in an experimental science curriculum.

**SB 472 (Alquist)** Extends the Mathematics and Reading Professional Development Program (AB 466) until July 1, 2012.

**SB 1209 (Scott)** Makes numerous changes to existing teacher quality statues consistent with the recommendations contained in *The Status of the Teaching Profession 2005*.

**SB 1292 (Scott)** Modifies existing statutes related to the teaching of English Learners.

**SB 1614 (Simitian)** Establishes the California Longitudinal Teacher Integrated Data System.

**SB 1655 (Scott)** Prohibits a district from transferring a teacher who requests to be transferred to a school that is ranked in deciles 1 to 3 on the Academic Performance Index if the principal of that school refuses to accept the transfer.

#### LEGISLATION THAT DID NOT PASS

**SB 1433 (Torlakson)** Would establish a California Teacher Leadership Program. This bill was passed in the Senate but held in Assembly Appropriations.

**SB 1567 (Soto)** Would establish the English Language Learner Teacher Coaching Program. This bill was held in the Senate Committee on Appropriations.

**SB 1824 (Migden)** Would require the Commission on Teacher Credentialing to issue a California Preliminary (CAP) credential to any person who displays knowledge and expertise in math or science as demonstrated by the qualifications of possession of a postbaccalaureate or graduate degree in those subject matters, five or more full-time equivalent years of practice in the field for which the postbaccalaureate or graduate degree was awarded, basic skills proficiency, and teacher fitness. This bill was passed in the Senate but held in Assembly Appropriations.

**AB 2970 (Pavley)** Would establish the Teacher Recruitment and Retention Act of 2006. This bill was held in the Assembly Committee on Appropriations.

#### VETOED

**AB 2423 (Wyland)** Would establish a science resource teacher for each elementary school or provide staff development to teachers in order to coordinate and provide instruction in an experimental science curriculum, as specified, and mentor other teachers in the provision of that curriculum. This bill was passed by the Legislature but vetoed by the Governor.

**SB 842 (Torlakson)** Would authorize School Boards to use state funds to pay the fees of teachers seeking National Board for Professional Teaching Standards certification improving recruitment, training, and retention.

**SB 1142 (previously 1190) (Alquist)** Would add Science to the Mathematics and Reading Professional Development Program. This bill was passed by the Legislature but vetoed by the Governor.

# S&T LEGISLATION UPDATES

## GOVERNOR SIGNS FEDERAL LABORATORY CONTRACT BILL

Senate Bill 1629, sponsored by Senator Jackie Speier along with Assemblymembers Sally Lieber and Betty Karnette, was signed by Governor Schwarzenegger. SB 1629, enacting the Federal Laboratory Contracting Act, modifies the existing state's contracting procedures and policies to enable California to contract with Department of Energy and NASA federal funded laboratories.

Previously, differences in accounting procedures between federal and state policies made it virtually impossible for the state to contract with these facilities, making much of the lab's cutting-edge research and development inaccessible to the state. CCST helped bring this procedural roadblock to legislators' attention with its January 2006 report, *California's Federal Laboratories: A State Resource*. Senator Speier proposed SB 1629 in response to the CCST report.

## FEDERAL LABORATORIES

**SB 1629 (Speier) Chaptered.** Creates the Federal Laboratory Contracting Act.

**HR 29 (Houston) Adopted.** Resolved, That the Assembly supports the Governor's efforts to direct the appropriate state agencies to assist and partner with the national laboratory partnership of Sandia National Laboratories, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory in advancing their petition to the United States Department of Energy to establish the Joint Bio-Energy Institute in California.

**SR 26 (Perata, Migden, and Speier) Adopted.** Resolved by the Senate that it appreciates and commends the national laboratory partnership of Sandia National Laboratories, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory for their plan to bring the National Biological Foundry to California, and affirms the Senate's support of efforts to locate the National Biological Foundry in California; that the United States Department of Energy approve locating the National Biological Foundry in California; and the appropriate state agencies assist with this effort.

## GOVERNOR SIGNS HEALTH INFORMATION TECHNOLOGY ORDER

Arnold Schwarzenegger signed an Executive Order S-12-06 which outlines the state's plan for the advancement of health information technology (HIT).

The order directs the secretaries of Health and Human Services and Business, Transportation and Housing, and the director of the Department of Managed Health Care, to devise financing strategies to allocate part of at least \$240 million to develop public and private financing alternatives to expedite HIT adoption by hospitals, physicians and health care providers. It also directs agencies to report back within 60 days of the forum and, implement a comprehensive HIT program by July 1, 2007. The bill includes many provisions from SB 1338, proposed by Senator Elaine Alquist, earlier this year.

"The only difference between the Governor's Executive Order and my measure is that the Governor's action forces a more aggressive timeline, which I welcome since it may mean that we realize all the goals of my legislation much sooner," said Senator Alquist.

CCST has been highlighting the importance of HIT for California since last year. At the October 2005 Council meeting, held jointly with the Institute of Medicine, CCST concluded that the implementation of health care information technologies (HIT) in California was both a huge problem and an opportunity for closing inequities in health care costs.

# S&T LEGISLATION UPDATES

## STATE TAKES ACTION ON ENERGY

A number of bills were chaptered that could decisively move California in the direction of controlling greenhouse emissions, accelerating the development of alternative energy supplies, and improving California's market for efficient energy production and use. On the supply and energy performance side, new legislation would require the PUC, by February 1, 2007, to establish a greenhouse gases emission performance standard for all baseload generation of public utilities. In addition, if Proposition 87 on the November General Election ballot passes, a \$4 billion program would be established to reduce petroleum consumption by 25%. The program includes research and production incentives for alternative energy, alternative energy vehicles, energy efficient technologies, and for education and training.

Some say that California is risking its economy by taking these actions. An alternative view is that California, given its massive internal energy production and consumption market, is striving to be the first mover in developing the new stationary and mobile emission control technologies that the world will soon need. For example, between 1994 and 2004, oil use in China more than doubled. If oil consumption per person reaches the U.S. level by 2031, China will use 99 million barrels of oil a day; world production today is 84 million barrels a day. If China were to have three cars for every four people, as the United States now does, its fleet would total 1.1 billion vehicles, well beyond the current world fleet of 800 million. Coal provides nearly two-thirds of China's energy. China's annual burning of 960 million tons easily exceeds the 560 million tons used in the United States. By encouraging the rapid development of emission control and consumption technologies for its own markets, California companies will be in a strong position to take advantage of China's and other developing country's ever increasing pressure to control energy costs. If this scenario works out, California would occupy a leadership position in the new global economy.

## ENERGY

### CHAPTERED

**AB 32 (Nunez and Pavley)** and companion bill **SB 1368 (Perata)** Establishes a greenhouse gases emission performance standard for all baseload generation of load-serving entities and public utilities. Would impose stringent demands on energy suppliers even outside California's borders for producing the lowest possible emission of greenhouse gases. Requires Large producers of carbon dioxide to reduce industrial carbon dioxide emissions by 25% by 2020. These bills were signed by the Governor.

**AB 1925 (Blakeslee)** Requires the State Energy Resources Conservation and Development Commission to submit a report to the Legislature recommending how the state can accelerate the adoption of cost-effective geologic sequestration strategies for the long-term management of industrial carbon dioxide.

**AB 2021 (Levine)** Requires the Energy Commission by certain dates, to develop a statewide estimate of all potentially achievable cost-effective electricity and natural gas efficiency savings and to establish related annual targets over 10 years. A plan would also be required to improve the energy efficiency and to decrease the peak electricity demand of air-conditioners. In addition, local publicly owned electric utilities would be required to identify all potentially achievable cost-effective electricity efficiency savings and to establish annual targets over 10 years.

### VETOED

**SB 757 (Kehoe) Vetoed.** Among other provisions, this bill would enact the Oil Conservation, Efficiency, and Alternative Fuels Act, stating that it is state policy that state agencies shall take all cost effective and technologically feasible actions to reduce the growth of petroleum consumption, and increase transportation energy conservation, efficiency, and the use of alternative fuels.

### ON THE BALLOT

**Proposition 87** on November ballot: a \$4 billion program with the goal of reducing petroleum consumption by 25%, includes research and production incentives for alternative energy, alternative energy vehicles, energy efficient technologies, and for education and training. It would be funded by a tax of 1.5% to 6% (depending on oil price per barrel) on producers of oil extracted in California. The program would be administered by a new California Energy Alternatives Program Authority.

# CCST PREPARES TO TAKE A NEW LOOK AT ENERGY

At the May 23rd CCST meeting in Sacramento, the urgent need to examine options for California's energy future in light of changing global, national and state economics, policies, and technologies was raised. This "big picture" view needs to include the realities of sustainability and climate change as well as the realistic ability to be able to accomplish set goals.

"Fossil fuel dependency is not a long-term option," said keynote speaker Harold Ray, consultant and retired executive vice president, Southern California Edison, and former president of the American Nuclear Society. "There are serious concerns about energy independence, sustainability, competitiveness and security."

In addition to meeting state needs, there are also real opportunities for California to take on more of a leadership role in energy innovation, research and development that would impact the economy and jobs. Since

May, several reports and media articles have appeared that confirm a growing interest in the state re-examining its energy options and especially the role of nuclear energy. Consequently, CCST's October meeting continued the focus on California's energy future. Discussions are being centered on putting energy needs in context with respect

"Fossil fuel dependency is not a long-term option. There are serious concerns about energy independence, sustainability, competitiveness and security."

**Harold Ray**  
Former President  
American Nuclear Society

to new data on sustainability and global warming and suggesting how to frame the costs, benefits, and trade-offs of California's complete energy needs in the short and long term.

The meeting was held in cooperation with the National Academy of Engineering (NAE). Speakers included Robert Fri, vice-chair of the National Research Council Board on Energy and Environmental Systems.

"Imagining a sustainable energy future is difficult enough, but predicting how it will come about is really risky," said Fri. "The challenge for energy policy is to foster technological innovation in the private sector that will meet national goals. The challenge for science and technology is to build the knowledge base that maximizes the opportunities for successful innovation."

The program was organized by CCST Council Chair Lawrence Papay, an energy consultant who recently retired from the position of sector vice president for the Integrated Solutions Sector at Science Applications

## GOVERNOR, LEGISLATURE PASS GLOBAL WARMING BILL

The passage of AB 32 and SB 1368 has set an environmentally conscious tone for California's energy future, establishing a greenhouse gases emission performance standard that all public utilities must meet, including suppliers from out of state. The bills, which garnered national media attention, requires reduction of carbon dioxide emissions by 25% by 2020. "The state is the 12<sup>th</sup> largest carbon emitter in the world... Reducing greenhouse gas emissions is an issue we must show leadership on," said Governor Schwarzenegger in a statement.

International Corporation; CCST Fellow and Council Member Linda Cohen, professor of economics at UC Irvine and professor of social science and law at USC and member of both of CCST's Public Interest Energy Research program Independent Review Panels; CCST Fellow Maxine Savitz, retired general manager of technology partnerships, Honeywell, Inc., vice president of the NAE, and a member of the Secretary of Energy's Laboratory Operations Board and the National Science Board; and CCST Fellow C. Judson King, director of the Center for Studies in Higher Education.

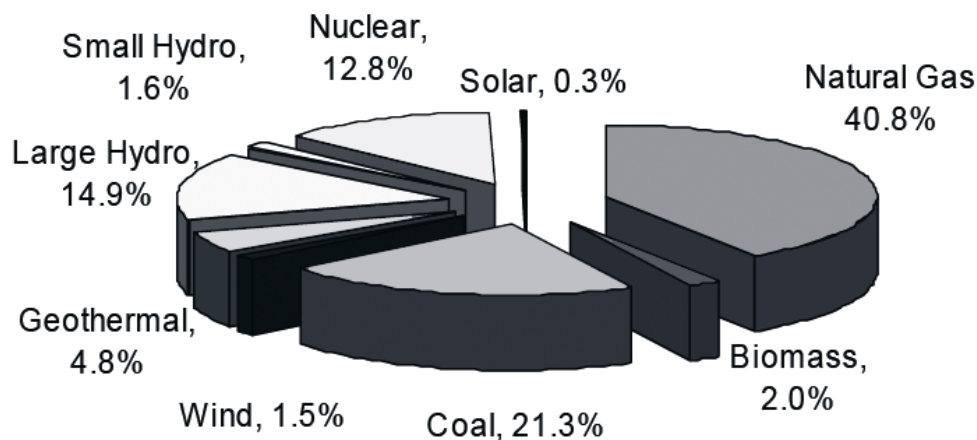
The issue of using nuclear power in California was a major component of discussion at the October meeting. At the May meeting, it was concluded that nuclear power in California encounters public perception and investor economics, not principally technical problems. It has become apparent that nuclear power must increasingly become a central source of energy for sustainable development as global energy demand continues to grow exponentially. This has led to the Bush Administration's Global Nuclear Future Initiative, which is designed to position the United States to have international influence over the expanding global use of nuclear energy. However, in California, state legislation on spent nuclear fuel waste disposal currently precludes any new construction of nuclear power plants.

"The October CCST meeting, in collaboration with the NAE, helped put into perspective the challenges and opportunities facing California in the production, distribution and use of clean, reliable energy sources and economical energy efficiency options, including nuclear energy," said CCST Executive Director Susan Hackwood. "The time is right for a deeper analysis of the costs, benefits, and public perception issues concerning nuclear energy. Moreover, California does not have to build a plant in order to help further the nuclear agenda. Just the fact that we are seriously considering nuclear in our energy mix is a very strong signal to the rest of the country who may be considering nuclear energy but are further along than we are."

CCST is developing a multi-part proposal to explore the issues surrounding nuclear power in California's energy future and will continue its dialogue with the Governor's office and the Legislature in the months to come.

"California has the right resources and expertise to explore these challenges and opportunities," said Ray at the May meeting. "We need to look down the road to develop a comprehensive and consistent strategy that works."

## CALIFORNIA ELECTRICITY PRODUCTION SOURCES 2004



While nuclear is the source of 12.8% of California's energy, it is 34% of California's non-fossil energy (vs. 70% for U.S.). Solar, wind, small hydro and biomass are 14%.

Source: Per Peterson, UC Berkeley

# EDISON INTERNATIONAL ADDRESSING WORKFORCE CHALLENGES



John Bryson

“High school alliances and education programs are a key component of our workforce strategy. You can’t build a skilled, technically competent workforce overnight.”

*John E. Bryson*  
Chairman, President and CEO  
Edison International

California recognizes the importance of increasing its science and technology workforce, investing in programs to increase the number of students obtaining science and math degrees, and increasing the number of teachers to train them. However, these efforts are still in an early stage. California’s high-tech employers are already facing recruitment challenges and many companies, such as Southern California Edison (SCE), an Edison International company, are taking active steps to deal with them.

“We need to recruit and retain employees with the competencies and expertise needed in the future,” said John E. Bryson, chairman, president, and CEO of Edison International. “However, like many employers, we face a number of serious recruitment challenges.”

SCE is the primary electricity supply company for much of the lower half of California, providing over 13 million people in portions of 11 counties with electricity. It employs over 13,000 people.

One of the most significant problems is the aging workforce. Thirteen percent of its employees are eligible to retire in 2006. Over a third of its entire workforce – 35% – will be eligible to retire in 2009, just three years in the future.

“Edison International is not the only company facing this retirement bubble,” said Bryson. California’s teacher workforce, for example, faces a similar wave of retirement in the next few years. “However, when combined with the changing demographics of the workforce and increased competition for quality talent, as well as the rising cost of living in Southern California, the problem becomes more urgent.”

In response to the shortfall, SCE has been pursuing a number of strategies, working to enhance its talent pipeline by actively recruiting student interns, recent college graduates for rotational training programs, and working with established programs such as Mathematics, Engineering, Science Achievement (MESA).

“Nationwide, we have a number of pipeline schools that we work closely with, including seven in California,” said Bryson. “We have developed a number of approaches to increase our supply of people with common engineering core competencies and the technical and leadership skills we need.”

One of these is the Job Skills Partnership (JSP) program, which provides mentoring, training, and employment to high school junior and senior students.

“The JSP is designed to instill the importance of education and encourage continued education in colleges or trade schools,” said Bryson. It offers employment for two to four hours a day during the school year, giving valuable experience as well as a window into the career possibilities in science and engineering.

“High school alliances and education programs are a key component of our workforce strategy,” said Bryson. “You can’t build a skilled, technically competent workforce overnight.”

## RECRUITMENT CHALLENGES

- Aging workforce/retirement bubble
  - 13% of all employees are eligible to retire in 2006
  - 35% of all employees are eligible to retire in 2009
- Changing demographics of the workforce
- Increased competition for quality talent
- Relocation challenges
- Rising Southern California real estate prices
- On-going - regulatory & compliance

## UPCOMING CCST EVENTS

JANUARY 31 - FEBRUARY 1, 2007. Sacramento Board and Council meeting and dinner program.

MAY 23 – 24, 2007. Sacramento Council meeting and dinner program.

OCTOBER 16 – 17, 2007. Beckman Center, Irvine Board and Council meeting and dinner program.

# "GATHERING STORM" HOLDS SERIOUS MESSAGE FOR CALIFORNIA

The message in the National Academies' *Rising Above the Gathering Storm* report – that the nation's science and technology capabilities are poised to falter in the coming years – has been sounded before in other venues. However, this report has succeeded in grabbing the attention not just of policymakers, but of industry leaders.

"The problems highlighted in this report are far-reaching and will require sustained cooperation to address," said CCST Council Member Andrew Viterbi, who is serving on the CCST committee working to develop a California response to the report. "In particular, the participation of industry will be important in developing sustainable long-term solutions."

Viterbi currently serves as president of the Viterbi Group, LLC, a company founded in 2000, which advises and invests in startup companies, predominantly in wireless communications, network infrastructure and imaging. Previously, Viterbi co-founded QUALCOMM Incorporated, a developer and manufacturer of mobile satellite communications and digital wireless telephony, where he served as vice chairman until 2000 and as chief technical officer until 1996. Under his leadership, QUALCOMM received international recognition for innovative technology in the areas of digital wireless communication systems

and products based on Code Division Multiple Access (CDMA) technologies. He is also a co-founder of LINKABIT Corporation, a digital communications company, where he served as executive vice president and later as president.

"Companies like QUALCOMM are built on a combination of successful innovation and a highly skilled workforce," said Viterbi. "Maintaining an environment where innovation has a chance to develop, and where there are people to enable that to happen, is critical for the nation's future as a high-tech leader."

Viterbi brings both industry and academic experience to the project – he was a professor in the Department of Engineering and Applied Science at the University of California, Los Angeles for ten years, and continued teaching on a part-time basis at the University of California, San Diego until 1994, where he is currently professor emeritus. In 2001, Technion, Israel Institute of Technology, invited him to become a distinguished visiting professor of electrical engineering. He has received numerous awards and recognition for his leadership and substantial contributions to communications theory and its industrial applications over the years, including honorary doctorates from universities in the United States, Canada, Italy and Israel. From 1997 until 2001, he served as

a member of the U.S. President's Information Technology Advisory Committee.

"It is often difficult for policymakers to plan effectively over years or decades," said Viterbi. "The strong response to the *Gathering Storm* report has given us an excellent opportunity to make a genuine difference for California over the long term."



Andrew Viterbi

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The CCST Report focuses on CCST activities and highlights innovative science and technology research and applications in California. The Report is written by Danny DeCillis, who welcomes information from readers about science and technology at work in the private, public, and education sectors. The Report thanks CCST members for their generous assistance in providing material for this issue. If you would like more information about CCST initiatives, please e-mail the request to [ccst@ccst.us](mailto:ccst@ccst.us), or visit CCST's website at <http://www.ccst.us>. Fax requests to (916) 492-0999 or telephone (916) 492-0996.

CALIFORNIA COUNCIL ON  
SCIENCE AND TECHNOLOGY  
5005 La Mar Dr, Ste 105  
Riverside, CA 92507



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