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**HAWAII ENERGY POLICY FORUM**

UNIVERSITY OF HAWAI'I AT MĀNOA

# **OBSTACLES IN HAWAI`I LAWS TO IMPLEMENTATION OF ENERGY EFFICIENCY AND RENEWABLE RESOURCES**

## **A Review of Hawai`i's State and County Laws**

**Prepared for the Hawai`i Energy Policy Forum**

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# OBSTACLES IN HAWAII LAWS TO IMPLEMENTATION OF ENERGY EFFICIENCY AND RENEWABLE RESOURCES

## A Review of Hawaii's State and County Laws

### INTRODUCTION

This report was commissioned by the Hawaii Energy Forum (Forum) to determine what existing laws in Hawaii present obstacles to the implementation of energy efficiency and renewable energy resources. The report is a preliminary part of one of the Forum's efforts to ensure that Hawaii's laws promote sound energy policies. The report seeks to find opportunities to improve Hawaii's laws and practices by identifying barriers that could ultimately be removed.

The State of Hawaii has recently reasserted long standing policies to promote energy efficiency and renewable energy resources and has implemented several laws and programs to address energy related concerns. These include efficiency standards for state projects, implementation of renewable portfolio standards in the electrical utility sector and legislation to limit Hawaii's greenhouse gas emissions to 1990 levels by the year 2020. These and other state and county laws along with global scale trends in energy economics and concern for environmental impacts will ultimately require substantial changes in how energy will be used and produced.

The recent laws and programs that are part of Hawaii's reinvigorated efforts to implement progressive energy policy are not the primary focus of this report. This report is an overview of the larger body of laws, most of which are not explicitly intended to address energy policy but may present unintended barriers.

Hawaii's laws<sup>1</sup> serve a multitude of purposes. The vast majority of Hawaii's laws have nothing to do with how energy is consumed or produced. Of the 2255 sections of state statutes and county codes reviewed to prepare this report, only 291 were found on first review to possibly be related to energy use or production.<sup>2</sup> Only a fraction of these sections were found, on further examination, to significantly affect energy efficiency or renewable energy resource implementation.

Of the sections that do have some effect, some explicitly promote energy efficiency and renewable energy resources by way of statements of policy, regulations and budget. Other sections affect energy consumption directly or indirectly without explicitly addressing how energy is used or produced.

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<sup>1</sup> Throughout this report the term "Hawaii's laws" refers collectively and inclusively to the Hawaii Revised Statutes and the revised county codes of Hawaii's four major counties.

<sup>2</sup> The term "sections" is used in this report to refer collectively to the chapters, articles, sections, parts and divisions of the Hawaii Revised Statutes and county codes as they were compiled for review in this report. The complete list of sections with accompanying notes and comments is provided in an appendix to this report.

## **APPROACH**

This project incorporated an overview of all of the Hawai'i Revised Statutes and County Codes. Detailed tables of contents of each of these bodies of law were compiled and reviewed to determine which sections might have direct or indirect effects on the use, production, taxation or regulation of energy. Each of the identified sections were examined to determine whether they posed obstacles to the implementation of energy efficiency or renewable energy resources. In those areas where administrative rules are applicable these were also examined.

Spreadsheets were developed that document each section of Hawai'i's laws, identify which sections were examined in some depth and provide brief comments regarding the findings for applicable sections.<sup>3</sup>

Because the project attempts to be an encyclopedic overview of Hawai'i's existing laws, the level of detail of the treatment of issues is necessarily limited. Certainly many specific matters of law could potentially be examined and argued in great depth. The approach in this project was to identify and characterize obstacles rather than to provide any exhaustive analysis of each.

In reviewing the extensive list of Hawai'i's laws, the scope and definition of what comprises an "obstacle" was a recurring question that provoked several necessary considerations. First is a question of magnitude: whether some aspect of the law is clearly prohibitive or whether it discourages implementation or perhaps poses some requirements that need to be met. Second is a question whether a requirement of law is reasonable or whether it is unwarranted.

Regarding these questions, the overview of Hawai'i's laws focused primarily upon substantial obstacles that are, at least in some way, unintended or unwarranted or could be constructively mitigated. It is clearly recognized, for example, that renewable energy projects may have environmental impacts. The environmental laws that apply to these projects may, in fact, pose "obstacles" that are warranted and proper. It is not a reasonable objective (and it is not an ultimate objective of the Forum) to promote efficiency or renewable resources by removing important legal protections. Indeed, some of the objectives underlying the Forum's support for energy efficiency and renewable energy resources spring generally from the same sort of environmental concerns that underpin Hawai'i's environmental regulations. This overview does not attempt to grapple with subjective distinctions regarding the merit of the intended purposes of laws and regulations. The focus is to identify barriers that are, at least in some way, unintended or unwarranted.

The scope of findings in this report was also broadened to some degree in light of the nature of its findings. The original intent was to identify opportunities to improve Hawai'i's laws by finding obstacles that could be removed. Since the number of outright obstacles found was so small, however, the scope of findings was broadened to include ways that Hawai'i's laws could more extensively promote energy efficiency and renewable energy resources, even in some cases where existing law presents no real barriers or provides no guidance at all. The extent to which these suggestions are offered is not comprehensive. Although the report attempts to be exhaustive in its overview of the existing laws to identify obstacles, the scope of possible improvements to Hawai'i's laws is limited to some of the more obvious missed opportunities.

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<sup>3</sup> The spreadsheets are included as an appendix to this study. The County Code of the County of Kaua'i is not available in electronic format. Documentation of the review of Kaua'i's laws is not in spreadsheet format.

## **GENERAL FINDINGS**

(1) Hawai'i's state and county laws pose very few outright obstacles to the implementation of energy efficiency and renewable energy resources. Several laws do pose obstacles, such as (1) a county mandate requiring the selection of lowest cost bids in procurement of government assets regardless of associated long term operation costs and (2) mandates requiring street lighting in all new subdivisions regardless of circumstances.

(2) Although the list of outright obstacles formalized in law is remarkably short, the implementation of exemplary practices is substantially wanting. Many cost effective energy efficiency measures continue to be ignored by government agencies and private entities in favor of conventional practices that are more costly and wasteful. Although some momentum is shifting, fossil fuels (and oil in particular) remain the overwhelming mainstay of Hawai'i's energy portfolio.

(3) There is a distinction between what is **allowed** by the law and what is **encouraged** or **required**. Hawai'i's state and county laws, almost without exception, allow for the implementation of energy efficiency and renewable energy resources. Some of Hawai'i's laws also encourage and/or require some implementation of energy efficiency and renewable energy resources. On the other hand, Hawai'i's laws also allow and facilitate practices that methodically ignore the benefits and opportunities of efficiency and renewable resources. In practice, Hawai'i's laws allow government agencies and private entities to make some poor choices.<sup>4</sup>

(4) There is a distinction between what is required by law and what is actually implemented. Regulations are often not followed if they are not enforced. Programs are often not implemented if they are not funded and supported by government administration. Governments often do not even follow their own laws without administrative direction and programmatic support. For example, Hawai'i has had several progressive, mandatory laws on the books for many years that set noble goals, provide ambitious energy savings thresholds and require implementation of specific energy efficiency measures by state agencies.<sup>5</sup> Without the necessary staff, budget and programmatic support, however, these laws have had little effect.

The general findings above lead to two general conclusions that might serve as recommendations to Hawai'i's lawmakers:

First, laws need to be specific. In order for Hawai'i's laws to be effective, they must go beyond statements of policy and general objectives and provide specific requirements and/or incentives. The general guidance provided by Hawai'i's long standing goals and objectives has not proven to be effective of its own accord. Prescriptive requirements are more likely to be implemented than general directions. Where thresholds are specified as goals to be attained, these need to be supplemented by specific implementing procedures and corresponding assignments of duties.

Second, agencies need sufficient resources to implement laws. In order to effective, Hawai'i's laws must be supported by necessary programs and resources for implementation and enforcement. Unfunded mandates, however ambitiously worded, have proven largely ineffective.

Summarized very briefly, the general findings of this project are:

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<sup>4</sup> It is not argued here that it is a duty of government to ensure that private entities avail themselves of opportunities to benefit from use of energy efficiency measures or renewable energy resources. Determining the proper scope of government's role in providing mandates to private entities (regulation) is an important and ongoing policy question. Government does mandate energy efficiency and renewable resources by regulation in some cases, such as the county building energy codes and the state renewable portfolio standards.

<sup>5</sup> See the discussion of the provisions in HRS § 196 (2002 through 2006) starting at page 7.

- Hawai'i's laws and rules pose few outright, unwarranted obstacles that are fixed in law.
- Hawai'i's laws could go further to promote or require implementation of energy efficiency and renewable energy resources.
- In order to be effective, laws must provide specific requirements and/or incentives.
- In order to be effective, laws must be supported by sufficient resources and programs to provide for implementation and enforcement.

These findings are described in more detail below.

# SYNOPSIS OF FINDINGS

The findings of this report are organized according to the general roles that government plays in Hawai'i's energy sector:

- Consumption: As large consumers of energy, governments affect how much energy is used, both by setting an example and by direct consumption.
- Financing: As financiers, governments provide funding for projects that use energy and/or produce energy by issuing, sponsoring or guaranteeing bonds, and/or by direct financing.
- Regulation: As regulators, governments control the actions of individuals and businesses by passing and enforcing laws, rules and plans.
- Taxation: As tax collectors, governments affect the costs of energy resources and provide incentives and disincentives that affect energy use.

A separate section addresses transportation issues since this sector represents such a large proportion of Hawai'i's energy consumption.

## A. GOVERNMENT AS A CONSUMER OF ENERGY

### ACQUISITION OF ENERGY CONSUMING ASSETS

The state and county governments are large consumers of energy. Energy costs are a substantial part of Hawai'i's state and county operating budgets. These ongoing energy costs are a direct consequence of past decisions made in the acquisition of capital assets that consume energy.

Many government assets, including buildings, lighted facilities, water and wastewater facilities and vehicle fleets consume substantial amounts of energy and incur other ongoing operating costs. These ongoing costs are not always fully considered when assets are specified or acquired. Decisions made in the acquisition of government assets tend to focus primarily on "up front" capital and implementation costs.

Energy efficiency measures are particularly capital intensive. Most of the costs of these measures are up front capital and installation costs. The benefits are realized in the longer term in the form of lower ongoing operational costs. The long term benefits of energy efficiency measures are often not sufficiently considered when capital assets are acquired. As a result, government agencies often acquire assets that have lower initial capital costs but consume more energy and are more expensive in the long run.

Decisions made regarding the acquisition of capital assets include budgeting, specification and the procurement of assets.

- Budgeting is the process of allocating government financial resources to specific programs and projects.
- Specification includes determination of the design and specific characteristics of the assets to be acquired.
- Procurement includes the process of soliciting, evaluating and selecting the supplier of the assets.

All of these phases of the acquisition process are important and can affect the long term energy consumption and operating costs.

## **BUDGETING**

The Hawai'i Revised Statutes provide requirements for the State's budgeting processes. Full capital costs and some operating costs must be identified. The county codes provide less emphasis on identification of operating costs in the budget process. Although these provisions fall short of requiring full life cycle cost analysis<sup>6</sup>, the budget provisions in Hawai'i's laws do not pose a substantial barrier to the implementation of energy efficiency or renewable energy resources. Requiring identification of the full life cycle costs of major capital expenditures in the budget process could improve the extent to which energy and other operating costs would be considered.

HRS § 37 - Budget, provides protocols and requirements for the preparation and submission of the State's executive budget. Section 37-64 requires the governor to prepare a six year budget and fiscal plan that identifies full costs including operation costs and the "full cost implications" of recommended programs. The requirement of a six year budget and fiscal plan that identifies operation costs is progressive but falls short of life cycle costing analysis.

HRS § 21F - Legislative Fiscal and Budget Analysis, establishes the office of the Legislative Analyst to provide the Legislature with information regarding fiscal and budget impacts. This chapter would allow but does not require the Legislative Analyst to utilize or present life cycle cost analysis to the Legislature.

## **SPECIFICATION**

Ideally, requirements for energy efficient project components should be explicitly specified in any requests for proposals. For larger projects that are designed and acquired in phases, specifications should be provided as early in the design process as possible. For example, when architects and engineers are commissioned to design government buildings, the energy consumption, operating costs and energy certification requirements<sup>7</sup> of the buildings should be identified as required design criteria.

The energy efficiency components of projects should be explicitly and sufficiently identified in the project bidding specifications and/or bid evaluation criteria. Specifications for energy efficiency can be provided in several forms.

- Analysis and evaluation can be required. Specifications can require that energy consumption and operating costs be evaluated, identified and minimized. For example: requirements that life cycle cost analysis must be used or that operating costs must be minimized.
- Threshold criteria can be provided. Specifications can require that energy consumption should be less than some standard or amount. For example: energy consumption less than "x" watts per square foot or less than "x" miles per gallon, etc.
- Prescriptive requirements can be specified. Specifications can require that particular technologies, equipment or measures be provided. For example: requirements for solar water heat, "daylighting" or energy efficient lighting, hybrid or biofuel powered vehicles, etc.

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<sup>6</sup> "Life cycle costs" are defined in HRS § 196-11, as "the sum of the present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs, over the lifetime for the project, product, or measure."

<sup>7</sup> As of 2006 government buildings are required to be built to the standards of Green Building Council LEED Silver, two golden globes or other equivalent certification. HRS § 196-9(b)(1).

Generally, requiring analysis and evaluation or specifying required thresholds are most appropriate for the project design and engineering phases of larger projects. Prescriptive requirements are more effective for construction contracts or procurement of capital assets.<sup>8</sup>

Past and existing laws do include some impressive requirements that energy efficiency provisions must be specified in government acquisition of capital assets. Most of these requirements, however, have not been effective where:

- requirements are too general;
- requirements are not mandatory;
- laws require expertise to apply;
- laws require extensive staff time and resources to apply; or
- funding and programmatic support are not provided for implementation.

For example, since 1999, HRS § 103D-410 has specified that “procurement practices of the State shall include energy efficient standards and policies, including life cycle costing.”<sup>9</sup> This section includes discretionary language providing that state and county agencies “shall be guided by energy efficiency standards and policies” and “shall consider purchasing via the life-cycle costing method.” In addition, this section includes a mandatory prescriptive requirement to use the “watt-saving variety of common-sized fluorescent lamps” unless standard wattage bulbs are specifically required.

Starting in 2002 and until repealed in 2006, HRS § 196 included several stronger mandates for state agencies to implement energy efficiency measures. These included mandatory goals for reduction of energy consumption by 20% by 2007 and 30% by 2012. State agencies were required to expand use of renewable energy, reduce use of petroleum generated energy, reduce resulting greenhouse gas emissions, reduce water consumption, provide funding in budget submissions to accomplish energy reductions, and develop and file annual implementation plans and reports regarding compliance. Each state agency was required to designate a senior official and form a technical support team to manage compliance and reporting. Each agency was required to use several management strategies to meet these goals including employee incentive programs, performance evaluations, training and education, designation of showcase facilities. State agencies were allowed to retain savings generated from compliance with the efficiency goals. Despite the mandatory language of the Chapter, however, these requirements were never substantially implemented.

Also starting in 2002 and remaining in effect are requirements for agencies to purchase Energy Star appliances when they are determined to be cost-effective on a life-cycle basis.

In 2006, the provisions of HRS § 196 cited above were substantially amended and replaced with requirements that are more prescriptive. These require each state agency to design and construct buildings that meet the “Leadership in Energy and Environmental Design (LEED) silver or two green globes rating system or another comparable state-approved, nationally recognized, and consensus-based guideline, standard or system.” Building envelope (insulation) standards are identified for low-rise residential state facilities. Installation of solar water heating in state facilities

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<sup>8</sup> Generally, the design and engineering phase services should include identification of prescriptive specifications for construction contracts or the procurement of capital assets. Where analysis, evaluation or fulfillment of threshold criteria are to be provided in submissions for project bids, the merits of these submissions should be explicitly identified in the bid evaluation criteria.

<sup>9</sup> HRS § 103D applies generally to all Hawai'i government agencies including county agencies.

is required based on a specified cost-benefit analysis. Purchase of Energy Star appliances for state facilities is required based on cost-benefit analysis. Agencies are encouraged to minimize pollution, use recycling and procure environmentally preferable products. Specific requirements are provided regarding the State's transportation vehicle fleet encouraging use of alternative fuels, ethanol blended gasoline and biofuels and requiring data collection and reporting on vehicle fleet cost and operating information. In addition to requirements pertaining to the state-owned vehicle fleet, a goal is established to facilitate the development of alternate fuels and support the attainment of a **statewide** alternate fuels standard to increase alternative fuel use in vehicles to ten percent by the year 2010, fifteen percent by 2015 and twenty percent by 2020.

The newer 2006 provisions of HRS § 196 have been supported by the State administration, the establishment of two new agency staff positions and are being implemented programmatically, referred to as the "Lead by Example" program. Due to the more prescriptive nature of the specification requirements and some funding for staff and programmatic support, it seems more likely that these more recent requirements will be effective.

Although there are some recent improvements, existing laws still present barriers and missed opportunities:

- The new more specific requirements for buildings apply only to state facilities.
- Requirements do not apply to all types of capital assets that consume significant amounts of energy.
- Only some requirements are supported by funding, staff and programs for implementation.
- Some requirements remain too general to be effectively implemented without programmatic support.
- Some provisions are not mandatory.
- Some recent requirements are not integrated into Hawai'i's procurement laws or supporting administrative rules.<sup>10</sup>

## **PROCUREMENT**

Procurement is the process by which government agencies determine the specific providers and proposals to provide services and assets. Government procurement laws are designed to ensure that public money is spent responsibly. A substantial focus of procurement laws is prevention of abuses in the spending of public money. Procurement laws can affect energy consumption and long range operating costs when:

- bid specifications do not explicitly require specific energy efficient components;
- bid specifications require evaluation of energy consumption with some aspects left to individual bidders to determine; or

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<sup>10</sup> Some of the provisions in Act 240 of 2006 were incorporated into the procurement section of the statutes and have been incorporated into supporting administrative rules. However, many of the provisions of the Act that are codified in HRS § 196-9 are not incorporated or referenced in HRS § 103D nor are they supported by the specific provisions in HAR § 3-122.

The provisions in Act 96 of 2006 that pertain to energy efficient vehicles and biofuel preference were codified in HRS § 103D in subsections 412 and 1012 respectively. HAR 3-122-13 was amended to incorporate provisions for vehicles and further rules are being developed.

The provisions of Act 96 of 2006 codified in HRS § 196-9 that pertain to state building standards, specific required energy efficiency measures, use of life cycle costing methods, procurement of environmentally preferable products, etc. are not reflected in the procurement section of the statutes (HRS § 103D) and are not incorporated into the supporting administrative rules (HAR § 3-122).

- bid proposals differ with respect to energy consumption and/or ongoing energy costs.

In these cases energy consumption and operating costs should be explicitly included in bid evaluation criteria.

Hawai'i's procurement laws are provided in HRS § 103D. This chapter applies to state and county procurement procedures. This chapter provides for several types of bidding procurement procedures:

- Competitive sealed bidding (HRS § 103D-302 & 303)
- Procurement of professional services (HRS § 103D-304)
- Small purchases (HRS § 103D-305)
- Sole source procurement (HRS § 103D-306)
- Emergency procurements (HRS § 103D-307)

§ 103D and its corresponding administrative rules explicitly allow but do not require consideration of life cycle costs (which include energy and other operating costs) in sealed bidding procedures.

In some subsections and county recitations of § 103D the types of costs that can be considered are listed explicitly but exclude all operating or long term costs. In the worst case, the Maui County Code requires agencies to select the lowest cost option or bid based exclusively on capital and implementation costs.<sup>11</sup> Unless bid specifications address energy efficiency and operation cost characteristics of the project, this formula is a prescription for procurement of "cheaper" goods that ultimately may cost more over the full life cycle than more energy efficient goods.

## **VALUE ENGINEERING**

Value engineering is a provision in Hawai'i's procurement laws that provides incentives to contractors to implement cost-saving measures in the performance and fulfillment of contracts with state and county agencies. Savings resulting from implementation of value engineering changes are shared by the contractor and the contracting agency.

Value engineering is a potential cost saving provision but, unless carefully implemented, it can result in potentially expensive results. Contractors have a strong incentive to provide cheaper equipment or propose cost-saving design changes than what is originally specified in the contract. Provisions exist to prevent value engineering changes from incurring added energy or other operating costs but these are not clearly sufficient to ensure effective administration.

HRS § 103D-411- Value Engineering Clauses, provides that value engineering measures must be implemented "without impairing any of their essential functions and characteristics such as service life, reliability, substitutability, economy of operation, ease of maintenance, and necessary standardized features..." The supporting administrative rules specify procedures for implementing value engineering including a standard form to be filled out and provided by a contractor proposing

a value engineering change proposal.<sup>12</sup> The standard form includes a "yes or no" check box for the contractor to state whether the proposed change will "increase the maintenance or operation costs of original or proposed items". This is the entire and only information required to be supplied by the contractor to address concerns regarding impacts on long term operation costs that could

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<sup>11</sup> The Maui County Code, Section 3.12 - Purchasing Procedures, includes several specific provisions regarding competitive bidding procedures including a requirement that the lowest cost bid be selected in competitive sealed bidding.

<sup>12</sup> Hawai'i Administrative Rules § 3-132.

result from delivering less expensive designs or equipment. There is no requirement that any of the operating costs of either the original specification or the proposed changes must be identified. There is no identified method of determining how operating costs are to be assessed, what components of operating costs should be included, whether indirect costs should be identified, etc. The protocols specified in HAR § 3-132 do not appear to be sufficient to ensure that value engineering changes will not sacrifice long term operating efficiencies for immediate capital or installation cost savings.

### **TRAINING OF PRACTITIONERS**

Energy analysis, specification of energy efficiency measures in large projects and life cycle costing all require some special expertise. Education and training are necessary for the agency staff and professional service providers who must employ and review these analyses.

- HRS § 103D-110 - Education and Training, provides for training for agency staff in procurement procedures but does not identify or require any training in energy analysis or life cycle costing.
- HRS § 464 - Professional Engineers, Architects, Surveyors and Landscape Architects, requires education and expertise in qualifying professional practitioners but does not require any education, experience or training in energy analysis, energy efficiency technologies or life cycle costing.

Several state agencies, including the State Procurement Office, DBEDT and the Department of Health, are taking commendable actions to train personnel in “green purchasing.” Requiring training broadly for agency staff engaged in project specification and procurement activities and requiring expertise in qualifications for professional architectural and engineering service practitioners could further improve the effectiveness of implementation of cost effective energy efficiency measures.

### **LIFE CYCLE AND INDIRECT COSTS GENERALLY**

Capital goods require upkeep and maintenance, generally require operating labor and eventually require decommissioning. Inevitably, there are also indirect costs that are not directly associated with the monetary costs of the project itself. Optimal decisions should be based on consideration of all associated costs, including both direct and indirect costs, not just initial capital and implementation costs.

Figure 1 shows the types of factors typically considered in several capital resource acquisition processes. The types of factors are listed in the column on the left. The extent to which each factor is considered is shown for each process. Three x’s indicate that the factor is typically a primary consideration with thorough analysis. Fewer x’s indicate that the factor is given less analysis and consideration.

Under classical acquisition, the process focuses exclusively on initial capital and implementation costs and the non-cost features of the asset. Operation costs, indirect costs, energy consumption, life span (replacement costs), disposal costs and indirect impacts are typically not primary considerations in project design, specification or procurement. This typifies most government specification and procurement practices in Hawai'i.

<b>FACTORS CONSIDERED IN ASSET ACQUISITION</b>				
	<b>Classical Acquisition</b>	<b>Improved Acquisition</b>	<b>Hawaii Utility IRP - Supply</b>	<b>Hawaii Utility IRP - DSM</b>
<b>Capital Costs</b>	XXX	XXX	XXX	XXX
<b>Operating Costs</b>		XXX	XXX	XXX
<b>Energy / Fuel Use</b>		XXX	XXX	XXX
<b>Operation Impacts</b>			XX	XXX
<b>Manufacturing Impacts</b>			X	
<b>Life Span</b>		X	XX	XX
<b>Non-Cost Features</b>	XXX	XXX	XXX	XXX
<b>Disposal</b>			XX	

**Figure 2** Factors typically considered in acquisition of capital assets

An improved acquisition process considers operation costs and energy consumption. If life cycle cost methods are used, life span and disposal costs may also be considered.<sup>13</sup> This process is consistent with what has been required by statute since 2002 but has not been implemented extensively. More recent legislation in 2006 provides more specific requirements for acquisition of state facilities with some programmatic support.<sup>14</sup>

An Integrated Resource Planning (IRP) process is used by Hawai'i's electric utilities in the planning and evaluation of future power plants, energy efficiency programs and load management programs. This is a full life cycle analysis process with rigorous characterization of capital costs, operating costs, direct energy and fuel use and features. Operation impacts are considered to a substantial extent. For supply (generation) resources limited consideration is made of some manufacturing impacts and disposal costs.

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<sup>13</sup> "Life cycle costs" are defined in HRS § 196-11, as "the sum of the present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs, over the lifetime to the project, product, or measure."

<sup>14</sup> The "Lead-by-Example" program is administered (with several dedicated agency staff positions) by DBEDT to promote the 2006 requirements in HRS § 196-9, regarding measures to promote energy efficiency in the acquisition of state facilities.

In the future, greenhouse gas emissions will have to be considered if the State hopes to meet its reduction goals.<sup>15</sup> Greenhouse gas emissions have not been considered in any explicit way in Hawai'i's classic or improved asset acquisition processes. Some tabulation and consideration of greenhouse gas emissions are considered in the IRP process but additional refinements will probably be necessary.

Disposal of assets after their useful life is an important consideration that is not often addressed directly in resource acquisition. The need for special disposal methods could be explicitly considered along with development and funding of mitigation methods.<sup>16</sup>

## **B. GOVERNMENT AS A SOURCE OF FINANCING**

The state and county governments provide financing for private sector projects and projects implemented jointly by government and private entities. These projects include housing, commercial developments, infrastructure, urban renewal, agricultural improvements and public utility facilities. Governments can provide financing by several means: by issuing or guaranteeing bonds or loans, by directly financing projects, or by providing financial incentives.<sup>17</sup>

Hawai'i's laws concerning the financing of government and private sector projects do not provide outright barriers to the implementation of energy efficiency and renewable energy resources. There are, however, several ways that existing laws discourage, fail to provide for or could better encourage energy efficiency implementation in projects financed by the state and county governments.

The laws providing for public funding affect energy use and resource development in several ways. Government financing is provided according to conditions specified by law. The relevant laws specify requirements regarding what types of projects qualify for funding and for what types of uses funding can be applied. These conditions provide both potential obstacles and potential means by which government financing can be used to promote energy efficiency and renewable energy resources.

To the extent that provisions preclude the use of funds for energy efficiency improvements they can present an obstacle. This happens in some cases where the allowed uses of funds are explicitly listed but omit and therefore exclude energy efficiency or renewable resource components.

To the extent that conditions specifically allow or require consideration or implementation of energy efficiency or renewable technologies they present progressive opportunities.

### **GOVERNMENT PROJECT FINANCING**

Several chapters of the Hawai'i Revised Statutes that provide state and/or county financing of private and joint public and private projects are listed below:

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<sup>15</sup> Act 234 adopted by the 2007 Legislature requires that Hawai'i reduce its greenhouse gas emissions to 1990 levels by the year 2020.

<sup>16</sup> This is true for energy efficiency technologies as well as large scale projects. For example, fluorescent light bulbs are energy efficient but contain small amounts of mercury which should require methods and protocols for proper disposal.

<sup>17</sup> The provision of tax credits could also be considered a method of government financing. Tax credits are discussed separately in the following section of this report.

- HRS § 46-80 Improvement by Assessment; Financing
- HRS § 53 Urban Renewal Law
- HRS § 155 Agricultural Loans
- HRS § 163D Agribusiness Development Corporations
- HRS § 201H Hawai'i Finance and Development Corporation
- HRS § 206E Hawai'i Community Development Authority
- HRS § 207 Mortgage Loans
- HRS § 356D Hawai'i Public Housing Authority

Each of these sections provides authority for the State and/or individual counties to provide or support financing for projects that consume energy.<sup>18</sup> Each section includes provisions that define conditions of project eligibility and the scope of the types of improvements for which financed funds may be used. Several of these laws present obstacles or miss obvious opportunities to promote energy efficiency measures:

- None of these sections provides guidelines or requirements to consider the long term energy consumption and other operating costs of the financed projects.
- None of these sections requires implementation of cost effective energy efficiency measures.
- HRS § 155 Agricultural Loans provides a list of specific allowed uses for loan funds. The list of permitted uses omits energy efficiency, water pumping efficiency or renewable energy generation improvements.
- HRS § 201H - Hawai'i Finance and Development Corporation and HRS § 206E - Hawai'i Community Development Authority both provide specific lists of desired housing amenities but do not provide guidance or requirements to consider energy costs, ongoing maintenance costs or energy efficiency measures in the financed housing buildings.

For the sections above that are intended to provide affordable housing for low income residents, it is an especially poignant omission to neglect any consideration of long term housing energy costs. As discussed above, there is a general tendency in project budgeting and design to focus primarily on capital and implementation costs at the expense of improvements that reduce long term energy use and operating costs.<sup>19</sup> For low income residents financing is especially important to provide access to capital to invest in energy efficiency improvements that will save money in the long run. Where government agencies or private sector developers are trying make projects affordable there is an exaggerated focus on minimizing up-front capital and installation costs. In these circumstances it is especially important to **require** consideration or implementation of energy and cost saving amenities in order to make the resulting housing truly affordable to its intended beneficiaries.<sup>20</sup>

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<sup>18</sup> In some cases provisions in the county codes explicitly recite and implement the financing authority provided by these sections, particularly HRS § 46. The county codes do not provide any further guidance or requirements, beyond what is provided in the Hawai'i Revised Statutes, to consider energy costs, operating costs or energy efficiency measures.

<sup>19</sup> See discussion starting at page 5

<sup>20</sup> The existing provisions in Hawai'i's laws tend to exacerbate rather than mitigate this tendency. Hawai'i County Code Chapter 11, Article 1-Affordable Housing and Maui County Code Section 2.96 - Residential Workforce Housing Policy, for example, are two sections of law specifically intended to promote affordable housing. Both of these sections define affordability in terms of purchase price without any consideration of energy or other operating

The language of all of these sections of Hawai'i law (as well as the corresponding administrative rules and county recitations of the authority provided by these sections) could be amended to require consideration and/or implementation of cost effective energy efficiency measures. This would only further the purposes and effectiveness of these sections with little or no resulting compromises.

## **SPECIAL PURPOSE REVENUE BONDS**

Hawai'i provides financing for specific projects by issuing tax exempt Special Purpose Revenue Bonds (SPRB's). SPRB's can lower costs for projects by providing financing at lower interest rates than most conventional debt instruments. SPRB's have been used extensively by the State's electric energy utilities to finance construction of utility assets including construction of power plants.<sup>21</sup> SPRB's have been approved to finance private sector renewable energy projects.

### **SPRB'S FOR ENERGY EFFICIENCY FINANCING**

Energy efficiency improvements are particularly capital intensive. The cost and availability of financing is an important consideration in the cost, viability and extent of implementation of energy efficiency investments.

Financing is a particularly important component to make energy efficiency measures practical for several sectors of Hawai'i's residences and businesses. The Demand Side Management programs implemented by the electric utilities in Hawai'i for the last decade have relied primarily upon rebate programs. These programs provide monetary rebates to utility customers who implement specific energy efficiency measures. Since the rebates cover only part of the costs of the energy efficiency measures, participation in most of the utility programs requires a financial investment on the part of the potential program participant. For many low income customers and for the 45% of Hawai'i residents who live in rented housing the rebate programs are not commensurately effective in encouraging expenditures on energy efficiency investments.

HRS § 39A - Special Purpose Revenue Bonds provides a list of approved types of eligible projects. Energy efficiency investments are not included and do not fall within the scope of eligible projects. Extending the availability of SPRB's to include energy efficiency investments could provide a cost-effective means to provide financing for large scale implementation by Hawai'i government agencies, private enterprises or potentially for the Hawai'i Public Benefit Fund Administrator.<sup>22</sup>

## **C. GOVERNMENT REGULATION**

One fundamental role of government is the establishment of laws and regulations that to some degree limit what is allowed by individuals and corporate entities. In this broad role the state and county governments provide several types of regulations that affect the use and production of energy. These include the regulation of public utilities, permitting codes and requirements for buildings and power production facilities, and land use planning regulations.

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costs. Neither section requires consideration of energy efficiency measures or solar water heating.

<sup>21</sup> An explicit provision of HRS § 39A-Special Purpose Revenue Bonds provides that SPRB's for fossil fueled power plant projects must be specifically approved by the Legislature.

<sup>22</sup> HRS § 269-121, et seq., provides authority to the Public Utilities Commission to establish a Public Benefits Fund (fund) and appoint a fund administrator. In Docket No. 05-0069 the Commission determined that it would establish a fund and appoint an administrator to implement the energy efficiency programs for the electric utilities on the Islands of O'ahu, Maui, Moloka'i, Lana'i and Hawai'i. On September 26, 2007 the Commission opened Docket No. 2007-0323 to establish the fund and select an administrator.

## **REGULATION OF PUBLIC UTILITIES**

Public energy utilities, including the electric and some gas utilities, are regulated by the Hawai'i Public Utilities Commission. The role of government in regulation of public energy utilities is the subject of a previous study by the Hawai'i Energy Policy Forum: *Hawai'i Energy Utility Regulation and Taxation*, July 2003. The substance of the previous study will not be repeated here.

## **BUILDING CODES**

One important way that government regulates how energy is used is through provisions in county building energy codes. Each county in Hawai'i implements energy codes.

There are several challenges in implementing effective energy building codes in Hawai'i but these are not obstacles and are addressed in the design and implementation of the building codes:

- Hawai'i's climate is different than most of the country. Many provisions of mainland building codes that address the efficiency of building space heating are not applicable in Hawai'i.
- Each of Hawai'i's islands has diverse microclimates. Windward, leeward, lowland and upland areas have different climates.
- Air conditioned buildings have different optimal building characteristics than buildings cooled by ventilation.

Figure 2 is a table showing the county energy codes that currently apply in Hawaii. Honolulu and Maui counties apply essentially the same energy codes. There are some differences in the codes applied by the Counties of Hawai'i and Kaua'i.

All of the counties have a code that applies to commercial buildings adopted from the codes published by the American Society of Space Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). The counties have adopted the ASHRAE 90.1 code for commercial buildings. The County of Hawai'i has an older version of the ASHRAE 90.1 code that has less rigorous provisions for ventilation and cooling systems.

Honolulu and Maui counties require R-19 insulation in the roof for new construction of low-rise residential buildings. Hawai'i and Kaua'i counties require insulation only in buildings with air conditioning but also require R-11 insulation in the building "shell."

	County Energy Codes			
	Honolulu	Maui	Hawai'i	Kaua'i
<b>Commercial</b>				
<b>Buildings</b>	<b>ASHRAE 90.1 1999</b>	<b>ASHRAE 90.1 1999</b>	<b>ASHRAE 90.1 1989</b>	<b>ASHRAE 90.1 1999</b>
<b>Manufacturing</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>
<b>Low Rise Residential</b>				
<b>Applies Generally</b>	<b>R-19 in roof</b>	<b>R-19 in roof</b>	<b>None</b>	<b>None</b>
<b>Applies W/Air Cond.</b>	<b>R-19 in roof</b>	<b>R-19 in roof</b>	<b>R-19 in roof R-11 shell</b>	<b>R-19 in roof R-11 shell</b>
<b>Solar Hot Water Required</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**Figure 3** County Energy Codes in Hawai'i

None of the counties currently require solar water heating as part of the energy code. Requirements for solar water heating were part of the recommendations in the Model Energy Code published by the Department of Business, Economic Development and Tourism in 1992.<sup>23</sup>

There may be merit in making the energy building codes of the counties uniform and consistent with one another. Uniformity could eliminate some confusion in applying different codes for each island and could simplify the administration of enforcement and supporting services. Updating the codes to the 2004 version of the ASHRAE standard would make the building codes consistent with baseline standards used in the LEED certification process and would increase the required efficiency for Hawaii buildings.<sup>24</sup>

An ongoing concern regarding the effectiveness of energy codes in Hawai'i is the adequacy of administration staff resources. In order for energy codes to be effective, sufficient county staff resources must be provided to review permit applications and enforce compliance. This remains an ongoing issue for all of the counties.

## **LAND USE PLANNING**

Land use patterns are an enormous factor in Hawai'i's transportation energy consumption. Where people work, where people live and the distances people need to travel to schools, commercial and recreational areas are the largest factors that drive ground transportation energy use. Ground transportation is a large component, comprising about one third of Hawai'i's total energy consumption.

It is not clear what level of priority the consideration of energy consumption should or will be applied to Hawai'i's land use planning processes. It is also not clear to what extent Hawai'i's land

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<sup>23</sup> *Hawaii Model Energy Code, Energy Efficiency Standard for Buildings*, October 1992, prepared by Eley Associates.

<sup>24</sup> A DBEDT analysis estimates that a building built to the 2004 version of the ASHRAE standard would be about 9% more efficient than the 1999 and 1989 versions of the ASHRAE standard upon which the county building codes are currently based.

use processes will effectively control the powerful momentum of land use trends generally. It is clear, however, that if Hawai'i is going to meet its long range greenhouse gas emission reduction targets, addressing energy use in the ground transportation sector will have to play a significant part. Land use planning is one of several potential approaches to address ground transportation energy use.<sup>25</sup>

Land use planning is a form of regulation that supports the collective general public welfare by limiting what individual landowners are allowed to do. Land use planning could potentially affect energy use in several ways. These include preserving corridors for future mass transit options and by reducing future transportation needs by reducing sprawl and providing for efficient mixed use zoning.

Land use planning in Hawai'i includes both state and county regulation. Multiple layers of land use planning jurisdiction and regulations apply, including:<sup>26</sup>

- State Land Use Boundaries
- State Enterprise Zones
- County General Plans
- County Island, Regional and Community Plans
- County Zoning Ordinance
- County Subdivision Ordinances
- County Project Designations (public facilities and private developments)
- County Development Plans

Land use planning provisions are primarily implemented by the counties. There are substantial differences in the implementation and administration of land use planning between the counties. No attempt will be made here to sort out the various layers of planning jurisdiction or to describe differences in the implementations by the counties except to note that the primary venues for implementing the approaches listed below are the individual county land use planning processes.

## MASS TRANSIT CORRIDORS

The primary existing ground transportation method is the passenger motor vehicle. Ubiquitous, inefficient and beloved, cars and pickup trucks are the preferred form of transportation for most Hawai'i residents and visitors.

Public transit systems offer a promising alternative. The cost of implementing effective public transit systems is a substantial obstacle that could be substantially reduced by planning and maintaining mass transit corridors to economically preserve the extensive required rights of way. The substantial costs of acquiring the land necessary to install a light rail system in Honolulu should be a lesson to planners on all of the islands regarding the value of establishing and preserving corridors as early as possible in long range plans.

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<sup>25</sup> See the discussion of the ground transportation energy sector starting at page 21.

<sup>26</sup> The county plans and ordinances listed below are referred to with terminology that differs between counties.

## MIXED RESIDENTIAL AND COMMERCIAL ZONING

Providing efficient mixed residential and commercial zoning reduces the distance people need to travel. This has several benefits that are increasingly recognized by urban planners. One important benefit is reduced energy consumption used in ground transportation. Existing zoning ordinances do not explicitly provide for or encourage mixed residential and commercial zoning.

## URBAN GROWTH BOUNDARIES

Establishing urban growth boundaries is one approach to reducing the “sprawl” of ever-more distant suburbs which require ever-increasing commuting distances.

## **STREET LIGHTING REQUIREMENTS**

Street lighting provides important benefits by providing well lit streets and sidewalks for motorists and pedestrians. It also has some disadvantages. Street lighting consumes energy and is a cost to county taxpayers.<sup>27</sup> Street lighting also causes “light pollution” that is detrimental to the qualities of the night sky that make Hawai`i an important center for astronomical observation and poses a threat to Hawai`i’s endangered seabird species.

Low pressure sodium vapor lighting consumes less energy than other sources and produces monochrome light that is recognizable by its characteristic yellow-orange color. The monochrome nature of the light is an advantage to astronomers because, unlike broad spectrum “white” lighting, the specific frequencies of light produced can be effectively filtered from the night sky. Monochrome light does have the disadvantage of substantially poor color rendition.<sup>28</sup>

County laws require street lighting to be installed in new subdivisions and in some cases provide certain specifications regarding the type of light and fixtures that must be used. Hawai`i County has unique, more rigorous standards that limit the type and placement of all outdoor lighting and fixtures and prohibits most outdoor lighting after 11:00 PM.

Although street lighting has important advantages, it may not be necessary or desirable in all circumstances. In many rural areas, for example, street lighting is not necessarily needed.

The Revised Ordinances of Honolulu and Maui County Code require installation of street lights in all new subdivisions without exception.<sup>29</sup> These requirements could be considered obstacles to implementing energy efficient practices because they require installation of street lighting in all circumstances without consideration of the need in particular circumstances.

The Counties of Hawai`i and Kaua`i do not require street lighting in all new subdivisions.

Hawai`i County has several progressive provisions regarding outdoor lighting generally that apply to commercial outdoor lighting as well as municipal street lighting. These provisions prohibit

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<sup>27</sup> Street lighting consumes about one half of one percent of the electrical energy produced in Hawai`i and costs Hawai`i’s counties (collectively) about ten million dollars per year.

<sup>28</sup> The poor color rendition of low pressure sodium light has been identified as problematic for law enforcement officers in identifying vehicles, suspects and blood at night.

<sup>29</sup> Revised Ordinances of Honolulu, Chapter 22. Subdivision of Land, Section 2. Street Lights and Maui County Code, Title 18. Subdivisions, Section 18.20. Improvements. The Revised Ordinances of Honolulu provide street light efficiency standards in a separate section and follow national criteria for roadway lighting (IESNA., Illuminating Engineering Society of North America).

mercury vapor lighting, require low pressure sodium fixtures for area lighting, require shielding of light fixtures and limit hours of operation.<sup>30</sup>

## **REGULATORY / PERMITTING REQUIREMENTS FOR RENEWABLE ENERGY RESOURCES**

Commercial scale renewable energy production projects are subject to a spectrum of environmental and land use regulatory and permitting requirements. These requirements are sometimes characterized as an obstacle to the development of renewable energy resources.

It is well recognized that renewable energy projects do have environmental and socioeconomic impacts. Although most renewable project developers can be heard to complain, at least occasionally, that the list of permitting and regulatory requirements is “burdensome,” few seriously claim that the regulatory requirements are unwarranted. Most renewable energy project developers, like developers of other projects, are aware of and accept the need for regulation, permits and environmental protection generally.<sup>31</sup>

Typically, there are other hurdles that exist for most renewable energy projects in Hawai‘i that are more formidable than those posed by governmental regulations. These include acquisition or leasing of land, obtaining sufficient project financing and negotiating necessary power purchase agreements. To the extent that government agencies are or could become involved in addressing each of these hurdles, these are potential opportunities for government to encourage renewable energy resource development.<sup>32</sup>

Although there are sound reasons for regulations and permitting, they nevertheless could pose obstacles to renewable energy project development to the extent that they include provisions that specifically preclude certain aspects of renewable technologies or, collectively, pose a regulatory burden that is prohibitive.

Simplifying the permitting process for renewable energy projects and/or giving renewable energy developers some expediting advantages are ways to encourage renewable energy projects. Existing Hawai‘i law does provide a streamlined permitting process for geothermal resources.<sup>33</sup> Several further expediting measures were previously identified and discussed (but not necessarily recommended) in a previous report prepared for the Forum<sup>34</sup>:

- Creation of an Energy Facilities Siting Council
- Implementation of more explicit and substantial procedures to consider the advantages of renewable generation technologies in utility Integrated Resource Planning
- Establishment of Wind Resource Development Subzones

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<sup>30</sup> Hawai‘i County Code, Chapter 14. General Welfare, Article 9. Outdoor Lighting

<sup>31</sup> These conclusions are based on several discussions with renewable project developers and presentations made to the Forum by renewable project developers.

<sup>32</sup> The roles that government agencies play with respect to these hurdles are discussed elsewhere. See the discussion of government financing of non-government projects starting at page 12. Issues regarding negotiation of power purchase agreements are addressed in a previous study prepared for the Forum: *Hawai‘i Energy Utility Regulation and Taxation*, July 2003.

<sup>33</sup> HRS § 196D - Geothermal and Cable System Development.

<sup>34</sup> *Hawai‘i Energy Utility Regulation and Taxation*, July 2003.

## D. TAXATION

Taxes on energy and fuels create powerful incentives to Hawai'i's energy consumers and producers. Hawai'i's taxes and tax structure do not pose an obstacle to the implementation of energy efficiency or renewable energy resources. Indeed, Hawai'i's tax structure is fairly progressive in this regard:

- Most generally, taxes on any commodity make it more expensive and thus tend to discourage consumption. In this respect the taxes on energy and energy services function to discourage energy use and promote efficiency.
- The structure of taxes affects how taxes create incentives more specifically. For example, Hawai'i indexes its taxes on motor vehicles primarily on fuel use and vehicle weight. This is progressive in the sense that the tax structure tends to encourage lighter vehicles and discourage fuel use proportionately.
- Several tax credits are used to encourage specific energy efficiency and renewable energy resource measures. In this way, Hawai'i uses tax structure directly as an incentive to promote specific technologies.

Although Hawai'i's tax structure is fairly progressive, further changes to the tax structure could more aggressively promote energy efficiency and renewable energy resources.

- A higher proportion of state and county taxes could be shifted to taxes on energy and fuels.
- Taxes could be indexed more directly on aspects of energy use to provide stronger or more targeted incentives. (See discussion of motor vehicle taxes and public utility taxes below.)
- Further tax credits could be established promote energy efficiency and renewable energy resources.

Each of these tax structure strategies should be implemented only after careful consideration. Tax reforms generally are a sensitive subject politically, can have broad economic impacts and must address details regarding the logistics of implementation as well as ongoing administration.

Some tax measures could be implemented so as to be "revenue neutral" resulting in no substantial increase or decrease in total net taxes. Two specific potentially revenue-neutral measures that have been given some previous consideration for Hawai'i are outlined below.

### **MOTOR VEHICLE "FEEBATE" REGISTRATION FEES**

Vehicle registration fees could be structured to further encourage light weight fuel efficient motor vehicles. A "feebate" proposal has been considered for Hawai'i that would tax heavier vehicles to subsidize lighter vehicles. A feebate mechanism for Hawai'i was analyzed and presented in substantial detail in a study prepared for the Forum by Rocky Mountain Institute in 2003, *Reducing Hawai'i's Energy Demand Through Increased Efficiency*.<sup>35</sup> A feebate proposal was subsequently proposed to the Hawai'i Legislature but was not adopted.

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<sup>35</sup> The RMI proposal included consideration of a portfolio of measures to promote adoption of hybrid vehicles including (1) feebates, (2) scrappage incentives (to encourage removing inefficient vehicles from Hawai'i's fleet, (3) tax credits and (4) allocation of insurance and other fees to "pay at the pump" fees (to reallocate fixed vehicle operation costs to be variable costs directly proportional to fuel use).

## TAXING CARBON RATHER THAN REVENUES

Taxes on electric utilities that are currently indexed on utility revenues could be indexed instead on the carbon content of source fuels or on carbon emissions. This change in tax structure could be implemented to be “revenue neutral” so that the total amount of tax collected would be approximately unchanged.

A discussion and analysis of a revenue neutral approach indexing existing electric utility revenue taxes on carbon emissions was presented in a previous study prepared for the Forum.<sup>36</sup> Implementation of this tax structure would provide an advantage to non-fossil fuel resources of approximately one cent per kilowatt-hour.

## E. TRANSPORTATION

Most of the energy consumed in the State of Hawai`i is for transportation.<sup>37</sup> If Hawai`i is going to successfully address its greenhouse gas reduction objectives, transportation energy use must be addressed.

State and county laws pertain primarily to ground transportation. Although air and marine transportation represents a substantial portion of Hawai`i’s energy use, there are few options available to the State and counties to affect air transportation energy use.

Hawai`i’s laws and practices affect and could potentially reduce energy consumption in the transportation sector in several ways:

- **MOTOR VEHICLE EFFICIENCY.**
  - **GOVERNMENT FLEET PROCUREMENT.** State and county governments operate fleets of vehicles. The efficiency and operating protocols for public vehicles are important factors in energy consumption. (See discussion on page 8.)
  - **USE OF ALTERNATIVE FUELS.** Use of ethanol, biodiesel or other renewable fuels could reduce petroleum use.
  - **MOTOR VEHICLE TAXES.** Taxes on vehicle fuels and fees for vehicle registration are used to allocate public transportation costs directly on transportation users. These taxes and fees are also an opportunity to provide incentives promoting the use of lighter weight (more efficient) vehicles. (See discussion starting at page 20.)
  - **TIRE INFLATION.** Proper inflation of tires on motor vehicles reduces fuel consumption. Maintaining proper inflation requires attention, however, due to normal inevitable leakage. Many motor vehicles typically operate with under-inflated tires. An increase of two percent mileage efficiency has been estimated with properly inflated tires.<sup>38</sup> Proper tire inflation could be encouraged by requiring

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<sup>36</sup> *Hawai`i Energy Utility Regulation and Taxation*, July 2003.

<sup>37</sup> Hawai`i Energy Strategy 2007 Project: Ground, marine and air transportation energy use accounts for more than half of Hawai`i’s current total energy use.

<sup>38</sup> Per study prepared for the Forum by Rocky Mountain Institute: Reducing Hawai`i’s Energy Demand Through Increased Efficiency, November 2003.

gasoline stations to maintain tire inflation equipment and make the equipment and/or tire inflation services available to customers.<sup>39</sup>

- TRAFFIC SIGNAL TIMING. Effective coordinated timing of traffic signals can increase the efficiency of motor vehicle operation (in terms of both time and energy) in urban areas. There are no specific provisions in Hawai'i laws requiring analysis, consideration or installation of coordinated timing of traffic signals.<sup>40</sup> Although not required by law, some traffic signals are timed in Honolulu.
- MOTOR VEHICLE RIDERSHIP
  - CAR AND VAN POOLING PROGRAMS. Car and van pooling programs could encourage increased use of each passenger vehicle and reduce total vehicle use and fuel consumption.
  - SUBSIDIZED DOWNTOWN PARKING. Provision of subsidized downtown parking in Honolulu currently promotes inefficient use of automobile transportation and discourages the use of public transportation and/or car pooling. Access to subsidized downtown parking could be phased out or could be made contingent upon participation in car or van pooling programs.
- GROUND TRANSPORTATION COMMUTING PATTERNS
  - SUPPORT FOR AND IMPLEMENTATION OF PUBLIC TRANSIT. A predominant use of energy in Hawai'i is fuel for passenger motor vehicles that often carry single passengers. Providing effective public mass transit opportunities could significantly reduce vehicle operation and fuel use. Effective measures include support for existing bus systems, provision of additional bus services and light rail or other mass transit systems.
  - ACCOMMODATIONS FOR BICYCLE USE. Providing effective improved routes, lanes and parking racks for bicycles could encourage use of bicycles for personal transportation and reduce motor vehicle and fuel use.
  - LAND USE PLANNING. State and county land use planning affects the amount of transportation of people and goods that is necessary as well as the viability of public mass transit options. (See discussion starting at page 16.)
    - Planning for mass transit corridors could encourage efficient public transportation options by reducing the costs and optimizing the location of transit options.
    - Planning and zoning that allows for and encourages mixed residential and appropriate commercial uses could reduce transportation needs.
    - Establishing effective urban growth boundaries could reduce sprawl and reduce transportation needs.

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<sup>39</sup> HRS § 486H - Gasoline Dealers provides regulations addressing retail motor vehicle fuel distribution but does not require maintenance or provision of tire inflation equipment.

<sup>40</sup> Provisions addressing traffic signals are included in state statutes and county codes: HRS § 291C - Statewide Traffic Code; Kaua'i Code Chapter 16 Article 4 - Traffic Control Devices; Maui Code Section 10.28 - Traffic Control Devices; Hawai'i County Code Chapter 24- Vehicles and Traffic; Honolulu County Code Chapter 15 Section 6 - Traffic Control Devices.

## **APPENDIX - Spreadsheet Matrix Tabulation of Hawai`i Revised Statutes and County Codes**

This project incorporated an overview of all of the Hawai`i Revised Statutes and County Codes. Detailed tables of contents of each of these bodies of law were compiled and reviewed to determine which sections might have direct or indirect effects on the use, production, taxation or regulation of energy. Each of the identified sections were examined to determine whether they posed obstacles to the implementation of energy efficiency or renewable energy resources. In those areas where administrative rules are applicable these were also examined.

Spreadsheets were developed that document each section of Hawai`i's laws, identify which sections were examined in some depth and provide brief comments regarding the findings for applicable sections. These spreadsheets are included as a separate appendix to the report.

The County Code of the County of Kaua`i is not available in electronic format. Documentation of the review of Kaua`i's laws at the end of this appendix is not in spreadsheet format.

## **ATTACHMENT - Abbreviated Matrix Tabulation of Hawai`i Revised Statutes**

A partial version of the spreadsheet tabulation of the Hawai`i Revised Statutes is attached. The full version is included in the Appendix.

Hawaii Revised Statutes - Table of Contents			Energy	Review	Issues
	Chapter		Impacts	Notes	Opportunities
<b>DIVISION 1.</b>		<b>GOVERNMENT</b>			
TITLE 1.		GENERAL PROVISIONS			
TITLE 2.		ELECTIONS			
TITLE 3.		LEGISLATURE			
	21F	Legislative Fiscal and Budget Analysis	x	Establishes agency: Office of the Legislative Analyst to provide legislature with information regarding fiscal and budget impacts. Defines purposes and required considerations for legislative analyst that would allow but do not require consideration of life cycle costing.	There are no explicit requirements that would require analysis of energy efficiency or renewable energy impacts or opportunities.
TITLE 4.		STATE ORGANIZATION AND ADMINISTRATION, GENERALLY			
TITLE 5.		STATE FINANCIAL ADMINISTRATION			
	37	Budget	x	Section 37-64 requires the "full costs" including operating costs to be identified for all programs.	Costs are required to be identified for the year of actual expenditure but there is no requirement for analysis of "life cycle costs or identification of operating costs over the life of the program.
	37	Budget		Requires a six-year budget and fiscal plan that identifies full costs including operation costs and identifying "The full cost implications of the recommended programs, by cost categories and cost elements" for each program at the "lowest level of the state program structure."	"Full cost implications" identified in the six year plan do not explicitly include identification or consideration of life cycle costs or costs beyond the six year plan timeframe. The budget includes identification, consideration and approval of costs for a two year time frame. Life cycle costs are not identified for capital improvements.
	39A	Special Purpose Revenue Bonds	x	Provides for tax exempt revenue bonds issued by the state for specific purposes in the public interest. Approved purposes include energy generation facilities but exclude fossil fueled generation facilities unless specific projects are approved by the Legislature.	Approved purposes include renewable generation projects but do not include energy efficiency projects. Energy efficiency improvements are capital intensive and are promoted by state policy to meet the similar objectives as energy generation facilities (maintenance of a sufficient supply of reliable, economical energy to meet public needs). SPRB's could provide a source of economical funding for energy efficiency programs if these were identified as approved purposes.
TITLE 6.		COUNTY ORGANIZATION AND ADMINISTRATION			
	53	Urban Renewal Law	x	Provisions do not present significant obstacles.	Provisions for capital investments in building reconstruction could require explicit consideration of energy efficient practices and life cycle cost assessment.
	56	Public Off-Street Parking Facilities	x		Explicit provisions or incentives could be established to encourage use of carpools and/or public transportation rather than facilitating expanded use of automobiles for single passenger transportation.

Hawaii Revised Statutes - Table of Contents				Energy	Review	Issues
	Chapter		Impacts	Notes	Opportunities	
TITLE 7.		PUBLIC OFFICERS AND EMPLOYEES				
TITLE 8.		PUBLIC PROCEEDINGS AND RECORDS				
TITLE 9.		PUBLIC PROPERTY, PURCHASING AND CONTRACTING				
	109	Stadiums and Recreational Facilities	x		There are no provisions addressing energy management or efficiency.	
TITLE 10.		PUBLIC SAFETY AND INTERNAL SECURITY				
TITLE 11.		AGRICULTURE AND ANIMALS				
	155	Agricultural Loans	x	Provides for loans and loan guarantees for agricultural purposes. Specific purposes are listed for each of several loan classes.	Energy efficiency improvement projects are not identified as an approved purpose for any class of loan.	
	163D	Agribusiness Development Corporation	x	Creates a corporation to promote agricultural activities to most effectively utilize resources made available by transition from decreasing sugar and pineapple production. Biofuel crops are not explicitly listed in the definition of agricultural activities but could be included in general applications of the definition. Provides for an agriculture development plan and inventories of available agricultural resources.	Consideration of biofuel crops is not explicitly listed, encouraged or required.	
TITLE 12.		CONSERVATION AND RESOURCES				
				§196-19 Life-cycle cost analysis	Provides a general requirement for agencies to use life cycle analysis in making decisions about procurement but does not provide specific standards or procedures and does not identify specific agency duties.	
TITLE 13.		PLANNING AND ECONOMIC DEVELOPMENT				
	201H	Hawaii Housing Finance and Development Corporation	x	Establishes a corporation to provide counseling, financial assistance and development of housing opportunities including programs for low income and first owners.	Provides specific list of desired housing amenities but does not provide specific guidance or requirements to consider life cycle housing costs or investments in energy efficiency measures in housing buildings.	
	206E	Hawaii Community Development Authority	x	Establishes a community development authority to designate community development districts and develop public projects including residential housing projects.	Provides specific list of desired housing amenities but does not provide specific guidance or requirements to consider life cycle housing costs or investments in energy efficiency measures in housing buildings.	
	207	Mortgage Loans	x	Provides for mortgage loans to very low income buyers.	Provides no consideration of life cycle housing costs or investments in energy efficiency measures.	
TITLE 14.		TAXATION				
	239	Public Service Company Tax Law	x	Levies a public service company tax on public service companies and public utilities to be paid to the counties in lieu of real property taxes.	Basis of the tax is a percentage of revenues. The tax could be based on fossil fuel carbon for energy utilities to provide an incentive to use non fossil fueled energy sources. This could be implemented to be revenue neutral (initially).	

Hawaii Revised Statutes - Table of Contents				Energy	Review	Issues
	Chapter		Impacts	Notes	Opportunities	
	249	County Vehicular Taxes	x	Vehicle taxes are based on vehicle weight. Determination of specific rates delegated to counties within certain parameters	Vehicle taxes could provide further incentives based on vehicle weight (such as a "feebate") to encourage fuel efficient vehicles and discourage large inefficient vehicles.	
	251	Rental Motor Vehicle and Tour Vehicle Surcharge Tax	x		Vehicle taxes could provide further incentives based on vehicle weight (such as a "feebate") to encourage fuel efficient vehicles and discourage large inefficient vehicles.	
TITLE 15.		TRANSPORTATION AND UTILITIES				
	269	Public Utilities Commission	x	Provisions addressed in previous separate study.	Provisions could be developed and expanded for collecting information and public education regarding energy costs, efficiency measures and options provided by registered service providers.	
TITLE 16.		INTOXICATING LIQUOR				
TITLE 17.		MOTOR AND OTHER VEHICLES				
	291C	Statewide Traffic Code	x		Provisions could be made to encourage energy efficient measures such as timing of traffic signals to provide for efficient traffic flow and proper tire inflation.	
TITLE 18.		EDUCATION				
TITLE 19.		HEALTH				
	340A	Solid Waste	x		Provisions could be established to encourage or require more effective recycling and separation of waste stream materials.	
TITLE 20.		SOCIAL SERVICES				
	356D	Hawaii Public Housing Authority	x		Provides no consideration of life cycle housing costs or investments in energy efficiency measures.	
TITLE 21.		LABOR AND INDUSTRIAL RELATIONS				
<b>DIVISION 2.</b>		<b>BUSINESS</b>				
TITLE 22.		BANKS AND FINANCIAL INSTITUTIONS				
TITLE 23.		CORPORATIONS AND PARTNERSHIPS				
TITLE 23A.		OTHER BUSINESS ENTITIES]				
TITLE 24.		INSURANCE				
TITLE 25.		PROFESSIONS AND OCCUPATIONS				
	448E	Electricians and Plumbers	x		Allows emergency repairs to plumbing fixtures by housing occupants but does requires liscensed plumber to replace inefficient fixtures with water saving replacements.	
	464	Professional Engineers, Architects, Surveyors and Landscape Architects	x		Requires professional expertise but does not require education or experience in life cycle costing, energy use analysis or energy efficiency technologies.	
TITLE 25A.		GENERAL BUSINESS PROVISIONS]				

Hawaii Revised Statutes - Table of Contents			Energy	Review	Issues
	Chapter		Impacts	Notes	Opportunities
TITLE 26.		TRADE REGULATION AND PRACTICE			
	481L	Motor Vehicle Lease Disclosure Act	x		Does not require identification of operation costs.
	481M	Lease-Purchase Agreements for Personal Property	x		Does not require identification of operation costs.
	486H	Gasoline Dealers	x		Does not require gasoline dealers to maintain adequate tire inflation equipment.
	487	Consumer Protection	x		Provisions could be developed and expanded for collecting information and public education regarding energy costs, efficiency measures and options provided by registered service providers.
TITLE 27.		UNIFORM COMMERCIAL CODE			
<b>DIVISION 3.</b>		<b>PROPERTY; FAMILY</b>			
TITLE 28.		PROPERTY			
	521	Residential Landlord-Tenant Code	x		Provisions could be made to require landlords to provide information to prospective tenants regarding operating costs of premises including energy utility costs.
TITLE 29.		DECEDENTS' ESTATES			
TITLE 30.		GUARDIANS AND TRUSTEES			
TITLE 30A.		UNIFORM PROBATE CODE			
TITLE 31.		FAMILY			
<b>DIVISION 4.</b>		<b>COURTS AND JUDICIAL PROCEEDINGS</b>			
TITLE 32.		COURTS AND COURT OFFICERS			
TITLE 33.		EVIDENCE			
TITLE 34.		PLEADINGS AND PROCEDURE			
TITLE 35.		APPEAL AND ERROR			
TITLE 36.		CIVIL REMEDIES AND DEFENSES AND SPECIAL PROCEEDINGS			
<b>DIVISION 5.</b>		<b>CRIMES AND CRIMINAL PROCEEDINGS</b>			
TITLE 37.		HAWAII PENAL CODE			
TITLE 38.		PROCEDURAL AND SUPPLEMENTARY PROVISIONS			