

SECTION 1: DEFINING THE PURPOSE OF THE KAUA`I ENERGY SUSTAINABILITY PLAN

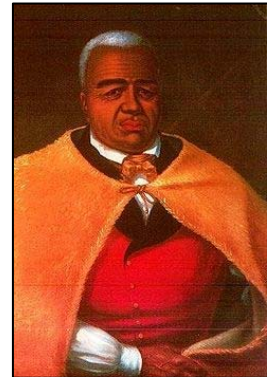
The Kaua`i Energy Sustainability Plan (KESP, or “Plan”) Final Report integrates the results of community engagement with objective energy analysis. The KESP was developed for the County of Kaua`i as a result of a competitive solicitation awarded by the County of Kaua`i to the SENTECH Hawai`i Team, consisting of:

- SENTECH Hawai`i, LLC,
- Kaua`i Planning Action & Alliance (KPAA), and
- Maurice Kaya, LLC.

In this section, the SENTECH Hawai`i Team addresses the purpose of the KESP, including finding the most appropriate definition of the term “sustainability,” and using that definition to help Kaua`i make tough decisions to move away from an energy paradigm based on imported petroleum to one based on local and sustainable energy for the ground transportation and renewable energy sectors. Other guiding principles are also explored.

A. Purpose

Kaua`i is the oldest, westernmost, windiest, rainiest, and perhaps the most ruggedly beautiful of the inhabited Hawaiian Islands. The people of Kaua`i have a reputation for being independent, dating back to the time when they resisted King Kamehameha’s two attempts to conquer Kaua`i during his 18th-century campaign to unify the islands. Kaua`i was unified in 1810 with the other islands through a negotiated agreement between the reigning ruler of Kaua`i, King Kaumuali`i, and King Kamehameha I on O`ahu.



Today, the people of Kaua`i can use this same independence and willingness to negotiate for the greater good to help them overcome a modern-day threat—an overdependence on imported oil to meet their energy needs.

Kaua`i is blessed with significant energy efficiency, renewable energy and fuels, and energy delivery opportunities that can be developed to help Kaua`i meet its energy sustainability goals.

After many discussions with County officials and staff, the Energy Plan Advisory Committee, and many Kaua`i stakeholders and residents, the SENTECH Hawai`i Team recommends the following purpose of the Plan:

The purpose of the KESP is to ensure maximum energy efficiency and conservation while facilitating Kaua`i’s production and use of local, sustainable energy resources in place of imported oil by the year 2030.

B. Defining Sustainability

To begin to define energy sustainability, the SENTECH Hawai'i Team engaged the community to analyze the term "sustainability," and received useful suggestions and questions that led to the following conclusions.

Several outside groups have tried to define the term "sustainability", but the basic definition for sustainable development from the Brundtland Commission may be the simplest and most profound:

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.¹

A possible weakness of this definition is that development is assumed; not all groups of people would agree that development *per se* is a given. What if a group doesn't want their land, society, and/or way of life to change?

C. Guiding Principles

A more objective and scientific definition of sustainability may be useful in examining energy generation, delivery and use on Kaua'i. It's hard to imagine finding more objective, scientific foundations on which to build guiding principles of energy sustainability than the First and Second Laws of Thermodynamics:

1. The First Law of Thermodynamics (the "law of conservation of energy") states that the total amount of energy in a closed system remains constant. A consequence of this law is that energy cannot be created nor destroyed.²
2. The Second Law of Thermodynamics (the "law of increasing entropy") is an expression of the universal principle of increasing entropy (basically, disorder). The implications of the Second Law are that matter and energy tend to become disorganized over time, or gain "entropy."³

The Natural Step (TNS) offers a framework of sustainability that is based on applying these unassailable thermodynamic laws to Earth's *nearly* closed-loop ecosystem.⁴ TNS believes that:

1. All the matter that will ever exist on earth is here now. (First Law).

¹ World Commission on Environment and Development (1987). *Our Common Future* (Chapter 2). Oxford: Oxford University Press.

² Borysowicz, Jerzy (2001). The First Law of Thermodynamics. Retrieved on 7/20/10 from http://35.9.69.219/home/modules/pdf_modules/m158.pdf.

³ Spakovszky, Z.S. (n.d.). Concept and Statements of the Second Law. Retrieved on 7/20/10 from <http://web.mit.edu/16.unified/www/FALL/thermodynamics/notes/node37.html>.

⁴ The Natural Step (n.d.). Our Approach. Retrieved on 7/20/10 from <http://www.thenaturalstep.org/~natural/our-approach>.

2. Disorder increases in all closed systems and the Earth is a closed system with respect to matter (Second Law), *except* that Earth receives energy from the sun.
 - a. Sunlight is responsible for almost all increases in net material quality on Earth through photosynthesis (for plant growth), solar heating effects (warming of the planet, evaporation of ocean water for fresh water production, creation of ocean currents and wind, etc.). In the realm of sustainable energy, sunlight can create electricity through photovoltaics, and solar heat can be used to drive concentrating solar power, as well as solar thermal heating and cooling systems.
 - b. This flow of energy into our ecosystem from the sun essentially creates order from disorder, making an exception to the natural trend of entropy (disorder) in a closed system.⁵

Signs that modern society is not sustainable include the fact that we are mining and dispersing materials (such as oil and coal) faster than they are returned to the Earth's crust. In the process, we are increasing the concentration of harmful emissions (such as carbon, nitrogen oxides, and sulfur oxides) and heavy metals (such as lead and mercury) into our ecosystem.

To become a sustainable society, TNS starts with the premise that sustainability means preserving all forms of life on Earth. The first three of four *TNS Principles of Sustainability* focus on interactions between humans and the planet, while the final principle addresses the basic needs of humans.

In a sustainable society:

- ***Nature is not subject to systematically increasing:***
 - ***Concentrations of substances extracted from the Earth's crust,***
 - ***Concentrations of substances produced by society, or***
 - ***Degradation by physical means and, in that society.***
- ***People are not subject to conditions that systematically undermine their capacity to meet their needs.***⁶

The SENTECH Hawai`i Team believes that the fourth and final TNS principle is compatible with the definition of sustainable development proposed by the Brundtland Commission, but without including the assumption of “development.” By using TNS principles to define sustainability, Kaua`i has the best of both worlds so to speak.

Leaders of TNS led a two-day workshop on Kaua`i in June of 2006 for about 40 leaders from the government, business and nonprofit sectors. The workshop focused on providing education and awareness-building of the sustainability challenge, provided an overview of TNS and the business case for sustainability, and discussed how the TNS framework can be applied at both the individual and corporate levels. The group performed a visioning exercise and developed a series of strategies to move Kaua`i toward sustainability. The results of the workshop laid the foundation for subsequent dialogue and efforts related to sustainability.⁷

The Big Island of Hawai`i is also reviewing and implementing an energy sustainability plan. In June of 2009, advisors from TNS visited the Big Island of Hawai`i to provide a series of public

⁵ Ibid.

⁶ Ibid.

⁷ Zachary, Diane, President and CEO. Kaua`i Planning and Action Alliance. Lihue, HI. Personal interview. November 2009.

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workshops and a two and a half day session with leaders from various Island businesses and organizations. The public workshops included audiences from the business community, municipal government representatives, and high school students attending the “Student Congress on Sustainability.” The session brought together 32 potential change leaders to focus on putting theory into practice through the completion of both baseline and visioning exercises specific to the Island of Hawai`i.⁸

⁸ The Natural Step (n.d.). TNS in Hawaii. Retrieved on 7/20/10 from <http://www.thenaturalstep.org/en/canada/tns-hawaii-opening-minds-closed-system>.