

# Hawaii Bioenergy Master Plan

## Hawaii Energy Policy Forum Briefing

**Scott Turn**  
**Hawaii Natural Energy Institute**  
**University of Hawaii**  
**December 1, 2009**



# Presentation Outline

---

- **Review bioenergy master plan enabling legislation**
- **Identify contributors**
- **Review main findings**
- **Review stakeholder comment response**
- **Review remaining project activities**



# Hawaii Bioenergy Master Plan

---

- Legislatively mandated in 2007
- Objective: *The primary objective of the bioenergy master plan shall be to develop a Hawaii renewable biofuels program to manage the State's transition to energy self-sufficiency based in part on biofuels for power generation and transportation.*



## .... address the following outcomes

---

- 1. Strategic partnerships for the research, development, testing, and deployment of renewable biofuels technologies and production of biomass crops;***
- 2. Evaluation of Hawaii's potential to rely on biofuels as a significant renewable energy resource;***
- 3. Biofuels demonstration projects, including infrastructure for production, storage, and transportation of biofuels;***
- 4. Promotion of Hawaii's renewable biofuels resources to potential partners and investors for development in Hawaii as well as for export purposes; and***
- 5. A plan or roadmap to implement commercially viable biofuels development.”***



# .... address the following issues

---

- 1. Specific objectives and timelines;**
- 2. Water resources;**
- 3. Land resources;**
- 4. Distribution infrastructure for both marine and land;**
- 5. Labor resources and issues;**
- 6. Technology to develop bioenergy feedstock and biofuels;**
- 7. Permitting;**
- 8. Financial incentives and barriers and other funding;**
- 9. Business partnering;**
- 10. Policy requirements necessary for implementation of the master plan; and**
- 11. Identification and analysis of the impacts of transitioning to a bioenergy economy while considering applicable environmental concerns.”**



## ***OUTCOME I: Evaluation of Hawaii's potential to rely on biofuels as a significant renewable energy resource***

---

- 1. Water resources***
- 2. Land resources***
- 3. Distribution infrastructure for both marine and land***
- 4. Labor resources and issues***
- 5. Technology to develop bioenergy feedstock and biofuels***
- 6. Integration and evaluation***



## ***OUTCOME II: Plan or roadmap to implement commercially viable biofuels development***

---

- 1. Permitting***
- 2. Financial incentives and barriers and other funding***
- 3. Business partnering***
- 4. Identification and analysis of the impacts of transitioning to a bioenergy economy while considering applicable environmental concerns***
- 5. Integration and plan development***



# Remaining Activities

---

- **OUTCOME III**: Strategic partnerships for the research, development, testing, and deployment of renewable biofuels technologies and production of biomass crops
- **OUTCOME IV**: Biofuels demonstration projects, including infrastructure for production, storage, and transportation of biofuels
- **OUTCOME V**: Promotion of Hawaii's renewable biofuels resources to potential partners and investors for development in Hawaii as well as for export purposes





# ***OUTCOME I: Evaluation of Hawaii's potential to rely on biofuels as a significant renewable energy resource***

---

## **Water resources**

***Ali Fares, UH Department of Natural Resources and Environmental Management***

***Aly El-Kady, UH Water Resources Research Center***

## **Land resources**

***Carl Evensen, Ali Fares, UH Department of Natural Resources and Environmental Management***

***Denise Antolini, Richelle Thomson, UH Law School***

***Richard Ogoshi, UH Dept. of Tropical Plants and Soil Sciences***



***OUTCOME I: Evaluation of Hawaii's potential to rely on biofuels as a significant renewable energy resource***

---

**Infrastructure (marine and land)**

***Manfred Zapka, Marc M. Siah & Associates, Inc.***

**Labor**

***James Spencer, UH Department of Urban and Regional Planning***

**Technology**

***Samir Khanal & Charles Kinoshita, UH Dept of Molecular Biosciences and Bioengineering***  
***Scott Turn, UH HNEI***

**Integration and evaluation**

***Team, Priscilla Thompson, Scott Turn***

---



# ***OUTCOME II: Plan or roadmap to implement commercially viable biofuels development***

---

## **Permitting**

***Manfred Zapka, Marc M. Siah & Associates, Inc.***

## **Financial incentives**

***Denise Konan, UH Dept. of Economics***

## **Business partnering**

***Steven Chiang, Janel Yamamoto, UH Agribusiness Incubator Program***

***Charles Kinoshita, UH Dept. of Molecular Biosciences and  
Bioengineering***

## **Impacts**

***Makena Coffman, UH Department of Urban & Regional Planning, UH  
Economic Research Organization***

## **Integration and plan development**

***Team, Priscilla Thompson, Scott Turn***



# Stakeholder Events

---

- **Bioenergy Master Plan Kickoff Meeting – May, 2008**
- **A Conversation with Hawaii's Agriculture Sector – September, 2008**
- **Stakeholder Meeting – April, 2009**
- **Drafts Posted for Stakeholder Review and Comment**



***OUTCOME I: Evaluation of Hawaii's potential to rely on biofuels as a significant renewable energy resource***

---

- **Land & Water: GIS assessment of land availability, water systems, and crop potential were deemed positive**
- **Infrastructure requirements must be addressed but were not deemed major limitations**
- **Labor resources adequate – training and living wages will be required**
- **Technology – support for development of harvesting equipment deemed necessary and progress on 2<sup>nd</sup> generation conversion technologies expected**
- **Conclusion: biomass based systems can contribute significant energy resource to State**



## ***OUTCOME II: Plan or roadmap to implement commercially viable biofuels development***

---

- **Industry Road Map**
  - **Program level coordination (15 actions items)**
  - **Availability and use of resources (13 actions items)**
  - **Value chain inter-dependencies (11 action items)**
  - **Industry impacts (6 action items)**



## ***OUTCOME II: Plan or roadmap to implement commercially viable biofuels development***

---

- **Priority Action Items**
  - **Fund and staff a Bioenergy Program at DBEDT**
  - **Establish a bioenergy technical advisory group**
  - **Develop a clear and consistent policy on the use of State lands**
  - **Develop methodology for evaluation of bioenergy projects based on principles of life cycle assessment (LCA)**
  - **Require LCA for projects on State lands or with State funding support**



## ***OUTCOME II: Plan or roadmap to implement commercially viable biofuels development***

---

- **Priority Action Items (continued)**
  - **Provide a tax credit for maintenance and refurbishment of irrigation systems**
  - **Provide tax credit for infrastructure development in support of bioenergy industry**
  - **Fund faculty position to conduct research and development on bioenergy crop harvesting technologies suitable for Hawaii conditions**





# Hawai'i Bioenergy Master Plan Project

[Home](#)

[About the Project](#)

[Project Approach](#)

[Project Team](#)

[Project Activities 2008](#)

[Project Calendar 2009](#)

[Resource Information](#)

[For Stakeholders](#)

[Website Contact](#)

[CO Counter](#)



## For Stakeholders

### Hawaii Bioenergy Master Plan Draft

We are soliciting stakeholder input on the content of the draft and request that you review it and provide comment. Comments will be included in the Hawaii Bioenergy Master Plan final draft due to the Department of Business, Economic Development and Tourism by October 2, 2009. COMMENTS CAN BE SUBMITTED BY EMAILING THEM TO [bionrg@hawaii.edu](mailto:bionrg@hawaii.edu) NO LATER THAN OCTOBER 2, 2009.

To assist with your review, the document is segmented into separate pdf files as follows:

- [Master Plan Vol I Draft .pdf](#)

Volume I includes:

Executive Summary

Part 1 - Overview

Part 2 - Perspectives on the Bioenergy Industry (Executive Summaries from the issue reports)

Part 3 - Potential and Actions (Outcomes mandated by Act 253)

Part 4 - Conclusion

- Volume 2 – Includes complete Issue Reports

[2.1 Master Plan Vol II Draft Land and Water.pdf](#) - This document is currently under review

[2.2 Master Plan Vol II Draft Distribution Infrastructure.pdf](#)

[2.3 Master Plan Vol II Draft Labor Resources.pdf](#)

[2.4 Master Plan Vol II Draft Technology.pdf](#)

[2.5 Master Plan Vol II Draft Permitting.pdf](#)

[2.6 Master Plan Vol II Draft Financial Incentives.pdf](#)

[2.7 Master Plan Vol II Draft Business Partnering.pdf](#)

[2.8 Master Plan Vol II Draft Economic Impacts.pdf](#)

[2.9 Master Plan Vol II Draft Environmental Impacts.pdf](#)

## Drafts Posted in September and November

[www.hnei.hawaii.edu/bmpp/stakeholder.asp](http://www.hnei.hawaii.edu/bmpp/stakeholder.asp)

## Request for comment emailed to >400 stakeholders



# Stakeholder Comments

---

- **Commission on Water Resource Management**
- **HI Dept. of Agriculture**
- **HI Dept. of Transportation**
- **Robert Ely**
- **The Gas Co.**
- **James Ewan**
- **Richard Ha, Hamakua Springs Country Farm**
- **Hawaii Cattleman's Council**
- **Pacific Biodiesel**
- **Life of the Land**
- **National Renewable Energy Laboratory**
- **Simonpietri Enterprises LLC**
- **Hawaii Farm Bureau Federation**
- **SunFuels Hawaii**
- **Tesoro**
- **HI Dept. of Labor and Industrial Relations**
- **Hawaiian Electric Co.**
- **Carolyn Hildebrand**



# Remaining Activities

---

- **Currently – Review and incorporate comments received on final draft**
- **12/12/09 – Submit final document to DBEDT**



---

# Questions?





[www.hnei.hawaii.edu](http://www.hnei.hawaii.edu)

HAWAII NATURAL ENERGY INSTITUTE



# Roadmap Action Items

## Program Level Coordination

- **1. Establish a Renewable Biofuels Program: DBEDT shall establish a bioenergy program (Program) to manage the State's transition toward energy self sufficiency based in part on bioenergy for electricity and transportation. The bioenergy program shall receive \$1.5 million dollars per year to establish three staff positions using up to \$340,000 and the balance shall be used to fund assessments and co-fund demonstration projects as identified in the bioenergy master plan. Assessment and demonstration projects shall be prioritized by bioenergy technical advisory group and stakeholder input. Program personnel shall schedule regular outreach meetings to exchange information with communities on all islands where bioenergy development is proposed. In its first year, the Program shall develop an appropriate tax credit based on green house gas reductions resulting from the displacement of fossil fuels by bioenergy products that accrues to Hawaii bioenergy feedstock producers and bioenergy conversion facilities. Activities of the bioenergy program shall be reported to the legislature annually in December.**



# Roadmap Action Items

## Program Level Coordination

- **2. Establish Bioenergy Technical Advisory Group that includes one representative each from DBEDT, the Department of Land and Natural Resources (DLNR), the Department of Agriculture (DOA), the Department of Hawaiian Home Lands (DHHL), the Department of Health (DOH), and 18 other members representing the bioenergy industry (3), refiners (2), agricultural producers (4), environmental concerns (3), utilities (3), the Office of Hawaiian Affairs (1), and bioenergy research (2). The advisory group will provide advisory support to the Renewable Biofuels Program.**



# Roadmap Action Items

## Program Level Coordination

---

- **3. Involve specific communities through all steps of the process.**
- **4. Establish Community-Based Bioenergy Working Group.**
- **5. Maintain an up-to-date list of State and Federal incentives, and provide guidance to prospective bioenergy value-chain business owners on how to apply for incentives (grants, loans, tax credits, etc.).**
- **6. Synergize the bioenergy master plan with the Hawaii Clean Energy Initiative goals**





# Roadmap Action Items

## Program Level Coordination

---

- **7. Encourage close collaborations among scientists, researchers, policy makers, extension agents, and farmers as a comprehensive link of information dissemination in order to provide the context for informed decision-making.**
- **8. Establish an independent fact-finding and policy discussion forum, based in science, technology assessment and land use analysis to support programmatic and policy decisions.**



# Roadmap Action Items

## Program Level Coordination

- **9. Provide research, education, and outreach on the role of biofuels.**
- **10. Act swiftly to capture funding made available through the federal programs, especially related to economic stimulus.**
- **11. Work to promote new workflow processes within State and County permitting agencies as well as efficient interagency cooperation.**
- **12. Develop and maintain a bioenergy partner database similar to the Bioenergy Partner Catalog in this report.**



# Roadmap Action Items

## Program Level Coordination

- **13. Facilitate partnerships through a matchmaker. The State can significantly encourage necessary bioenergy partnerships through the creation of a position or program that facilitates such partnerships...and acting as an industry advocate and government liaison.**
- **14. Position Hawaii's bioenergy strategy in the context of vital State interests such as energy security and greenhouse gas emissions reduction targets.**
- **15. Clarify whether the State should only attempt to attract those parts of the industry where wages are above manual labor level.**



# Roadmap Action Item

## Availability and Use of Resources

- **1. Develop and prepare a single, clear, consistent policy on use and lease of State lands for agriculture, grazing, forestry, and bioenergy feedstock production, in consultation with relevant stakeholders and to promulgate policies of energy and food security. The plan shall include components describing favorable lease terms for bioenergy demonstration projects. Report of this policy shall be submitted to the Legislature by December 2011.**
- **2. Implement land policy developed in December 2011.**
- **3. Provide a tax credit of \_\_\_% of investment to support the refurbishment and continued maintenance of irrigation systems supplying water to agricultural lands of importance to the State of Hawaii that are used for food or bioenergy feedstock production, employ appropriate conservation agriculture practices, and are committed to production agriculture or bioenergy feedstock production for 25 years.**



# Roadmap Action Item

## **Availability and Use of Resources**

- **4. Study the potential effect of bioenergy crop production on drinking water resources. Assess influence of new groundwater resources for biofuel production on aquifer recharge and estimated aquifer sustainable yields.**
- **5. Conduct a systematic study for cost/benefit analyses of potential reuse of treated water for bioenergy crops.**
- **6. Increase sustainable water supplies (traditional and non-traditional) for agriculture including bioenergy and biomass crops.**



# Roadmap Action Item

## **Availability and Use of Resources**

- **7. Assess the potential for sustainable use of resources for bioenergy crops and other agriculture including ranch lands. Prioritize the use of resources for production of food and fuel.**
- **8. Encourage appropriate conservation agriculture practices to help reduce water consumption, use of pesticides and fertilizers, and pollution.**
- **9. Maintain land currently used for agriculture and forestry, and additionally, increase land available for bioenergy use sufficient to support biofuel production.**



# Roadmap Action Item

## Availability and Use of Resources

- **10. Conduct research on Hawaii-specific crops and Hawaii-specific crop incentives.**
- **11. Develop cropping systems that integrate bioenergy crops with current crops for efficient utilization of resources such as land, water, time, and labor.**
- **12. Develop a decision support system that could match biological characteristics of crops to physical characteristics of soil and to environmental and ecological acceptance.**
- **13. Test water-harvesting technologies in Hawaii to minimize water runoff and maximize water storage.**



# Roadmap Action Items

## Value Chain Inter-Dependencies

- **1. Provide a \_\_\_% tax credit for investments made to convert existing infrastructure to be compatible with bioenergy products or for construction of new infrastructure components for transporting and distributing bioenergy products derived from bioenergy feedstocks that are produced in Hawaii. The credit will be available in the first year that 50% of the total product volume of the infrastructure component is a bioenergy product.**
- **2. Provide funding for a full-time, tenure track, faculty position in the College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawaii at Manoa to conduct research and demonstration of appropriate bioenergy feedstock harvesting technologies suitable for Hawaii's conditions.**





# Roadmap Action Items

## Value Chain Inter-Dependencies

- **3. Fund a continued bioenergy technology assessment activity that can provide updated information on the status of bioenergy conversion pathways and estimates of energy return on investment (EROI) for bioenergy value chain components.**
- **4. Provide support to industry for preliminary feasibility studies of selected energy crop conversion alternatives to identify the most promising technology pathways and the resource requirements for those pathways.**
- **5. Develop funding mechanisms to leverage federal and private funds and support demonstration projects**



# Roadmap Action Items

## Value Chain Inter-Dependencies

- **6. Establish a bioenergy/biofuel development fund to support research, and technology development and demonstration.**
- **7. Reconcile investors' concern for exit strategies with biofuels incentives.**
- **8. Provide incentives for early implementation of bioenergy production.**



# Roadmap Action Items

## Value Chain Inter-Dependencies

- **9. Implement a purchase program, (targeted at slightly below market rates to avoid competing with private industry) for surplus crops, with restrictions on annual volumes and the duration of the program.**
- **10. Develop policy to provide benefit streams to bioenergy projects that result in increased State energy resiliency, reduced greenhouse gas emissions, and benefits to rural communities in Hawaii.**
- **11. Test biofuels under development or in a pre-commercial stage for compatibility with existing petroleum equipment and distribution assets.**



# Roadmap Action Items

## Industry Impacts

- **1. Develop a methodology for evaluation of bioenergy projects based on the principles of life cycle assessment (including energy inputs vs. energy outputs and greenhouse gas balances) in consultation with relevant stakeholders.**
- **2. Establish policy and process whereby State agencies will require life cycle assessments for bioenergy development proposals that seek to use State lands or State funds.**
- **3. Develop a certification program for biofuels to safeguard Hawaii's unique native eco-systems and culture, and support sustainable biofuels development.**



# Roadmap Action Items

## Industry Impacts

- **4. Assess the impacts of rising world oil prices and increasing local production of bioenergy on the two refineries.**
- **5. Continue assessment of economic impacts of bioenergy production as industry develops and data become available**
- **6. Encourage use of existing infrastructure to minimize the potential environmental impacts from the development of new infrastructure.**

