

# Working Paper No. 3

## Mobility and Energy Conservation

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### 1. Background

#### *a. Travel patterns and the transportation system*

On the ground, Puna's present development form exhibits characteristics of a rural community – i.e., relatively low-density development amid a scattering of small farms and towns. Yet, a parcel map of Puna reveals the potential for extensive sections of Puna to develop as a large-lot suburban area. The emerging pattern is already evident in aerial photos of subdivisions such as Hawaiian Paradise Park. It is also increasingly apparent in the travel characteristics of Puna's residents. Over 97% of Puna's workforce commutes to work by personal vehicle.<sup>1</sup> For over 90%, the commute time is 10 minutes or longer, and for 21% the commute time is 40 minutes or longer. Hilo is the primary place of employment for Puna residents, as well as the location for shopping and services. About 24 percent of the workforce carpools, but congestion is growing along Puna's principal corridors during peak commute periods.

Primary transportation routes are the Volcano Road (Highway 11), which provides access to Hilo and serves upper Puna; the Puna Road (Highway 130), which serves lower Puna from Kea'au to Kalapana-Kaimū; the Kapoho Road (Highway 132), which connects Pāhoa to Kapoho; and the Puna Coast Road, which links Kapoho to Kalapana-Kaimū. During peak commuting periods, traffic volumes are highly concentrated along these routes -- especially Highway 11 between Kea'au and Hilo and Highway 130 between Pāhoa and Kea'au – because there are no alternative routes to Hilo and connections between roads in adjacent subdivisions are poor or non-existent.

Roads within the nonconforming subdivisions are privately-owned and maintained by community road maintenance associations. Some associations have mandatory maintenance fees while others are voluntary. Typical road maintenance fees range from \$60 to \$150 per year per lot. Most of the roads are narrow and lack paving, lighting and traffic control signs.<sup>2</sup>

These road conditions, combined with poor connectivity in the street system and a dispersed pattern of development, make it challenging to devise and sustain a viable mass transit system for Puna. The county's Mass Transit Agency (MTA) operates the Hele-on bus, whose service is available to the general public at fares ranging from \$0.75 to \$2.25. In 2005, the county initiated a free fare service between Pāhoa and Hilo that more than doubled ridership (see Figure 1.) Less than 1% of the workforce commutes by bus, but Puna residents with special needs, such as the elderly, disabled and/or those with low-income are vitally dependent on transit and paratransit services for mobility. Table 1 lists paratransit services that are provided by programs to serve people with special needs. A

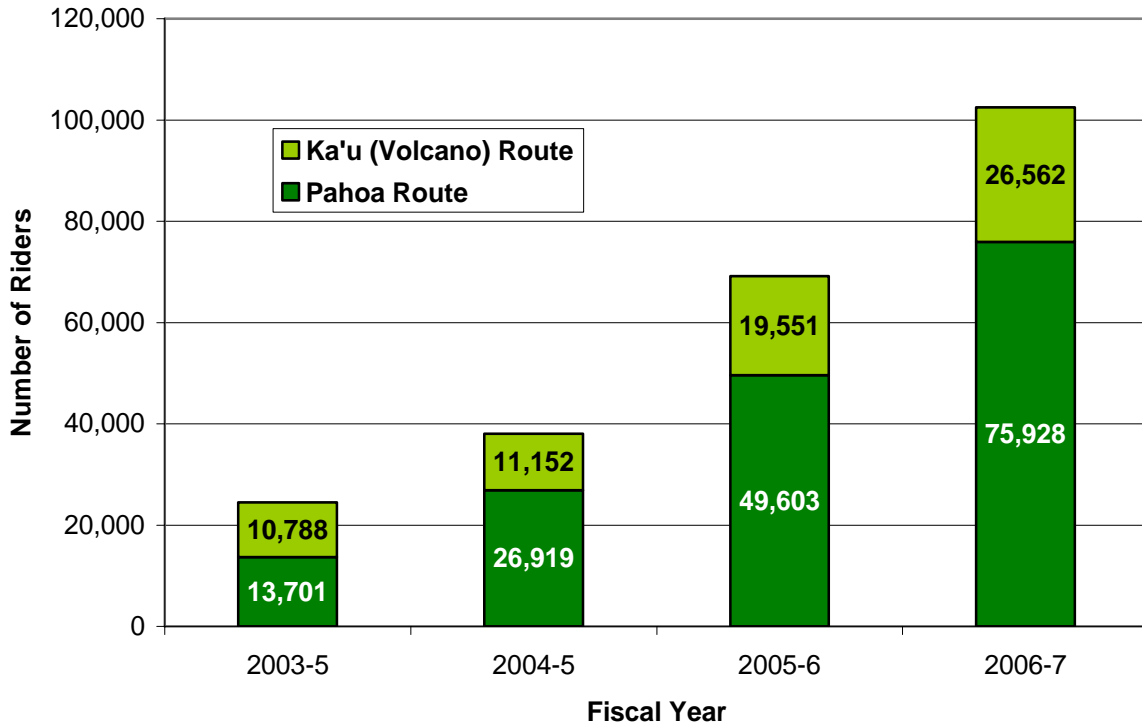
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<sup>1</sup> U.S. Bureau of Census, *2000 Census of Population*.

<sup>2</sup> Townscape, Inc., for County of Hawai'i Planning Department, *Puna Regional Circulation Plan*, 2005.

2005 study estimated that only 20% of the need for paratransit services was being met islandwide, with a probable higher rate of unmet demand in Puna.<sup>3</sup>

**Figure 1**  
**Hele-on Ridership on Pāhoa and Ka‘u (Volcano) Routes, 2003 to 2007**



**Table 1**  
**Transit and Major Paratransit Services Operating in Puna**

Operator	Type of Service
Mass Transit Agency, Hele-on bus	Fleet of 43 buses, most with wheelchair lifts, provides service along fixed routes. There are five round-trips per day on the Pāhoa-Hilo route and two round-trips per day on the Volcano-Hilo route.
Hawaii County Economic Opportunity Council	Operates fleet of 26 vans islandwide to provide transportation services for low-income people. Riders must be registered with the agency and schedule trips in advance. In 2005, 483 of the registered riders lived in Puna or Ka‘u.
Parks and Recreation Department, Coordinated Services for the Elderly program	Van service for people 60 years and older who lack access to conventional transportation due to disability or income. Serves primarily Hilo, with limited service in other districts. In 2005, there were 175 registered riders living in Puna. Priorities are to provide access to: medical care, resource agencies to qualify for benefits or services, and essential shopping.

<sup>3</sup> Lyon Associates for the County of Hawai‘i Mass Transit Agency, *Rural Paratransit Study for Puna and Kona, Island of Hawai‘i*. August 2005.

At present, there are few physical provisions for bicycle and pedestrian travel anywhere in Puna, even within older settlements, although there are plans to establish a network of bikeways throughout the district (see Appendix A.) The longer of these proposed bikeways are incorporated into the recreational trail system described in Working Paper #2. The dispersed pattern of development discourages walking and bicycling for short trips. Working Paper #1 proposes the formation of village centers to encourage the location of services and frequent destinations within more convenient walking and bicycling distances for residents of nonconforming subdivision, but it requires a long-term effort by many property owners to implement this more compact development pattern.

**Figure 2**  
**Existing Hele-On Bus Routes**



A significant concern for all modes of travel in Puna is roadway safety. Puna has the highest five-year total motor vehicle fatality rate of all the districts on the island.<sup>4</sup> Pedestrians and bicyclists are also at risk.

**Table 3**  
**Motor Vehicle Accidents in Puna, 1990 and 2000**

Roadway	Number of Major Traffic Accidents								Number of Persons Killed		Number of Persons injured	
	Fatal		Injury Only		Property Damage Only		Total					
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Kahakai Blvd.	1	0	7	12	8	7	16	19	1	0	11	14
Pohoiki Rd.	0	0	5	4	2	1	7	5	0	0	10	12
Hwy. 11	5	3	79	42	81	44	165	89	5	3	165	89
Hwy. 130	2	1	114	53	98	36	214	90	2	1	197	95
Hwy. 132	1	0	17	13	12	4	30	17	1	0	30	23
Hwy. 137	0	0	2	3	5	0	7	3	0	0	5	6
Total	9	4	224	127	206	92	439	223	9	4	418	239

*Source: Hawaii County Police Department*

***b. Energy use and infrastructure***

Puna has been known as a district where people live largely “off-the-grid”; that is, where dwellings, particularly in more remote locations of the nonconforming subdivisions, are not connected to the electrical power service provided by the local utility company, Hawaiian Electric Light Company (HELCO). While many residences in remote locations still remain unconnected to the power grid, the rate of new residential service connections in Puna over the past two to three decades has outpaced the number of new dwellings (see Figure 2), suggesting that owners of many existing dwellings are choosing to connect to the grid to supply at least a portion of their power needs or to provide back-up power.

There are two power generation facilities in Puna. HELCO’s Puna Steam Plant and the geothermal power generation source at Kapoho operated by Puna Geothermal Ventures (PGV). The PGV facility has a rated capacity to generate 30 megawatts (MW) of baseload power, making it the second most significant firm source of power on HELCO’s islandwide network.<sup>5</sup> HELCO’s transmission lines follow the corridors of Highways 11, 130 and 132, with spurs leading to substations the Hawaiian Beaches and Ainaloa subdivisions. The

<sup>4</sup> *Puna Regional Circulation Plan*, p. 6-3.

<sup>5</sup> Hawaiian Electric Light Company, Inc., *Integrated Resource Plan, 2007-2026*, PUC Docket No. 04-0046, May 2007

most recent segment is a 138kv transmission line connecting the PGV geothermal facility at Kapoho to the Kea‘au substation.

While larger-scale development of geothermal power for export has been proposed in past years, several factors discourage this:

- Public opposition from residents living in proximity to potential geothermal sources; from those concerned about impacts to the natural environment; and from those who object based on cultural practices and beliefs.
- The costs and environmental impacts associated with the development of infrastructure necessary to develop the source and export the power, particularly an interisland cable.
- The inefficiencies and “line loss” related to the transmission of power a long distance from the source.

For these reasons, it is unlikely that large-scale expansion of geothermal power generation within the eastern rift zone of Puna will occur within the time horizon of the Puna Community Development Plan. On the other hand, there is potential to capture excess heat for direct uses, such as greenhouses, pasteurization of potting media, biodiesel production and lumber kilns. A recent study conducted for the county Department of Research and Development found that development of such indirect uses was technically feasible but, at least for the time being, economically unattractive.<sup>6</sup> The principal barrier is lack of access to the excess heat generated by the PGV facility.

## **2. Limiting demand for commuting and other trips**

### ***a. Expand telecommuting opportunities***

Advances in the telecommunication network have allowed for greater flexibility in the workplace. It offers several advantages for Puna residents, such as:

- Greater flexibility in work hours.
- Reduced time spent driving and commuting.
- Greater employability and access to education for marginalized groups, such as mothers and fathers with small children, the handicapped and people living in remote areas.
- Fewer vehicles on the roads and therefore reduced impacts on the natural environment.

Telecommuting is by no means a panacea for traffic congestion during peak commuting periods. Flexible job locations would work well for certain small business owners, part-time workers, and others who are able to perform work that requires little direct supervision, such as data analysts, events coordinators, researchers, grant writers, college students and telephone answering service providers. Internet access and videoconferencing can also be employed to some extent for students. However, studies indicate that most home-based telecommuting is only partial, with time split between home

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<sup>6</sup> Okahara & Associates for County of Hawai‘i Department of Research and Development, *Feasibility Study, Geothermal Direct Use, Kapoho/Pohoiki Area*, February 2007

and other workplace. Over half of all telecommuters work at home 1 to 3 days per week; the average total time worked at home is 18.6 hours per week.<sup>7</sup> Also, many jobs – especially in the service sector – require the employee to be physically present. Studies have also pointed out that there are both advantages and disadvantages of telecommuting, as summarized below:

**Table 4**  
**Advantages and Disadvantages of Telecommuting**

Benefits	Disadvantages
<ul style="list-style-type: none"> <li>• Flexible schedules</li> <li>• Less distractions</li> <li>• Increased productivity, more efficient</li> <li>• Helps the environment</li> <li>• Less stress</li> <li>• Improved quality of life</li> <li>• Good working conditions</li> <li>• Reduced facility costs</li> <li>• Retain valuable employees</li> </ul>	<ul style="list-style-type: none"> <li>• Feel isolated</li> <li>• Lack of access to data and files</li> <li>• Communications</li> <li>• May breed resentment from coworkers</li> <li>• Hardware costs, personal expenses</li> <li>• Not available for meetings or when problems arise</li> </ul>

Currently, wire-based access to high speed internet network for telecommuting purposes in Puna is limited to the areas served by the Hawaiian Telcom and Roadrunner (cable) networks. An alternative will soon be offered as part of a contract between Sandwich Isles Communications and the Department of Hawaiian Home Lands (DHHL) to provide broad-band width, high-speed communications access to all DHHL lands in the state. DHHL lands in Puna are at Maku‘u, Keonepokonui, and Ola‘a. Though the network is being built for DHHL lands, Sandwich Isles indicates that it is possible for other users to connect to their network.<sup>8</sup>

As of July 2007, the Hilo portion of this fiber optic network is almost completed. Once this segment is finished, the network will continue south towards Pāhoā. The route will follow an off-highway alignment from Hilo to Kea‘au. At Kea‘au, the network will run parallel alongside Highway 130 until it reaches Pāhoā. Several of the existing and proposed village centers of Puna will be within five miles of the fiber optic line. These developments include: Orchidland Estates, Hawaiian Paradise Park, ‘Āinaloa, Nanawale Estates, and Lelani Estates

Long-term, Sandwich Isles will add a spur along Highway 11 towards Volcano to connect to DHHL lands in the Ola‘a area, but only when DHHL starts developing that area. When the Ola‘a fiber optic line is completed, the village centers of Volcano, Kurtistown and Mountain View will be within five miles of the network.

Access to broadband internet service does not necessarily depend on any of these wire-based networks. Wireless local area networks (commonly known by the brand “Wi-Fi”) are also commercially available. Wi-Fi operates over radio waves, so radio towers would need to be constructed at strategic, high elevations. With respect to Puna, a benefit of this

<sup>7</sup> U.S. Department of Transportation, *Transportation Implications of Telecommuting*, April 1993.

<sup>8</sup> Telephone interview, 7/19/07.

system is that wires do not have to be laid over seismically active areas that could become cut off during an earthquake or lava flow.

Several small towns and rural communities around the world have begun creating their own Wi-Fi networks. The larger service providers do not have the financial incentive to create these networks, so government entities are subsidizing their construction. These systems are promoted as a way to increase job opportunities and expand technology into rural areas. The U.S. Department of Agriculture Rural Development program provides several types of loans and grants for financing rural telecommunications infrastructure:

- The *Traditional Telephone Loan* program consists of hardship, cost of money, and guaranteed loans that finance voice telephone service with capability for broadband service using digital subscriber loop (DSL) technology.
- The *Broadband Access Loan* program provides loans for funding the costs of construction, improvement, and acquisition of facilities to provide broadband service to eligible rural communities.
- The *Distance Learning and Telemedicine* program brings electronic educational resources to rural schools and improves health care delivery in rural areas.
- The *Community Connect Grant* program provides financial assistance to eligible applicants that will provide currently unserved areas with broadband service that fosters economic growth and public safety services.

*Due to the high cost of creating a Puna-wide Wi-Fi network, it would be more feasible to locate Wi-Fi reception areas within existing and planned village centers. Wi-Fi transmitters could be constructed at public facilities such as schools or community centers. These “hotspots” have the potential to attract even greater numbers of people to the village centers and to promote higher density development. The service should either be subsidized by the federal or county government or paid through a modest user fee.*

#### ***b. Promote ride-sharing, van-pools, car-pooling***

The state Department of Transportation (HDOT) administers programs to encourage more efficient commuting by vehicle:

- HDOT contracts with Vanpool Hawaii to provide air-conditioned, vans and sport utility vehicles for 7 to 15 passengers. Monthly costs vary based on the daily round trip miles and type of vehicle. The driver gets to keep the vehicle to use on weekends and after commute hours, in exchange for picking up riders and collecting fee. Insurance and maintenance costs are included in the fees. Vanpoolers share the costs of parking and gas.
- HDOT matches commuters for ride-sharing. SchoolPool is a type of ride-sharing program that is co-sponsored by the Department of Education and is designed specifically for the transportation of school children by their parents or guardians.

Presently, there are no Vanpool originating from Puna. *Availability of the VanPool and ride-sharing alternatives should be more actively promoted to Puna’s commuters by working through major employers and large institutions such as University of Hawai‘i at*

*Hilo and Hawai'i Community College, which can offer incentives such as preferential parking for ride-share vehicles.*

**c. Provide more services within Village Centers**

Working Paper #1 identifies several existing and proposed Village Centers to provide Puna residents – especially the increasing number of those living in the nonconforming subdivisions – with more convenient access to services (see Table 5.)

**Table 5  
Uses and Services within Village Centers**

<i>Type</i>	<i>Regional Town Center</i>	<i>Community Village Center</i>	<i>Neighborhood Village Center</i>
Locations	Kea'au, Pāhoā.	Āinaloa, Kurtistown, Mountain View, Hawaiian Paradise Park (no more than two locations), and Volcano.	(Potential): Hawaiian Beaches, Orchidland, Nanawale, Leilani, Kapoho, Glenwood, an area between Kaimu and Opihikao, and Hawaiian Paradise Park. <sup>9</sup>
Typical Uses	More than 40 tenant spaces for full range of retail and personal services, repair shops and other light industrial uses	20 to 40 small tenant spaces for retail and personal services, repair shops	5 to 15 small tenant spaces for convenience retail and personal services
Commercial Floor Area	Up to 250,000 square feet aggregate, but no tenant spaces larger than 50,000 square feet.	Up to 150,000 square feet aggregate, but no tenant spaces larger than 25,000 square feet.	Up to 50,000 square feet
Other Uses	Regional park; schools (all grades); community hall, theater; outdoor events area; bed-and-breakfast homes and small inns; elderly or other special needs housing; transit hub; medical facility with emergency room; police and fire station; walking and bicycling paths.	Community park, elementary or middle school, community center and outdoor events area; bed-and-breakfast homes and small inns; elderly or other special needs housing; transit stop; medical clinic; walking and bicycling paths.	Neighborhood park, elementary school, multi-purpose meeting room or (minimum) place to congregate or post community notices; outdoor events area (e.g., barbeques and farmer's markets); small bed-and-breakfast homes; transit (or para-transit) stop; connections to walking and bicycling paths.

Development and expansion of these Village Centers will have several types of impacts on travel patterns in Puna:

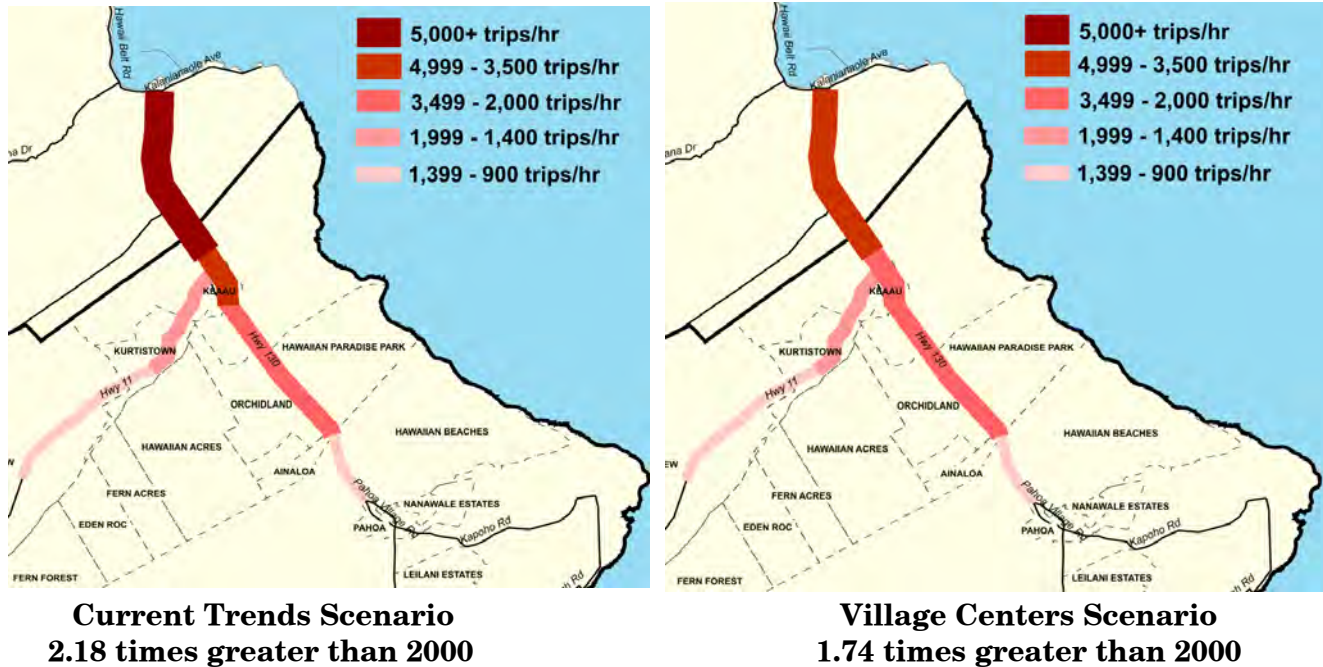
- Commercial services for everyday shopping or other personal needs will be in closer proximity to a larger number of residents. While this may not significantly reduce the number of vehicle trips, the average length of those trips will be shorter.
- Parks, schools, community centers and similar facilities will be closer to more people who use them, especially the young, elderly or lower-income people who are not able to drive themselves. This will encourage more walking, bicycling and transit trips, provided that there are also safe and convenient facilities for these modes to and within the Village Centers.

<sup>9</sup> Hawaiian Paradise Park may have a Neighborhood Village Center in the makai area in addition to the two Community Village Centers in the mauka area of that subdivision.



- Village Centers will be places of employment, as well as services. To the extent that these jobs are filled by Puna residents, this will reduce the length and number of commuting trips. The impact on peak commuting period traffic would be greatest along the Highway 11 corridor between Hilo and Kea‘au and along Highway 130 between Kea‘au and Shower Drive at Hawaiian Paradise Park (see Figure 3.)

**Figure 3**  
**Projected 2030 Traffic Volumes on Principal Corridors**



*Source: Puna Regional Circulation Plan, 2005*

**d. Create new “green” employment within Puna**

Working Papers #1 and #2 identify several opportunities to create or expand employment opportunities in Puna, mostly through use of the region’s natural assets. As noted in Working Paper #2, Puna is already a major producer of tropical flowers and fruits. Volcanoes National Park already draws large numbers of “eco-tourists”. Below are several opportunities to expand on “green” and energy-related employment:

- *Biomass Production:* Former sugarcane lands in the Kea‘au could be put back into cultivation to produce plant biomass for conversion to biodiesel or ethanol fuel. Other potential sources for biofuel production include palm oil, and Kukui nut. Additionally, there is ongoing research into turning algae into a biofuel. If this technology continues to advance, there could be opportunities for algae farms along the Puna coast.
- *Direct Use of Geothermal:* As mentioned in Section 1.b., a recent county study concluded that direct use of excess geothermal heat for greenhouses, pasteurization of potting media, biodiesel production and lumber kilns is only

marginally feasible. However, this assessment could change if another stable source of heat other than the PGV facility is identified and a source of public subsidy for a start-up period can be found.<sup>10</sup>

- *Organic Produce:* With four large retail outlets planned for locations on O'ahu and Maui, the entry of Whole Foods Market is expected to be a major boon to organic farming throughout the state. The Big Island's Hamakua Springs Country Farms will be one of Whole Foods' providers.<sup>11</sup> Mala 'Ai 'Opio (MA'O) Farms in Wai'anae is a good example of a successful non-profit organic farming venture that could be replicated in Puna. MA'O not only provides employment, but also training for underemployed youth (see Appendix D.)
- *Agricultural and Eco-Tourism:* Tours that feature Puna's unique agricultural products, such as tropical flowers and fruits, not only increase direct sales, but also expose visitors to unfamiliar produce, such as rambutan, durian and cheremoya, which in turn expands export sales. In 2004, the value of agricultural tourism on the Island of Hawai'i was estimated at over \$12.5 million, up 42% from four years earlier.<sup>12</sup> Local farms also supply the bed-and-breakfast inns that attract eco-tourists to Volcanoes National Park and other sites of natural and cultural interest. The Hawai'i Tourism Authority offers grants of up to \$50,000 to businesses and organizations to undertake projects and events to stimulate this niche market. A recent grantee was Big Island Farm Bureau, which was awarded \$25,000 to hold an agricultural festival.<sup>13</sup>
- *Enterprise Zone Incentives:* Virtually the entire populated area of Puna is within the state-designated Enterprise Zone (EZ). Businesses within an EZ that make at least half of their gross annual income from agriculture or alternative energy development and increase the number of full-time employees by at least 10% by the end of the first year and an average of 10% annually in the following six years are eligible for the following incentives:
  - Full exemption from the General Excise Tax (GET) for up to seven years. The GET exemption applies only to gross revenues from EZ-eligible business categories within an EZ. Licensed contractors are also exempt from GET on construction done within an EZ for an EZ-qualified business.
  - An 80% reduction of state income tax the first year. This reduction goes down 10% each year for the remaining six years.
  - An additional income tax reduction equal to 80% of annual Unemployment Insurance premiums the first year.
  - Three-year exemption from any increase in property taxes resulting from new construction by EZ firms at their EZ sites.
- *Federal Sources:* The U.S. Department of Agriculture (USDA), whose state headquarters is located in Hilo, offers an array of grants and loans for rural economic and agricultural development (see Appendix E.) Many of these

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<sup>10</sup> Okahara & Associates, *op. cit.*, p. ii.

<sup>11</sup> <http://www.hamakuasprings.com/>

<sup>12</sup> Hawai'i Agricultural Statistics Office, <http://www.nass.usda.gov/hi/speccrop/agtour.htm>

<sup>13</sup> Hawai'i Tourism Authority, County Product Enrichment Program, <http://www.hawaii-county.com/rd/2007%20CPEP%20Application%20Packet%20for%20Distribution.pdf>

programs are available only to non-profit organizations. In some instances, they are available through a federally-funded non-profit organization, the Rural Community Assistance Corporation<sup>14</sup>

### **3. Promoting mass transit and alternative travel modes**

The most important long-term measure to promote transit ridership, walking and bicycling as modes of travel is to reshape the development growth pattern of the region along the Village Center model, so that more people can live closer to services and places of employment. In the meantime, steps can be taken to support those travel modes in the near term and anticipate and facilitate the gradual transformation of the land use pattern.

#### ***a. Expand and improve delivery of transit services***

The county Mass Transit Agency (MTA) is presently implementing several measures to expand and improve transit service in Puna by converting to a “hub-and-spoke” system as follows:

- The larger Hele-on coaches will operate more frequent runs on a shorter route between Hilo and a Puna “hub” at Kea‘au. There will also be secondary hubs at Pāhoa and Volcano.
- MTA is acquiring a fleet of 18-passenger 4-wheel drive vehicles to operate paratransit services for the general population in areas beyond the hubs, where roads are typically unimproved. Passengers will call to schedule a pick-up. Paratransit vans will be available at the hubs to take passengers disembarking from the Hele-on bus to their destinations.
- MTA will schedule pick-up appointments for paratransit passengers and coordinate the Hele-on service with the paratransit operations provided by the Hawaii County Economic Opportunity Council, the Coordinated Services for the Elderly, and other smaller programs for riders with special needs through the computerized Trapeze NOVUS program or similar software.
- Intermediate Hele-on stops are being considered along the routes between the hubs at park-and-ride locations. MTA is presently in the process of identifying suitable park-and-ride sites.

MTA expects to have the hub-and-spoke system in operation by late Spring 2008. It will be further refined as vehicles are added to the fleet and other supporting infrastructure, such as the park-and-ride lots, are developed.

*Proposed sites for the hubs and park-and-ride lots, shown in Figure 4, are:*

- *Kea‘au (Primary Hub): In-town location near commercial centers or on state lands adjacent to the soccer fields; second site could include a new MTA baseyard and headquarters.*

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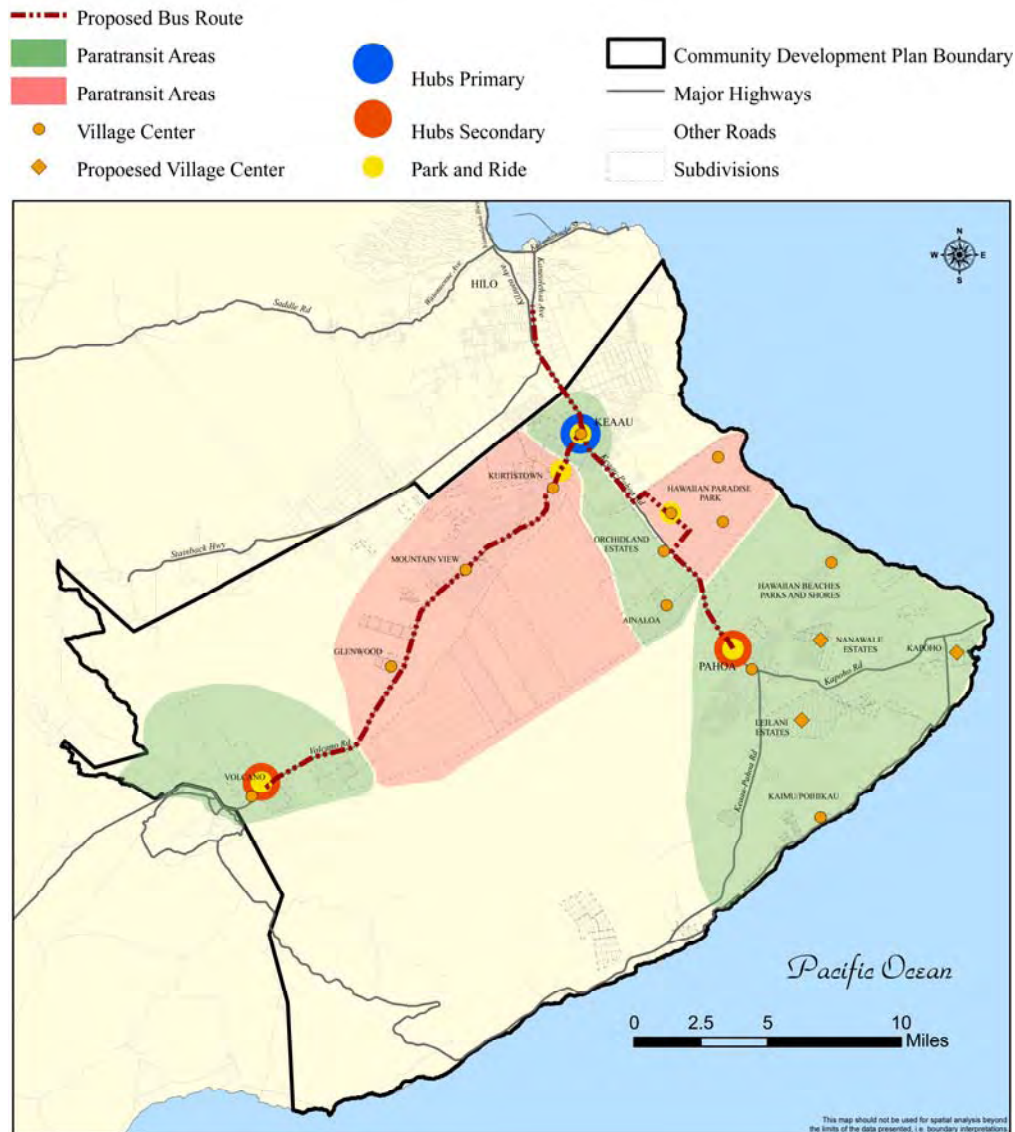
<sup>14</sup> <http://www.rcac.org/doc.aspx?142>

- *Pāhoa (Secondary Hub): On county-owned sites, either adjacent to Pāhoa Community Center or on Highway 130 near Kahakai Boulevard where the new fire and police stations are planned.*
- *Volcano (Secondary Hub): Either at Cooper Center (with the permission of the Volcano Community Association) or on state land near Old Volcano Highway and Wright Road.*

*Additional recommended locations for park-and-ride lots are:*

- *Hawaiian Paradise Park, at one or two of the proposed Village Center locations, where the community-owned parcel could serve as a parking lot for commuters, as well as a location for farmers' markets.*
- *Kurtistown, at Mea'ulu Street, which would serve commuters living in Puna Mauka subdivisions, Kurtistown and Mountain View.*

**Figure 4**  
**Proposed Transit Hubs, Park-and-Ride Lots and Paratransit Service Areas**



Other recommended measures to improve and expand transit service are:

- *Develop a county-wide Transit Master Plan to provide an overall framework for transit improvements.*
- *Launch a public education campaign promoting transit services, tailoring them to target populations such as youth, commuters, and the elderly.*
- *Cultivate public /private partnerships, such as employer-sponsored bus passes.*
- *Expand the staff of the Mass Transit Agency to provide greater support for public relations, route planning and coordination, technical operations and fleet management.*
- *Investigate other incentives to increase ridership, such as convenient bus ticketing systems, reduced monthly rates for residents and special needs populations, and tourist passes.*

***b. Create safe routes to schools and parks***

The Department of Education (DOE) contracts private bus companies to provide transportation for students in Puna. However, there are limits to the value of this service:

- DOE reports that the service in East Hawai'i has been unreliable due to a chronic shortage of bus drivers<sup>15</sup>
- Parents, teachers and students have reported disciplinary problems on school buses, which are difficult to control when the sole adult on board is the driver.
- Many students are unable to take part in after-school tutoring, sports or other activities due to lack of transportation.
- Large numbers of students attend charter and private schools with no bus service.

Improvements to MTA transit service could supplement the DOE bus service and provide more options for students. *This could be accomplished by a reduced or free fare service for students, with reimbursements to MTA from DOE and private or charter schools via a voucher system.*

Even with improved bus service, however, there need to be safer, more convenient walking and bicycle routes to frequently used public areas, especially schools and parks. Often, these facilities are collocated and are used by people of all ages at various times of the day and week, not just when school is in session. Accessibility to these facilities by pedestrian and bicycle routes is particularly important for the young people who most commonly use them, since they are not able to drive themselves to these locations. Some school complexes in Hawai'i have undertaken on-the-ground inventories and assessments to identify safety problem areas and strategies and projects to make routes safer and more convenient. *Funding is available through Healthy Hawai'i Initiative, a program of the*

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<sup>15</sup> Communication from John Saplan, Department of Education coordinator for student transportation in East Hawaii to the Puna CDP Transportation – Mass Transit Working Group, 2006.

Table 6 lists the indicators for a safe routes program. Often, relatively simple physical or operational modifications can be made to make routes safer, such as properly marked crosswalks with crossing guards at peak periods, improved signage, or brightly painted berms to separate the pedestrian path from a travel lane. Following are minimal features that should be incorporated in all roadway improvements that involve identified walking and bicycling routes to schools and parks:

- *Improve roadway shoulders in roadway construction and maintenance projects.*
- *Provide bicycle /pedestrian paths as part of new roadway connection projects.*

**Table 6**  
**Key Indicators of Safe Routes to Schools Program**

Outcome	Objectives
Behavior of children	<ul style="list-style-type: none"> <li>• Increase numbers of children walking to and from school</li> <li>• Increase numbers of children bicycling to and from school</li> <li>• <u>Improve skills for walking and bicycling safely</u></li> </ul>
Behavior of drivers	<ul style="list-style-type: none"> <li>• Reduce the numbers of vehicles arriving and departing school at morning drop-off and evening pick-up times</li> <li>• Decrease speed of vehicles in and around school area</li> <li>• Prevent aggressive driving behavior (e.g., not yielding to pedestrians)</li> <li>• Decrease number of driving trips by parents and length of commute</li> </ul>
Community facilities	<ul style="list-style-type: none"> <li>• Improve the quality of walking environment: number and usefulness of sidewalks and bike lanes</li> <li>• Safely design intersections (lights, crosswalks, etc.)</li> </ul>
Crashes and Injuries	<ul style="list-style-type: none"> <li>• Reduce the number of traffic crashes involving children walking or biking to and from school</li> <li>• Decrease severity of injuries to children from traffic on their way to and from school</li> <li>• Reduce the number of conflicts between vehicles and pedestrians/bicyclists which would be likely to lead to crashes (i.e., "near misses")</li> </ul>
Community buy-in	<ul style="list-style-type: none"> <li>• Increase the diversity of people involved in SR2S efforts</li> <li>• Heighten the level of commitment and energy displayed by collaborators</li> <li>• <u>Develop parent enthusiasm about allowing their children to walk or bike</u></li> </ul>
Environmental quality	<ul style="list-style-type: none"> <li>• Decrease level of air and noise pollution in school area</li> <li>• Reduce land devoted to parking and drop-off/pick-up areas</li> </ul>
Health, Responsibility and Empowerment	<ul style="list-style-type: none"> <li>• Provide children with activity of daily living (ADL) which contributes to physical and mental health.</li> <li>• Reduce public health concerns related to juvenile obesity.</li> <li>• Provide opportunity for empowerment of children taking a responsible and active role in their own transportation needs.</li> <li>• Provides children choice of flexible transportation schedule that accommodates after-school activities.</li> </ul>

<sup>16</sup> See [http://www.healthyhawaii.com/about/about\\_start\\_living\\_healthy/about\\_start\\_living\\_healthy.htm](http://www.healthyhawaii.com/about/about_start_living_healthy/about_start_living_healthy.htm) and <http://safety.fhwa.dot.gov/saferoutes/fy09projection.htm>

***c. Increase the amount of funding for enhancing alternative travel modes***

The above proposals for improving transit and creating safer routes to schools and parks will require a lot more investment than the county presently has available to spend. Federal subsidies are available for a portion of operational costs, including the purchase of transit vehicles. Also, federal money can be appropriated for transit-related capital improvements, such as baseyards and park-and-ride lots. Most federal funds come through the state Department of Transportation (HDOT), which identifies planned uses of federal money for projects in the State Transportation Improvement Program (STIP).

Other sources of funding can be tapped through various public agencies and private organizations. Following are recommended actions to increase funding from existing available sources:

- *Request that HDOT allocate in the STIP a larger share of federal “flex funds” (i.e., the Section 402 program funds) for projects in Puna from highway capacity improvements to transit-related and alternative travel mode improvements, including pedestrian and bicycle safety.*
- *Request that the Department of Education and private schools allocate or increase funding for school buses, crossing guards and improvements to school routes for walking and bicycling.*
- *Supplement public funding for safe routes to schools and parks with voluntary fundraising efforts by associations of school parents, staff, students and area businesses and service organizations and charitable foundations. Funding could be used for hiring a coordinator, purchasing incentives, printing newsletters, or for managing community and school participation. In order to receive tax-deductible donations, which are important to charitable donors, a bike advocacy or safe routes to school group needs to be affiliated with a non-profit agency or school.*
- *Allocate local funding to the county Department of Public Works to make improvements such as sidewalk and crosswalks, traffic signage and acquisition of access easements based on recommendations of a safe routes to schools/parks assessment.*
- *Allocate local funding to the county Police Department to monitor traffic operations along safe routes to schools/parks and enforce against traffic code violations.*

To accelerate progress, the county should also consider additional local funding. The options are fairly limited because the county depends primarily on real property taxes for revenue, and the largest share of this revenue is spent to provide basic public safety and emergency services. For transportation improvements, the county is authorized to levy a motor vehicle weight tax and a gasoline tax, both of which they already use. Last year, the County Council increased the motor vehicle weight tax and allocated two-thirds of the additional revenue to the repair and maintenance of county roads. The other third of the increase went to transit improvements. The Council declined to raise the gasoline tax,

although the County of Hawai'i has the lowest gasoline tax rate of all the counties in the state.<sup>17</sup>

Another opportunity for the County Council to raise local revenue for transportation improvements is to levy a surcharge of up to 0.5% on the Hawai'i General Excise Tax, which the State Legislature authorized in 2006.<sup>18</sup> Revenue from the surcharge may be used for the following purposes:

- (1) Operating or capital costs of public transportation systems, including public roadways or highways, public buses, pedestrian paths or sidewalks, or bicycle paths; and
- (2) Expenses in complying with the Americans with Disabilities Act of 1990

*Accordingly, it is recommended that the County Council consider the following measures to increase funding for enhancement of transit and alternative travel modes in Puna:*

- *Increase the gasoline tax to a level commensurate with other Hawai'i counties.*
- *Enact a surcharge of up to 0.5% on the Hawai'i General Excise Tax.*

#### **4. Promoting the use of off-grid renewable energy sources**

Puna lacks the physical conditions suitable for hydro-electric or wind power generation, except for small applications at specific locations. In Puna, solar-generated power has greater potential.

##### ***a. Promote use of solar technologies***

Solar powered street fixtures have the potential to provide adequate street lighting without the cost of monthly electricity bills or extensive wiring. These models employ the same bulbs that are used in existing street light fixtures and provide the same light intensity. They contain a moderately sized photovoltaic panel and protected electrical box that stores the battery and other electrical equipment. The batteries retain enough power to keep the lights running throughout the night. Additionally, the lights can be programmed to provide high levels of light during peak travel time and lowered amounts throughout the night, decreasing light pollution.

Solar panels can also be attached to bus stops and other structures that have more moderate lighting needs. These arrays have a higher start-up cost, but in the long-term pay for themselves through lowered electrical bills. In addition, the self-contained units do not require any long trenching of electrical wires, so they are ideal for rural settings.

As noted in Section 1.b., many homes in Puna are not connected to HELCO's electrical power grid or use it only for back-up power. Given the rural nature of the area, renewable energy is already widely accepted and utilized by Puna residents.

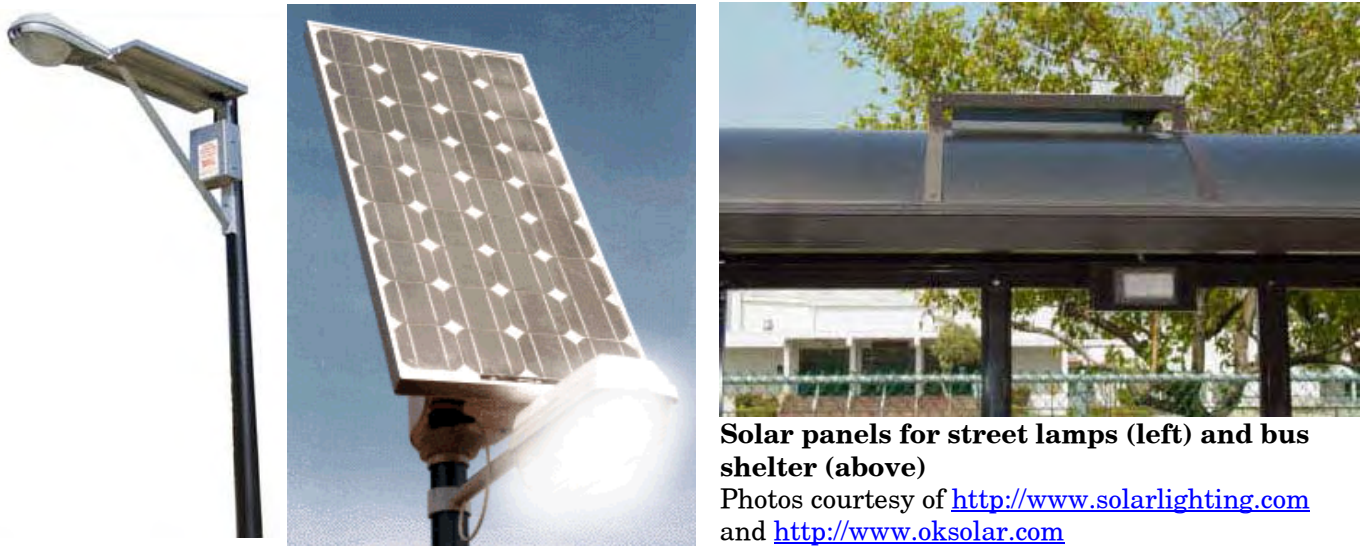
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<sup>17</sup> The County of Hawai'i gasoline tax is \$0.088 per gallon, compared to \$0.165 in Honolulu, \$0.18 in Maui and \$0.13 in Kaua'i.

<sup>18</sup> The relevant citation is Section 46-16.8, Hawai'i Revised Statutes.



**Figure 5**  
**Use of Solar Technology for Public Facilities**



Off-grid systems allow users to save money on utility bills while providing enough energy for their home's needs. Photovoltaic panels (or "solar panels") can be adjusted to fit an individual building's needs and come in several shapes and styles including: raised flat panels, metal-appearance panels, or shingle-style panels.

**Figure 6**  
**Residential Applications of Solar Energy**



If the photovoltaic (PV) panel is independently connected to the house and off the electrical power grid then it will require a battery backup. If the house is hooked into the electrical grid then a net-metering system can be set up. By law, the electric company is

required to provide the free installation of net-metering boxes upon request.<sup>19</sup> These systems allow the solar producer to feed energy back into the electrical grid when the home is not using the energy. The electric company buys the electricity from the producer at a wholesale rate.

The use of PV panels for residential application is already cost-competitive with conventional utility service in Puna. In 2005, PV modules were selling at \$5.20 per watt.<sup>20</sup> According to the U.S. Department of Energy, an installed cost of \$9.70 per watt is the breakeven point where residential utility rates are \$0.20 per kilowatt-hour. HELCO's residential electricity rates are at \$0.29, so PV panels are well below the breakeven point in Puna.

Currently, the state and federal governments offer several tax incentives for renewable energy production (see Appendix C.) These rebates and other financial enticements are aimed at expanding the use of renewable energy production in homes, businesses, and government offices. The current popular rebate programs cover technology such as solar water heaters, photovoltaic panels, and compact fluorescent light bulbs. While these tax incentives are attractive for many homeowners, more direct financial assistance is needed to reach the lower-income homeowners or renters who could most significantly benefit from lower utility costs.

In 2006, the state established a Public Benefits Fund administered by the Public Utilities Commission (PUC) to promote energy efficiency through subsidies for investments in energy conservation installations and improvements.<sup>21</sup> As of January 2009, this fund will replace similar programs administered by the public utility companies, such as HELCO, that are funded by revenues from ratepayers. Fund administration was transferred to the PUC to remove the perceived conflict between the utility's desire to generate revenues and its motivation to implement energy-efficient measures that decrease sales and defer the need for additional generating plant investments. Based on this change, the following is recommended to promote the installation of PV panels in residences for low-income people in Puna:

- *Urge the Public Utilities Commission to target revenues in the Public Benefits Fund for the installation of devices to generate heat and electrical power from natural sources in residences occupied by low-income households.*

***b. Employ LEED standards for buildings***

The Leadership in Energy and Environmental Design (LEED) is an internationally recognized certification program established through the U.S. Green Building Council. A LEED certification indicates that a building meets certain benchmarks for design, construction, and operation in ways that reduce the use of natural resources while providing for healthier working environments and protecting the integrity of surrounding ecosystems. The certification process focuses on five key areas of human and

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<sup>19</sup> Hawai'i Revised Statutes, Section 269-101

<sup>20</sup> Hawai'i Department of Business, Economic Development and Tourism, *Photovoltaic Electricity in Hawai'i*, January 2006.

<sup>21</sup> Act 162, Session Laws of Hawai'i 2006.

environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

LEED criteria relevant to Puna:

- On site renewable energy production
- Water use reduction/ Water-efficient landscaping
- Re-use of construction materials
- Construction materials made from recycled products
- Increasing natural lighting
- Low emitting construction materials
- Alternative transportation

The amount of “green” construction methods that a project employs determines the level of certification for the project. There are four certification levels for LEED: Certified, Silver, Gold, and Platinum. Project checklists for LEED Certified Schools and LEED Certified New Construction are in Appendix B.

Nation-wide, green building methods increase the overall construction costs of a project by an estimated 2% to 5%.<sup>22</sup> Because material costs are higher in Hawai‘i, the increased cost locally is likely to be in the 6% to 8% range. While this represents a significant increase in the amount of up-front construction costs, the added costs pay for themselves within 10 to 15 years through reduced energy and water bills.<sup>23</sup> Over time, the savings accumulate to the benefit of the building’s owner or tenant.

The current Model Energy Code exempts many new residential homes and does little to encourage energy efficient design. To encourage more energy efficient structures, the county should:

- *Employ LEED construction standards for the public buildings in Puna a minimum goal of Certified level.*
- *Impose higher energy efficiency standards on residences larger than 2,000 square feet in floor area. Applicable standards might include better insulation for the outer walls, low-emissivity windows and doors, reduction of roof heat gain, and use of energy-efficient appliances. Imposing these regulations only on larger homes would avoid higher initial cost burden on the construction of owner-built homes for people who can least afford it. However, energy-efficient features should be incorporated into lower-cost homes, as well, if public subsidies are available.*

***c. Convert power grid system to alternative energy sources over long-term***

Due to a surplus of the baseload and peak power generation on the Island of Hawai‘i that ties into Hawaiian Electric Light Company’s electrical power grid, HELCO has no immediate plans to significantly expand the total output. Over the long-term, however,

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<sup>22</sup> U. S.. Green Building Council (LEED): <http://www.usgbc.org>

<sup>23</sup> U.S. Department of Energy: <http://www.eere.energy.gov>

existing fossil fuel-based generation plants could be replaced by sources of renewable energy if these sources can provide a reliable supply of baseload power.

The current electrical production capacity for the Puna Geothermal Venture (PGV) plant is 30 megawatts (MW), which is enough to supply around 30,000 homes with their electrical needs. This alone makes Puna a net exporter of electrical power. In 2001 PGV received permission to double its total capacity output to 60 MW. However, HELCO has said that it will probably not need to add this much additional generation capacity from the Puna area until at least 2020 because there is already a comfortable margin of extra generation capacity and the HELCO has greater need for power sources on the west side of the island where the demand is growing at a faster pace.<sup>24</sup>

Over the past couple of years, HELCO and PGV have been negotiating to increase PGV capacity by 8 MW, to a total of 38 MW, but no final agreement has been reached. If a purchase agreement is consummated, it should also include some provision for the use of excess heat by the direct-use enterprises identified in the recent county-sponsored feasibility study. These enterprises would benefit the Puna community, whereas the export of more power does not.

Another potential baseload energy source is Ocean Thermal Energy Conversion (OTEC), although this prospect is very long term. OTEC is the process of turning seawater into electrical energy. The Natural Energy Laboratory Hawaii Authority (NELHA) on the Kona coast of Hawai'i has been conducting experiments using this technology since the 1970's. Although briefly suspended during the 1990's, this technology is making a comeback as a way of offering clean energy production.

Through this process, solar radiation is converted into electrical power. The ocean is divided into various thermal layers, with the warmer layers resting at the surface and the cooler layers at deeper depths. OTEC pumps the colder water up to the surface to interact with the warmer water. In order for the conversion process to work, there must be a temperature difference of at least 36 degrees Fahrenheit between the cooler and warmer waters.

- Warm water is pumped from the ocean surface (typically within the top 35 feet).
- Cold water is pumped from deeper depths (more than 2000 feet).
- Warm water is sent into a heat exchanger that boils another fluid (typically ammonia) into steam.
- The steam propels a turbine that generates electricity.
- Cold water is sent through a condenser that turns the steam back into a liquid (preserving the ammonia for future use).
- The warm water and cool water are discharged back into the ocean.

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<sup>24</sup> <http://the.honoluluadvertiser.com> (February 5, 2007)

**Figure 7**  
**Ocean Thermal Energy Conversion (OTEC) Process**

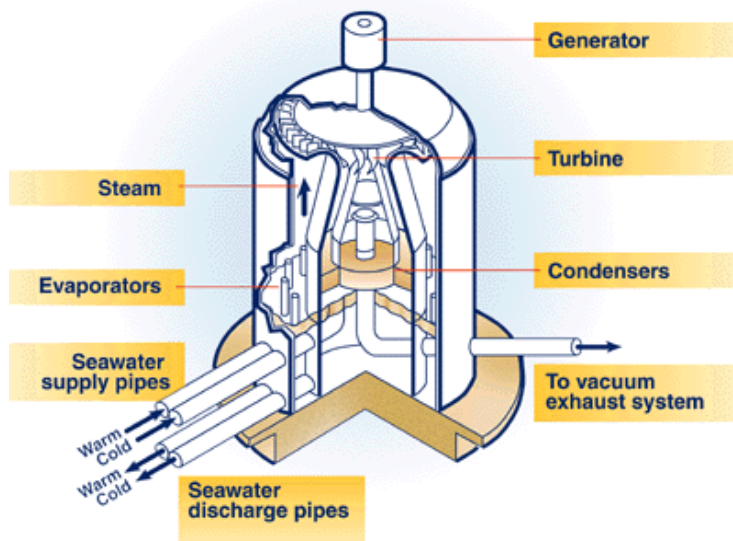


Diagram courtesy of <http://www.nrel.gov>

OTEC offers several useful additional applications:

- Because the deep seawater this is used is largely free of impurities and becomes desalinated in the OTEC process, it can be bottled and marketed as a high-end bottled drinking water, as the company Deep Ocean Hawaii does off the Kona Coast, or it can be used as a tap water source for the county's water supply system.
- Because the cold water that is drawn during this process is rich in nutrients – much more than the warmer surface water – it can be diverted into pools and used for several forms of aquaculture; e.g., (1) cultivation of cold water fish such as salmon and lobster, (2) cultivation of the health supplement *Spirulina* and (3) preservation of live fish in the colder water.

In 2006, the company Ocean Engineering & Energy Systems signed an agreement with NELHA to construct a 1.2 Megawatt facility at Keahole Point on the Kona Coast. The cost of construction is estimated to be 10 to 15 million dollars. Though this system will not likely provide residential power, it will be used for further research of ocean thermal energy conversion and in the commercial production of hydrogen.<sup>25</sup>

In summary, following are recommended strategies that involve Puna in reducing HELCO's reliance on fossil-fuel generating plants over the long-term:

- *Provide incentives (described in Section 4) to reduce energy consumption and reliance on the HELCO grid as a primary source of electrical power.*

<sup>25</sup> Natural Energy Laboratory Hawaii Authority (NELHA) - <http://www.nelha.org>

- *As modest additions to the PGV geothermal plant are negotiated with HELCO, make provisions for direct-use applications of excess heat (see Section 2.d.) that support new enterprises in Puna.*
- *Promote the production of biofuels (see Section 2.d.) as an energy source.*
- *While it does not seem feasible at this time to make the significant infrastructure investment required for an OTEC facility in Puna, pursue this option over the long term as the technology advances beyond the research and development phase and demonstrates its value as a viable source of energy production.*

## **5. Improving roadway connectivity and safety**

The transportation sub-consultant, Wayne Yoshioka of PB Americas, is still in the process of identifying, through a combination of community meetings, analysis and on-site investigations, potential short-range, mid-range and long-range plans to improve roadway connectivity and safety in Puna. These ideas are being explored in tandem with transit-related improvements.

In addition, PB Americas recommends the following *short-range actions for the Department of Transportation to avoid the foreclosure of future options for transportation planning in Puna:*

- *Reallocate shoulder lane funds to intersection safety improvements.*
- *Proceed with the planning phase of Highway 130 improvements*
- *Include alternative concepts for Highway 130 in planning phase*
- *Evaluate the effectiveness of short-range actions to guide medium and long-range plans*

Preliminarily, PB Americas suggests the following short-range, mid-range and long-range plan elements:

### ***Short-Range (Within 5 Years)***

- *Traffic safety improvements*
  - *intersection safety improvements*
  - *emergency routes on existing roads*
- *Transit improvements*
  - *increase awareness of transit*
  - *park and ride lots*
  - *increase transit service on pāhoa and ka’u routes*
  - *increase school busing of students*
- *Traffic operational improvements*
  - *intersection operational improvements*
- *Short-range intersection safety improvements*

- add median left-turn lanes where appropriate*
- add right-turn acceleration and deceleration lanes where appropriate*
- reduce posted speed limit on highway 130 to 45 mph from 55 mph between Shower and ‘Āinaloa*

***Mid-Range (5 to 10 Years)***

- Highway 130 improvement*
- Highway 11 improvement*
- Demand responsive transit*
- Increased subdivision interconnectivity*
- Emergency routes using new roads*
- Scenic byway / recreational trails*

***Long-Range (Beyond 10 Years)***

- Develop Puna Makai Alternate Route*
- Develop other alternative routes*
- Hub and spoke transit*
- Implement land use policies (village centers, land pooling)*

## Appendix A Bike Plan Hawai'i Projects

Project No.	Facility Location	Type	Juris.	Class.	Length (mi.)	Cost Estimate	Bike Plan Priority
29b	Railroad Avenue Bikeway Kaaahi Rd. / RR Ave (end)- Hawn. Paradise Park	Path	C/P	C	5.6	\$2,160,000	I
30a	RR Avenue Bikeway connection to Kea'au schools RR Ave Bikeway-Kea'au Bypass	Path	C	C	0.5	\$193,000	I
32	Kea'au- Pāhoa Road Kea'au Bypass Road-Shower Drive	SSR	S	C	2.4	\$781,000	I
35	Old Volcano Trail Vol. Hwy-Glenwood Rd.-Kahikopele- Puhala-Olaa Rd.	Path	S	B	12.5	\$3,220,000	I
29c	Railroad Avenue Bikeway Hawn. Paradise Park -Hawn. Beaches Subdivision	Path	C/P	C	6.8	\$2,623,000	II
30b	Various local roads and off-road paths Kea'au Town	Path	C/P	C	2.0	\$772,000	II
31a	Old Kea'au- Pāhoa Road Volcano Hwy-Kea'au- Pāhoa Bypass	SSR	S	C	1.1	\$358,000	II
31b	Old Kea'au-Pahoa Road Remnant	SSR	C/S?	B	0.5	\$25,000	II
33	Shower Dr/PohakuDr/Olaa/40th Kaaahi Road-Volcano Hwy	SSR	P/C	C	5.4	\$1,758,000	II
34	Paradise Acres - 9 Rd / C Rd / Kūlani Rd. 9 Road-Volcano Hwy near Mountain View	SSR	P/C	C	5.6	\$1,823,000	II
36a	N. Puna Corridor--Makai along Paradise or Makuu Drive Hawaiian Paradise Park-Kea'au-Pahoa Rd	SSR	P/C	C	4.2	\$1,367,000	II
36b	North Puna Corridor--Mauka Kea'au-Pahoa Rd-11 Rd	SSR	P/C	C	3.7	\$1,204,000	II
36c	North Puna Corridor--D Rd/Rose Street 9 Rd-Pikake St	SSR	P/C	C	4.1	\$1,335,000	II
36d	S. Glenwood Rd. – Fern Forest Volcano Hwy. – S. Glenwood Rd.-Old Volcano Trail	Path	P/C	C	4.6	\$260,000	II
37a	Ala Hele O Puna (going north) Hawaiian Beaches Subdivision- Hawn. Paradise Park	SSR	C	C	6.1	\$1,985,000	II
37b	Ala Hele O Puna (going south) Hawn. Beaches Subdivision-Jct. Pahoa- Kapoho Rd	SSR	C	C	5.2	\$1,693,000	II
38	Kahakai Blvd. (mauka-makai corridor) Railroad Avenue-Pahoa schools complex	SSR	C	C	4.0	\$1,302,000	II
39	Ag Road/Kehau Road Railroad Ave (Waiakahiula)-Nānāwale Blvd to Pahoa-Kapoho Rd	SSR	C	C	3.8	\$1,237,000	II
40	Pahoa-Kapoho Road Volcano Hwy- Pāhoa Coast	SSR	C	A	7.2	\$26,000	II
41	Lighthouse Road Pahoa-Kapoho Rd-Kumukahi Lighthouse	SSR	C	C	1.6	\$521,000	II
44	Kalapana-Kapoho Beach Road Pahoa-Kapoho Rd-Kea'au-Pahoa Rd	SSR	C	A	15.0	\$55,000	II
45	Old Kalapana Hwy Remnants	Path	C?	C	4.5	\$1,736,000	II
46	Pāhoa -Kalapana Hwy	SSR	C	A	9.0	\$33,000	II



Project No.	Facility Location	Type	Juris.	Class.	Length (mi.)	Cost Estimate	Bike Plan Priority
	Kapoho-Kalapana Beach Rd-Kea'au- Pāhoa Rd						
47a	Volcano Highway[Mamalaho Hwy Kea'au- Pāhoa Bypass-Hawai'i Volcanoes Natl. Park	SSR	S	A	23.2	\$85,000	II
47b	Volcano Village Collector Roads, Shoulder Improvements Wright Rd., Haunani Rd.	SSR	C	B	1.6	\$79,000	II
29d	Railroad Avenue Bikeway Hawn. Beaches - Kapoho-Kalapana Beach Road	Path	C/P	C	6.5	\$2,507,000	III
37c	Koae Access Railroad Path/Kaaahi Rd-Ala Hele O Puna	Path	C	C	0.8	\$309,000	III
42	Pahoa-Kapoho Powerline Trail Pahoa-Kapoho Rd-Pahoa-Kalapana Rd	Path	C/P	C	2.8	\$1,080,000	III
43	Kapoho-Kalapana Ridge Trail Off Pahoa-Kapoho Rd-Kamoamo Hmstds	Path	C/P	C	8.1	\$3,125,000	III

**Type**

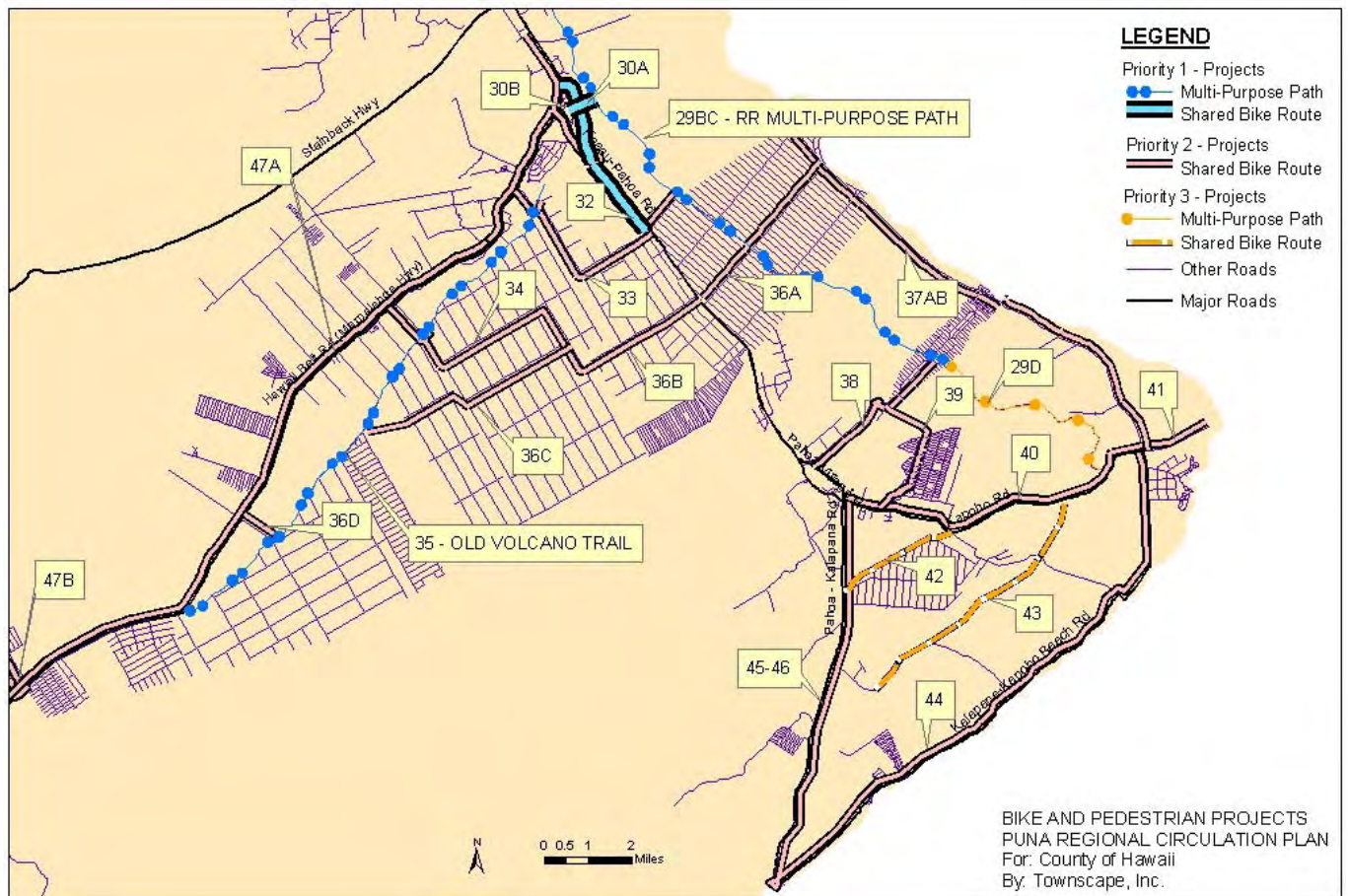
SSR – Signed Shared Roadway

**Jurisdiction**

C – County  
S – State  
P – Private

**Classification (suitable for use by)**

A – Advanced bicyclists  
B – Basic bicyclists  
C – Children



# Appendix B

## LEED Standards Checklist for Public Schools and New Buildings

Source: U.S. Green Building Council (LEED) – <http://www.usgbc.org>

LEED for Schools Credit Modifications to NC v2.2										
Updated on 7/20/2006										
35 6 14 9										
Possible Points 77										
<b>7 1 6 3 Sustainable Sites</b>					<b>Possible Points 16</b>					
Prereq 1										<b>Erosion &amp; Sedimentation Control</b>
										<b>Environmental Contamination Free Site</b>
Credit 1										<b>Site Selection</b>
Credit 2										<b>Development Density and Community Connectivity</b>
Credit 3										<b>Brownfield Redevelopment</b>
Credit 4.1										<b>Alternative Transportation, Public Transportation Access</b>
Credit 4.2										<b>Alternative Transportation, Bicycle Storage &amp; Changing Rooms</b>
Credit 4.3										<b>Alternative Transportation, Low-Emitting/Fuel Efficient Vehicles</b>
Credit 4.4										<b>Alternative Transportation, Parking Capacity</b>
Credit 5.1										<b>Site Development, Protect or Restore Habitat</b>
Credit 5.2										<b>Site Development, Maximize Open Space</b>
Credit 6.1										<b>Stormwater Design, Quantity Control</b>
Credit 6.2										<b>Stormwater Design, Quality Control</b>
Credit 7.1										<b>Heat Island Effect, Non-Roof</b>
Credit 7.2										<b>Heat Island Effect, Roof</b>
Credit 8										<b>Light Pollution Reduction</b>
										<b>Future Expansion Within Master Plan</b>
										<b>Joint Use of Facilities</b>
<b>13 Materials &amp; Resources</b>					<b>Possible Points 13</b>					
Prereq 1										<b>Storage &amp; Collection of Recyclables</b>
Credit 1.1										<b>Building Reuse, Maintain 75% of Existing Walls, Floors &amp; Roof</b>
Credit 1.2										<b>Building Reuse, Maintain 100% of Existing Walls, Floors &amp; Roof</b>
Credit 1.3										<b>Building Reuse, Maintain 50% of Interior Non-Structural Elements</b>
Credit 2.1										<b>Construction Waste Management, Divert 50%</b>
Credit 2.2										<b>Construction Waste Management, Divert 75%</b>
Credit 3.1										<b>Resource Reuse, Specify 5%</b>
Credit 3.2										<b>Resource Reuse, Specify 10%</b>
Credit 4.1										<b>Recycled Content, Specify 10% PC + PI</b>
Credit 4.2										<b>Recycled Content, Specify 20% PC + PI</b>
Credit 5.1										<b>Regional Materials, 20% Manufactured Locally</b>
Credit 5.2										<b>Regional Materials, 20% Above, 50% Harvested Locally</b>
Credit 6										<b>Rapidly Renewable Materials</b>
Credit 7										<b>Certified Wood</b>
<b>6 2 7 4 Indoor Environmental Quality</b>					<b>Possible Points 19</b>					
Prereq 1										<b>Minimum IAQ Performance</b>
Prereq 2										<b>Environmental Tobacco Smoke (ETS) Control</b>
Prereq 3										<b>Minimum Acoustical Performance</b>
Credit 1										<b>Outdoor Air Delivery Monitoring</b>
Credit 2										<b>Increased Ventilation</b>
Credit 3.1										<b>Construction IAQ Management Plan, During Construction</b>
Credit 3.2										<b>Construction IAQ Management Plan, Before Occupancy</b>
Credit 4.1										<b>Low-Emitting Materials, Adhesives &amp; Sealants</b>
Credit 4.2										<b>Low-Emitting Materials, Paints &amp; Coatings</b>
Credit 4.3										<b>Low-Emitting Materials, Flooring Systems</b>
Credit 4.4										<b>Low-Emitting Materials, Composite Wood &amp; Aqfiber Products</b>
Credit 5										<b>Indoor Chemical &amp; Pollutant Source Control</b>
Credit 5.1										<b>Lighting System Design &amp; Controllability</b>
Credit 5.2										<b>Thermal Comfort Controllability</b>
Credit 7.1										<b>Indoor Environmental Comfort, Design</b>
Credit 7.2										<b>Indoor Environmental Comfort, Verification</b>
Credit 8.1										<b>Daylight &amp; Views, Daylight 75% of Spaces</b>
Credit 8.2										<b>Daylight &amp; Views, Views for 90% of Spaces</b>
										<b>Enhanced Acoustical Performance</b>
										<b>Mold Prevention</b>
										<b>Low Impact Cleaning and Maintenance Equipment Policy</b>
<b>3 2 1 Energy &amp; Atmosphere</b>					<b>Possible Points 17</b>					
Prereq 1										<b>Fundamental Building Systems Commissioning</b>
Prereq 2										<b>Minimum Energy Performance</b>
Prereq 3										<b>Fundamental Refrigerant Management</b>
Credit 5.1										<b>Optimize Energy Performance</b>
Credit 2.1										<b>On-Site Renewable Energy</b>
Credit 3										<b>Enhanced Commissioning</b>
Credit 4										<b>Enhanced Refrigerant Management</b>
Credit 5										<b>Measurement &amp; Verification</b>
Credit 6										<b>Green Power</b>
<b>1 1 1 Innovation &amp; Design</b>					<b>Possible Points 6</b>					
Credit 1.1										<b>Innovation in Design</b>
Credit 2										<b>LEED Accredited Professional</b>
Credit 3										<b>The School As A Teaching Tool</b>

**Table Key:**

	No change from NC
	Clarification on requirements
	Modification, deletion or addition to requirements
	New credit or prerequisite



### LEED for New Construction v2.2 Registered Project Checklist

Project Name:  
Project Address:  
Yes ? No

Sustainable Sites				14 Points
Y				
	Prereq 1	<b>Construction Activity Pollution Prevention</b>		Required
	Credit 1	<b>Site Selection</b>		1
	Credit 2	<b>Development Density &amp; Community Connectivity</b>		1
	Credit 3	<b>Brownfield Redevelopment</b>		1
	Credit 4.1	<b>Alternative Transportation, Public Transportation Access</b>		1

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.2	<b>Alternative Transportation</b> , Bicycle Storage & Changing Rooms	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.3	<b>Alternative Transportation</b> , Low-Emitting & Fuel-Efficient Vehicles	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4.4	<b>Alternative Transportation</b> , Parking Capacity	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5.1	<b>Site Development</b> , Protect or Restore Habitat	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5.2	<b>Site Development</b> , Maximize Open Space	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6.1	<b>Stormwater Design</b> , Quantity Control	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6.2	<b>Stormwater Design</b> , Quality Control	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.1	<b>Heat Island Effect</b> , Non-Roof	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.2	<b>Heat Island Effect</b> , Roof	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 8	<b>Light Pollution Reduction</b>	1
Yes	?	No			

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Water Efficiency</b>			5 Points
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	<b>Water Efficient Landscaping</b> , Reduce by 50%	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	<b>Water Efficient Landscaping</b> , No Potable Use or No Irrigation	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	<b>Innovative Wastewater Technologies</b>	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	<b>Water Use Reduction</b> , 20% Reduction	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2	<b>Water Use Reduction</b> , 30% Reduction	1

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Energy &amp; Atmosphere</b>			17 Points
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<input checked="" type="checkbox"/>	Prereq 1	<b>Fundamental Commissioning of the Building Energy Systems</b>	Required
<input checked="" type="checkbox"/>	Prereq 2	<b>Minimum Energy Performance</b>	Required
<input checked="" type="checkbox"/>	Prereq 3	<b>Fundamental Refrigerant Management</b>	Required

**\*Note for EAc1:** All LEED for New Construction projects registered after June 26<sup>th</sup>, 2007 are required to achieve at least two (2) points under EAc1.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	<b>Optimize Energy Performance</b>	1 to 10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		10.5% New Buildings or 3.5% Existing Building Renovations	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		14% New Buildings or 7% Existing Building Renovations	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		17.5% New Buildings or 10.5% Existing Building Renovations	3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		21% New Buildings or 14% Existing Building Renovations	4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		24.5% New Buildings or 17.5% Existing Building Renovations	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		28% New Buildings or 21% Existing Building Renovations	6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		31.5% New Buildings or 24.5% Existing Building Renovations	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		35% New Buildings or 28% Existing Building Renovations	8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		38.5% New Buildings or 31.5% Existing Building Renovations	9
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		42% New Buildings or 35% Existing Building Renovations	10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	<b>On-Site Renewable Energy</b>	1 to 3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		2.5% Renewable Energy	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		7.5% Renewable Energy	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		12.5% Renewable Energy	3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	<b>Enhanced Commissioning</b>	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4	<b>Enhanced Refrigerant Management</b>	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5	<b>Measurement &amp; Verification</b>	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6	<b>Green Power</b>	1

continued...

Yes ? No

			<b>Materials &amp; Resources</b>	<b>13 Points</b>
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Y				Prereq 1	<b>Storage &amp; Collection of Recyclables</b> Required
				Credit 1.1	<b>Building Reuse</b> , Maintain 75% of Existing Walls, Floors & Roof 1
				Credit 1.2	<b>Building Reuse</b> , Maintain 100% of Existing Walls, Floors & Roof 1
				Credit 1.3	<b>Building Reuse</b> , Maintain 50% of Interior Non-Structural Elements 1
				Credit 2.1	<b>Construction Waste Management</b> , Divert 50% from Disposal 1
				Credit 2.2	<b>Construction Waste Management</b> , Divert 75% from Disposal 1
				Credit 3.1	<b>Materials Reuse</b> , 5% 1
				Credit 3.2	<b>Materials Reuse</b> , 10% 1
				Credit 4.1	<b>Recycled Content</b> , 10% (post-consumer + ½ pre-consumer) 1
				Credit 4.2	<b>Recycled Content</b> , 20% (post-consumer + ½ pre-consumer) 1
				Credit 5.1	<b>Regional Materials</b> , 10% Extracted, Processed & Manufactured Regionally 1
				Credit 5.2	<b>Regional Materials</b> , 20% Extracted, Processed & Manufactured Regionally 1
				Credit 6	<b>Rapidly Renewable Materials</b> 1
				Credit 7	<b>Certified Wood</b> 1
Yes	?	No			

			<b>Indoor Environmental Quality</b>	<b>15 Points</b>
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Y				Prereq 1	<b>Minimum IAQ Performance</b> Required
Y				Prereq 2	<b>Environmental Tobacco Smoke (ETS) Control</b> Required
				Credit 1	<b>Outdoor Air Delivery Monitoring</b> 1
				Credit 2	<b>Increased Ventilation</b> 1
				Credit 3.1	<b>Construction IAQ Management Plan</b> , During Construction 1
				Credit 3.2	<b>Construction IAQ Management Plan</b> , Before Occupancy 1
				Credit 4.1	<b>Low-Emitting Materials</b> , Adhesives & Sealants 1
				Credit 4.2	<b>Low-Emitting Materials</b> , Paints & Coatings 1
				Credit 4.3	<b>Low-Emitting Materials</b> , Carpet Systems 1
				Credit 4.4	<b>Low-Emitting Materials</b> , Composite Wood & Agrifiber Products 1
				Credit 5	<b>Indoor Chemical &amp; Pollutant Source Control</b> 1
				Credit 6.1	<b>Controllability of Systems</b> , Lighting 1
				Credit 6.2	<b>Controllability of Systems</b> , Thermal Comfort 1
				Credit 7.1	<b>Thermal Comfort</b> , Design 1
				Credit 7.2	<b>Thermal Comfort</b> , Verification 1
				Credit 8.1	<b>Daylight &amp; Views</b> , Daylight 75% of Spaces 1
				Credit 8.2	<b>Daylight &amp; Views</b> , Views for 90% of Spaces 1
Yes	?	No			

			<b>Innovation &amp; Design Process</b>	<b>5 Points</b>
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				Credit 1.1	<b>Innovation in Design</b> : Provide Specific Title 1
				Credit 1.2	<b>Innovation in Design</b> : Provide Specific Title 1
				Credit 1.3	<b>Innovation in Design</b> : Provide Specific Title 1
				Credit 1.4	<b>Innovation in Design</b> : Provide Specific Title 1
				Credit 2	<b>LEED® Accredited Professional</b> 1
Yes	?	No			

			<b>Project Totals (pre-certification estimates)</b>	<b>69 Points</b>
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**Certified:** 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points

**Appendix C**  
**Financial Incentives for Renewable Energy Production**

<u>Description</u>	<u>Amount</u>	<u>Authority</u>
<b>Hawaii State Tax Credit Solar Thermal Energy</b>		HRS §235-12.5
Single	35% of actual installation or \$2250	
Multi-family	35% of actual installation or \$350 per unit	
Commercial	35% of actual installation or \$250,000	
<b>Hawaii State Tax Credit Photovoltaic System</b>		HRS §235-12.5
Single	35% of actual installation or \$5,000	
Multi-family	35% of actual installation or \$350 per unit	
Commercial	35% of actual installation or \$500,000	
<b>Federal Tax Credit Solar Water Heater, PV, and other Solar Tech.</b>		
Individual	30% of actual or \$2,000 (can combine two credits; eg. Solar water heater and PV)	26 USC § 25D
Commercial/Industrial	30% of actual installation	26 USC § 48
<b>Utility Company Rebates Solar Water Heaters</b>		H.E.L.C.O.
Residential	\$1,000	
Commercial	\$125 per deferred Kwh, plus \$.05/kwh for retrofits and \$.06/kwh for new construction	

## **Appendix D**

### **Case Example of MA'O Farms Project in Wai'anae, O'ahu**

Mala 'Ai 'Opio (MA'O) Farms in Wai'anae, O'ahu is an example of a project that could work in Puna by tapping existing federal, educational institution, foundation and private sector resources.<sup>26</sup> Wai'anae's socio-economic profile is similar to Puna's.

MA'O was formed in 2001 by the non-profit Wai'anae Community Re-Development Corporation to train and employ out-of-school youth from the Wai'anae community in organic farming production, marketing and food handling and preparation. Initially funded by a \$125,000 three-year grant from the USDA Community Food Project, the project has already grown into the largest USDA-certified producer of organic fruit and vegetables on O'ahu and is poised to become the largest in the state.

Following are highlights of the project:

- Since the farm started, MA'O has trained about 20 interns who spend 10 months learning both the technical and entrepreneurial sides of farming and get a small stipend and a lot of good food in the process. More than 500 Wai'anae intermediate and high school students have participated in agricultural classes put on by MA'O.
- MA'O's core educational partners are the University of Hawai'i Native Hawaiian Leadership Project and Leeward Community College. The project has also received hundreds of hours of technical and business planning consultation from Yale University School of Management, Stanford University Haas Center for Public Service, Chaminade University and leaders of successful nonprofits. Yale and Chaminade have also awarded cash grants to the project.
- Additional grants to MA'O for leadership training have come from Office of Hawaiian Affairs (\$73,800), Hogan Family Foundation (\$50,000), Pew Charitable Trusts (\$25,000) and Goldman Sachs Foundation (\$25,000).
- In 2003, MA'O opened Aloha `Aina Café, which is a community gathering place with healthy food and nutrition information, as well as a market and restaurant outlet. The café is a venue for the `Ai Pohaku Workshop, which is a hands-on, culturally based program that nurtures youth and strengthens families through traditional Hawaiian practices centered on the culture, traditions, and values of the kalo plant. It also serves as a venue for the Wai'anae Organic Agriculture Center, which is a partnership with Leeward Community College (LCC) to expand organic agriculture, support local farmers, and provide training activities in Wai'anae.
- MA'O operates four mini-markets staged at the Aloha `Aina Cafe, Wai'anae Comprehensive Health Center, Kaiser Permanente Health Clinic, and Leeward Community College and participates in farmers markets at Kapiolani Community College and other locations on Oahu. It also provides organic produce to Kokua Market and two well-known restaurants in Honolulu. Most recently, it negotiated an agreement to provide produce to Whole Foods Market.

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<sup>26</sup> For an overview of the project, see <http://starbulletin.com/print/?fr=/2005/06/27/news/story4.html> and <http://www.ventures.yale.edu/docs/2005%20conference/plans/Wai'anae.pdf>

## Appendix E

### U.S. Department of Agriculture Programs for Rural Development

Program	Objective	Applicant	Uses	Population	Loan/Grant
Single Family Home Ownership. Section 502 <a href="#">Rural Housing Direct Loan</a>	Safe, well-built, affordable homes for rural Americans.	Families and individuals. Apply to Rural Development.	Buy, build, improve, repair or rehabilitate rural home as the applicant's permanent residence.	Rural areas with populations of 20,000 or less.	Direct loan.
Single Family Section 504 <a href="#">Housing Repair &amp; Rehabilitation Loan</a> Single Family Section 504 <a href="#">Housing Repair &amp; Rehabilitation Grant</a>	To help very-low-income applicants remove health and safety hazards or to repair their homes.	Families and individuals who currently own their home. Apply to Rural Development.	Repair or replace roof, winterizing, purchase or repair of heating system, structural repair, and water and sewage connect fees, and similar uses.	Rural areas with populations of 20,000 or less.	Direct loan and grant.
Single Family Home Ownership Section 502 <a href="#">Rural Housing Guaranteed Loan</a>	Assist eligible applicants in buying their homes by guaranteeing loans made by private lenders.	Families and individuals. Apply to lender.	Purchase new or existing home.	Rural areas with populations of 20,000 or less.	Loan guarantee.
Section 502 <a href="#">Mutual Self-Help Home Ownership Loans</a>	Individual homes built by a group of applicants, with construction guidance from a non-profit organization.	Families and individuals. Apply to Rural Development. Loan applications are processed on an individual basis for each participating family.	Construction of a new home, in part by the applicant under supervision.	Rural areas with populations of 20,000 or less.	Direct loan.
<a href="#">Mutual Self-Help Technical Assistance Grant</a>	Assist lower income families in building their own homes.	Non-profits and public bodies.	Technical assistance to qualify and supervise small groups of families to build each other's homes.	Rural areas with populations of 20,000 or less.	Grant.
Rental Housing for Families and Elderly Direct Loans and Loan Guarantees <a href="#">Section 515</a> <a href="#">Section 538</a>	Safe, well-built, affordable rental housing for very-low-income individuals and families.	Individuals, limited profit and non-profit organizations. For guarantees, apply to intermediary lender; for direct loans, apply to Rural Development.	New construction or substantial rehabilitation of rental housing.	Rural areas with populations of 20,000 or less.	Direct loan or loan guarantee.
Section 533 <a href="#">Housing Preservation Grant</a>	Repair and rehabilitate housing owned or occupied by very-low- and low-income rural families.	Public bodies and non-profit organizations. Apply to Rural Development.	Operation of a program which finances repair and rehabilitation activities for single family and small rental properties.	Rural areas with populations of 20,000 or less.	Grant.
<a href="#">Community Facilities Direct and Guaranteed Loan Program</a> <a href="#">Community Facilities Grant Program (Faith-Based and First Responder)</a>	Provide essential community facilities for rural communities.	Public bodies, non-profit organizations, and Indian tribes. Apply to Rural Development.	Build facilities and purchase equipment for fire and rescue, telecommunications, schools, libraries, hospitals, etc.	Rural areas with populations of 20,000 or less.	Direct loan or loan guarantee, grant.
Section 514/516. <a href="#">Farm Labor Housing Loans and Grants</a>	Safe, well-built affordable rental housing for farm workers.	Individuals, public and private non-profit organizations. Apply to Rural Development.	New construction or substantial rehabilitation of rental housing.	N/A	Direct loan and grant.

## Other Rural Development Housing Programs

### Section 523 [Rural Housing Self-Help Site Loans](#)

Limited to private or public nonprofit organizations that will provide sites solely for self-help housing.

### Section 524 [Rural Housing Site Loans](#)

This program provides Government funding for a public or private non-profit organization to buy and develop building sites, including the construction of access roads, streets, and utilities. Sites developed under this program may be sold to individual households, non-profit organizations, public agencies, and cooperatives who provide financial assistance for housing to low- and moderate-income families.

### Section 509 [Housing Application Packaging Grants](#)

This program provides government funds to tax-exempt public agencies and private non-profit organizations to package applications for submission to Rural Housing Programs. Packagers assist very low- and low-income applicants with the application process by prescreening, making preliminary eligibility determinations, ensuring the application is complete, and helping the applicant understand the program.

### Section 515 [Rural Rental Housing](#)

(including congregate housing and group homes; and rural cooperative housing.)

### Section 538 [Guaranteed Rental Housing](#)

Guaranteed loans for development of multi-family housing facilities in rural areas of the United States. Loan guarantees are provided for the construction, acquisition, or rehabilitation of rural multi-family housing.

### Section 521 [Rental Assistance Program](#)

Provides an additional source of support for households with incomes too low to pay the subsidized (basic) rent from their own resources. The program pays the owner of a multi-family housing complex the difference between the tenant's contribution (30 percent of adjusted income) and the monthly rental rate.

### [Rural Community Development Initiative](#)

The Rural Community Development Initiative (RCDI) program provides grants to qualified intermediary organizations that will provide financial and technical assistance to recipients to develop their capacity and ability to undertake projects related to housing, community facilities, or community and economic development.

### Rural Business [www.rurdev.usda.gov/rbs/index.html](http://www.rurdev.usda.gov/rbs/index.html)

Program	Objective	Applicant	Uses	Population	Loan/Grant
<a href="#">Business and Industry Guaranteed Loans (B&amp;I Guar.)</a>	Create jobs and stimulate rural economies by providing financial backing for rural businesses.	Businesses. Apply through Federal or State chartered banks, credit unions, savings & loan associations.	Most legal business purposes except production agriculture. Include acquisition, start-up and expansion of businesses that create rural employment.	All areas except cities of more than 50,000 and their contiguous and adjacent urbanized areas.	Loan guarantee.
<a href="#">Rural Business Enterprise Grants (RBEG)</a>	Finance and facilitate the development of small and emerging private business enterprises.	Public bodies, private non-profit corporations, and federally recognized Native American tribal groups. Apply to Rural Development.	Buy and develop land, establish a revolving loan fund, construct buildings, plants, equipment, access streets and roads, parking areas, utility and service extensions, and rural distance learning networks.	All areas except cities of more than 50,000 and their contiguous and adjacent urbanized areas.	Grant.
<a href="#">Intermediary Relending Program (IRP)</a>	Finance business facilities and community development projects in rural areas.	Public bodies, non-profit corporations, Native American tribes, and cooperatives. Apply to Rural Development.	Community development projects, establishment or expansion of businesses, creation or saving of rural jobs.	Rural areas and incorporated places with populations of less than 25,000.	Direct loan.



Program	Objective	Applicant	Uses	Population	Loan/Grant
<a href="#">Rural Economic Development Loans (REDL)</a> <a href="#">Rural Economic Development Grants (REDG)</a>	Finance economic development and job creation in rural areas.	Rural Utilities Service-financed electric and telephone utilities. Apply to Rural Development.	Business startups or expansion projects that create rural jobs.	Rural areas and places with populations of 2,500 or less.	Direct loan and revolving loan fund grant.
<a href="#">Rural Cooperative Development Grants</a>	Establish and operate centers for cooperative development to improve the economic condition of rural areas through the development of new cooperatives and improving operations of existing cooperatives.	Non-profit corporations and institutions of higher education. Apply directly to Rural Development National Office.	Establish operating centers for development of rural cooperatives.	No population restriction.	Grant.
<a href="#">Value-Added Producer Grants (VAPG)</a>	Assist independent agricultural producers to enter into activities that add value to their crops.	Independent producers, farmer and rancher cooperatives, agricultural producer groups, and majority-controlled producer-based business ventures. Apply to Rural Development State Office.	Planning purposes such as conducting feasibility studies or business plans; or as working capital to help start the operations of a venture.	No population restriction.	Grant.
<a href="#">Rural Business Opportunity Grants (RBOG)</a>	Finance technical assistance for business development planning in rural areas.	Public bodies, non-profit corporations, Indian tribes on Federal or State reservations, and cooperatives with members that are primarily rural residents.	Technical assistance, leadership training, establishment of business support centers, economic development plans.	All areas except cities of more than 50,000 and their contiguous and adjacent urbanized areas.	Grant.
<a href="#">Renewable Energy and Energy Efficiency Grant Program</a>	Finance the purchase of renewable energy systems, and make energy improvements.	Agricultural producers and rural small businesses.	Construction or improvements, purchase and installation of equipment, energy audits, permit fees, professional service fees, business plans, feasibility studies.	All areas except cities of more than 50,000 and their contiguous and adjacent urbanized areas.	Grant.

### Other Rural Development Business and Cooperative Programs and Special Initiatives

Biomass Research and Development Initiative	Finance the research and development of biomass based products, bioenergy, biofuels, and related processes.	Institutions of higher education, National laboratories, Federal or State research agencies, private sector entities, and non-profit organizations.	Research and development of biomass based products, bioenergy, biofuels, and related processes.	No population restriction.	Grant.	Applicants must meet specific selection criteria. Grants are awarded on a competitive basis. A minimum of 20 percent cost sharing requirements apply, and may be up to 50 percent depending on nature of project. Cost share must come from non-Federal sources.
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- [Cooperative Development Technical Assistance Program](#)
- Grants to Assist Small, Minority Producers (SMP)

- [Research on Rural Cooperative Opportunities & Problems](#)
- [Appropriate Technology Transfer for Rural Areas](#)
- [National Sheep Industry Improvement Center](#)
- [Agriculture Innovation Center Program \(AIC\)](#)
- [1890 Land-Grant Program](#)
- [Bio-based Products and Bio-energy Program](#)
- [Army's Armament Retooling & Manufacturing Support](#)
- [ARMS Loan Guarantee Program](#)
- [Hawaii Rural Development Council \(\[National Rural Development Partnership\]\(#\)\)](#)
- [Empowerment Zones and Enterprise Communities \(Moloka'i\)](#)
- [Kauai Rural Champion Community](#)
- [National Centers of Excellence Program](#)
- [Rural Community Advancement Program](#)
- [Rural Economic Area Partnership Program \(REAP\) Zones](#)
- [Community Development Technical Assistance](#)

### Community Food Projects Competitive Grants Program

<http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1080>

Community Food Projects should be designed to (1): (A) meet the food needs of low-income people; (B) increase the self-reliance of communities in providing for their own food needs; and (C) promote comprehensive responses to local food, farm, and nutrition issues; and/or (2) meet specific state, local, or neighborhood food and agriculture needs for (A) infrastructure improvement and development; (B) planning for long-term solutions; or (C) the creation of innovative marketing activities that mutually benefit agricultural producers and low-income consumers.

### Rural Infrastructure [www.rurdev.usda.gov/rus/index.html](http://www.rurdev.usda.gov/rus/index.html)

Program	Objective	Applicant	Uses	Population	Loan/Grant
<a href="#">Water and Waste Disposal Grants and Loans</a>	Provide infrastructure for rural areas.	Public entities, Indian tribes, and non-profit corporations. Apply to Rural Development.	Build, repair, and improve public water systems, and waste collection and treatment systems. Also other related costs.	Rural areas, cities, and towns with up to 10,000 population.	Direct loan and grant.
Water and Waste Disposal Loan Guarantees	Provide infrastructure for rural areas.	Public entities, Indian tribes, and non-profit corporations. Apply to Rural Development.	Construct, repair, modify, expand, improve water supply and distribution systems, and waste collection and treatment systems. Also other related costs.	Rural areas, cities, and towns with up to 10,000 population.	Loan guarantee.
<a href="#">Solid Waste Management Grants</a>	Provide technical assistance and/or training to help communities reduce the solid waste stream.	Non-profit organizations and public bodies. Apply to Rural Development.	Provide technical assistance and training to reduce pollution of water resources and improve management of solid waste facilities; reduce solid waste in streams.	Rural areas, cities and towns with up to 10,000 population.	Grant.
<a href="#">Rural Broadband Access Loan and Loan Guarantee Program</a>	The deployment of broadband service to eligible rural communities.	Legally organized entities providing or proposing to provide broadband service in eligible rural communities. Cannot serve more than 2% of the telephone subscriber lines installed in the U.S.	The construction, acquisition, and improvement of broadband transmission facilities and equipment; land and buildings used in providing broadband service; and the refinancing of Telecommunications Program debt.	Eligible rural communities with a population of 20,000 inhabitants or less. The community cannot be located in a standard metropolitan statistical area.	Direct loans and loan guarantees.

Program	Objective	Applicant	Uses	Population	Loan/Grant
<a href="#">Rural Electrification Hardship Loans</a>  <a href="#">Rural Electrification Municipal Rate Loans</a>  <a href="#">Rural Electrification Treasury Rate Loans</a>  <a href="#">Rural Electrification Guaranteed Loans</a>  <a href="#">Rural Telephone Bank</a>	Provide financial aid through direct and guaranteed loans for electric and telecommunications services.	Non-profit and cooperative associations, public bodies, and other utilities. Contact USDA-RUS Administrator, STOP 1510, 1400 Independence Ave. SW, Washington, DC 20250-1510.	Generation, bulk transmission facilities, and distribution of electric power. Enhance 911 emergency service, digital switching equipment, fiber optic cable, along with traditional main system telecommunications service.	Rural areas.	Direct loan or loan guarantee.
<a href="#">Distance Learning and Telemedicine Grant and Loan Program</a>	Development and deployment of advanced telecommunication services throughout rural America to improve education and health care.	Incorporated entities, including municipal corporations, on a for-profit or not-for-profit basis, that operate rural schools, libraries, health care clinics and other organizations that operate educational or health care facilities.	Equipment for classrooms: cameras, video monitors, computers, and LAN. Also for physician consultation, radiology, x-ray scanners, and digital microscopes.	Rural areas.	Direct loan and/or grant.

### Other Rural Development Utility Programs

- [High Energy Cost Grant Program](#)
  - [Technical Assistance and Training Grants \(TAT\)](#)
  - [Rural Water Circuit Rider Technical Assistance Grants](#)
  - [Emergency Community Water Assistance Grants](#)
  - [Weather Radio Grant Program](#)
  - [Rural Public Television Digital Transition Grant Program](#)
  - Local Dial-Up Internet Grant Program
- <http://www.usda.gov/rus/water/tatg.htm>