



## Costa Rica Aims for Carbon Neutrality

*"An ounce of prevention is worth a gallon of crude."* - Óscar Arias, President, Costa Rica

On June 7, Óscar Arias, President of Costa Rica, announced his goal to make the country carbon neutral by 2021, the year of its 200th anniversary. Europe, Japan and California have discussed plans for 20 to 30 percent reductions of carbon emissions by 2020. Scientists believe the world needs to reduce global emissions by 80 percent by mid-century. An NRDC/E2 delegation arrived in Costa Rica on June 19 for a series of meetings over five days to discuss with President Arias, members of his cabinet, representative from the ministries, energy companies, and local entrepreneurs how Costa Rica could achieve these reductions and become a model for the rest of the world. This article presents the situation in Costa Rica, how it compares to the U.S. and how the two countries can help one another.



President Óscar Arias (second from left) accepts a new-generation compact florescent bulb that replaced an incandescent bulb in his living room, saving 50 watts per hour. Accompanying him are (left to right): Suzanne Hunt, NRDC biofuels consultant; Lee Stein, E2 member; Roger Liddell, E2 member; and Emily Arnold, NRDC consultant.

### Background

In April 2006, E2 members Bob Epstein and Wendy Neu participated in an NRDC trip to Costa Rica to understand the potential threat of Harken Energy drilling for oil off the Caribbean coast. During that trip, a local environmentalist suggested that, instead of constantly fighting drilling (currently there is no oil production in Costa Rica), we should encourage the country to focus on developing alternatives to oil and a policy of carbon neutrality. In May 2006, NRDC attorney Robert F. Kennedy, Jr. wrote a letter to President Arias on the occasion of his inauguration, suggesting a goal of carbon neutrality was feasible and that NRDC and E2 were available to help develop a plan.

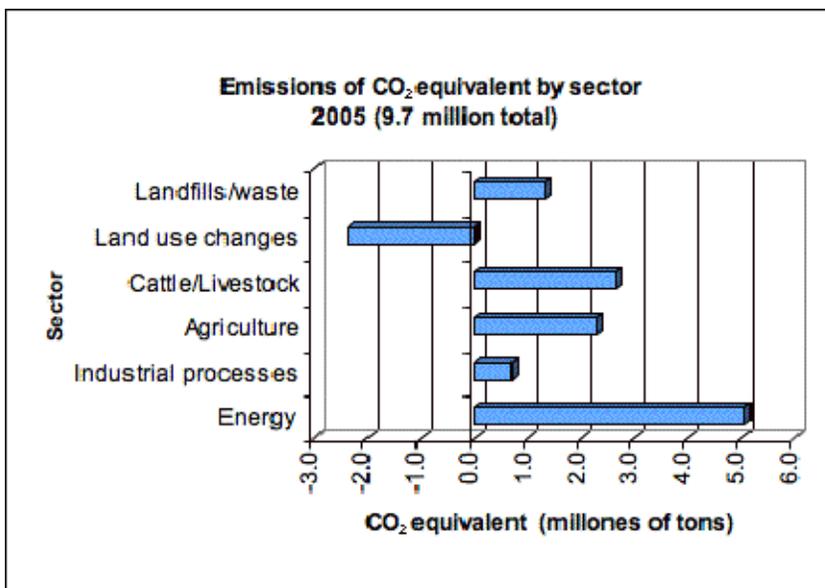
Over the last year, NRDC's International Program, led by Jacob Scherr with Elizabeth Beall as project manager, have worked with people throughout Costa Rica and interacted with E2 members to assess the opportunities. Our motivation was based on our belief that:

1. Costa Rica has an excellent chance of becoming carbon-neutral and a showcase for what is possible. This would raise the debate beyond the currently discussed 20 - 30 percent reductions, and focus instead on reductions of 80 percent or more.
2. Costa Rica has excellent potential to develop biofuels without impacting food crops or reducing tropical forests.
3. Observing this process would help us understand the differences between addressing climate in the developed and the developing worlds.

## Costa Rica's Energy and Climate Change Profile.

The majority of carbon emissions in Costa Rica come from burning oil for transportation and electricity. The government gave us preliminary numbers from a report entitled "Basado en el Balance Energético 2005 (prelimininar)."

**Electricity:** In 2006 Costa Rica generated 94 percent of its electricity with zero carbon emissions, using mostly hydropower, some geothermal power, and a very small amount from wind and biomass. As demand has increased over the last three years, electricity generated from oil has increased from 1 to 6 percent, and this disturbing trend is continuing. Electricity demand has been growing at 5 to 6 percent per year and the country's existing policies have not been favorable to increased availability of renewable electricity like solar, wind and biomass due to legal barriers to private investment and no incentive to increase private generation.



**Transportation:** Nearly all transportation in Costa Rica uses petroleum, with diesel being the most popular fuel. Vehicle ownership is on the rise with over one million vehicles now and an additional 50,000 added each year. The vehicle fleet is much older than that of the U.S. due to an import tax structure that favors older vehicles. Approximately one-third of passenger vehicles run on diesel.

In 2005, emissions from electricity and transportation were estimated to be 5 million metric tons of CO<sub>2</sub> (MMTCO<sub>2</sub>).

**Other emissions:** Preliminary data from 2005 showed emissions from landfills, agriculture, livestock and industrial sources totalled approximately 7 MMTCO<sub>2</sub>.

**Land use:** Over the last 10 years, the government has managed an active program of reforestation that has increased the proportion of total public and private lands that have forests from 40 percent to almost 50 percent. More than 25 percent of Costa Rica's land is protected by a system of national parks and reserves. Costa Rica currently uses tax revenues, some of which are derived from a tax on fuels, to pay for the preservation of some private forestland and to plant new areas. They expect this program to be expanded with the adoption of a carbon offset program (see Costa Rican plan below). Estimated emissions from changes in land use in 2005 was 1.5 MMTCO<sub>2</sub>. However, 3.5 MMTCO<sub>2</sub> was sequestered in (i.e. absorbed by) new forests, resulting in a total net benefit of 2 MMTCO<sub>2</sub> removed from the atmosphere.

## Similarities and Differences

Costa Rica and the United States face some of the same challenges in addressing climate change. Among the similarities are:

- Significant use of oil - Both countries have transportation systems that run almost entirely on oil. The countries share a common need to develop alternative transportation fuels.
- Growing use of automobiles with inadequate fuel efficiency.
- Climate leadership - Both Costa Rica and many U.S. states have top-down leadership in government aggressively instituting measures to address global warming. This obviously is not true for the U.S. federal government.

There are also significant differences:

- Government-owned electricity and transportation fuel companies - State monopolies control the distribution of electricity and fuel in Costa Rica. This strongly discourages investment and innovation.
- No natural gas, coal or nuclear power - Costa Rica does not use natural gas for cooking, heating or electric generation. Home cooking is primarily done on electric ranges that account for 20 percent of electricity demand.
- Oil used for electric generation - Costa Rica is using an increasing amount of oil for electric generation (6 percent and growing), while in the U.S. that figure is about 1 percent and declining.
- Ideal climate for biofuels - Costa Rica has abundant sunlight, water and a tropical climate - all ideal for growing plants which can be used to create biofuels to replace oil, and biomass for generating electricity. The U.S. is much more limited and will be more dependent on cellulosic ethanol and other advanced biofuels that have yet to be proven in scale.
- Developing nation - Costa Rica is a developing nation and as such has a much lower average income. As the economy continues to grow, more wealth will mean demand for electricity that is growing at a faster rate than in the U.S. Currently, Costa Rica uses an average of 2.5 megawatt-hours per capita per year. By contrast, California, one of the most efficient states in the U.S., uses 7.5 megawatt-hours per capita per year. While improved energy efficiency will help, it seems likely that overall demand will continue to grow.
- High potential for public transit - Half of the 4.2 million Costa Ricans live within the greater San Jose area (Central Valley) and can benefit from improved public transit systems.

## Costa Rican Plan

The Costa Rican government is developing two plans under the direction of Roberto Dobles, Minister of Environment and Energy. The "Peace with Nature" plan addresses a comprehensive range of environmental issues and will be announced on July 6, 2007. Within this plan is a greenhouse gas reduction strategy - expected to be released this fall - that aims for carbon neutrality by 2021. Some regulatory measures are already in effect that will reduce emissions. For example, beginning in 2008, the gasoline additive, MTBE, will be replaced with low-carbon ethanol from sugar cane.

Minister Dobles discussed with the NRDC/E2 delegation the concept of a branding program

tentatively called "C-neutral." Certain businesses - such as hotels and travel companies - could volunteer to be C-neutral certified by the government. This means that a company will pay for all global warming emissions released and the money will go into a fund that will be invested in reforestation and avoided deforestation programs. The government also hopes that this will encourage companies to increase their use of renewable energy and invest in cleaner technologies. For example, a tourist trip could be made carbon-neutral by including an offset to cover the emissions from the plane travel and using renewable energy while in Costa Rica. The government would sell carbon offsets through their forestry programs.

In general, Costa Rica has done an exemplary job managing their forest resources and national parks, but is lagging behind on issues such as water quality, waste management, mass transit and air quality in urban areas.

### NRDC Proposal

We delivered a preliminary proposal in english<sup>1</sup> and spanish<sup>2</sup> which emphasized four areas:

1. Increasing energy efficiency
2. Raising fuel economy and promoting plug-in hybrids
3. Encouraging productions of biofuels and biomass for electricity
4. Improving public transport

During our trip, we met with over 30 people representing members of the government and its agencies, local groups and several local entrepreneurs. It seems likely that Costa Rica can become carbon-neutral primarily with existing technologies. The country will need to initially pursue efficiency measures to reduce long-term demand on electricity and transportation fuels. Concurrently, it will need to grow its biofuels industries to supply most of its liquid fuels and will need significantly more electricity from renewable sources. The country has sufficient biomass, solar and wind resources to meet its electricity demands.



The fruit from the palm tree produces up to 5,000 liters of oil per acre.

Biomass for liquid fuels and electricity will most likely come from sugar cane, and oil from palm and jatropha plants, until cellulosic feedstocks are developed.

There is already significant production (100,000 hectares or 250,000 acres) of sugar cane and palm oil that historically has been used for granular sugar and cooking oil. The crops are also starting to be used to produce electricity (from the biomass left over) and fuel (from excess production) as prices for biofuels become more attractive for producers. Local groups and government studies have identified land that can be used to expand production of biofuels without impacting forests. We

<sup>1</sup> [Costa Rica: Setting the Pace for Reducing Global Warming Pollution and Phasing Out Oil](http://www.e2.org/ext/jsp/controller?docId=13234). NRDC. June 2007. Available online at <http://www.e2.org/ext/jsp/controller?docId=13234>.

<sup>2</sup> [Costa Rica: Marcando el Paso para Reducir la Contaminación que Afecta el Calentamiento Global](http://www.e2.org/ext/jsp/controller?docId=13235). NRDC. June 2007. Available online at <http://www.e2.org/ext/jsp/controller?docId=13235>.

would like to encourage the development of feedstocks that have the broadest social and economic benefits.

Peak electricity demand is currently met by diesel-electric generation with a cost approaching US \$.30 per kilowatt hour (at least three times more expensive than other sources). This occurs mostly in the dry season when there is reduced hydroelectric capacity. Both solar and wind power are significantly less expensive than diesel-electric at optimal production in the dry season, and with the proper incentive structure they could displace the use of diesel. In particular, we believe the country should explore solar and wind power and the use of energy storage (by pumping water uphill into storage facilities) during periods of surplus electricity.

## Next Steps

Minister Roberto Dobles, who is responsible for the carbon neutral strategy, expects to have a draft report in July that NRDC and E2 will review. Concurrently, E2 members are developing several proposals for the financing and acceleration of energy efficiency and renewable energy efforts in the country.

Once the final carbon-neutral report is issued, we anticipate a long-term collaboration through NRDC to help Costa Rica achieve its goals.

Our thanks go to Elizabeth Beall, who coordinated our trip and much of the research that led to the development of the strategies.



From left to right: Bob Epstein, E2; Florence Liddell, E2; Peter Lehner, NRDC Executive Director; Costa Rica President Óscar Arias; Lisa Gansky, E2; Costa Rica Minister of the Interior Rodrigo Arias; Roger Liddell, E2; Lee Stein, E2; Emily Arnold, NRDC consultant; June Stein, E2; Suzanne Hunt, NRDC consultant; Elizabeth Beall, NRDC International Program; Jacob Scherr, NRDC International Program; and Adam Wolfensohn.