

Panel 3. “All hands on deck”—Innovating to Implement Adaptation¹



Panelists

Yoram Bauman, PhD (Stand Up Economist)
Professor Makena Coffman, PhD (Director, Institute for Sustainability and Resilience, UH-Mānoa)
Stephen Long (Director of Government Relations, The Nature Conservancy, MA)
Jennifer Jurado, PhD (Chief Resiliency Officer, Broward County, FL)

Moderator

Professor Richard Wallsgrove (Assistant Professor, William S. Richardson School of Law, UH Mānoa)

Introduction: Tradeoffs, assessments and funding

Panel 2 discussed sea level rise projections for Hawai‘i, and the hard adaptation choices to be made. Rising seas, along with “stronger and more frequent El Niño events and tropical cyclones in waters surrounding Hawai‘i,” indicate a “growing threat of coastal flooding and erosion.”² To competently respond to these and other impacts

of climate change, Hawai‘i will likely need to take steps to continue identifying vulnerabilities, and planning a comprehensive adaptation response.

In this realm, a key area of ongoing work is assessing needs and opportunities for funding and supporting adaptation.³ Panel 3, and this supplemental panel briefing, will outline some of the tools, strategies, and partnerships that may be available to fund and support climate adaptation in Hawai‘i.

Three appendices are also attached to this document: (A) panelist Stephen Long’s summary of funding opportunities available to communities in Massachusetts’ Municipal Vulnerability Preparedness program; (B) panelist Dr. Yoram Bauman’s outline of options and considerations for designing and utilizing a carbon pricing mechanism; and (C) a brief summary of communications strategies for carbon pricing, compiled from observations at the recently concluded 24th Annual Conference of the Parties to the United Nations Framework Convention on Climate Change.

¹ *Panel Briefing*. Disclaimer: This is a draft document produced for discussion purposes for the 2019 Climate Conference of the State’s Climate Commission. Since this is an emerging document, with gaps that need to be filled, if you have any information that would further its intent, please contact the Hawaii Climate Change Mitigation and Adaptation Coordinator, Anukriti Hittle at the following email: Anukriti.s.Hittle@hawaii.gov. Date of document: February 13, 2019.

² See Hawai‘i Climate Change Mitigation and Adaptation Commission, Hawai‘i Sea Level Rise Vulnerability and Adaptation Report at 31 (2017).

³ See *id.* at 244:

Recommended actions in this section are proposed to support innovative and sustainable financing and incentives needed to address the complexities of adapting to sea level rise. More comprehensive financial and economic analyses of the impacts of sea level rise are needed to quantify the loss to tax revenues and the economy from sea level rise. The potential economic impacts assessed in this Report are limited to primarily the loss of structures and land. Additional analyses would provide a greater understanding of what would be lost as well as the cost of adaptation.

Response will require all hands on deck

For Hawai'i, climate change is here and now.⁴ As discussed in panel 2, the future looks more watery—projections for sea level rise, coastal erosion, and flooding are more impactful than previously estimated. In Hawai'i, the upper reach of the wash of the waves defines an important boundary between public beaches and private land.⁵ This boundary “is based on ancient Hawaiian tradition, custom, practice and usage”⁶ and is long-embodied in Hawai'i's law. Climate impacts thus threaten to create and increase tensions between public beach access and protection on one hand, and private nearshore developments on the other hand. Resolving those tensions will require difficult choices for Hawai'i's public and its policymakers. And in any formulation, responding to climate change will require a cross-cutting “all hands on deck” approach to implementing climate adaptation.

A big question: How to fund and implement adaptation?

Many mechanisms for climate adaptation implementation and funding may be available to the state. This panel will explore examples from Massachusetts, Florida, Washington, and Utah. For example:

1. **Environmental bonds.** Massachusetts has issued two environmental bonds—one in 2013 and one in 2018—and gone on to establish the Municipal Vulnerability Program. Panelist Stephen Long will describe how the state works with partners to bring expertise to local governments, and helps them prioritize and characterize their vulnerabilities.

Questions:

Can something like this be done in Hawai'i? How would it operate? How would bond revenues be used? (See Appendix A)

⁴ For example, the *Fourth National Climate Assessment* chapter on Hawai'i and U.S.-affiliated Pacific islands (*available at* <https://nca2018.globalchange.gov/chapter/27/>) identified a number of current and future climate impacts relevant to Hawai'i, including:

- *Rising temperature* (“In Hawai'i, air temperature increased by 0.76°F (0.42°C) over the past 100 years. The year 2015 was the warmest on record at 1.43°F (0.79°C) above the 100-year average.”).
- *Precipitation changes* (“While Hawai'i precipitation has experienced upward and downward changes across a range of timescales, more than 90% of the state had a net downward rainfall trend during 1920–2012.”).
- *More frequent drought and floods* (“Increasing trends in extreme 30-day rainfall and the lengths of consecutive dry-day and consecutive wet-day periods indicate that Hawai'i's rainfall is becoming more extreme and suggest that both droughts and floods are becoming more frequent in Hawai'i.”).
- *Rising sea temperatures* (“NCA3 documented historical increases in sea surface temperature (SST), and current levels in much of the region have now exceeded the upper range of background natural variation.”).
- *More acidic ocean waters* (“Atmospheric carbon dioxide levels recorded at Mauna Loa, Hawai'i, have recently exceeded 400 parts per million, and oceanic pH levels measured off O'ahu have steadily declined from an annual average of about 8.11 to 8.07 over the past 25 years (data from Hawai'i Ocean Time Series, SOEST, University of Hawai'i) and are projected to decrease to 7.8 by 2100. As pH declines, it lowers the saturation level of aragonite (the form of calcium carbonate used by corals and many other marine organisms), reducing coral and shell growth. By the end of the century, aragonite saturation is projected to decline from a current level of 3.9 to 2.4, representing extremely marginal conditions for coral reef growth.”).

⁵ See, e.g., H.R.S. §§ 205A-1, 115-4 and -5; *Diamond v. State, Bd. of Land & Nat. Res.*, 112 Haw. 161, 168, 145 P.3d 704, 711 (2006).

⁶ *Diamond*, 112 Haw. at 168, 145 P.3d at 711.

2. **Carbon pricing.** Another potential source of funding, one that is supported by Hawai'i's Climate Change Mitigation and Adaptation Commission (the "Commission"), is to price carbon.⁷ Carbon pricing can serve two purposes: (1) raising funds for climate adaptation; and (2) supporting climate mitigation (i.e. reducing greenhouse gas emissions) by influencing choices about carbon consumption. Approximately seventy national or sub-national jurisdictions have adopted carbon pricing initiatives.⁸ These initiatives include a range of carbon taxes or cap and trade mechanisms. According to a working paper from the International Monetary Fund, potential revenues from carbon taxes are higher than other sources, and the impact on greenhouse gas emissions is generally better.⁹ However, the World Bank's High Level Commission on Carbon Prices has observed that many carbon prices are not yet high enough to achieve climate goals.¹⁰ The World Bank Commission recommended pricing between \$40-80/tCO₂ in 2020 and \$50-100/tCO₂ by 2030, to "create revenue for infrastructure, protect poor people and invest in innovation." Panelist Yoram Bauman will discuss a variety of considerations for carbon pricing options pricing Hawai'i.

As observed by the Hawai'i Climate Change Commission, a particularly key consideration for carbon pricing is

managing or eliminating regressive social impacts. Some advocates recommend a revenue-neutral carbon pricing mechanism, in which revenues are returned to citizens (e.g. through distributions, or by displacing other tax revenues). Other advocates recommend using carbon pricing revenues to fund adaptation initiatives, noting regressive physical impacts from climate change and the potentially regressive nature of other funding mechanisms,

Lessons learned from other jurisdictions can illustrate the importance of a strategic and effective public communication plan when implementing carbon pricing. This plan should incorporate involvement from the public, businesses, and government agencies. Panelist Dr. Jennifer Jurado will describe how the Southeast Florida Regional Climate Change Compact, now ten years old, has engaged the business community and the media. Lessons from this coalition may be applicable in Hawai'i.

Questions:

- Which carbon pricing mechanisms are most suitable in Hawai'i?*
- How should the price be set, and how should it evolve over time?*
- How will revenue be utilized? Or should the mechanism be revenue neutral? (See Appendix B).*
- How can we ensure transparency, open and effective communication, and other elements of broad public acceptance for carbon pricing? (See Appendix C).*

⁷ In November 2018, the Commission, seeking to address greenhouse gas emissions from transportation and other source, released a statement in support of carbon pricing:

The Commission believes that putting a price on carbon is the most effective single action that will achieve Hawai'i's ambitious and necessary emissions reduction goals. This view is also supported by expert global and local institutions. . . . While the specific mechanisms behind a carbon fee program are not yet outlined, the Commission emphasizes the urgent need for such a program, and supports legislation that endeavors to establish such a program, but also recognizes that any carbon pricing mechanism:

- Must be equitable, and appropriate for the people of Hawaii; and
- Must demonstrate how this is a critical policy tool to protect the future—of Hawaii's keiki and 'āina; and
- Must be adequate to change behavior.

The Commission recommends carbon pricing mechanisms that minimize regressivity, which can be pursued through structures such as equity-based tax credits or carbon fee and dividend."

All Hands On Deck: Action Steps from Panelists at 2019 Climate Conference

Panelists at the 2019 conference agreed that to achieve Hawaii’s goals, all financing mechanisms and partners were needed. To do this, here are a few action steps recommended by the panel participants:

1. Hawaii needs to price carbon (whether cap-and-trade or carbon tax) because this is crucial to Hawaii achieving its goals—there are some success stories such as the ones in British Columbia, RGGI in the eastern states and California;
2. Develop programs with equity in mind. This is a chance to open the door to make life more fair in Hawaii;
3. Develop programs that allow for individuals to participate at different levels, so everyone can “own” the transformation that is needed;
4. Use all hands on deck—involve the business community and the media in working through the issues. Government and research communities alone cannot make the transformation;
5. Design state programs for municipal assistance that require communities to take pro-active steps (beyond business as usual – such as adopting by-laws and ordinances, developing local plans and stakeholder processes) to be eligible for funding and technical assistance; and
6. Provide a preference for nature-based solutions (conserving and restoring natural functions of forests, wetlands and coastal ecosystems and also planting urban trees) to enhance safety and avoid costs and provide co-benefits such as clean air and water, working lands (farming) and recreation.

⁸ World Bank, *State and Trends of Carbon Pricing 2018* at 18, available at <https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf>.

⁹ Ian Parry et al., *IMF Working Paper, Mitigation Policies for the Paris Agreement: An Assessment for G20 Countries, An Assessment for G20 Countries at 7 (August 2018)*, available at <https://www.imf.org/-/media/Files/Publications/WP/2018/wp18193.ashx>.

¹⁰ See World Bank, *Report of the High-Level Commission on Carbon Prices (2017)*, available at https://static1.squarespace.com/static/54ff9c5ce4b0a53deccfb4c/t/59b7f2409f8dce5316811916/1505227332748/CarbonPricing_FullReport.pdf (observing that “85 percent of global emissions are currently not priced, and about three quarters of the emissions that are covered by a carbon price are priced below US\$10/tCO₂.”).



Appendix A.

Massachusetts State Funding Opportunities for MVP Communities Compiled by Stephen Long, Director of Government Relations The Nature Conservancy-Massachusetts January 4, 2019

Resilience

Dam and Seawall Repair or Removal Program Grants and Funds

<https://www.mass.gov/service-details/dam-and-seawall-repair-or-removal-program-grants-and-funds>

The Dam and Seawall Repair or Removal Grants and Funds can be used to support the repair or removal of dams, seawalls and other coastal infrastructure, and levees.

Flood Hazard Mitigation Program

<https://www.mass.gov/service-details/flood-hazard-mitigation-program>

The Flood Hazard Mitigation Program provides funds to states, territories, tribal governments, and other communities after a disaster to reduce or eliminate future risk to lives and property from natural hazards. State and local governments, tribal organizations, and certain private non-profits may be eligible to apply for funding to cover projects including storm-water upgrades, drainage and culvert improvements, property acquisition, slope stabilization, infrastructure protection, seismic and wind retrofits, structure elevations, etc.

Division of Ecological Restoration

<https://www.mass.gov/how-to/become-a-der-priority-project>

The Division of Ecological Restoration selects wetland, river and flow restoration projects through a state-wide, competitive process. We choose high-priority projects that bring significant ecological and community benefits to the Commonwealth.

- Dam Removal: <https://www.mass.gov/river-restoration-dam-removal>
- Streamflow: <https://www.mass.gov/river-restoration-streamflow>

- Culvert Replacements: <https://www.mass.gov/river-restoration-culvert-replacements>
- Urban River Revitalization <https://www.mass.gov/river-restoration-urban-river-revitalization>
- Wetlands Restoration: <https://www.mass.gov/wetlands-restoration>

Coastal Resilience Grant Program

<http://www.mass.gov/eea/agencies/czm/program-areas/stormsmart-coasts/grants/>

The Massachusetts Office of Coastal Zone Management (CZM) administers the Coastal Resilience Grant Program to provide financial and technical support for local efforts to increase awareness and understanding of climate impacts, identify and map vulnerabilities, conduct adaptation planning, redesign vulnerable public facilities and infrastructure, and implement non-structural (or green infrastructure) approaches that enhance natural resources and provide storm damage protection. Managed through CZM's StormSmart Coasts program, grants are available for a range of coastal resilience approaches—from planning, public outreach, feasibility assessment, and analysis of shoreline vulnerability to design, permitting, construction, and monitoring.

Coastal Pollutant Remediation Grant Program

<https://www.mass.gov/service-details/coastal-pollutant-remediation-cpr-grant-program>

The Coastal Pollutant Remediation Grant Program, administered by CZM since 1996, provides funding to municipalities in the Massachusetts Coastal Watershed to address nonpoint source pollution impacting coastal habitats and water quality. Eligible projects include assessment of pollutant sources, prioritization of

sites for remediation, and the design, permitting, and construction of appropriate stormwater Best Management Practices and commercial boat-waste pumpout facilities. The CPR grant program strongly encourages applicants to include the consideration of climate change impacts when siting and designing stormwater infrastructure, to ensure long-term resilience and effectiveness.

Agriculture

Agricultural Environmental Enhancement Program (AEEP)

<https://www.mass.gov/service-details/agricultural-environmental-enhancement-program-aEEP>

AEEP is a competitive, reimbursement grant program that funds materials and labor for conservation practices that mitigate or prevent negative impacts to the state's natural resources that may result from agricultural practices. Practices funded include those that prevent direct impacts on water quality, ensure efficient use of water, and address agricultural impacts on air quality. Reimbursement grants up to \$25,000 will be awarded on a competitive basis.

Agricultural Preservation Restriction Program (APR)

<https://www.mass.gov/service-details/agricultural-preservation-restriction-apr-program-details>

The APR program preserves and protects agricultural land, including designated farmland soils, which are a finite natural resource, from being built upon for non-agricultural purposes or used for any activity detrimental to agriculture. It is a voluntary program which offers a non-development alternative to farmers and other owners of "prime" and "state important" agricultural land who are faced with a decision regarding future use and disposition of their farms.

Water

Drinking Water Supply Protection Grant Program (DWSP)

<https://www.mass.gov/service-details/drinking-water-supply-protection-grant-program-1>

The DWSP Grant Program provides financial assistance to public water systems and municipal water departments for the purchase of land or interests in land for the protection of existing public

drinking water supplies and the protection of planned future public drinking water supplies. The grants are awarded on an annual basis and reimburse 50% of the total project cost, up to that year's grant award maximum. Protection is permanent and appropriate public access must be provided.

State Revolving Fund (SRF) Loan Program

<https://www.mass.gov/state-revolving-fund-srf-loan-program>

The Clean Water SRF Program helps municipalities comply with federal and state water quality requirements by focusing on watershed management priorities, storm water management, and green infrastructure. The Drinking Water Program provides loans to communities to improve water supply infrastructure and drinking water safety.

Parks and Recreation

Massachusetts Land and Water Conservation Fund Grant Program (LWCF)

<https://www.mass.gov/service-details/massachusetts-land-and-water-conservation-fund-grant-program>

The Land and Water Conservation Fund (LWCF) was authorized by the federal Land and Water Act in 1965 with the intention of preserving, protecting, and assuring the availability of close-to-home outdoor recreation areas and conservation land for all current and future citizens of the United States. States award grants through a competitive process to communities or state agencies. The Executive Office of Energy and Environmental Affairs' (EEA) Division of Conservation Services (DCS) administers the LWCF program on behalf of the NPS for the Commonwealth of Massachusetts. Eligible projects include the acquisition of conservation or recreation land, the development of a new park, the renovation of an existing park, or the development of trails. The LWCF grant program requires a 50% contribution from the awardee.

Community Preservation Act (CPA)

<http://communitypreservation.org/content/cpa-overview>

The Community Preservation Act (CPA) is a smart growth tool that helps communities preserve open

space and historic sites, create affordable housing, and develop outdoor recreational facilities. CPA also helps strengthen the state and local economies by expanding housing opportunities and construction jobs for the Commonwealth's workforce, and by supporting the tourism industry through preservation of the Commonwealth's historic and natural resources.

Gateway City Parks Grant Program

<https://www.mass.gov/service-details/gateway-city-parks-program>

The Gateway City Parks Grant Program funds the creation or restoration of significant urban parks and trails in the 26 Gateway Cities, often projects that would otherwise be difficult to build. Gateway Cities are midsize urban centers that anchor regional economies around the state. Priority is given to projects that support broader urban revitalization efforts; are ineligible for other funding sources; address critical park infrastructure needs; have strong support from city leaders; engage local businesses, neighbors and others in park financing, programming and stewardship; or are accessible to Environmental Justice populations.

Parkland Acquisitions and Renovations for Communities (PARC) Grant Program

<https://www.mass.gov/service-details/parkland-acquisitions-and-renovations-for-communities-parc-grant-program>

The PARC Grant Program was established in 1977. It is a municipal grant program that funds the acquisition of parkland, the renovation of existing parks, and the development of new parks. Grants are awarded through an annual competitive grant round. The grant reimburses anywhere between 52 and 70% of the total project cost up to that year's grant award maximum, which has been \$400,000 for the past number of years. Land funded through this program must be open to all residents for active recreation and remains protected in perpetuity.

Conservation

Local Acquisitions for Natural Diversity (LAND) Grant Program

<https://www.mass.gov/service-details/local-acquisitions-for-natural-diversity-land-grant-program>

The LAND Grant Program helps cities and towns acquire land for conservation and passive recreation purposes. The grants reimburse cities and towns for the acquisition of land in fee or for a conservation restriction.

Landscape Partnership Grant Program

<https://www.mass.gov/service-details/landscape-partnership-grant-program>

This program seeks to protect large blocks of conservation land. Local, state, and federal government agencies and non-profit groups can use this grant to work together to protect at least 500 acres of land. Eligible projects include purchase of land in fee simple for conservation, forestry, agriculture, or water supply purposes, purchase of a Conservation Restriction, Agricultural Preservation Restriction, or Watershed Preservation Restriction, or construction of a park or playground.

MET Drive for a Better Environment (DFBE) Grants Program

<https://www.mass.gov/service-details/met-drive-for-a-better-environment-dfbe-grants-program>

The DFBE Grants Program provides funding to innovative and well-designed projects that support the advancement of marine animal conservation efforts and restoration and enhancement of aquatic ecosystems within Massachusetts.

MassBays Healthy Estuaries Grants

<https://www.mass.gov/massbays-healthy-estuaries-grants>

MassBays provides small grants to nonprofit organizations, academic institutions, and municipalities for projects that advance progress toward the goals of our Comprehensive Conservation and Management Plan. MassBays seeks proposals that will fill in gaps in knowledge about assessment areas, demonstrate new approaches to monitoring or protecting near-shore habitats, or lay the groundwork for future restoration.

Conservation Partnership Grant Program

<https://www.mass.gov/how-to/apply-for-a-conservation-partnership-grant>

The Conservation Partnership Grant funds the acquisition of conservation land by non-profit entities. This program provides funding to assist non-public, not-for-profit corporations and conservation districts in acquiring and holding

interests in lands suitable for conservation or recreation purposes. Municipalities interested in conserving a land through a Conservation Partnership Grant can coordinate with a non-profit entity to achieve the desired conservation goal.

Habitat Management Grant Program

<https://www.mass.gov/service-details/masswildlife-habitat-management-grant-program>

Managed by the Massachusetts Division of Fisheries and Wildlife (MassWildlife), the Habitat Management Grant Program (MHMGP) was developed to establish partnerships between MassWildlife and private and municipal landowners to enhance habitat and increase recreational opportunities on properties across the state. MHMGP is designed to provide financial assistance to private and municipal landowners of protected lands to support active habitat management while fostering partnerships to encourage landscape scale habitat management and expand public recreation on conserved lands.



Appendix B. Some thoughts on a Hawai'i carbon tax

Yoram Bauman PhD
yoram@standupeconomist.com
January 14, 2019

Any carbon tax proposal needs to describe the carbon tax itself as well as the disposition of carbon tax revenue. This paper lays out some options and considerations on both fronts and concludes with some options for a carbon tax package.

1. The carbon tax

[EIA data](#) (linked from [here](#)) provide a good overview of the state's carbon emissions. Emissions for 2016 totaled 18.4 MMTCO₂. A breakdown by fuel shows coal accounting for 1.6 MMT (9%) and petroleum products accounting for the remaining 16.9 MMT (91%). A breakdown by sector shows the transportation sector with 10.2 MMT (55%), the electric sector with 6.6 MMT (36%, including almost all of the coal and 5.1 MMT of petroleum), and a small industrial sector and an even smaller commercial sector accounting for the remaining 1.6 MMT (9%) in direct emissions.

Given these emissions data, a very basic estimate is that a \$20 carbon tax (about 20 cents per gallon of gasoline or 2 cents per kWh of coal-fired power) would generate revenue on the order of \$368m a year. That's assuming little to no demand response, but it's a good starting point for a discussion. (The revenue estimate can of course be scaled, so that a starting point for a \$10 carbon tax discussion would be \$184m and for a \$30 carbon tax would be \$552m.)

A more thorough discussion would include the following points:

Jet fuel: 5.2 MMTCO₂, or ballpark \$104m a year from a \$20 carbon tax

Hawai'i has a lot of jet fuel consumption: [13 million barrels](#). At 42 gallons a barrel and [9.57 kg CO₂ per gallon](#) that's 5.2 MMTCO₂, or about \$100m a

year from a \$20 carbon tax. There's a legal issue here that may constrain jet fuel revenue to airport purposes: [49 US Code section 47107](#) basically says that taxes on jet fuel have to be earmarked for airports in any state seeking federal DOT funds for airport projects. Since the state probably doesn't want to give up on [tens of millions in DOT grants](#), you probably need to consider either exempting jet fuel or putting that \$100m a year into an airport fund. (In Utah, for example, there's an "Aeronautics Restricted Fund" that get money from an existing tax on jet fuel that's about 3 cents a gallon.)

For context: Airplanes get roughly [60mpg per coach passenger](#). It's about 2400 miles from Hawai'i to (say) Los Angeles, so that's about 40 gallons of jet fuel per passenger; so a \$20 carbon tax—about 20 cents a gallon—would amount to about \$8 per passenger. That's for the one-way from Hawai'i to LAX; the flight from LAX to Hawai'i would fuel up at LAX and so wouldn't be subject to the Hawai'i carbon tax.

Industrial sector: 1.6 MMTCO₂, or ballpark \$32m a year from a \$20 carbon tax

Hawai'i does have modest industrial sector emissions: about 1.6 MMTCO₂, mostly petroleum but also a bit of coal. It looks from [EPA FLIGHT](#) data that it's mostly two oil refineries. If those count as energy-intensive trade-exposed (EITE, which they may or may not) then there's a case for helping those businesses maintain competitiveness by offsetting their carbon tax with business tax reductions and/or providing a partial or complete exemption from the carbon tax. (By analogy: a steel mill in Utah might not be able to compete with steel mills in other states if there were a carbon tax in Utah but not in other states, so there's an economic case to be made for

addressing this issue.) But if the industrial activity isn't trade-exposed (if, for example, the refineries in Hawaii do not compete with refineries elsewhere) then that economic case doesn't really exist. In any case, if a tax on refinery activity were passed along in the price of petroleum products then a good ballpark is that \$20 per ton on refinery emissions would add a bit less than a penny per gallon to fuel prices.

Electric sector: 6.6 MMTCO₂, or ballpark \$132m a year from a \$20 carbon tax

This sector may have substantial demand responsiveness because of existing high prices and because of the state's [goal to be 100% renewable by 2045](#). A \$20 carbon tax amounts to about 2 cents per kWh for coal-fired power and perhaps 1.5 cents per kWh for petroleum-fired power. Those are significant amounts, even in the context of electricity rates of [20-40 cents per kWh](#).

Remaining emissions: 5 MMTCO₂, or ballpark \$100m a year from a \$20 carbon tax

Most of the remainder is motor gasoline, which totals about [11.2m barrels](#) in Hawai'i. (At 42 gallons a barrel and [8.89 kg CO₂ per gallon](#) that's 4.2 MMTCO₂, or about \$84m a year from a \$20 carbon tax.)

2. Disposition of the revenue

The revenue from a carbon tax can be used to fund mitigation and/or adaptation efforts, and it can also be used to offset pocketbook impacts of the carbon tax on households and businesses.

Given the federal DOT constraints described above, special consideration must be given to any carbon tax revenue from jet fuel, which amounts to 5.2 MMTCO₂ or ballpark \$104m a year from a \$20 carbon tax. One option for this revenue would be to fund adaptation issues at airports if any such issues exist concerning sea-level rise, etc. Another option would be to use the carbon tax revenue to replace the existing airport funding structure, e.g., a per-passenger fee. Changing airport fees from per-passenger to per-gallon would promote fuel economy and would perhaps not significantly change flight costs.

The remaining emissions total 13.2 MMTCO₂, or ballpark \$264m a year from a \$20 carbon tax, but consideration of EITEs (energy-intensive trade-exposed businesses) and/or potential demand responsiveness likely reduces this total to more like 10 MMTCO₂, or about \$200m a year. Funding for mitigation and/or adaptation efforts is one possible use of this revenue. But some or all of it could also go toward tax reform efforts as described below.

Make the state's EITC match refundable: \$30m per year

The federal Earned Income Tax Credit is one of the most successful anti-poverty programs in the country. It essentially functions like a Milton Friedman-style negative income tax: low-income working families receive a [refundable tax credit of up to \\$6,431](#) depending on their income and their family structure. (It mostly benefits families with children, and the "refundable" part of it means that families get a check in the mail if their EITC exceeds the amount of income tax they owe.) About 25 states have [state-level matches](#) of the federal EITC, so that if you get (say) \$2,000 from the federal government then you get a match from the state government. Hawai'i passed a *nonrefundable* 20% EITC match in 2017 (HB 209), with an expected [revenue impact of \\$20m a year](#). There are ongoing efforts to make this a *refundable* 20% EITC match, so that families would get a check in the mail if their state EITC exceeds the amount of state income tax they owe; doing this would come with an expected [additional revenue impact of about \\$30m a year](#).

Note that additional information on revenue impacts is likely to become available after the *nonrefundable* EITC match goes into effect.

Make the state's EITC match refundable and boost it from 20% to 30%: \$55m per year

Since a refundable 20% EITC match has an expected revenue impact of about \$50m a year, a refundable 30% EITC match should have an expected revenue impact of an additional \$25m; adding this to the \$30m from the previous section brings the total to \$55m. A 30% match is within the

bounds of [policies in other states](#) that provide refundable EITC matches, including Massachusetts and New York (both at 30%), Minnesota (approximately 34%), Vermont (36%), New Jersey (37%), and Washington DC (40%). A 40% EITC match would be at the upper bound of policies in other states—although note that California apparently has an 85% match for families earning up to \$22,300—and would come with an expected additional revenue impact of \$80m a year.

Per-capita dividends of \$100 per person: \$150m per year

A dividend approach means sending residents of Hawai'i a yearly check, similar to the Alaska Permanent Fund; the cost can be scaled up or down by changing the amount of the dividend, which is a plus in terms of policy. There might also be political advantages from paralleling national proposals from [Citizens Climate Lobby](#) and [Baker-Shultz](#). However, there are open questions about the costs of administering dividends and about whether the approximately [45,000 undocumented residents](#) of Hawai'i can or should qualify for a dividend check.

Reduce existing taxes

State tax collections totaled [\\$7 billion](#) in Fiscal Year 2017, with major categories including

- general sales and gross receipts taxes (\$3.2b),
- selective sales taxes (\$1.1b, including \$122m from public utilities),
- licenses (\$269m, including \$188m in motor vehicle licenses, \$17m in public utility licenses, and \$49m in occupation and business licenses),
- individual income tax (\$2.1b),
- corporate income tax (\$185m), and
- other taxes (\$113m).

The relevant carbon tax revenue from a \$20 carbon tax is on the order of \$200m per year, so

some or all of this revenue could be used to fund a modest reduction in these existing taxes.

Alternatively, carbon tax revenue could be used to fund a more significant reduction in a targeted sliver of this revenue, for example reducing or eliminating the state portion of the GET on grocery store food and medicine, which a very rough estimate puts at \$120m-\$220m a year.¹ Another option here is to expand the state's [Refundable Food/Excise Tax Credit](#).

3. Putting it all together: Options for a carbon tax package

There are many options for the details of the tax itself as well as for the disposition of carbon tax revenue, but my suggestion is to **start by thinking about what you want to fund**. Assuming that jet fuel revenue goes into a separate airport fund, here are two options:

- A “small” package could focus on making the state EITC match refundable (\$30m) plus annual funding of (say) \$50m for climate adaptation. A carbon tax starting at about \$10 (increasing at about 3.5% plus inflation) would be needed to fund this package.
- A “medium” package could eliminate the GET on grocery store food and medicine (\$120m-\$220m) in addition to the \$80m above. A carbon tax starting at about \$20-\$30 (depending on the GET cost) would be needed to fund this package.

A carbon tax in the range of \$10-\$30 per ton would likely reduce non-jet-fuel emissions by about 5-20%. That estimate comes from modeling and experience in [British Columbia](#) and elsewhere; making a more precise estimate would require additional analysis of the unique aspects of the state's electricity and transportation sectors.

¹ Based on [U.S. Census Bureau data](#), grocery store sales in Hawai'i totaled about \$3 billion in 2012. Population growth, economic growth, and non-grocery-store sales of food and medicine would perhaps boost the total to \$4 billion for 2020, which at a GET rate of 4% amounts to \$160m a year in state revenue. Note that [BLS data](#) are in roughly the same ballpark, showing national per-household expenditures of about \$4,049 for food at home and \$463 for drugs, for a total of about \$4,500; there are about [0.5m households](#) in Hawai'i, for total sales of \$2.2 billion, but food costs are [considerably higher](#) than the national average, plus there are some purchases by the many non-resident visitors to Hawai'i.)



Appendix C.

Brief Summary of Four Sessions on Carbon Pricing Discussions at the United Nations Framework Convention on Climate Change, 24th Conference of the Parties (“COP 24”), Katowice, Poland, December 2018.

Stacey Gray, Student at William S. Richardson School of Law, University of Hawai‘i, Mānoa.

Highlighted Discussion Points from COP 24

- Generally three types of revenue structures discussed:
 - Revenue neutral—revenues redistributed to citizens and/or businesses in the form of a rebate or other mechanism
 - Revenues reinvested into green infrastructure
 - A combination of the first two – apportioning some revenues into green investment, and returning some revenue to citizens and/or businesses
- Public understanding and acceptance is the key consideration from the start, and requires strategies such as transparency and visibility for the disposition of revenues, along with a clear communications plan
- Success factors include flexibility, transparency, and industry collaboration to communicate and implement pricing benchmarks; consider how benchmarks should evolve over time
- Framing matters—e.g. the phrases “carbon tax” and “paying to pollute” may

be perceived differently, even if describing the same carbon pricing mechanism

Other Discussion Points

At COP 24, several events focused on using carbon markets as a way to put a price on pollution, and using this policy to simultaneously support climate and economic development goals. Approximately seventy jurisdictions around the world are putting a price on carbon.¹ At COP 24, representatives and experts from several of these jurisdictions discussion described a growing momentum to adopt carbon pricing at national and sub-national levels around the world.² For example, representatives from British Columbia (sub-national) and Chile (national) described experiences in adopting a carbon price, and described how those mechanisms are intended to support economic growth and innovation.

One of the key lessons from the discussion at COP 24 centered on effective communication as an integral part of designing and implementing a carbon pricing program.³ Communication provides the means for building acceptance internally across government agencies, and externally with citizens, communities, and businesses. A shared

¹ See World Bank, *State and Trends of Carbon Pricing 2018* at 17, May 2018, available at <https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf?sequence=5&isAllowed=y> (reporting that “[a]s of 2018, 545 national and 25 subnational jurisdictions are putting a price on carbon”). Individual U.S. states, such as Massachusetts, Virginia, Washington, Oregon, and California, are implementing or considering carbon markets or prices. See *id.* at 51-52. Hawai‘i might be added to this list, as the current “barrel tax” applies to most direct fossil fuel imports, albeit at the modest level of \$1.05 per barrel or barrel-equivalent. See H.R.S. § 243-3.5.

² Notably, a global consensus at COP 24 was able to agree on a “rule book” for implementing a Paris Agreement, but could not agree on details intended to address carbon markets in the international realm. This portion of the rule book was blocked by a proposed amendment from Brazil, and will be addressed at subsequent meetings of the parties.

³ See also World Bank, *Guide to Communicating Carbon Pricing*, December 2018, available at <https://openknowledge.worldbank.org/bitstream/handle/10986/30921/132534-WP-WBFINALonline.pdf?sequence=9&isAllowed=y>.

understanding and acceptance of a carbon program is essential for building a robust policy that can be sustained through electoral and economic cycles.⁴ Commentators from both developed and developing countries stressed the importance of clear and effective communication from the very inception of the policy design process. Several also noted the potential design of setting low initial carbon pricing benchmarks, with a clear plan to increase the benchmarks over time and to evolve other aspects of the mechanism. British Columbia's representatives described policy considerations and changes related to distributing revenues to low- or median-income taxpayers, to businesses. They also discussed support for investing a portion of tax revenues in green industry and infrastructure. Similarly, polling in Hawai'i has indicated citizen support reinvesting "barrel tax" revenues in green initiatives.⁵

One group of experts at COP 24 released a summary of strategies for designing, implementing, and communicating carbon mechanisms.⁶ Some of the recommended communication strategies include:

- Considering both climate and non-climate benefits of carbon pricing;
- Ensuring that the use of carbon price revenues is transparent;
- Remembering to consider values, rather than focusing solely on benefit-cost calculations;
- Building trust through early and often stakeholder engagement;
- Setting clear priorities and objectives for the carbon pricing mechanism, and for its accompanying communications plan;
- Defining and engaging priority audiences across the political spectrum;
- Implementing a communications strategy from the beginning of the policy design process;
- Utilizing consistent and understandable messages for public communication;
- Incorporating mechanisms to understand and address sources of concern and opposition;
- Keying on the potential fairness of carbon pricing mechanisms;
- Emphasizing that carbon pricing is widely viewed as a considered, reasonable, and moderate approach to the climate crisis, which can encourage businesses and citizens to consider short- and long-term carbon impacts;
- Avoiding a framing that describes carbon pricing through the lens of fear, expert consensus, or the threat of climate change.

⁴ Around the same time as COP 24, the "yellow vests" in France gained notoriety for protests of petrol taxes. Several commentators at COP 24 discussed those protests, and asserted that one source of the problem could be traced back to insufficient public communication about tax changes. Another commentator suggested that the yellow vest protests, at their core, were about more than petrol taxes and were instead related to broader social issues in France.

⁵ See Honolulu-Star Advertiser, *Barrel tax revamp gains support*, Jan. 19, 2013, available at https://energy.hawaii.gov/wp-content/uploads/2011/09/BarrelTaxSupport_HonStarAd_1.19.13.pdf (describing polls conducted by the State Energy Office and by Blue Planet Foundation).

⁶ Partnership for Market Readiness, Carbon Pricing Leadership Coalition, *Guide to Communicating Carbon Pricing* (2018), available at <https://openknowledge.worldbank.org/bitstream/handle/10986/30921/132534-WP-WBFINALonline.pdf?sequence=9&isAllowed=y>.