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MEMORANDUM

August 19, 2008

TO: Water Resources Review Committee

FROM: David Beaujon, Senior Analyst, 303-866-4781

SUBJECT: Hydroelectricity and Colorado's Renewable Energy Standard

House Bill 08-1222 requires the Water Resources Review Committee to study the feasibility of expanding the types of hydroelectricity that qualify as an eligible energy resource under Colorado's renewable energy standard, also known as *Amendment 37* (Attachment A). This memorandum identifies the issues to be considered by the committee when it conducts this review. It describes the current renewable energy standard, including the types of hydroelectricity that satisfy the standard (Attachment B).¹ It also describes hydroelectricity production in Colorado (Attachment C). The committee is scheduled to review hydroelectricity on August 20 at its meeting in Vail, Colorado.

House Bill 08-1222 and the Review of Hydroelectricity

Review requirements. House Bill 08-1222 requires the Water Resources Review Committee to study, during the 2008 interim, the feasibility of expanding the types of hydroelectricity that qualify as an eligible energy resource under Colorado's renewable energy standard (Attachment A). The committee must consider:

- issues related to the appropriate definition of eligible hydroelectricity;
- environmental impacts of hydroelectricity;
- potential for hydroelectricity to displace other eligible energy resources; and
- whether the inclusion of hydroelectricity as an eligible energy resource violates the intent of Amendment 37.

Provisions of introduced bill. The introduced version of House Bill 08-1222 would have expanded the definition of *renewable energy resources* to include "low-impact hydroelectricity" that met certain environmental criteria and pumped hydroelectricity. There was no limit on the capacity of such facilities. These provisions were removed from the bill and replaced by the study requirement for the Water Resources Review Committee.

¹Section 40-2-124, CRS

Pumped storage facilities. Pumped storage facilities are a type of hydroelectric facility that use an upper and lower reservoir system. Water from the upper reservoir is released for electric generation during periods of high demand for electricity. The water is then captured in the lower reservoir and pumped back into the upper reservoir during the late evening or other periods of low demand when electricity is cheaper. Pumped storage plants enable excess off-peak generation capacity to be "used" during peak periods, thereby reducing the need for new peak generation facilities. They may also increase the reliability of solar and wind resources by capturing energy during periods of peak production and storing it for release during periods of low productivity, such as at night or during calm weather. Pumped storage facilities also provide a quicker response to customer demand than other electric generation facilities such as coal-fired plants. There are three pumped storage facilities in Colorado:

- Cabin Creek – a 300-megawatt (MW) facility near Georgetown;
- Mount Elbert – a 200-MW facility near Leadville; and
- Flatiron/Carter Lake – an 8-MW facility near Loveland.

A megawatt is a million watts, or approximately the amount of energy consumed by 500 to 1,000 homes at one time depending upon the time of day.

Colorado's Renewable Energy Standard

Declaration of legislative intent for Amendment 37. In 2004, Colorado voters approved Amendment 37, which created the renewable energy standard for investor-owned utilities. Section 1 of Amendment 37 is a non-statutory declaration of legislative intent. Such declarations assist the courts, implementing governmental entities, and other interested persons to determine the purpose of a statute and to construe its scope and effect. According to the Amendment 37 declaration:

"Energy is critically important to Colorado's welfare and development, and its use has a profound impact on the economy and environment. Growth of the state's population and economic base will continue to create a need for new energy resources, and Colorado's renewable energy resources are currently underutilized. Therefore, in order to save consumers and businesses money, attract new businesses and jobs, promote development of rural economies, minimize water use for electricity generation, diversify Colorado's energy resources, reduce the impact of volatile fuel prices, and improve the natural environment of the state, it is in the best interests of the citizens of Colorado to develop and utilize renewable energy resources to the maximum practicable extent."

Renewable portfolio standard for investor-owned utilities. In 2007, the General Assembly increased the renewable portfolio standard (RPS) for investor-owned utilities according to the following schedule:²

- 5 percent for 2008 through 2010;
- 10 percent for 2011 through 2014;
- 15 percent for 2015 through 2019; and
- 20 percent for 2020 and after.

At least 4 percent of the standard for investor-owned utilities must be generated by solar-electric technologies. At least one-half of this solar standard must be generated by solar-electric systems located at customers' facilities. Each kilowatt-hour of eligible electricity generated in-state receives 125 percent credit for RPS-compliance purposes.

Eligible renewable energy resources. Under the law,³ eligible renewable energy resources include:

- new *hydroelectricity* facilities up to 10 MW;
- *hydroelectricity* facilities in existence on January 1, 2005, up to 30 MW;
- solar-electric;
- wind;
- geothermal;
- biomass including nontoxic plant matter, animal waste, or methane from landfills or wastewater;
- fuel cells using hydrogen generated from an eligible energy source; and
- recycled energy.

Recycled energy converts the heat from exhaust stacks and pipes into electricity that would otherwise be lost energy. Only recycled energy from generation units of 15 megawatts or less satisfy the RPS. The law also creates a system of tradeable renewable energy credits that may be purchased by utilities that do not generate the required amount of renewable energy from utilities that exceed the requirement. Fossil and nuclear fuels and their derivatives are excluded from the RPS.

Legislative history of hydroelectricity under the RPS. Amendment 37 defined *eligible renewable energy resources* to include hydroelectricity up to 10 MW. In 2005, the law was amended to allow *new* hydroelectricity up to 10 MW and hydroelectricity in existence on January 1, 2005, up to 30 MW.⁴

²House Bill 07-1281.

³Section 40-2-124 (1) (a), CRS

⁴Senate Bill 05-143.

Public Utilities Commission and implementation of the RPS. The Public Utilities Commission is charged with implementing the RPS for investor owned electric utilities that are subject to rate regulation. The commission regulates the recovery of costs incurred by utilities to satisfy the RPS. It also oversees utilities to ensure that they meet the renewable energy standard in the most cost-effective manner, including the review of renewable energy supply contracts.⁵

RPS for electric cooperatives and municipal utilities. In 2007, the General Assembly enacted an RPS for municipally-owned utilities serving at least 40,000 customers and electric cooperatives.⁶ The same renewable energy resources satisfy the RPS for electric cooperatives and municipally-owned utilities as investor-owned utilities. The RPS for electric cooperatives and municipally-owned utilities is lower than is required for investor-owned utilities. Specifically, municipally owned utilities serving over 40,000 customers and electric cooperatives must generate or obtain electricity from renewable resources according to the following schedule:

- 1 percent for 2008 through 2010;
- 3 percent for 2011 through 2014;
- 6 percent for 2015 through 2019; and
- 10 percent for 2020 and after.⁷

Credits for community-based projects and solar. Under the law, electricity generated by community-based projects receives a 150 percent credit for RPS-compliance purposes. Such projects are limited to 30 megawatts in capacity. They must also be located in Colorado and owned by individual residents or by non-profits, cooperatives, local governments, or tribal councils. There is no solar requirement for electric cooperatives and municipal utilities. However, solar electricity generated by a facility that begins operation before July 1, 2015, receives 300 percent credit for RPS-compliance purposes. Solar electricity generated by a facility that begins operation on or after July 1, 2015, receives 100 percent credit.

Hydroelectricity Production in Colorado

There are 62 operating hydroelectricity facilities in Colorado.⁸ These sites have a combined installed capacity of approximately 1,162 MW and produce about 1,036 gigawatt hours of electric energy annually. These plants range in size from 5 kilowatt to 300 MW. Xcel Energy, Colorado's largest utility, owns six, small hydroelectricity facilities that satisfy the renewable energy standard, including the 15 MW Shoshone hydroelectric generating

⁵4 CCR 723-3 Rule 3655

⁶House Bill 07-1281.

⁷Section 40-2-124 (1) (c) (IV), CRS

⁸Based on a 2005 inventory developed by National Renewable Energy Laboratory (NREL).

station in Glennwood Canyon. Xcel Energy also purchases electricity generated by 19 other small hydroelectric facilities to help satisfy its renewable energy requirement.⁹

Task Force on Renewable Resource Generation Development Areas. In 2007, the General Assembly created the Task Force on Renewable Resource Generation Development Areas to map renewable resources throughout Colorado, including hydroelectricity.¹⁰ The report from the task force identifies existing hydroelectric and pumped storage facilities. It also identifies opportunities for new hydroelectric and pumped storage facilities and topics for further study including the use of pumped storage facilities to increase the reliability of renewable energy resources (Attachment C).

⁹2007 Renewable Energy Standard Compliance Report for Public Service Company of Colorado, submitted June 2, 2008 to the Public Utilities Commission.

¹⁰Senate Bill 07-91.