

Utah's Blue Castle Nuclear Generating Station

- Water use and key economic benefits -

Executive Summary

The use of fresh water at the proposed Blue Castle Nuclear Generation Station is an efficient, economically beneficial and environmentally sound utilization of this important natural resource. Blue Castle has prepared this summary report for the general public and policy makers of the State of Utah to provide facts and pertinent comparisons supporting the above statement and the following conclusions:

- ***The proposed Blue Castle Nuclear Project would increase the electricity generated in Utah by approximately 50%, adding about 3000 Megawatts of installed electrical capacity, using less than 1% of the State current water diversion, and with a very favorable state-wide economic impact.***
- ***The water proposed for this use is currently being sent down stream to other states as an unused portion of Utah's allocations from the Colorado River Compact.***
- ***The water for the Project was approved and allocated for electric generation by Utah's State Water Engineer for use in coal fired power plants that were not constructed.***

Introduction

The beneficial uses of fresh water are of vital importance to the economy, health and quality of life to the people of the State of Utah. Historically and currently, the largest water use of fresh water in the State is for irrigation (at about 83% of the water withdrawn from all sources in 2008), followed by water used for public supply and domestic uses at about 12.3% of water withdrawn, all other water uses in the State used the remaining 4.7% of water withdrawn¹. Although no direct comparison can be made between the benefits to the State and its people from the different uses of fresh water, it is possible to obtain a good indication of their relative benefits by evaluating specific economic indicators and comparing their water use per unit of economic benefit.

Therefore, this summary report provides a useful comparison, within a common frame of reference, of the benefits to the State of Utah and the utilization of fresh water by the critically important agricultural industry and thermoelectric generation, and more directly, by the proposed Blue Castle Nuclear Generation Station.

¹ 2008 projections based on United States Geological Survey reports "Estimated Use of Water in the United States 2000 (U.S. Geological Survey Circular 1268)", Table 2 "Total Water Withdrawals by Water Use Category, 2000" and "Estimated Use of Water in the United States 2005 (U.S. Geological Survey Circular 1344), Table 2A, "Total Water Withdrawals by Water Use Category, 2005, in Million Gallons per Day.) 2008 data was used throughout the report because agricultural data is for the year 2008.

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Utah's agricultural industry is undoubtedly one of the State's most important and productive industries, benefiting many sectors of the economy across the State. The importance of agriculture to the economic health of Utah cannot be overstated and is summarized in the publication² *"The Economic Impact of Agriculture on the State of Utah"*, published by the Utah State University in January, 2010. It identifies the contribution to the gross state product, the jobs market and tax revenues from the agricultural industry in Utah. Agriculture is comprised of production and processing sectors including farming, ranching, dairy and related support industries. This industry directly accounts for nearly 8% of State Gross Domestic Product (GDP) and employees slightly over 22,500 people³. It pays to state and local governments about \$350 million in business and personal taxes per year.

The generation and use of electricity is one of the vital components of Utah's economy and contributor to the quality of life of its citizens. Our future economic growth is dependent on reliable and affordable sources of electricity. The thermo-electricity generation sector is by far the largest producer of electricity in the State, supplying close to 98% of the electricity generated, and provides significant employment and economic benefits⁴; it used about 2.2% of the total water withdrawn from surface streams and ground water in the year 2008⁵. The electrical generation industry directly accounted for about 1.7% of State GDP in 2008, generating approximately \$1.9 billion in revenue, with retail sales of 28.2 million MWh. This industry directly employed about 3,100 people.

The proposed Blue Castle Nuclear Generation Station is projected to generate up to 23.2 million MWh annually for market consumption, utilizing less than 1% of the total amount of withdrawn water currently used in the State, and employing 825 permanent workers. These jobs are expected to pay an average of about \$65,000 per year. Building two new nuclear units would also result in the creation of an annual average of 1,000 to 2,500 jobs during the 7 years of construction for two units, with peak construction employment as high as 4000 jobs. The average construction wage for such a project is about \$85,000 per year.

A stable, secure, economically efficient source of electricity is vitally important to the overall State economy and the agriculture industry, primarily due to the increase of pressurized irrigation systems and food processing. Electricity has been increasing its share in supplying energy to the agricultural sector since 1965, and is now the second most important energy source behind diesel fuel, accounting for slightly less than 20% of its energy costs.

² Ward, R.A., Jakus, P.M., Feuz, D., "The Economic Impact of Agriculture on the State of Utah", Utah State University Department of Applied Economics, Utah State University Economic Research Institute Report #2010-02 (January 25, 2010)

³ Bureau of Economic Analysis, *Regional Economic Accounts, Gross Domestic Product by State*. Utah's 2008 GDP is \$112,738 million current dollars while according to footnote 2, above, 2008 agricultural output was \$8,691 million current dollars (see Table 2) <http://www.bea.gov/regional/gsp/action.cfm>

⁴ Energy Information Administration, "Utility, Non-Utility, and Combined Heat and Power Plant Database" (EIA 923)

⁵ Source of 2008 thermoelectric generation: Utah Division of Water Rights 2008 database (UDWRi)

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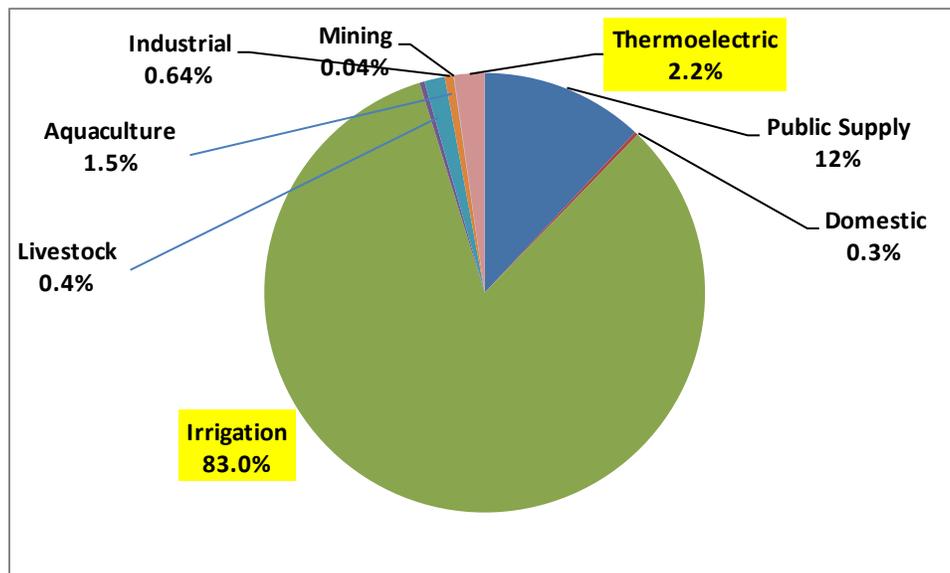
A comparison between the agricultural industry and the proposed Blue Castle Nuclear Generation Station contributions to the State's economy and their respective water use will be made on the basis of four positive economic attributes: (1) direct output (sales); (2) labor income; (3) jobs; and (4) tax revenues; these attributes will also be compared on a *per unit water use* basis.

Finally, a brief summary of an environmental assessment conducted by Dr. Thomas B. Hardy, Ph.D. Chief Science Officer of the River Systems Institute, Texas State University concludes this summary.

Utilization of Utah's Fresh Water

The uses of Utah's water withdrawals (all sources) by category are shown for the year 2008 in the pie chart below. In the State, approximately 20% of withdrawn water is from groundwater, with over 50% of drinking water taken from these groundwater sources.

Estimated Uses of Utah's Withdrawn Fresh Water by Category, 2008



Total withdrawals of fresh water in Utah were estimated to be 5.52 million acre-feet in 2008, estimated from published data from the United States Geological Service for 2000 and 2005 (see footnote 1) and the Utah Division of Water Rights (see footnote 5). As shown in the above pie chart, 83% of fresh water was used for irrigation in 2008, 12% for public supply, 1.5% for aquaculture and 2.2% was for the generation of thermoelectric power in 2008.

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Economic Attributes Comparison for Utah's Agriculture and Blue Castle Project

A comparison of the economic attributes of Utah's agricultural sector and the Blue Castle Nuclear Generation Station needs to take into consideration the considerable differences between the two industries. The agricultural industry in Utah is of a widely distributed nature and involves multiple business sectors; the generation of electricity is highly concentrated, although it is distributed on a multi-state transmission system. The direct benefits from agriculture are derived from the sales of agricultural products directly to the market. Indirect benefits are multipliers to direct effects and arise from two sources: (1) sales to the agricultural industry from other businesses (i.e., seed, machinery, finance); and (2) increased demand for goods and services from increased employee household income. In addition, there are implied sales within vertically integrated agricultural businesses, such as growing hay or corn to be fed to livestock. When direct, indirect and implied sales are taken into account, Utah's agricultural industry represents nearly 15% of the State's GDP. The comparisons shown below are focused on the better quantifiable direct benefits since the indirect effects of electricity are so multifaceted it is difficult to calculate. Virtually there is not a part of the economy that is not affected by electricity.

The proposed Blue Castle Nuclear Generation Station importance can be ascertained by comparing modeled economic attributes and water usage to the critically important agricultural industry in the State. The comparison between the documented agricultural and the estimated Blue Castle Nuclear Generation Station contributions to the State's economy and their respective water use will be made on the basis of four positive economic attributes stated earlier. These attributes are representative of the overall impact that the agricultural industry has and Blue Castle nucleo-electrical generation should have on the economy of the State. Furthermore, the economic attributes will finally be presented on a per-unit of water use basis, as an indication of the productive utilization of water for the generation of electricity.

The table below shows the estimated productivity of the Blue Castle Nuclear Generation Station, if operating in 2008 in comparison to the agricultural sector, in 2009 dollars. This Table measures only the direct effects of the two industries (i.e. the industries themselves without regard to any multiplier effects) for sales, labor income and jobs generated.

**Comparison of Direct Economic Attributes in 2008
(\$2009)**

Economic Sector	Total Sales Output (million dollars/yr)	Labor Income (million dollars/yr)	Total Taxes ⁽²⁾ (million dollars/yr)	No. of Jobs (# employed)
Agriculture	\$8,926	\$820	\$351	22,500
Blue Castle ⁽¹⁾	\$2,105	\$54	\$123	825 ⁽³⁾

Table Footnotes

(1) Assumes two unit nuclear plant (2,794MW) and \$100/Mwhr electricity price in 2009.

(2) Includes sales, business and personal taxes

(3) Permanent employees; excludes construction and cyclical workers

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The following table attempts to establish the beneficial use of water projected for the Blue Castle Nuclear Generation Station by comparing the above direct economic attributes on the basis of water use. The agriculture sector uses approximately 4.50 million acre-feet of water per year and Blue Castle uses only about 50,000 acre-feet of water per year, and is predicted to make a strong contribution to the economy for its 60 to 80 year plant lifetime. In the table below, the above numbers are divided by their respective yearly water consumption, to create a relative value in dollars (or number employed) per million gallons of water consumed per year.

Comparison of Direct Economic Attributes 2008 per Million Gallons of Water Diverted Per Year (MGYR) (\$2009)

Economic Sector	Total Sales Output (\$/MGYR)	Labor Income (\$/MGYR)	Total Taxes (\$/MGYR)	No. of Jobs (#/MGYR)
Agriculture	\$5,080	\$467	\$200	0.013
Blue Castle	\$127,569	\$3,250	\$7,450	0.050

Environmental Assessment of the Blue Castle Generation Station Water Use on the Green River

The results of the environmental assessment were presented by Dr. Hardy at the January 12, 2010 public hearing of the change applications for the proposed water use by the Blue Castle Nuclear Generation Station. This hearing was conducted by the Utah Division of Water Rights. The environmental assessment was based on the examination four factors Physical, Chemical, Biological and Recreational. The assessment conclusion was "The Applications will not unreasonably affect the natural stream environment or public recreation."

Below are listed a few of the supporting facts and conclusions from this environmental assessment.

- "Changes in river depths are less than 1.5 inches at flows as low as the 99 percent exceedance level"
- "Given the very small changes in flow volumes, depths, velocities, channel widths, and cross section area, no detrimental loss (change) in fish or wildlife habitat is expected"
- "The analysis of physical changes do not support the claim that the proposed diversion would have an impact to recreational fishing given the small changes in depths, velocities, channel width or cross section area"

Based upon the information presented above, it can be concluded that the operation of the Blue Castle Nuclear Generation Station would have very favorable state-wide economic impact with a modest use of water. The proposed Blue Castle Nuclear Generation Station would increase the electricity generated in Utah by approximately 50%, adding about 3000 Megawatts of installed electrical capacity, while using less than 1% of Utah's current water diversion.