ELEEP Policy Recommendations For Water-Energy-Climate Nexus

US Southwest Study Tour 7-12 July 2013

Introduction "The Water-Energy-Climate Nexus"

Ecologic Institute and the Atlantic Council of the United States co-organize the Emerging Leaders in Environmental and Energy Policy Network (ELEEP). ELEEP was created under the I-CITE project, which was funded by the European Union's External Action Service. In early 2012, the ELEEP Network was awarded additional support by the Robert Bosch Stiftung, which provided for two study tours and other events in the second half of the year. The ELEEP Network has received additional funding from the European Union under the auspices of the EU's "Transatlantic Civil Society Dialogues EU-USA 2012"; with this grant, Ecologic Institute and the Atlantic Council will conduct "The ELEEP Energy and Climate Dialogue" from January 2013 through mid-2014. In addition to a second round of funding from the European Union, the Robert Bosch Stiftung has also provided a second round of support to ELEEP through mid-2014. ELEEP is a dynamic, membership-only forum for the exchange of ideas, policy solutions, best-practices, and professional development for emerging American and European leaders working on or around environmental and energy issues. ELEEP currently has approximately 120 members, split between the US and the EU. ELEEP Members provide policy advice based on their experiences and lessons from different study tours addressing environment, climate and energy issues.

In July 2013, a group of ELEEP members visited New Mexico, Arizona, and Nevada in the US Southwest to explore the relationship between energy production, water consumption, and its effects on climate change. By visiting government, academic, and private organizations, they were able to understand the economic, environmental and social complications that come with production of energy and the use of water in an area that faces drought conditions. Moreover, they were able to gain insights on solutions and what is exactly happening in the field that can be replicated around the world through streamlined policy. Below you will find a series of recommendations derived from the study tour. There are four overarching themes with precise recommendations listed under each one: Conservation & Technological Innovation; Address Data Gaps & Publicize Best Practices, Government Leadership; and Public & Private Partnerships. Of course, there can be many more policies if we expand these concepts further. These are just a few examples.

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Highlight of the recommendations

Scientist at the Los Alamos National Laboratories have recently demonstrated that produced water from hydraulic fracking can be highly effective when utilized for the growth of algae which can then be converted into biofuels. Based on this scientific progress, ELEEP recommends to use fracking water as a feedstock for algae to produce biofuels instead of injecting it into the ground or discard it.

The use of water for electricity production can be reduced through a systematic addition of renewables. Increasing the use of renewables reduces GHG emissions as the power grid and the water use especially in arid areas where water is an essential resource. ELEEP refers to the projects of PNM Resources, an energy holding company in New Mexico.

ELEEP visited the Arizona Department of Water Resources which demonstrated the possibility to archive economic growth with quality and sustainability. Different examples and strategies of the Departments are highly recommended by ELEEP making economic growth in an arid or semi-arid area possible while reducing water and energy inputs.

Energy production in times of climate change must be based on data of water availability and future impacts to water supply. This recommendation is formulated by ELEEP to address highly vulnerable energy production industries such as fossil fuel power plants or nuclear generation.

ELEEP recommends encouraging businesses to incorporate and use desalination plants provide water supply for their production and local communities. A good example is Intel's initiative of corporate social responsibility to incorporate a desalination plant (Reverse Osmosis Facility) in its water lifecycle.

Decentralized/personal electricity generation has a growing demand of new business strategies to maintain and expand the transmission and distribution grid infrastructure. Higher osts and fewer sales spall inevitable rate increases, which exposes utilities to competitive threats and the infamous regulated utility death spiral. ELEEP recommends US stakeholders to have a closer look across the Atlantic where Germany can be an example. Policies and commodity prices have resulted in competitive rates and lower sales, decapitalizing traditional European utilities.

Conservation & Technological Innovation

Recommendation: If a country is going to pursue hydraulic fracturing for the production of oil and gas, consider economic uses of produced water from the process. Instead of injecting it into the ground, use the water as input, for example as a feedstock for algae to produce biofuels.

Justification: Hundreds of millions of gallons of produced water – waste water that is collected from fracked oil and gas wells through the hydraulic fracturing process – is generated each year in the US. Most of this water is simply injected underground. Since the produced water often has

heavy metals and other hazardous waste, this makes sense as an initial response. At the very beginning, some produced water was released into waste water treatment plants, leading to dangerous water quality conditions.

Scientists at Los Alamos National Laboratories and elsewhere have been investigating options for using this produced water, instead of discarding it. Recent experiments have demonstrated that produced water can be highly effective when utilized for the growth of algae, which can then be converted into biofuels.

Recommendation: When citing locations for carbon capture and sequestration (CCS), look first to options for producing water as a bi-product.

Justification: Water supplies, especially in arid areas, will be affected by climate change. If a region is using fossil fuels for the generation of electricity and considering the implementation of carbon capture and sequestration to mitigate the contributions to climate change, some geologic formations can be used to produce water resources as a bi-product. Perhaps not suitable for drinking water, water from these processes actually controls the CO2 placement in the geologic subsurface and also results in water supplies for a variety of other uses. The Los Alamos National Laboratories is testing options for doing this.

Recommendation: Increase the use of renewable energy, not only to reduce greenhouse gas emissions, but also to decrease dependency on water supplies for energy production.

Justification: Especially for arid regions, adding renewable energy to the electricity mix not only reduces climate change contributions, it also mitigates needs for water and reduces the dependency on water as an input of electricity production. Renewables, thereby, not only reduce greenhouse gas emissions and diversify the sources of electricity supply, they also help mitigate against changed water supply conditions, which will be one of the largest climate change impacts on the energy system.

The systematic addition of renewables to the electricity grid is an effective way of reducing water demand from coal, gas, and nuclear energy production. This was learned by visiting PNM Resources, an energy holding company in New Mexico.

Address Data Gaps & Publicize Best Practices

Recommendation: When focused on encouraging economic growth in an age of climate change impacts and changed water availability, the key consideration is not the speed of growth, but its quality and sustainability.

Justification: Many areas of the US and the EU are arid or semi-arid. These regions will seek economic growth, which requires supplies of energy and water. Yet additional supplies of energy and water will be affected by climate change. Economic growth is possible while reducing water and energy inputs. The Arizona Department of Water Resources demonstrates this possibility. The current water use in the State of Arizona is comparable to 1957 levels, while the efficiency of water use has increased by 70% relative to the same time period.

Recommendation: When considering climate change impacts from an energy production perspective, look first to water availability and future impacts to water supply.

Justification: Climate change expresses itself through water. As recognized in recent reports from the US Department of Energy, the energy industry's assets are highly vulnerable to climate-related droughts, floods, storms, and sea-level rise. Power issues are water issues, and vice versa. Especially for fossil fuel and nuclear generation, a lack of sufficient/regular water supplies in the future could jeopardize the viability of certain projects.

Recommendation: Develop standardized project criteria for water project types that would increase the availability of water (i.e., by creating and issuing water rights in the amount of water that is introduced into the system) in regions that are expected to experience more severe draught with the development of climate change. This would include a framework for analyzing the following: a) what sources of water would be eligible (produced, treated, recycled, conserved, etc.), b) criteria for eligibility of storage locations (natural and artificial), c) the purpose for which the "new" water could be used (irrigation, flow augmentation, recharging and/or banking), and d) what sort of regulatory framework exist and/or would need to be in place for jurisdictions to authorize appropriate project types. Some examples of project types could include: (1) increasing water irrigation efficiency in agriculture, (2) introducing treated produced water for flow augmentation, (3) introducing treated recycled or brackish water for flow augmentation, (4) introducing treated produced water for recharging and/or banking, and/or (5) introducing treated recycled or brackish water for

recharging and/or banking.

Justification: Various regions in the European Union and the United States are expected to experience extended and more severe draught conditions as climate change continues, most notably the Iberian Peninsula and the Southwest U.S. These regions tend to have a history of water scarcity and already have extensive and complex water rights systems in place. Because water rights are already in place and are valuable, robust water trading markets already exist. These markets however tend to be limited to existing rights, which often prevents the introduction of "new" water sources. Some have suggested developing "water offsets" modeled after carbon offsets in emissions trading schemes. However due to complex regulatory schemes and public perception of the potential sources of water, projects have been scarce. While some pilot programs exist to introduce water in these regions, the projects are limited both in size and number, and thus are unable to take full advantage of the existing markets. Standardized project criteria could provide a controlled venue for new water to enter into the appropriate streams, taking into consideration local and regional concerns for water quality and other public relations issues, while offering the water trading markets strong signals to incentive private financing.

Government Leadership

Recommendation: Especially for states with weaker institutional structures and significant (energy) resource endowments, ministries or departments that have responsibility for both energy and other resources can be an effective method of managing both.

Justification: In the case of Poland or Romania, or any state with weaker policy/institutional frameworks, it may be possible to learn from the example of New Mexico or other states that have developed ministries or departments that have responsibility/jurisdiction for both energy planning and resource management. This combined competence allows for better planning, offsets some of the power concentrated in the traditional energy sector, and enables the development of a suite of energy resources. This is especially pressing for places with natural resources, low energy efficiency, and high energy usage. Poland, for example, should think the way states like New Mexico did and consider creating a new ministry that would cover both energy and resources, including specifically: (A) conventional and unconventional energy resources (coal, gas, oil); (B) metals and minerals; (C) air, water, land, forests; and (D) renewable energy sources (water, sunlight, wind).

Recommendation: When developing energy/water projects with significant impacts on vulnerable populations, it is imperative to engage in an inclusive planning process. Environmental justice is part of this consideration, not something to be overlooked or

ignored.

Justification: The energy planning process that led to the current situation in the Navajo Nation is not one that warrants emulating. Years of expensive litigation against companies like Peabody Energy and the critical health and environmental impacts for the Navajo and their territory has created a challenging context for any future energy development, be it low carbon or high carbon. Viewing energy planning through an environmental justice lens requires understanding not only the cumulative injustices incurred by the Navajo, but realizing the implications of their systematic economic and political marginalization. A planning process that is respectful of their traditional consensus-based decision-making process and that addresses the power imbalances between interested parties will result in an energy planning process that is more inclusive and ultimately, more durable. In this environment, litigation will be used as the last resort — not the only resort. These conclusions hold for any large-scale project with implications for vulnerable populations, be they immigrant or minority groups, the rural or urban poor, or aboriginal peoples.

Recommendation: Before implementing energy/water projects affecting disadvantaged communities, government and other stakeholders should engage in building local capacity, and incorporate the needs and interests of that community in the planning process.

Justification: The Black Mesa Water Coalition is currently looking for partners on a 20 MW utility-scale solar installation that they hope to build on a brownfield site on their reservation. Rather than imposing external solutions, public and private sector actors can learn what the important energy and water issues are for community members and enable them to create and manage a solution. In doing so, utility companies or government agencies can help break the Faustian bargain of having to choose between highly polluting forms of economic growth or status quo poverty. In this case, rather than rely on diesel generators, kerosene lighting or connections to a coal-dominated electrical grid, this project can help bring clean electricity to the 37 percent of Navajo households that are still without electricity and much-needed employment to the reservation. Building local capacity can help to not only improve local economic conditions in the short-term but also enable communities to rechart their future.

Recommendation: Energy development and resource management plans in water-constrained areas should account for impacts on native species. Long-term baseline population numbers should be carefully studied, and any restrictions must be justified with

thorough scientific analysis. Additionally, robust local stakeholder participation is critical to both effective species conservation and buy-in from industry, environmental groups, and government.

Justification: Energy development of all forms can have major impacts on native species. As climate change continues to affect local environments, the need for effective habitat conservation will become more difficult. In New Mexico, populations of species like the silvery minnow have faced drastic declines in recent decades and will require careful protection. Growth of both renewable and traditional energy sources accentuate this effect.

In the Southwest United States, new issues of species conservation have arisen in recent years, creating conflict among industry, environmental groups, and governments. Failure to effectively collaborate with local stakeholders early in the process can impact government's ability to balance economic development with habitat conservation. Unreliable baseline population numbers and limited pre-existing scientific assessments exacerbate this problem. Transparent and early engagement is necessary to successfully manage wide-ranging interests.

Public & Private Partnerships

Recommendation: Encourage businesses to incorporate and use desalination plants to provide water supply for their production and local communities.

Justification: Desalination plants can provide water inputs for industrial users of water (especially in arid areas). When appropriately cited and developed, these plants can result in significant water and energy savings for the business and reduce water supply pressure in the greater community. Intel's initiative in incorporating a desalination plant (Reverse Osmosis Facility) in its water lifecycle is an example of corporate responsibility undertaken by large manufacturing plants, yet saving millions of dollars in energy and water savings.

Recommendation: Electricity market regulators and electricity generators/utilities need to develop new business models and strategies to avoid the so-called regulated utility "death spiral."

Justification:

With the rise of decentralized/personal electricity generation, regulators and utilities need to get ahead of the death spiral and develop new business strategies. This is especially important for maintaining and expanding transmission and distribution grid infrastructure. Higher costs and fewer sales spell inevitable rate increases, which in turn further exposes utilities to competitive threats and the infamous regulated utility "death spiral."

To get a better understanding of how this "death spiral" can develop, US stakeholders should simply look across the Atlantic. Policies and commodity prices have resulted in uncompetitive rates and lower sales, decapitalizing traditional European utilities, particularly in Germany. However confused or counterproductive the transition, Europe's power industry has moved towards a competitive, decentralized model.