CETF COMMENTS ON DRAFT SCOPING PLAN

February 20, 2017

To: Mary Nichols, Chair, California Air Resources Board

Cc: Members of the California Broadband Council
California Transportation Commission

Fr: Hon. Lloyd Levine (ret.) on behalf of the California Emerging Technology Fund

Subject: Scoping Plan – Broadband as a Green Strategy

Broadband is an enabling technology. The "Internet of Things" and the environmental benefits derived from Smart Grids, Smart Homes, and Smart Transportation depend on ubiquitous, redundant, high-speed Internet access in all corners of California.

BROADBAND AS A GREEN STRATEGY

In 2007 The American Consumer Institute reviewed industry and academic material, including 181 referenced items, to quantify the existing and future impacts of broadband. In their paper, they found that greenhouse gas reductions, resulting from the deployment and utilization of broadband Internet access, could exceed 1.1 billion tons over 10 years[i]. Of these gas reductions, 60% were a direct result of telecommuting efficiencies, 18% from Business-To-Business (B2B) and Business-To-Consumer (B2C) electronic commerce simplified processes and distribution, 17% from meeting participation replaced by teleconference applications, and 5% from electronic media previously distributed using paper and/or plastic products. The 1.1 billion tons of greenhouse gas reduction, in energy, equated to 11% of the total U.S. oil imports, and if realized, would be a significant contributor to the country's emission reduction goals.

In the past 10 years much has changed, and the potential GHG savings have grown due to the invention and proliferation of energy saving devices that depend upon broadband. Broadband is an "enabling technology", and a service. As such, it is the key to unlocking the promise of the internet's environmental benefits.

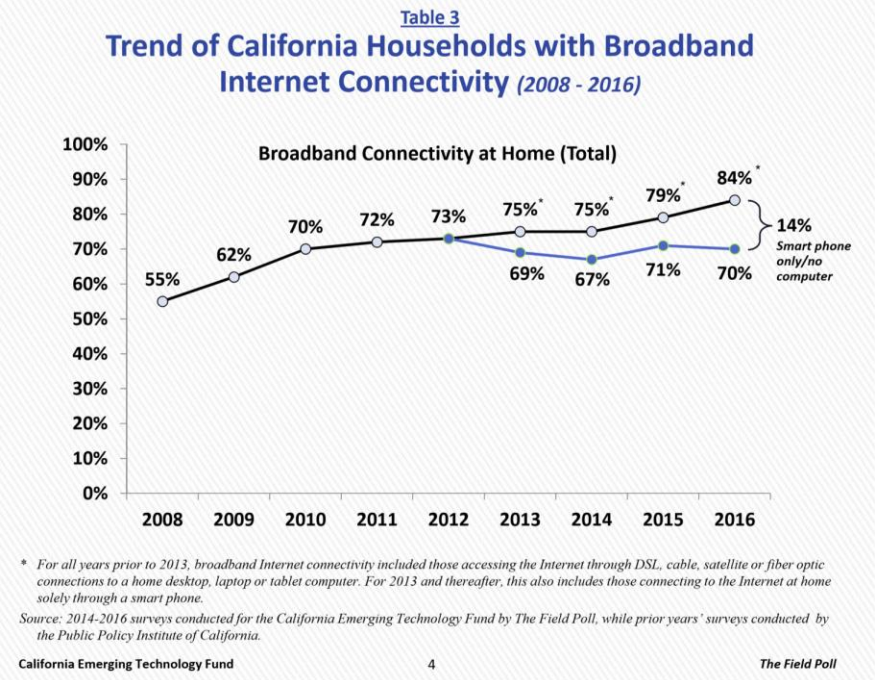
Even still, the Internet is in its relative infancy, especially with regard to commercial use and device integration. The first commercial web sites started appearing only about 20 years ago. And it was even more recently that WiFi, Blue Tooth, Z-Wave, and other types of wireless connectivity were developed and deployed on a wide scale. As such, the sophistication and diversity of devices and programs that enable environmental benefits have only just begun to emerge. But even today, broadband enabled devices have the potential to reap huge savings in energy and a resulting GHG reduction.

Environmental Benefits of Broadband – Quick Facts
The following calculation shows the potential energy savings from a relatively new and popular thermostat called Nest.

- According to the Energy Information Administration, the average California household consumes 6,684 kWh of electricity annually.
- According to Nest: In independent studies, the Nest Thermostat saved an average 15% on cooling bills.
- That produces an annual household savings of 1,002.7 kWh. [6,684 kWh x 15% = 1,002.7 kWh Annual Electricity Reduction]
- Broadband deployment and adoption has the potential to reduce greenhouse gas emissions by more than 1.1 billion tons over the next 10 years[ii].
- Electronic commerce, as compared to conventional shopping, generates 36% less air pollutants, 23% less hazardous waste, and 9% less greenhouse gases[iii].
- Electronic grocery shopping with e-delivery generates 18% to 87% less greenhouse gases than conventional grocery shopping[iv].

MAJOR GAPS IN INTERNET DEPLOYMENT AND ADOPTION

As the following graph[1] shows, despite California being home to Silicon Valley and many of the largest technology companies in the world, significant portions of the population lack do not have meaningful internet access.



Specifically, the graph shows that 30% of Californians do not have meaningful broadband access at home, and that access is necessary to enable potential GHG savings. A Nest thermostat, for example, will not be able to provide the energy reductions without broadband.

Those gaps in meaningful internet access exist for two primary reasons:

1) Lack of access to infrastructure, primarily in rural areas,
2) Lack of adoption, primarily in urban areas

[1] Data from the 2016 edition of the Annual Broadband Survey conducted by the Field Poll.

Only 63% of Californians living in cities of 10,000 people or smaller have meaningful internet access. Looking at adoption (defined as having physical access, but choosing not to receive service), only 64% of households with incomes between $22,000 and $39,999 have meaningful internet access. And when household income falls below $22,000, only 43% of have meaningful internet access.

A REAL-WORLD EXAMPLE – ALTURAS, CA

The City of Alturas, California, with a population of 2,600 people and a median household income of $27,000, is located in the northeastern corner of California. It is 145 miles from Alturas to Redding, where the nearest EDD Tax Office is, and 205 miles to Chico, where the nearest EDD disability insurance office is located. A car that gets 25 mpg would use 16.4 gallons of gas to make the 410 mile round trip from Alturas to the EDD disability office in Chico. Using the federal Energy Information Administration calculation of 20 lbs of Carbon Dioxide (CO2) generated per gallon of gas burned, that trip would generate 328 lbs of CO2.

That same calculation can be played out in similar trips all over California, whether in rural areas where field offices are often a long drive away, or in urban areas where congested freeways and roads means more gas burned.

Ensuring Californians have sufficient broadband capacity would reduce the vehicle miles traveled by shifting physical trips to virtual ones.

SPECIFIC COMMENTS ON SCOPING PLAN

The draft scoping plan does not calculate or include any GHG savings from broadband deployment or adoption. CETF is asking that GHG reductions from the enhanced and expanded Internet usage created by greater broadband deployment and adoption be specifically calculated and included in the scoping plan.

How to Achieve GHG Reductions Via Broadband

The following items are aimed at facilitating both the deployment of infrastructure and the adoption of service necessary to obtain the GHG reductions available through broadband as a green strategy.

- State Investment in Broadband Infrastructure Deployment and Adoption

As was illustrated in the graph above, the rate of meaningful internet access at home has held at approximately 70% for the past five years. Since broadband companies have a profit motive to enroll more customers, the stagnation in adoption rate is a strong indication that, with the currently available technology and pricing, the private sector has driven adoption as far as it can go. The state needs to invest public dollars in infrastructure deployment and internet adoption programs to close the gap. This would provide benefit both immediately and into the future as new technologies, devices, and applications are developed. CETF has proposed legislation to extend the existing California Advanced Services Fund for another 5 years to do exactly this. This legislation should be a priority for CARB and the state.

- Implement a "Dig Once" Policy

The Scoping Plan should include a model "dig once" policy that can be adopted by both Caltrans and local governments. Such a plan would leverage public rights-of-way and existing assets to strategically deploy broadband will all major infrastructure projects.

The National Broadband Plan found that substantial savings can be captured if the deployment of fiber-optic cable is coordinated with other infrastructure projects such as road, water, sewer, gas, and electricity work. Deploying new fiber through existing conduit is 3-4 times less expensive and significantly reduces or eliminates the need for heavy vehicles to do the construction work.

- Develop State Policies and Programs that Utilize Internet Functions to Avoid VMT

There are multiple policies that fall under this umbrella that can be adopted. First, however, we caution that, as was stated in the first bullet point in this section, in order to recognize these benefits, the state MUST also ensure the remaining 30% of Californians have meaningful internet access.

Once that is achieved, the state can develop even more robust web sites, and employ the latest technologies to move in-person transactions to the internet to the greatest degree possible.

The state should also develop and adopt policies, programs, and incentives for people telecommute and teleconference to the greatest extent possible. The greenest trip is the trip avoided, and state policy can facilitate that.

The state must develop intelligent transportation systems, that are fully integrated, coordinated and have maximum deployment. From the ports, trains, and trucks necessary for goods movement, to daily commutes, smart roads and smart systems can reduce fuel consumption. (See Appendix A for more information about Broadband as a Green Strategy.)

CONCLUSION

The data is clear: greater broadband use can heavily reduce our impact to the environment. Broadband Internet access improves the environment by enabling a greater use of telecommuting, teleconferencing, material avoidance, energy saving devices. As experts in broadband technology, we can also state unequivocally, that whatever technology exists today will be leapfrogged in 10 years. But what we do know is that it will depend on bandwidth, deployment, and access. As we stated earlier, the "Internet of Things" cannot be achieved, first and foremost, without the Internet.

We know broadband technologies enable many benefits to society, including GHG reductions We have provided a few examples and strategies in our comments, but know that by bringing in experts more savings can be identified. We stand by willing to lend our expertise to assist CARB in identifying and calculating GHG reductions associated with the deployment of broadband infrastructure as part of the state's plan to meet its overall GHG reduction targets.

WHO IS CETF?

The California Emerging Technology Fund (CETF) was created in 2005 by the California Public Utilities Commission as a condition of the merger of several telecommunications companies. CETF was founded with the sole mission of closing the digital divide in California.

CETF provides statewide leadership to ensure the accelerated the deployment and adoption of broadband to unserved and underserved communities and populations, and that California is a global leader in the availability and use of broadband technology.

The mission is achieved by making investments in programs and projects to improve access, affordability, applications, accessibility and assistance to broadband—the "5As" of the Digital Divide. The priority focus is on rural communities that lack the broadband infrastructure; Urban poor and disadvantaged communities that lack the computers and affordable connections to the Internet with relevant applications; Disabled populations that lack technology accessibility.

We compile conclusions about best practices from research and results of pilot projects and demonstration programs, and consult the most knowledgeable experts and stakeholders to identify and invest in strategic opportunities (based on sound research and proven track records) to achieve the highest impacts in eliminating the Digital Divide. CETF measures our progress quantitatively in terms of status of the Digital Divide statewide and for priority communities and populations.

With offices in Los Angeles and San Francisco, CETF has established and institutionalize partnerships with civic leadership and community-based organizations, and continues to develop regional strategies and collaboratives for bridging the Digital Divide.

Through the end of 2016, CETF has leveraged the initial $60 million in seed capital into greater than $250 million of investment and activity through partnerships and co-investments with private sector, government and foundations.

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[iv] Ibid

Can the Internet Help Save the Environment? Yes.

"Investment in broadband infrastructure is a fundamental part of sustainable social and economic growth, and is essential to building a greener and more equitable California."

John Gioia, Contra Costa County Supervisor
President of California State Association of Counties
Member of California Air Resources Board

Broadband and the Environment: Technology Strategies for a Greener California

We've all heard of the ways we can help save the planet, such as conserving energy in our homes and driving fewer miles in our cars. Such common environmentally-conscious strategies become a lot easier when technology supports our efforts. It turns out that high-speed Internet—also known as broadband—can do exactly that.

Today, workplaces, government offices, farms, schools, hospitals, and households use broadband to cut costs and carbon emissions. Internet tools and electronic communications allow Californians to use computers and smart devices to work from home, manage irrigation in the fields, apply for a driver's license, get a check-up with a healthcare specialist, and monitor thermostats while away from home. When we use less fuel, water, and electricity, we emit less air pollution into the atmosphere.

These modern-day approaches to managing daily life all depend on having fast, reliable, and affordable Internet service everywhere—from the kitchen table to the tomato field. E-Government, Telehealth, Teleworking, Precision Agriculture, Smart Building, and Smart Grid are key opportunities in which Californians are making progress to conserve resources and promote cleaner, healthier lifestyles.

Affordable, accessible broadband is critical for California to meet its greenhouse gas (GHG) emissions goals, which will reduce impacts on the environment and improve the quality of life for all.
The data proves it. Let's all promote broadband for a greener California!

August 2014

"In Northern California alone, the most efficient 481 buildings saved approximately $148 million in annual utility bills and reduced CO_2 equivalent to 50,800 homes."

U.S. Environmental Protection Agency
April 2014

E-Government

Skip the Trip, Go Online

E-Government services allow Californians to obtain services online, saving time, money, and travel-related pollution. The California Department of Motor Vehicles (DMV) encourages customers to "Save Time, Go Online", and the program has been met with great success. In 2013, nearly one quarter of all California vehicle registrations—over 8 million—were completed electronically.[1] Drivers were able to trim the number of trips to the DMV while keeping fuel costs in their wallets.

Governments at all levels can drive efficiency while improving customer service.[2] The federal government is encouraging the shift to electronic communications, for example, by promoting online tax filings and direct deposit payments. Those activities alone last year saved the federal government $64 million in paper costs.[3]

Telehealth

Bring Quality Healthcare Closer to You

Telehealth brings the healthcare provider and patient together online, ensuring quality and timely care, saving travel headaches, and encouraging better monitoring of health status. Each online health appointment saves 95 percent of GHG emissions that would result from a typical drive to a doctor's office.[4]

Based on the findings at a California hospital serving a large rural area, the California Telehealth Network estimates that the value of each follow-up consultation conducted online saves $300 by eliminating transportation costs and counting wages that would be lost due to time off. In a single year, those savings added up to 288,000 fewer miles driven at a single hospital. Imagine the combined impact of online consultations across all 345 hospitals in the state.

Teleworking

Cut Traffic and Carbon Emissions

Teleworking utilizes alternative worksites and video conferencing while generating cost savings, boosting employee satisfaction, and reducing GHG emissions. Companies that encourage their employees to telework see results both in economic value and in positive impacts on the environment. If an employee works from home one day per week, reducing car travel by 7 percent and air travel by 10 percent, the carbon reduction impact could be as much as 65 megatons of CO_2 with a corresponding national economic value of $25 billion by 2020.[5]

Experts at UC Davis and UC Irvine reviewed available research and discovered similar findings. For home-based workers, they found that work-related miles driven were reduced by 90 percent. For telecommuters working at a central site away from the main office, mileage reductions ranged between 62 and 77 percent.[6]

Precision Agriculture

Save Water and Increase Productivity

Precision Agriculture preserves one of California's most precious resources: water. Water delivery accounts for 20 percent of the state's total energy consumption, and the agricultural sector is a major user.[7,8] Precision Agriculture uses real-time information to help farmers more efficiently irrigate and monitor their crops. Wireless broadband-enabled systems supply satellite observations and data about the plants, soil, atmosphere, and irrigation systems to help farmers manage their fields and livestock.

The results are encouraging: farmers have seen increases in productivity ranging from 20 to 70 percent, and a decrease in water use ranging from 20 to 30 percent[8] (depending on how many water-use efficiencies have been previously implemented on a given farm). More efficient agricultural practices save money and reduce water and delivery-related energy consumption.

Smart Building

Make Buildings More Energy Efficient

Smart Building strategies make for better working environments and lead to significant energy savings. Energy use in buildings ranks as the second highest source of GHG emissions in California.[9] In Northern California alone, the 481 most-efficient buildings saved approximately $148 million in annual utility costs and reduced GHG emissions equivalent to that produced by 50,800 homes.[10]

Modern construction standards are leading to better efficiency, but energy waste persists in older buildings because of inefficient heating and cooling, lighting, and other power systems.[11] Building management systems (BMS) use technology to control and monitor usage patterns, which can lead to major improvement even in older construction. Utilities and technology companies now are providing online services to track daily energy usage for industry, public facilities, and residences.

Smart Grid and Electric Vehicles

Drive for a Cleaner California

The Smart Grid is an electricity supply network that uses digital communications technology to detect and react to changes in usage. While providing critical information to help Californians conserve at work, at home and on the road, the Smart Grid also allows for easier integration of solar and wind in the power supply.[12]

When the Smart Grid and Electric Vehicles (EVs) operate together seamlessly, large reductions in energy usage and GHG emissions can be achieved. The transportation and power sectors, in fact, have the highest potential for Internet-enabled reductions of GHG pollution— and now account for more than 40 percent of the estimated total reductions in California. EVs are one of the most promising technologies for reducing fuel consumption and air pollution.[12, 13]

To reach their highest potential in cutting energy use and resulting emissions, the Smart Grid and EVs must work interdependently. For example, EV owners need online access to obtain real-time information from the Smart Grid to ensure that they plug in when electricity demand—and usually prices—are at their lowest.

Without online monitoring and communications, it is impossible to manage energy demand in 21st century California. The repercussions of poor management are large on the environment as well as the economy. For example, when the electric grid becomes strained, often-dirtier backup generators are fired up to meet peak demand.[13] Carefully coordinated policy, planning, and investment around EV infrastructure and the Smart Grid will go a long way to help Californians realize their largest potential for reducing air pollution and GHG emissions.

Learn More

- **Read** Broadband as a Green Strategy: Understanding How the Internet Can Shrink our Carbon Footprint, 2014. http://valleyvision.org/resources/broadband-as-a-green-strategy-understanding-how-the-internet-can-shrink-our-carbon
- **Read** Broadband as a Green Strategy Policy Brief, 2012. http://valleyvision.org/resources/broadband-as-a-green-strategy-policy-brief-2012
- **Read** Getting Connected for Economic Prosperity and Quality of Life: A Resource Guide for Local and Regional Government Leaders to Promote Broadband Deployment and Adoption. http://www.cetfund.org/resources/information/model-policies-and-ordinances

Act Now

- **Encourage** your jurisdiction to implement the Checklist in the CETF Resource Guide for Local and Regional Government Leaders: Getting Connected for Economic Prosperity and Quality of Life.
- **Champion** policies that support broadband infrastructure investment and include broadband infrastructure in land use and other community plans.
- **Promote** the role that broadband plays in achieving emission reductions when state leaders are developing greenhouse gas reduction policies, goals, and investments.

CETF
CALIFORNIA EMERGING TECHNOLOGY FUND

About the California Emerging Technology Fund

The mission of the California Emerging Technology Fund is to close the Digital Divide in California by promoting high-speed Internet access at home. The goal is to reach 98% of all residences with broadband infrastructure and to achieve 80% home adoption by 2017. This statewide goal can only be accomplished if the following specific hard-to-reach target communities achieve at least a 70% adoption rate: low-income populations, Latino households, rural communities, seniors and people with disabilities. For more information, please visit www.cetfund.org.

VALLEY VISION
Connect. Partner. Impact.

About Valley Vision

The mission of Valley Vision is to provide research, collaboration, and leadership services to make California's Capital Region prosperous and sustainable. Valley Vision functions like a social enterprise, combining the rigor of a for-profit business with the passion of a nonprofit to drive large-scale initiatives to success. The goal is to bring individuals and organizations together to find impactful solutions to issues pertaining to social equity, the environment and economic development. For more information, please visit www.valleyvision.org.

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BROADBAND AS A GREEN STRATEGY:
Promising Best Practices to Achieve Positive Environmental and Economic Benefits Through Accelerated Broadband Deployment and Adoption

Introduction

Broadband (high-speed Internet access) is an essential 21st Century infrastructure and a necessity for California's future global competitiveness, prosperity, and high quality of life. The use of diverse broadband-driven applications also has the potential to reduce greenhouse gas (GHG) emissions and energy consumption, helping meet local, state, and federal air quality standards.

"Broadband and advanced communications infrastructure will play an important role in achieving national goals of energy independence and efficiency."
Federal Communications Commission
National Broadband Plan

A report[1] by the American Consumer Institute estimated that wide adoption and use of broadband applications in the U.S. could achieve a net reduction of 1 billion tons of GHG over 10 years, which, if converted into energy saved, would constitute 11% of annual U.S. oil imports.

The State of California is a leader in demonstrating its commitment to reduce GHG emissions. There are great opportunities to capture additional reduction benefits with the adoption and widespread implementation of the promising best practices and emerging successful strategies.

Background

The California Emerging Technology Fund (CETF) engaged Valley Vision to research the potential of broadband as a "green strategy" to reduce impacts on the environment. Valley Vision conducted an assessment of research that quantifies GHG emission reductions due to broadband-driven applications. The purpose was to determine the feasibility of developing a protocol that could enable the monetization of emission reductions for use in a carbon trading system. To meet environmental integrity requirements, eligible reduction credits must be independently verified as surplus, permanent, quantifiable, and enforceable in a cost-effective process.

The project included a literature review, supplemented with interviews and consultations with subject-area experts, and focused on the following broadband-driven applications: telecommuting and telework; intelligent transportation systems; telehealth and telemedicine; smart buildings; electric vehicles; efficient energy use; e-materialization and e-commerce; and e-learning.

A summary of the literature review and findings is available on the California Emerging Technology Fund website at www.cetfund.org and the Valley Vision publications page at www.valleyvision.org.

While the research process revealed a potential but lengthy path for developing a protocol, it also uncovered many areas and promising best practices that, if promoted, should help meet important policy goals and provide numerous co-benefits.

This briefing document focuses on a subset of the research areas that were identified to offer the best immediate opportunity for high-level impact: transportation, health and energy. It highlights recommended strategies and promising best practices to achieve positive environmental, economic, and health impacts and co-benefits from reductions in air pollution and GHG emissions through accelerated broadband deployment and adoption in these three areas.

Checklist for Best Practices

1. Deploy programs and policies that promote employees to telecommute on a frequent basis. (Transportation)
2. Encourage replacement of travel with teleconference and/or videoconference services. (Transportation)
3. Assist commuters with carpool, vanpool, and ride-matching services, transit solutions, and bicycle routes. (Transportation)
4. Prioritize funding for Intelligent Transportation Systems. (Transportation)
5. Leverage public right-of-ways and existing assets to deploy broadband with all major infrastructure projects. (Transportation)
6. Expand telehealth services eligible for reimbursement. (Health)
7. Plan for and build Smart Grid infrastructure through public-private partnerships. (Energy)
8. Provide financial incentives to utilize broadband-enabled technologies and reduce commercial and industrial energy use. (Energy)
9. Educate residents and building owners about smart building technologies and benefits. (Energy)
10. Promote an "Electric Vehicle (EV) ecosystem" and analyze the resulting impacts and challenges. (Energy)

Transportation Best Practices

Why? An Urban Land Institute publication[2] cites that transportation contributes roughly 28 percent of the United States' total GHG emissions, with this category growing faster than any other sector. A strategy to reduce transportation-induced emissions is through telecommuting[3] programs, or through teleworking, where broadband-driven applications substitute high-carbon travel for meetings. Additionally, technology that utilizes broadband provides opportunities to educate and assist commuters and employers with trip reduction options. Intelligent Transportation Systems (ITS) technologies process and share information that can prevent potential crashes, keep traffic moving, and decrease the negative environmental impacts of the transportation sector on society[4]. Finally, better coordination of broadband deployment with other infrastructure projects can reduce the disruptions associated with street excavation.

1. Deploy programs and policies that promote, and where possible, provide incentives for employees to telecommute on a frequent basis.

Fact: Telecommuting could reduce greenhouse gas emissions over the next 10 years by approximately 588.2 million tons of which 247.7 million tons is due to less driving, 28.1 million tons is due to reduced office construction, and 312.4 million tons because of less energy usage by businesses. Estimates conclude that if 10% more of the workforce could telecommute full-time, emissions of greenhouse gases would reduce by an additional 42.4M tons of CO2[5].

Example: Many larger public and private sector organizations have successfully implemented telecommuting programs. Ideas and resources for implementing a telework program can be found at http://www.teleworkresearchnetwork.com/ or http://www.telework.gov/.

2. Deploy programs and policies that encourage replacement of travel with teleconference and/or videoconference services. (Telework)

Fact: Travel substitution through virtual meetings and consultations, based on videoconferencing, audio-conferencing, and flexible work arrangements, could reduce CO2 by 70–130 million metric tons (MMT) and save $20–40 billion[6].

Example: Caltrans offers teleconference options using regional call-in centers to minimize travel for meetings, such as for the Statewide Conformity Working Group.

3. Assist commuters with carpool, vanpool, and ride-matching services, transit solutions, and bicycle routes.

Fact: The San Diego Association of Governments (SANDAG) found through use of their "iCommute" program that commuters avoided 21 million vehicle miles traveled (VMT) in fiscal year 2011[7].

Example: The SANDAG "iCommute" program[8] is a model that offers assistance and tools to commuters and employers to help coordinate commuting solutions that reduce traffic congestion during peak-times.

4. Prioritize funding for Intelligent Transportation Systems to reap both GHG reductions and a high return on investment.

Fact: A paper evaluating the benefits of optimizing traffic signal timing plans, coordinating traffic signal control, and implementing adaptive signal control at locations throughout the State of California found a 17-to-1 benefit-to-cost ratio[9].

Example: Benefits of ITS technologies employed in the Sacramento region, including the pedestrian countdown timer and Stockton Boulevard Rapid Transit bus, can be found in the *Intelligent Transportation Systems Strategic Development Plan for the Sacramento Region*[10].

5. Leverage public right-of-ways and existing assets to deploy broadband with all major infrastructure projects.

Fact: The National Broadband Plan found that substantial savings can be captured if fiber builds are coordinated with other infrastructure projects in which the right-of-way (i.e., road, water, sewer, gas, electric, and so forth) is already being dug. Running a strand of fiber through an existing conduit is 3–4 times cheaper than constructing a new aerial build.[11]

Example: The "Lit San Leandro" project is a public-private partnership deploying a state-of-the-art last mile of fiber optic cable as an economic development strategy. By utilizing a network of underground conduits owned by the City of San Leandro and Bay Area Rapid Transit (BART) the project receives a "significant cost advantage and elimination of a major disruption in that street excavation and conduit installation are not required," expanding capacity for local businesses.[12]

Health Best Practices

Why? Telehealth and telemedicine, using broadband technologies to support remote health care, have been found to make better use of staff time, reduce time spent traveling, and assist in reducing climate change by limiting the emissions of CO2 [13].

6. Expand telehealth services eligible for reimbursement.

Fact: The University of California, Davis, found each telemedicine consultation saved an average of 200 miles of travel each way for patients resulting in 4.7 million avoided vehicle miles traveled, an equivalent of 1,700 metric tons of reduced carbon emitted to the atmosphere[14]. California is building a statewide broadband partnership for telehealth dedicated to healthcare through the California Telehealth Network (CTN). The organization is already the largest rural telehealth pilot program in the nation, with 60 percent of the sites serving rural communities, and will ultimately connect over 900 California healthcare providers by the end of 2013.

Example: Medicare reimbursement was recently expanded to cover smoking cessation services provided by video conferencing.

Energy Best Practices

Why? The National Broadband Plan defines the Smart Grid as the "two-way flow of electricity and information to create an automated, widely distributed energy delivery network."[15] The top contributors to GHG emissions in California are on-road vehicles and the existing building stock. By serving as the enabling technology for two-way communication, the Smart Grid provides the opportunity to address the top two GHG emission sources through widespread adoption of electric vehicles and implementation of smart building technologies and practices. Additionally, better management of the flow and transmission of energy will allow the integration of new renewable energy sources into the Grid.

7. Plan for and build Smart Grid infrastructure through public-private partnerships.

Fact: A study by the Pacific Northwest National Laboratory estimates the Smart Grid can reduce GHG emissions from electricity generation by as much as 12% by 2030, the equivalent of removing 65 million cars from the road[16].

Example: The Sacramento Municipal Utility District's (SMUD) SmartSacramento Project[17], which secured $127.5M in federal economic stimulus funds, is an example of a public-private partnership that brought together research, higher education, utilities, energy regulators, work force development organizations, consumers, and private businesses to work collaboratively to develop a successful Smart Grid implementation strategy.

8. Provide financial incentives to utilize broadband-enabled technologies, such as remote regulation of air conditioning and lighting systems, to reduce commercial and industrial energy use.

Fact: The incorporation of a financial incentive can make energy efficiency investments more alluring for private and public entities, particularly by lowering inhibitive upfront costs. Financial incentives also complement other efficiency policies such as appliance standards and energy codes, overcoming market barriers for cost-effective technologies[18].

Example: The Sacramento Municipal Utility District's (SMUD) commercial and industrial energy efficiency "Performance Incentive" program offers an incentive of $0.08 per kWh per percentage of energy savings.

9. Educate residents and building owners about smart building technologies and benefits.

Fact: Consuming less energy through smart buildings could abate 270-360 MMT of CO2 in the U.S. and save $40–50 billion[19]. Seven out of the eighteen recommendations in the *Recommendations from the Green Building Task Force* report[20] from the Green Capital Alliance rely on education and marketing approaches to build consumer awareness.

Example: Energy Upgrade California[21] informs businesses, homeowners, and communities about how they can benefit from incentives to make buildings more energy efficient and save money.

10. Promote an "Electric Vehicle (EV) ecosystem" and analyze the resulting impacts and challenges.

Fact: According to the Federal Communications Commission National Broadband Plan, EVs have the potential to reduce U.S. dependence on foreign oil by half and decrease GHG emissions of the light-duty vehicle fleet by 27%.[22] Smart Grid technology must be in place for charging cars during off-peak hours and balancing loading demands. The potential oil savings associated with EV adoption could reduce the need to build additional power plants.

Example: The Electrification Leadership Council proposes deployment of a large commercial EV fleet in a geographically dense region followed by analysis of the impacts and challenges to the infrastructure, air quality, and value chain support systems.

Conclusion

There is much research available and underway to capture the "green benefits" from broadband use. New applications continue to emerge that will influence human behavior and potentially reduce vehicle miles traveled, such as mobile banking deposits and climate change mitigation and adaptation strategies. They will require ongoing study and analysis. The promising best practices shared in this document are not an exhaustive list, but they focus on key recommended actions that are the most achievable, have a high potential impact, and the most relevant in today's economic climate.

In the continued transition to a digital and highly-connected world, ubiquitous broadband availability and widespread use is essential for California to remain a leader in economic competitiveness, environmental sustainability, and high quality of life. CETF will continue to work with leaders and partners at the state, regional, and local levels to develop and advance policies that promote these promising best practices to encourage accelerated deployment of broadband.

About CETF

The **California Emerging Technology Fund** (CETF) was established by order of the California Public Utilities Commission as a statewide non-profit public benefit organization and key partner to the State with $60 million in seed funding to accelerate deployment and adoption of broadband to unserved and underserved California communities. To date, CETF has leveraged a 4:1 match distributing over $20 million in grants to more than 60 community-based organizations. CETF strategies, statewide leadership, and public-private policy commitments are contributing to a measurable impact on Californian's broadband use by household since 2008: 17% increase for overall use; 25% for Low-Income; 21% for Latinos; 18% increase for Rural; and 13% for People with Disabilities. CETF is performance-driven, outcomes-focused, and committed to closing the Digital Divide by 2017. (www.cetfund.org)

About Valley Vision

Valley Vision is an independent non-profit that provides analysis and action to improve the Capital Region's economic prosperity, social equity, and environmental sustainability. Valley Vision manages over a dozen regional-scale coalitions and joint ventures for business, government, community and foundation partners in the areas of digital access, green business development, environmental sustainability, air quality, climate change, health care improvement for underserved populations, food access in urban areas, agriculture sustainability and more. Its signature effort has been its partnership with SACOG in co-designing and conducting the civic engagement activities that led to the adoption of the Sacramento Blueprint for Transportation and Land Use, now a national model for long-range visioning, smart land use and civic engagement. (www.valleyvision.org)

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