Note: Connor Kain is a law student who interned with Carol Wampler in the renewable energy program during the summer of 2011.

To: Carol Wampler
From: Connor Kain
Date: July 13, 2011
Re: Water Related Renewable Energy

Issues

There are four water related renewable energy sources found in the definition of "small renewable energy project" in the Code of Virginia § 10.1-1197.5, falling water, wave motion, tides, and geothermal power. Is there a need to develop a Permit by Rule (PBR) for these resources, based on their availability and the federal government's authority in the area? If so, what sort of resources are available in Virginia and what would a Permit by Rule (PBR) regulating these sources look like?

A. Does Virginia have sufficient wave and tidal forces with which to generate electricity?

B. Does Virginia have accessible geothermal resources with which to generate electricity?

C. Is it possible to construct more hydroelectric facilities in Virginia? What is the state's authority compared to the Federal Energy Regulatory Commission (FERC)? Is it possible to construct a hydroelectric facility in the Commonwealth that would fall outside of FERC jurisdiction, but still fall under DEQ's regulatory authority of small renewable energy projects?

Brief Answers

A. Virginia does not have sufficient tidal forces to generate electricity. However, it is possible that during some parts of the year, the Commonwealth does have sufficient waves to generate electricity, but the technology to exploit this resource is in the very early stages and will likely not reach commercial viability within the four years before regulatory review.

B. Virginia does not have access to sufficient geothermal resources to generate electricity. It does have a growing direct application, heating and cooling geothermal industry.

C. It may be possible to construct new hydroelectric facilities in Virginia, but probably with great difficulty. FERC has expansive jurisdiction under the Commerce Clause of the U.S. Constitution and its authorizing statute over hydroelectric facilities. This may leave some room for state regulation of proprietary issues.

Facts

The Code of Virginia § 10.1-1197.5 is the authorizing statute for DEQ to regulate small renewable energy projects. It defines that term to include "falling water, wave motion, tides, [and] geothermal power." As these are all related to water, it is sensible to consider them all under one Regulatory Advisory Panel (RAP).

Discussion

I. Geothermal

It seems that Virginia does not have much, if any, capacity for geothermal electricity generation. That is something that is most available in Western states that are more geologically active, as well as other parts of the world. Many resources that have information on geothermal energy do not even provide data for states east of the Mississippi. In Virginia, geothermal resources are mainly used directly for heating and cooling buildings, making use of the steady temperatures beneath the surface of the Earth. DMME has forms for geothermal, presumably for this direct use. The following link shows the limited areas that can be used, and shows that temperatures at reachable depths are not hot enough for electricity generation: http://geoheat.oit.edu/state/wava/wava.htm

The 2010 Virginia Energy plan mentions geothermal energy, but not in the context of producing electricity. It refers to heating and cooling as well as some limited water and space heating. It also mentions "hot-rock geothermal resources," which may refer to electricity producing resources, but it confirms that these resources are currently not accessible for such use.[1]

II. Tidal and Wave Motion

There is a wide range of machinery and processes to extract energy from tides and waves, and a number of players that are developing them. For tidal generation, there are forms that look like wind turbines underwater. There is one that looks like a commercial jet turbine, but with a hole in the middle. There is one that is made of four barrels connected together in a manner that looks like a snake. It rests on the water, partially submerged, and somehow generates electricity by the movement of the waves. Other forms also exist or are being developed.

Dr. Carl Friedrichs, a professor at VIMS, said that Virginia does not have sufficient tidal forces to generate electricity, but there may be the possibility, during windier times of the year, of generating electricity from waves. However, he does not know of anyone who has been successful at generating energy from waves.

An internet search showed that the European Marine Energy Centre is at the fore of researching tidal and wave electricity generation. The Centre's website gives an idea of the variety of forms at some stage of development for harvesting energy from waves and tides:

- Wave Devices - 7 main types
- Wave Developers - 100 different technologies

[1] http://www.dmme.virginia.gov/DE/VAEnergyPlan/2010-VEP/VEP-2010.pdf page 6-13

•Tidal Devices - 5 main types
•Tidal Developers - over 50 different technologies
The following link shows several types of devices that derive power from waves, although no specific models: http://www.emec.org.uk/wave_energy_devices.asp
The following link provides the same relating to tidal generation: http://www.emec.org.uk/tidal_devices.asp. As description of these unique forms of power generation is often difficult, the above links are helpful.

By executive order, Virginia regulations must be reviewed at least every four years; therefore, it may be logical to use a four year horizon when evaluating whether a PBR for tides or wave motion should be attempted at the present time. The science and expert advice show that Virginia does not have the tidal forces to generate electricity. At this time, mechanisms for capturing wave motion and tides and converting them to electricity is not mature enough to generate commercially available electricity. Perhaps in four years the technology will be available, but the evidence shows that it will not likely be available before that time.

III. Hydroelectric

The Constitutional power of the Federal government to regulate foreign and interstate commerce gives it the authority to regulate and permit hydroelectric facilities on interstate waterways. FERC's website lists the following conditions for its jurisdiction relating to hydropower:

1. The project is located on navigable waters of the United States.
2. The project occupies public lands or reservations of the United States.
3. The project utilizes surplus water or waterpower from a federal dam.
4. The project is located on a body of water over which Congress has Commerce Clause jurisdiction, project construction occurred on or after August 26, 1935, and the project affects the interests of interstate or foreign commerce.[2]

Some of Virginia's waterways that would be most suitable for hydro power probably fall under this federal authority. Although some rivers, such as the James, are completely within Virginia borders, they are navigable waterways and connect to the Chesapeake Bay and Atlantic. Thus, they fall under Federal purview. Further, the 2010 Virginia Energy Plan states, "Hydropower is limited due, to [sic] the few locations in Virginia without a major environmental impact." Also, "[m]ost sites in Virginia capable of hosting hydroelectric power generation have been developed."

In addition to navigation, the effect of a hydroelectric facility on interstate commerce more generally can bring these projects under Federal authority.

> Any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined in this chapter as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States shall before such construction file declaration

[2] http://ferc.gov/industries/hydropower/gen-info/comp-admin/jur-deter.asp

> of such intention with the Commission, whereupon the Commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not construct, maintain, or operate such dam or other project works until it shall have applied for and shall have received a license under the provisions of this chapter. If the Commission shall not so find, and if no public lands or reservations are affected, permission is granted to construct such dam or other project works in such stream upon compliance with State laws.

16 U.S.C.A. § 817 (West).

To reiterate and clarify the above quotation, if FERC finds that new construction for a dam in any way affects interstate commerce, it has sole permitting authority. Judging by cases such as *Gonzalez v. Raich*, basically any dam that generates electricity will affect interstate commerce. This statute also suggests that FERC has no discretion to refuse to assume jurisdiction, unless it finds that interstate commerce is not affected.

Additional evidence is provided by *U.S. Dept. of Commerce v. FERC*, 36 F.3d 893. In that case, a man built a hydroelectric dam across a creek used by certain fish for spawning, blocking the upper portions from the fish. All electricity from the dam was consumed on the individual's property. The court held that the effect on the fish, used commercially, recreationally, and by Indian tribes, affected interstate commerce and fell under FERC's authority. In *FPC v. Union Elec. Co.*, 381 U.S. 90, the facility fell under FERC jurisdiction merely because of its interstate transmission of power. The "language does not limit licensing to some specified projects affecting interstate or foreign commerce. As the Court in [*FPC v. Union Elec. Co.*] reasoned, it is 'of compelling significance that the Congress adopted comprehensive language and refrained from writing any limitation or reference to [navigation]'". *U.S. Dept. of Commerce v. F.E.R.C.*, 36 F.3d 893, 896 (9th Cir. 1994)(quoting *FPC v. Union Elec. Co.* 381 U.S. at 107).

Case law shows that there is authority left to the states to regulate hydroelectric facilities. *First Iowa Hydro-Elec. Co-op. v. Fed. Power Comm'n*, 328 U.S. 152, 167; *Mountain Rhythm Res. v. F.E.R.C.*, 302 F.3d 958, 960 (9th Cir. 2002); *State of Cal., By & Through Dept. of Water Res. v. Oroville-Wyandotte Irrigation Dist.*, 411 F. Supp. 361, 367 (E.D. Cal. 1975) aff'd sub nom. *State of Cal. v. Oroville-Wyandotte Irr. D.*, 536 F.2d 304 (9th Cir. 1976); *Wisconsin Valley Improvement Co. v. Meyer*, 910 F. Supp. 1375, 1377 (W.D. Wis. 1995). The question is, does that authority fall under DEQ's authority to permit small renewable energy projects.

States may not attempt to regulate hydroelectric facilities in any way that would give them a veto power. *First Iowa Hydro-Electric Coop.*, 328 U.S. 152. However, states retain authority over proprietary water rights. *Wisconsin Valley Improvement Co. v. Meyer*, 910 F. Supp. 1375, 1381 (W.D. Wis. 1995); *First Iowa*, 328 U.S. at 176; *Sayles Hydro Associates v. Maughan*, 985 F.2d 451. "[T]he Court made it clear that the state could control only proprietary rights to water, that established the category as "occupy the field" preemption for everything but proprietary rights to water." *Sayles Hydro*

Associates v. Maughan, 985 F.2d 451, 456 (9th Cir. 1993)(referring to *California v. F.E.R.C.*, 495 U.S. 490 (1990)). This quotation shows how states' authority has been limited with regard to hydroelectric facilities. *Wisconsin Valley* states that, although a new applicant may be required to consult with a state fish and wildlife agency, FERC retains sole permitting authority, and a state may not put in place any more stringent requirements. *Wisconsin Valley Improvement Co.*, 910 F. Supp. 1375 ("Although First Iowa and California v. FERC involved situations in which states intervened in the federal licensing process in an attempt to impose more stringent state requirements or to prohibit the operation of hydropower projects already licensed by the Federal Energy Regulatory Commission, both decisions confirmed the preemptive effect of the Federal Power Act"). The case even suggests that the requirements may not even need to amount to a veto power to be superseded. *Id.*

It is conceivable that more hydroelectric facilities could be sited in Virginia that would exceed 5 MW electricity generation (DEQ's and SCC's "de minimis" limit). Legally, however, FERC has sole permitting authority over these facilities, preempting state licensing action. Even if the state were not legally precluded from licensing hydropower facilities, FERC is directed to give equal consideration to the "protection, mitigation of damage to, and enhancement of, fish and wildlife." 16 U.S.C.A. § 797(e). FERC is also require under Federal statutory law to consider the effect of the proposed project "on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register" of Historic Places. 16 U.S.C.A. § 470f. It might be beneficial to develop a PBR regulation that would consider the PBR requirements met if the applicant is subject to FERC jurisdiction. This would accept the duty placed upon the DEQ by statute, yet defer to FERC when its jurisdiction supersedes that of the state.