# Creating Hawaii's AV Future


## **A Framework for Hawaii's Autonomous Vehicle Future:**
Accessible, Automated, Connected, Electric, and Shared

May 2020

# HAWAII'S MOBILITY FUTURE

Perhaps no other populace is as keenly attuned to the shifting balance of the world's climate and the urgent need to find sustainable solutions as islanders. Autonomous vehicles (AVs) can be a threat or a part of the solution. Whether Hawaii is ready or not, automated vehicles and other disruptive technologies are rapidly proliferating. The chance is now to create an accessible, automated, connected, electric, and shared ($A^2$CES) mobility future that promotes equity, the environment, and economic opportunity for all in Hawaii.

Hawaii is already a leader in autonomous transportation—at the end of next year, Honolulu will introduce the first truly autonomous rail transit system in the United States. This system can be the backbone of an $A^2$CES mobility system that will bring riders to the rail system and connect people to economic opportunity.

Equity: Access and accessibility must be the guiding principle in our $A^2$CES policies. All should share in the benefits of mobility with a strong focus on those historically disadvantaged. Thousands of nondrivers in Hawaii can ultimately share in the new mobility revolution through universally designed vehicles and accessible transportation facilities. Access and accessibility can also mean new shared-mobility options for those who are not now well served by current transportation options.

Environment: Addressing climate change and resilience are perhaps the most urgent and important threats that Hawaii faces. AVs can compound the damage wrought by single-occupancy vehicles powered by internal combustion engines by increasing trips. On the other hand, if AVs are shared and powered by renewable energy, Hawaii can reduce carbon emissions.

Economic Opportunity: Ubiquitous mobility connects people to jobs, health care services, educational opportunities, and recreational activities. High-quality mobility choices are anchors for the tourism industry and for building a self-sustaining economy. Hawaii could serve as a laboratory for innovative mobility solutions that produces environmental and economic benefits.

A²

## ACCESSIBLE

Accessible vehicles and services allow for all to travel without regard to disability or socioeconomic circumstances.

## AUTOMATED

Vehicles with autonomous features can travel in narrower lanes and in a safer manner, improving the efficiency and safety of the road network.

C

## CONNECTED

Vehicles and infrastructure with sensors and Wi-Fi or dedicated short-range communication can connect cyclists and walkers, other vehicles, and infrastructure. Increasing safety and efficiency.

E

## ELECTRIC

Vehicles powered by renewable energy reduce fuel use and carbon emissions.

S

## SHARED

Vehicles—whether cars, bicycles, shuttles, buses, or rail cars—where rides or ownership is shared reduce congestion, costs, and total vehicle miles traveled.

# BUILDING MOMENTUM

A year ago, Governor Ige signed Executive Order 17-07 (Autonomous Vehicle Testing), which made Hawaii the first state to identify its airport for deployment of autonomous shuttles. The Governor also announced that Hawaii welcomed developers of autonomous mobility systems to test their vehicles in the state.

Honolulu moved closer to opening the first stage of the Honolulu Authority for Rapid Transportation (HART), joining Vancouver and Copenhagen with an automated elevated metro that will be the first fully driverless system in the United States. Throughout 2018, public, private, research and innovation leaders explored the development and deployment of AVs gaining insight into applications in public transportation, freight and logistics, hospitality industry, and more.

Stakeholder engagement was the next step to help move from speculation about AVs to understanding key elements for implementation. Ulupono Initiative collaborated with government agencies in Hawaii to help lay the groundwork and bring stakeholders together to accelerate development and deployment of AVs in the state. From this, Mobility e3 helped to articulate an A$^2$CES vision of mobility and recommend a framework for how Hawaii can create a mobility future that promotes equity, the environment, and economic opportunity in Hawaii.

The strategies discussed in this framework build on the accomplishments of public, private, and nonprofit agencies in Hawaii. HART has developed a plan to future-proof the investment in stations and station access by considering opportunities and requirements for A$^2$CES. The Hawaii Department of Transportation has looked at ways to advance connectivity for all, to attract developers of AVs to Hawaii, and to advance electrification and AV systems at the airport.

The City and County of Honolulu (C&C) Department of Transportation Services (DTS) moved forward to electrify the bus system and advance development of electric and autonomous buses and articulated a vision to guide early Accessible Low Speed-Automated Vehicle (LSAV) pilots on Oahu. The Hawaii Autonomous Vehicle Institute (HAVI) at University of Hawaii at Manoa is partnering with other universities, collaborating with midwestern research entities, holding a forum, and starting to document a strategic research plan. Private developers have incorporated AVs as clean energy options in their planning for existing developments and greenfield areas.

In parallel with specific efforts around AVs, the C&C offices of Transit Oriented Development and Climate Change and Resilience and the Oahu Metropolitan Planning Organization, with other stakeholders (such as Sustainable Transportation Coalition of Hawaii, Elemental Excelerator, Ulupono, Hawaiian Electric Company, etc.), have moved forward on renewable energy and electrification, resilience, land use, and economic development fronts.

The effect of these accomplishments is muted, if not stymied, by confusion over the conditions for deploying these vehicles on public roadways. And at the same time, disruptive technologies have turned upside down the regulatory paradigm. Deploying technology in a measured way can offer the data needed to ensure a vehicle can operate safely in a particular context and shape the application of the technology. None of these impressive achievements by leaders in Hawaii are likely to afford the full benefits of A$^2$CES without attention to related policies, investment, and planning. To tap this potential, Mobility e3 proposes five key strategies and supporting activities for each strategy, which form a framework for Hawaii to create its A$^2$CES future.

# STRATEGIES

### LEGAL AND SAFETY
Confirm the legal framework for safe operation of A$^2$CES vehicles on public roads including developing guidance or regulation on requirements for safe operation.

### POLICY
Adopt policies and initiatives at the state and local levels designed to ensure the public's interest in equitable and environmentally sound travel that is powered by renewable energy and promotes economic vitality.

### INFRASTRUCTURE INVESTMENT
Bake A$^2$CES readiness, including electric charging from renewable resources, into public and private sector investment including rail stations, rail catchment areas, station access, and roadway and multimodal pathways.

### PLANNING
Incorporate AV and EV considerations into all aspects of planning, public and private, so that the vision of A$^2$CES is recognized and realized through land use, economic development, and transportation planning.

### MOBILITY INNOVATION
Launch a program of A$^2$CES focused technology demonstration projects across modes, prioritizing projects that expand renewable resources.

# 01 LEGAL AND SAFETY STRATEGY

## Confirm the legal framework for safe operation of A$^2$CES vehicles on public roads including developing guidance or regulation on requirements for safe operation

Building on prior legislative discussions and the Governor's Executive Order, Hawaii should confirm the legal framework is in place to allow AVs to operate on public roads. Initial research and interviews produced contradictory information as to whether and where AVs can be legally operated. Although the Governor's Executive Order explicitly states the policy of the State is to pursue the testing of vehicles in Hawaii, many question how to proceed. Confusion over testing on public roads is common outside Hawaii despite extensive efforts by the federal government, through legislative proposals and departmental guidance, to establish when and how AVs are permitted to operate on public roadways.

A good starting place would be to conduct an audit of current statutes and regulations focusing on questions of operation, registration, licensure, traffic enforcement, emergency response, insurance, and liability. The first step is delineating whether any provisions appear to limit a vehicle from being operated without a driver and, if so, the needed steps to address these provisions.

Hawaii should take steps to establish appropriate oversight and continuing development of operational safety standards for initial testing of AVs and beyond, as has been done in other states. Whether this takes the form of state legislative, regulatory, or policy action depends, in part, on the status of any federal legislative or policy actions.

For now, the state or the city and county could address the issue through a variety of means including adopting legislation or a resolution, issuing an executive order, or an opinion by the attorney general or other appropriate legal counsel. A cross-agency working group may also be a useful way to vet and address shared concerns about the legality of roadway operation of AVs and other policy issues.

Some caution is warranted as state legislation intended to facilitate deployment may unintentionally call into the question the legality of operating AVs on public roads. For example, legislation authorizing a specific pilot may raise a presumption that all pilots operating on public roads require legislative approval. There is some threat of gridlock around testing, pilots, and deployments on public roads if agency leadership and staff do not share a common understanding of legal requirements. Since the regulations were originally for human-driven vehicles, those applications for AVs are often a matter of drawing inferences rather than a finding of explicit authorization; operation of AVs may be legal even if not explicitly authorized, at least in the short term, i.e., the next two years.

Hawaii should also engage with other states through the uniform code process to examine questions of licensure, registration, insurance, oversight of operations, inspection of vehicles, and other issues. The uniform code process is used for a range of vehicle issues and involves states, private industry, and other stakeholders working together to produce cohesive model legislation that addresses the issues in each state, and which can be adopted by all states to ensure a standardized (or "uniform") set of regulations. This is a great way for Hawaii to learn from other states' experiences and position itself to engage with AV policy nationally.

## KEY ACTIVITIES

**Audit Hawaii statutes and regulations regarding vehicle registration, licensure, emergency response, insurance, and liability.** It is important to identify which regulations hinder a common understanding of the requirements for safe operation.

**Establish a cross-agency working group to develop recommendations to provide a common understanding for safe operation of AVs on public roads.** This group can develop a roadmap for specific legislative/legal needs. The audit will provide the problem statement and scope for this group's efforts, whereas the working group will help develop solutions.

**Equip county departments of motor vehicles with the authority and resources to oversee safe operation of AVs on public roads.** Once solutions have been identified, then its implementation will need to be guided for the counties.

**Implement A²CES safety toolkit or protocol for operation of A²CES vehicles** including data-based assessment of the operations with hazard mitigation strategy, a digital checklist to provide for safety operations compliance, and vehicle and autonomy performance validation through analysis of operating data gathered through onboard data recorders.

**Consider participating in the Uniform Code process to develop shared model legislation with other states and stakeholders.** This can help inform Hawaii's own processes and position the state to engage with policy on AVs at a national level.

# 02 A²CES POLICY STRATEGY

Adopt policies and initiatives at the state and local levels designed to ensure the public's interest in equitable and environmentally sound travel that is powered by renewable energy and promotes economic vitality.

In addition to the manifest safety benefits of AVs, Hawaii can also advance environmental, economic diversification, and equity goals. Realizing A²CES requires promoting electric and shared mobility systems. As electrification becomes economically efficient and taps renewable energy systems, Hawaii must plan for an electric charging system. Further, shared use and ownership reduces vehicle miles traveled and helps avoid empty or "zombie" trips.

Policy levers, including congestion pricing, reducing parking requirements, work development programs, streamlining procurement requirements, implementing data management, governance strategies and more, all offer means to shape the effects of deployment of AVs. The A²CES concept provides a framework for Hawaii's policies to reap the full benefits of AVs.

The State of Hawaii and local governments should adopt policies and practices that maximize benefits and mitigate negative impacts. At its core, A²CES provides a way to address all aspects of new mobility including automation, accessibility, connectivity, clean energy, shared use, and safety. Planning issues, such as curbside management, parking requirements, and declining revenue for infrastructure, are not unique to the deployment of AVs and are occurring now with the growth of ride-hailing services and e-commerce deliveries. The deployment of AVs may compound these challenges and also open up new opportunities to address these issues.

**The policy questions include how to:**

- Manage the impact on transit of current new mobility trends such as ride-hailing services and microtransit so that these services can complement and support transit.
- Encourage shared trips and ownership to reduce vehicle miles traveled and zero-occupancy travel.
- Allocate curbside access to ridesharing, freight deliveries, transit, cyclists, and pedestrians.
- Find new sources of revenue to fund infrastructure in light of declining revenue from gas taxes, parking, and shifting trends in curbside usage.
- Promote the switch to electric vehicles and facilitate the transition through appropriate incentives and infrastructure.
- Design and implement ways to govern new mobility systems.
- Protect smart city technology from cyber intrusion and ensure data privacy.
- Prepare for workforce displacement and develop training to meet new skills.

## KEY ACTIVITIES

**Adopt A²CES principles and a supportive governance framework through legislation at state and county levels.** Governance over the usage of AVs will help ensure that all potential benefits can be realized and negative impacts are minimized.

**Examine revenue replacement options and value or congestion pricing to manage curbside and roadway congestion.** Build in data management frameworks and metrics that allow for the governance of new modes of mobility and support A²CES.

**Encourage shared trips and ownership to reduce vehicle miles traveled and zero-occupancy travel.** Shared mobility can be promoted through congestion pricing and by prioritizing right of way usage.

**Allocate curbside access to ridesharing, freight deliveries, transit, cyclists, and pedestrians.** The use of geofencing, pricing and other tools can manage conflicting uses safely and efficiently.

**Promote the switch to electric vehicles and facilitate the transition through appropriate incentives and investment in infrastructure.** Meeting the 2040 goals of 100 percent renewable energy sources for transportation requires supporting clean electricity production as well.


# 03 INFRASTRUCTURE INVESTMENT STRATEGY

Bake A²CES readiness into public and private sector investments including rail stations, rail catchment areas, station access, and roadway and multimodal pathways.

Hawaii's tremendous investments in transportation infrastructure should be future-proofed and cost-effective steps should be taken now to ensure that the benefits of A²CES are realized.

It is probable that the early deployments of AVs will be low-speed autonomous vehicles, which should require minimal infrastructure enhancements or expenditures. Typically, these needs are addressed by the manufacturer, either by providing those enhancements, such as a sensor for a blind intersection, or by choosing a route to accommodate the technology. As a result, short-term infrastructure goals have been met and our efforts will focus on the medium- and long-term changes needed.

Over the medium term, Hawaii should factor A²CES readiness into the design and construction of rail stations and station access in accordance with the evolution of larger needs.

In addition, Hawaii should take AVs into account in managing complete streets, developing low-speed networks and paths, and planning residential and commercial development.

HART provides the spine for a carbon-free corridor that is automated and electric. Appropriate A²CES readiness can be ensured through a coordinated set of public and private investments in this area, including rail station access, road network design, and complementary residential and commercial development. In addition, an "autonomous travel district" could be created, featuring a low-speed network of roads and multimodal paths. In an integrated system, AV's can enhance access to transit and expand the catchment area of HART stations. A²CES vehicles can compound these factors to achieve greater carbon reductions and improved mobility.

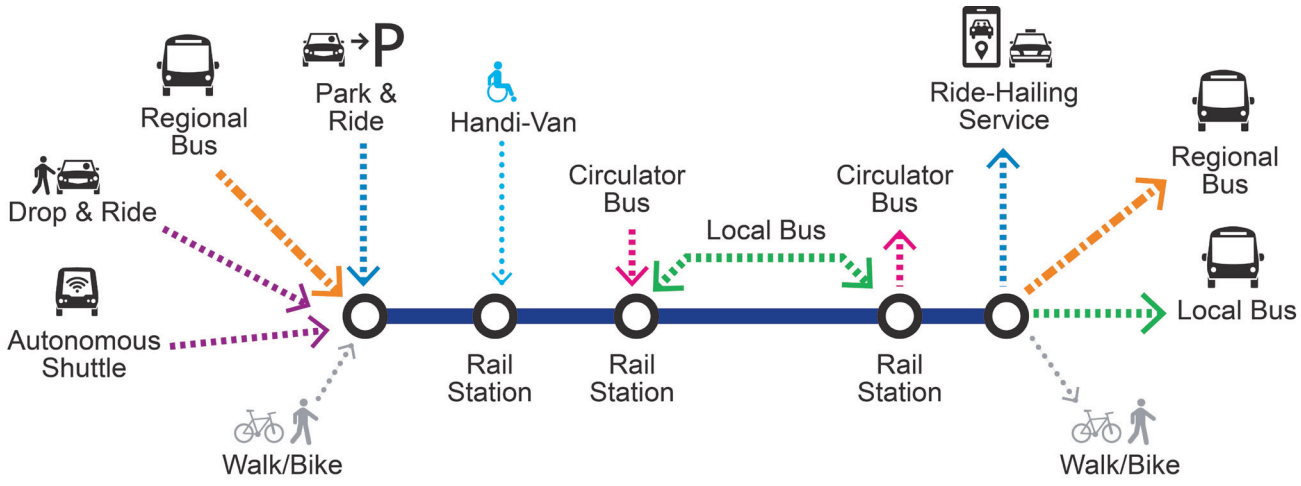



Image credit: HART Honolulu Authority for Rapid Transportation

## KEY ACTIVITIES

**Ensure structured parking facilities accommodate charging, storage, and other A²CES requirements** to create flexibility so that it is less costly to modify in the future (future-proof to be EV and AV ready). Also use this opportunity to "push" connected technology that will allow for more efficient use of parking facilities.

**Incorporate universal design and assistive technology across state design and complete streets.** Create guidance manuals for universal design and assistive technology deployment.

**Make the low-speed network of roads and paths the heart of the Carbon-Free Corridor.** This could be the centerpiece of the City and County's Climate Change and Resilience effort. These should be Integrated with the City and County's TOD, Complete Streets, and CCSR plans and programs and support active transportation, micromobility, and microtransit.

**Expand joint-development opportunities at HART Stations.** An example includes modifying HART station designs to allow for retail opportunities, particularly at the Pearl Highlands station.

**Coordinate with private real estate developers on mobility innovation** including station access, parking requirements, bike and pedestrian integration; AV infrastructure readiness; and pilots.

**Design and implement a network of solar-powered electric chargers** for personal and commercial use.

# 04 PLANNING STRATEGY

Incorporate AV and EV Considerations into all aspects of planning, public and private, so that the vision of A²CES is recognized and realized through land use, economic development, and transportation planning.

Cities and counties can develop comprehensive technology pilot programs and other methods for accelerating planning cycles and project delivery for testing of AVs. Metropolitan planning organizations (MPOs) and cities can partner for pop-up and other temporary installations to support the pilot projects addressed in this report (e.g., signage, pick-up and drop-off zones).

A focus on A²CES mobility systems provides a framework for aligning plans, policies, and project design around multiple planning initiatives such as TOD, access to transportation, equity, and resilience. This will require assessing and auditing multiple plans to see how they pose barriers or present opportunities for meeting multiple goals, including smart-mobility readiness. A cross-departmental audit ensures new language is consistent across plans, which reduces legal risk and aligns budgets. Finally, charting plan update schedules that facilitate cross-department coordination will reveal early opportunities to advance A²CES through existing work plans of the city and county, MPO, and the state.


## KEY ACTIVITIES

**Create an AV strategy for Oahu that knits sectors together, supports A²CES investment, and manages energy, congestion, parking, curbside, and revenue impacts.** This would be conducted as part of the Oahu Work Plan and the Oahu Regional Transportation Plan and ideally kicked off by a convening on technology, site assessments, and the like. Subsequent efforts should secure discretionary grants for AVs (deployment and research) or allocating funding sources such as Congestion Mitigation and Air Quality program, Transit, Planning, and VW Settlement funds for technology development and deployment.

**Integrate A²CES goals and strategies in current and future MPO and City and County plans, operations, and capital budgeting.**

**Conduct design workshops** to see how TOD and Complete Streets project and streetscape design may change with A²CES and increased shared-use mobility.

**Consider and account for the impact of mature AV technology and infrastructure through scenario planning.** Plan for the changes this will cause in transportation patterns and plan to address the displacement of current conditions and structure. Use A²CES principle to engage changes in a way that is equitable.

# 05 MOBILITY INNOVATION STRATEGY

Launch a program of A²CES technology demonstration projects across all modes, prioritizing projects that expand renewable resources.

Rather than a one-off, costly demonstration of a prototype vehicle, Hawaii would be best served by an initiative or program that facilitates and sponsors a set of A²CES focused projects. These could include short demonstrations of a day or two, to longer term deployments of a fleet of LSAV, cars and buses, and integration high-speed applications as they mature. This first-of-a-kind program could be supported by a public-private-university partnership that brings together stakeholders, including sponsors. Integral to this effort would be an innovative safety program that assesses and mitigates hazards, ensures compliance with safety practices, validates and monitors autonomous vehicles, and makes sure that performance that aligns with A²CES framework.

Unlike conventional AVs, which may be years away from deployment, LSAVs are ready to deploy now. By pairing a driverless metro with LSAVs, the C&C of Honolulu and HART will be able to demonstrate the value and efficiency of an end-to-end automated system. This end-to-end automated system can also support a carbon-free transportation corridor and promote autonomous travel districts. A network of low-speed AVs could further serve mobility deserts or those with low-frequency services.

In the fall of 2018, stakeholders identified a list of demonstration and pilot sites, in addition to the airport, that may be appropriate for the deployment of a fleet of 20 passenger AV shuttles.

Pilots would extend beyond proof of technology; each would foster a richer understanding of transportation use cases, place-making, reallocation of lane capacity, and safety for bicyclists and pedestrians. Moreover, these enhanced pilots could incorporate testing for other technology applications, such as aftermarket installation of sensing technology on DOT vehicles and connected technologies.

Through the A²CES focus, a program of pilots could incorporate other mobility innovations such as microtransit, mobility-on-demand, and car sharing that can ensure that automated vehicles operate within a larger portfolio of mobility services that are shared, electric, and automated at all levels. This includes lower-level automation, which offers economic, energy efficiency, and safety benefits.

With careful design, these pilots can provide important insights into data sharing, impacts on emissions, and applications that benefit underserved/nondriving populations – aging, disabled, and youth.

Research and technology development activities can be integrated into pilots or be developed as a complementary activity to bolster Hawaii's research sector and economic growth through applied research. Based on stakeholder discussions, especially with HDOT and DTS, Mobility e3 identified a range of opportunities for development of both AV buses and of targeted applications for freight and logistics, particularly at the airport and port. Ongoing discussions with bus manufacturers and Elemental Excelerator offer a springboard for an autonomous bus pilot within the Carbon-Free Corridor.

Also, in fall 2018, stakeholders—including campus owners, the City and County Department of Transportation Services, the Governor's Office, and the Department of Transportation—identified 11 other sites for AV demonstrations, pilots, or deployments in Oahu and Hilo (this does not include first/last mile connections at rail stations).

## KEY ACTIVITIES

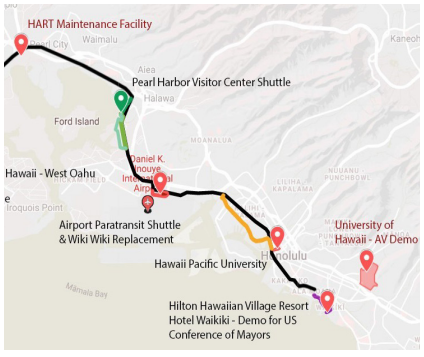
**Launch the first projects in a program of demonstrations, pilots, or deployments with an A²CES focus.** A single pilot can advance several strategies including building safety oversight at the state and county level; advancing shared-use and transit versus zero-occupancy and single-occupancy vehicles; stimulating the development of vehicles that are accessible; and tapping the research and technology capabilities, including safety evaluation, of University of Hawaii, HAVI, HECO, and innovation accelerators public and private. Top candidates for such projects include:

- East Kapolei routes serving Barbour's point, the Department of Hawaiian Homelands, and first-and last-mile service to the two rail stations in the catchment.
- Honolulu Airport Fleet Deployment—Replace Wiki Wiki with AV Fleet or paratransit application.

**Lay the foundation for a strong network of stakeholders and implementers through a convening that:**

- Level sets the understanding of technology opportunities.
- Assesses and sequences demonstration, pilot and deployment sites across Hawaii and across modes.
- Aligns public and private sector funding.
- Identifies related investments in emerging mobility technologies as well as AV vehicle development and production in Hawaii.
- Develops implementation plans for legal, policy, planning, and infrastructure plans.
- Courts outside public-private sector support for AV shuttle pilots, for application of AV technology at the airport and harbor, and for larger development of AV and A²CES technology in Hawaii.
- Stakeholders should include technology firms, public agencies, investors, nonprofits, and real estate and commercial developers.

**Showcase Hawaii A²CES readiness and mobility innovation through demonstrations and conferences.**

# STRATEGIES FOR CREATING HAWAII'S AV FUTURE

It is a time of rapid change for the transportation industry. Navigating these developments to ensure Hawaii's AV future will require dedicated attention to a number of areas. Legal, safety, policy, infrastructure, planning and mobility innovation issues will all have to be addressed. The following are key strategies and activities needed to successfully overcome these new challenges. They are broken down into activities for the short, medium and long term to illustrate the need for immediate and ongoing work. Although just a beginning, they illustrate the broad and varied disciplines that must be brought together to accomplish everything Hawaii hopes for and can achieve.

## LEGAL & SAFETY

**Confirm the legal framework for safe operation of AVs on public roads including developing guidance or regulations.**

**Short**
- **Audit Hawaii statutes and regulations regarding registration, licensure, traffic enforcement, emergency response, insurance, and liability.**
- Establish a cross-agency working group to develop recommendations to provide a common understanding for safe AV operation on public roads.

**Medium**
- Equip County departments of motor vehicles with the authority and resources to oversee safe operation of AVs on public roads.
- Implement A²CES safety toolkit or protocol for operation of A²CES vehicles.

**Long**
- Consider participating in the Uniform Code process to develop shared model legislation with other states and stakeholders.

## A²CES POLICY

**Adopt policies and initiatives at the state and local levels designed to ensure the public's interest in equitable and environmentally sound travel that is powered by renewable energy and promotes economic vitality.**

**Short**
- **Adopt A²CES principles and a supportive governance framework through legislation at state and county levels.**

**Medium**
- Examine revenue replacement options and value or congestion pricing to manage curbside and roadway congestion.
- Encourage shared trips and ownership to reduce vehicle miles traveled and zero-occupancy travel.

**Long**
- Allocate curbside access to ridesharing, freight deliveries, transit, cyclists, and pedestrians.
- Promote the switch of electric vehicles and facilitate the transition through appropriate incentives and infrastructure investment.

## INFRASTRUCTURE INVESTMENT

**Bake A²CES readiness, including electric charging from renewable resources, into public and private sector investments including rail stations, rail catchment areas, station access, and roadway and multimodal pathways.**

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|---|---|
| Short | • **Ensure designs for structured parking accommodate charging, storage, and A²CES requirements.** |
| Medium | • Incorporate universal design and assistive technology across state design and complete streets manuals and guidance.<br>• Expand joint-development opportunities at HART Stations.<br>• Make the low-speed network of roads and paths the heart of the Carbon-Free Corridor.<br>• Coordinate with private real estate developers on mobility innovation.<br>• Design and implement a network of solar-powered electric chargers for personal and commercial use. |
| Long | • **Ensure designs for structured parking accommodate charging, storage, and A²CES requirements.** |

## PLANNING

**Incorporate AV and EV considerations into all aspects of planning, public and private, so that the vision of A²CES is recognized and realized through land use, economic development, and transportation planning.**

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| Short | • **Create an AV strategy for Oahu that knits sectors together, supports A²CES investment, and manages energy, congestion, parking, curbside, and revenue impacts.** |
| Medium | • Integrate A²CES goals and strategies in current and future MPO and City and County plans, operations, and capital budgeting.<br>• Conduct design workshops to see how TOD and Complete Streets project and streetscape design may change with A²CES and increased shared-use mobility. |
| Long | • Consider and account for the impact of mature AV technology and infrastructure through scenario planning. |

## MOBILITY INNOVATION

**Launch a program of A²CES focused technology demonstration projects across modes, while prioritizing projects that expand renewable resources.**

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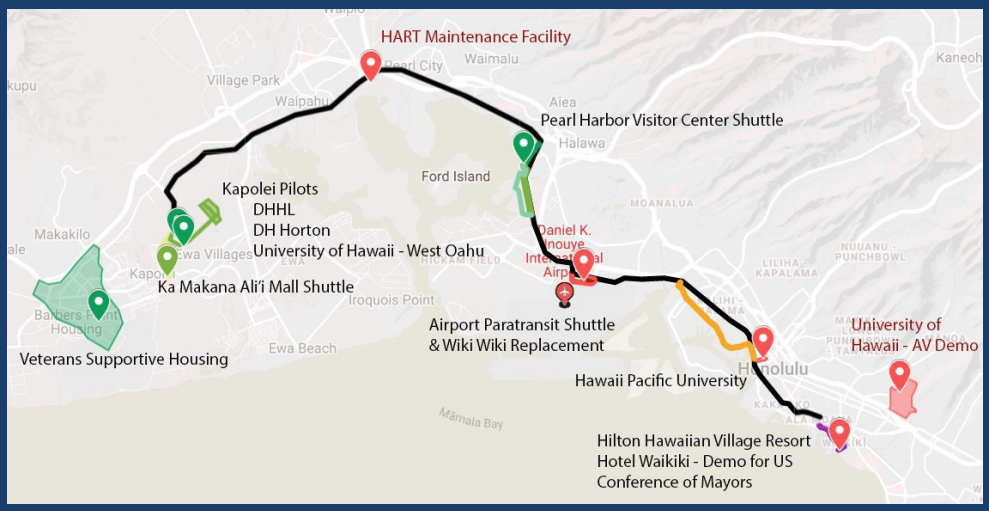
| Short | • **Launch the first projects in a program of demonstrations, pilots, or deployments.** |
| Medium | • Lay the foundation for collaboration among a strong network of stakeholders and implementers. |
| Long | • Showcase Hawaii A²CES readiness and mobility innovation through demonstrations and conferences. |

# DEPLOYMENT OPPORTUNITIES

**In the fall of 2018, stakeholders**—including campus owners, the City and County Department of Transportation Services, the Governor's Office, and the Department of Transportation—identified 11 potential sites for AV demonstrations, pilots, or deployments in Oahu and Hilo.




| SITE | DESCRIPTION | TYPE |
|---|---|---|
| Hilo | Proving Ground: Cordoned Road for ODD testing of Waymo light-duty vehicles | Testing |
| Airport | Paratransit Pilot | Pilot |
| Airport | Wiki-Wiki AV Replacement | Deploy |
| HART Maintenance | Point-to-Point Between Facilities on Grounds; Shuttle to Lee Community College | Demo |
| HART Maintenance | First/Last Mile Connector to HART Station; Shuttle to Lee Community College* | Demo |
| Hawaii Pacific U. | Apron in front of retail and student center on waterfront; parking lot or static demo | Demo |
| E. Kapolei Station | Kualakai Parkway from the end of the line Kapolei Station to the Pilot Ka Makana Ali'i Mall in a dedicated lane* | Pilot |
| E. Kapolei | Connect DHHL community to Salvation Army Campus based service at University of Hawaii; West Oahu | Pilot |
| Barbour's Point | On-demand rides for human service appointments; Retail Circulator | Pilot |
| Nimitz Boulevard | Dedicated Lane | Pilot |