

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.

A report¹ 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.

"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 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 publication² 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 telecommuting³ 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 society⁴. 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 CO₂⁵.

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 billion⁶.

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 2011⁷.

Example: The SANDAG “iCommute” program⁸ 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 ratio⁹.

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 CO₂¹³.

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 atmosphere¹⁴. 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 road¹⁶.

Example: The Sacramento Municipal Utility District’s (SMUD) SmartSacramento Project¹⁷, 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 technologies¹⁸.

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 billion¹⁹. Seven out of the eighteen recommendations in the *Recommendations from the Green Building Task Force* report²⁰ from the Green Capital Alliance rely on education and marketing approaches to build consumer awareness.

Example: Energy Upgrade California²¹ 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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