

## **Environmental Health**

*Utah Citizens' Counsel Environmental Health Committee*

***Article 2. All Utahns, young and old, have the right to live and thrive in a healthy environment that includes clean air, land, and water, and share in the responsibility to pass that healthy environment on to succeeding generations.***

### **Introduction**

This year's report focuses on two issues: air quality and water availability. We discuss progress that has been made during the past year to improve air quality and what problems still remain. The second issue, the future of water availability, is a rapidly approaching problem that most Utah citizens are not fully aware of. In both cases, it is important to recognize the overlap in what the government and Utah residents need to do to confront these problems.

### **Context: Air Quality**

Last year's UCC report made several recommendations to reduce automobile emissions. The recommendation on "user fees" based on miles driven and fuel economy was not adopted. Nor was the recommendation to increase rebates and tax refunds to \$2500 on electric and fuel-efficient vehicles, although the tax credit for electric vehicles was increased from \$605 to \$1500 and for hybrid plug-in vehicles from \$605 to \$1000. These rebates are valid for vehicles purchased in 2015. HB 15 (2015) extended the expiration date for the rebate to the end of 2016.

Last year, we recommended expansion of alternative fueling infrastructure. Happily, public libraries, schools, parks, and various private entities have now established electric plug-in stations for electric vehicles. Natural gas refueling stations have also increased. Utah currently has 179 electric and alternative fueling stations. Most of them are concentrated on the Wasatch Front and along the I-15 corridor.<sup>1</sup>

Last year's report also strongly recommended expanding public transportation. The Utah Transit Authority has continued to improve bus and rail service. The expansion of the TRAX system and Front Runner has helped to increase ridership from 24 million in 1999 to 45 million in 2014.<sup>2</sup> In contrast, bus ridership has stayed flat during the last 15 years.<sup>3</sup>

### **Commendations: Air Quality**

- **The Governor's initiatives over the last year to encourage adoption of Tier 3 fuels and the corresponding catalytic converter technology in vehicles.**
- **The Utah Legislature's positive steps to improve air quality in the State.<sup>4</sup>**
- **The Department of Environmental Quality's activity in identifying sources of pollution and issuing regulations to reduce emissions harmful to health.<sup>5</sup>**

- **The DEQ’s numerous State Implementation Plans (SIPs) for reducing air pollutants.** An example is the SIP for Salt Lake City to reduce PM<sub>2.5</sub> particles,<sup>6</sup> which details efforts to meet EPA standards for PM<sub>2.5</sub> during non-attainment winter inversions.
- **The Summit County Council’s extension of its ban on the installation of wood-burning stoves and appliances** in new homes and remodels in Snyderville Basin.<sup>7</sup>
- **The efforts of nongovernmental organizations to guide policy and increase public awareness of the health effects of air pollution in Utah.** These groups include Heal Utah, Moms for Clean Air, Utah Physicians for a Healthy Environment, Envision Utah, and Breathe Utah.

### **Recommendations: Air Quality for the Transportation Sector**

- **UCC urges rapid adoption of Tier 3 fuels and better catalytic converters.** The State should pressure the refineries to implement Tier 3 production within three years.<sup>8</sup>
- **We recommend maximum vehicle speeds no higher than 60 mph in urban areas and 70 mph in rural areas. Speed limits should be strictly enforced both on freeways and on local streets.** Speed limit reductions have multiple benefits for air quality, public health, and consumer costs. See details in Appendix 1.
- **The Legislature should support the Utah Air Quality Board’s rule that will prevent the sale or installation of residential hot water heaters that do not qualify as ultra-low nitrogen oxide emitters after November 1, 2017.**<sup>9</sup>
- The Federal Government has proposed that corporate vehicle fleet average be 55 MPG by 2025. **We recommend that Utah adopt the same goal.**<sup>10</sup>
- **State Government and the media should mobilize to inform the public of the cost of fossil fuel consumption.** Car advertisements should disclose the MPG, the cost of driving 15,000 miles per year, and the amount of pollutants emitted, including the tons of CO<sub>2</sub>.

### **Recommendations: Air Quality for the Building Sector**

- **We urge that policy makers and the public study the analyses and proposals in the book *Reinventing Fire* by Amory B. Lovins.**<sup>11</sup>
- **Utah’s Uniform Building Commission (UBC) should review the International Energy Conservation Code (IECC) of building construction and recommend its adoption to the Utah Legislature.**<sup>12</sup>
- **We urge increased state incentives for installation of renewable energy sources.**<sup>13</sup>

- **Surcharges for residential solar (PV) installations should not be allowed until such installations generate a significant (15% to 20%) percentage of the power in an electric grid.** PV generation in Utah is less than 1 percent of the total electric energy.<sup>14</sup>
- **Utah state government should support the Clean Power Plan,** an effort of the federal government and most of the global community to reduce the emissions of heat trapping gases, particularly CO<sub>2</sub> and methane.<sup>15</sup>

### **Context: Water Availability**

Utah is rapidly approaching a crisis in water availability. State projections suggest that statewide demand for water will surpass the currently developed supply in about 25 years.<sup>16</sup> These projections lead to widespread concern that water availability will eventually limit population growth and economic development. However, our review of the available information suggests that the near-term threat is not to Utah's growing population but to specific industries, recreation, and, most important, to essential ecosystems and wildlife. Rivers and wetlands provide habitat for 80% of Utah's wildlife species. If we continue on our current path, the greatest impact will be to essential riparian and wetland habitats and the wildlife they support.

As demand for water increases with population growth, reduced snowpack and increased evaporation are expected to decrease the supply. Because of human caused climate change, long-range forecasts suggest that Utah's climate will continue to warm at rates above the global average.<sup>17</sup> These changes appear to already be underway. Temperatures in Utah between 1997 and 2007 were more than 2° F higher than the recorded 100-year average. As temperatures rise and evaporation increases, demand for water to irrigate crops, lawns, and gardens will also climb, as will demand for evaporative cooling of buildings. At the same time, forecasts suggest that Utah's population will double to approximately six million by the year 2060.<sup>18</sup> A recent modeling by hydrologists at the Utah Division of Water Resources indicates that our water consumption has reduced the level of the Great Salt Lake by approximately 12 feet since the pioneers arrived.<sup>19</sup> Given that the average depth of the lake is now only 14 feet,<sup>20</sup> this study suggests that the Lake would be almost twice as deep as it is today if humans were not here consuming the water or redirecting it into reservoirs. Thus, to preserve Utah's rivers and wetlands in the face of climate change and population growth, we must make critical changes in water allocation policy and provide real incentives for conservation.

The Office of the Legislative Auditor General has recently questioned the Utah Division of Water Resources' projections<sup>21</sup> that Utah's statewide demand for water will surpass the currently developed supply in about 25 years.<sup>22</sup> The Auditor General found that the Division's projections for the future were flawed because (1) they were based on unreliable local water use data and (2) the potential of modest and practical conservation policies was not considered. This audit has led critics to question whether the Division is opposed to water conservation in order to protect revenues for water sellers and has inflated estimates of future water needs to scare the public into spending billions of dollars on water projects such as the proposed Lake Powell Pipeline and the proposed Bear River Development (estimated cost of both projects is \$2.5 billion<sup>23</sup>).

Although agriculture accounts for only 2% of Utah's economic output, it is responsible for 82% of the water used in the state.<sup>24</sup> Much of this agricultural use is a direct consequence of the antiquated Doctrine of Prior Appropriation, which requires farmers to use their water or forfeit

their right to it.<sup>25</sup> This law made sense when it was adopted in the 19<sup>th</sup> century with the goal to encourage and facilitate agriculture growth. The “use it or lose it” policy, however, makes no sense at a time when important ecosystems are threatened.

Domestic indoor use accounts for only 4% of the water used in Utah.<sup>26</sup> Nevertheless, this municipal use is what is driving calls for new water projects. Throughout the state, property taxes from homes and businesses are used to lower the price of water, giving Utahns an economic incentive to waste rather than conserve municipal water. Using property tax to subsidize water is unique to Utah among western states and gives us some of the cheapest water rates in the country. As a consequence, our per capita domestic water use is the highest in the country,<sup>27</sup> 8.6% higher than Nevada’s, which has the second highest rate.

### **Commendations: Water Availability**

- The continuing **efforts of the Utah Rivers Council and Friends of Great Salt Lake** to educate and inform citizens about water issues facing our state.
- The **Auditor General’s report** raising serious concerns about the validity of the DWR’s projections for future water use.
- **KUED’s excellent TV documentary**, *Utah’s Uncertain Water Future*, which addressed Utah’s future water needs.

### **Recommendations: Water Availability**

- **Utah state government should combat climate change.**<sup>28</sup> To do so, the State should institute a carbon tax and significantly expand incentives for solar and wind energy.
- **To encourage municipal conservation, the price of water must reflect its actual cost.** Subsidizing water supply with property taxes should be phased out.<sup>29</sup>
- **State and municipal governments need to invest in agricultural irrigation infrastructure.**<sup>30</sup> Funds now allocated for water projects such as the Bear River Development Project, and funds raised through municipal taxes, should be used to update current agricultural irrigation systems to save water to preserve riparian and wetland habitats as well as supply future urban development.
- **The State should change its laws so that Utah’s rivers and lakes have a legal right to exist.**<sup>31</sup> Specifically, water rights holders need to be able to conserve water without forfeiting their right and without others being able to use the conserved water.
- **Given the environmental, economic, and recreational importance of the Great Salt Lake, the State should adopt a minimum acceptable elevation for the lake level**, with mandatory conservation policies kicking-in if the level nears the critical lower elevation.

## Appendix 1

### Rationale for Reduced Speed Limits

**Rationale 1.** Increased gas consumption at higher speeds is well documented by numerous studies and is based on well-known engineering and physics principles.<sup>32</sup> At speeds higher than 50 mph, the force required to overcome air resistance predominates and is related to the speed squared. The formula for the force is given by  $F = C_d d A \times V^2$  where  $C_d$  is the coefficient of drag,  $d$  is the density of air,  $A$  is the frontal area of the vehicle, and  $V$  is the net velocity of the air impacting the front of the vehicle. The energy required to overcome this air resistance is obtained by multiplying the force,  $F$ , by the distance traveled. That is basic Newtonian physics. This energy has to come from the fuel burned in the car engine. When speed is increased from 50 to 70 mph, the energy to overcome wind resistance does not increase by the linear ratio of 7/5 but by the square of this ratio or 49/25 or nearly a factor of 2. These theoretical facts are confirmed by actual testing. In 2013, the Oak Ridge National Laboratory<sup>33</sup> tested the MPG for 74 vehicles from small sedans to SUVs and trucks. The average decrease in MPG was 12%, 14% and 15% for each increment of 10 miles from 50 to 80 mph. The net decrease in fuel efficiency as speed increased from 50 mph to 80 mph was 41%. Note also that if we decreased the urban speed limit on freeways from 70 to 60, the average increase in gas mileage would be 14%. This would significantly reduce monetary and pollution costs.

**Rationale 2.** Since the 2001 terrorist attack in New York City, approximately 500,000 Americans have been killed and another 35 million (10% of the US population) have been injured by our current car-centered transportation system.<sup>34</sup> According to the Rocky Mountain Insurance Information Association (RMIIA), the National Highway Traffic Safety Administration reported that U.S. motor vehicle crashes in 2010 cost “almost 1 trillion dollars in loss of productivity and loss of life.”<sup>35</sup>

Speed has a significant effect on the amount of damage and injury occurring during an accident. The kinetic energy, which is proportional to  $\frac{1}{2}$  mass times velocity squared ( $E = \frac{1}{2} M V^2$ ) must equal the product of the force times the stopping distance ( $E = F \times D$ ) of the vehicle. In a crash, the energy absorbed by impact and hence the damage to car and occupants increases as the square of the velocity. The mass  $M$  can refer to the car or the person’s body and head. The good news is that, over the last 20 years, fatalities and injuries have decreased significantly because of air bags and increased seat belt use. Other technology with the potential of reducing the accident rates is being developed, including driverless cars, sensors of side and frontal obstacles that warn about lane changes, and automatic braking to avoid collisions. The goal should be to reduce the death, injury, and property damage by 50% in the next five years, as well as the cost of auto insurance.

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## Notes

<sup>1</sup> U.S. Department of Energy, Alternative Fuels Data Center, "Locate Stations," accessed October 30, 2015, <http://www.afdc.energy.gov/fuels/locator/stations/>. The federal website also provides a downloadable spreadsheet of the location, hours of operation, and type of fuel of each station.

<sup>2</sup> Utah Transit Authority (UTA), "UTA Ridership Nearly Doubles in 15 Years," accessed September 12, 2015, <http://www.rideuta.com/news/2015/02/ridership/>

<sup>3</sup> UTA, "UTA Network Study: Executive Summary," Figure ES-3, accessed November 5, 2015, [http://www.rideuta.com/uploads/NetworkStudy\\_Exec\\_Summary.pdf](http://www.rideuta.com/uploads/NetworkStudy_Exec_Summary.pdf).

<sup>4</sup> Utah State Legislature, "Bill Tracking Service," accessed November 8, 2015,

<http://le.utah.gov/asp/billtrack/track.asp?addbill=HB0015&latest=true&agensort=true>. HB 15 with HB 95 appropriated \$1.2 million to extend the tax credit for fuel-efficient vehicles. An attempt by the Building Industry to delay building code reviews to six years, rather than the current three years, was voted down (HB 285). HB 110 authorizes the Division of Motor Vehicles to rescind registration of a vehicle that fails to meet emission standards. Also, HB 17 allows judicial discretion of fines up to \$750 for repeated violations of emission standards.

<sup>5</sup> Utah Department of Environmental Quality, "Utah Division of Air Quality 2014 Final Report," accessed September 13, 2015, [http://www.airquality.utah.gov/docs/2015/02Feb/2014DAQAnnualReport\\_FINAL.pdf](http://www.airquality.utah.gov/docs/2015/02Feb/2014DAQAnnualReport_FINAL.pdf)

<sup>6</sup> Utah Air Quality Board, "Utah State Implementation Plan Control Measures for Area and Point Sources, Fine Particulate Matter, PM<sub>2.5</sub> SIP for the Salt Lake City, UT Nonattainment Area Section IX. Part A.21," accessed October 18, 2015,

[http://www.deq.utah.gov/Laws\\_Rules/daq/sip/docs/2014/12Dec/SIP%20IX.A.21\\_SLC\\_FINAL\\_Adopted%2012-3-14.pdf](http://www.deq.utah.gov/Laws_Rules/daq/sip/docs/2014/12Dec/SIP%20IX.A.21_SLC_FINAL_Adopted%2012-3-14.pdf).

<sup>7</sup> Summit County, Utah, "Ordinance No. 847," accessed November 8, 2015,

[http://sterlingcodifiers.com/codebook/index.php?book\\_id=522&section\\_id=929212](http://sterlingcodifiers.com/codebook/index.php?book_id=522&section_id=929212). The ban also covers open burning of trash, treated wood, and plastic. Existing buildings that use wood-burning appliances as a sole source of heat are exempt.

<sup>8</sup> Environmental Protection Agency, "Tier 3 Vehicle Emission and Fuel Standards Program," accessed November 8, 2015, <http://www3.epa.gov/otaq/tier3.htm>. The rationale for adoption of Tier 3 standards is that these fuels eliminate sulfur and other elements from the fuel that "poison" or reduce the efficiency of catalytic converters and thereby increase the emission of harmful air pollutants such as nitrous oxides and carbon monoxide. DEQ needs to ensure that the removed sulfur compounds are not released from the refineries to pollute the air, water, or soil.

<sup>9</sup> Governor's Office of Energy Development, "Utah Will Require Sale, Installation of Low-Emission Water Heaters in 2017," accessed November 8, 2015, <http://energy.utah.gov/utah-will-require-sale-installation-of-low-emission-water-heaters-in-2017/>. Modeling by the Division of Air Quality suggests that this change will reduce area-source emissions of nitrogen oxide by 35% by 2024. This represents a significant step in the right direction for Utah because nitrogen oxide is one of the main chemicals that produce wintertime PM<sub>2.5</sub> pollution.

<sup>10</sup> The White House, Office of the Press Secretary, "Obama Administration Finalizes Historic 54.5 MPG Fuel Efficiency Standards," accessed November 5, 2015, <https://www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard>. Purchase of electric and hybrid vehicles should be encouraged with more incentives. Incentives could be financed by imposing a "gas guzzler fee" on vehicles that get gas mileage below 25 MPG. State, city, and county governments need to lead the way by purchasing zero emission vehicles.

<sup>11</sup> Amory B. Lovins, *Reinventing Fire: bold business solutions for the new energy era*, (White River Junction, VT, Chelsea Green Publishing, 2011). Chapter 3, "Buildings: Design for Better Living," details how retrofitting older buildings and designing new buildings for residences and business can greatly reduce the use of electricity and fossil fuels, pollution, and costs. On page 82, Lovins illustrates that buildings in the U.S. are responsible for approximately 42% of primary energy use. A reduction of up to 50% in energy needed for our buildings is possible by 2050 if business, residential consumers, and Utah government adopt the suggested behaviors and policies. P. 119, Fig 3-14.

<sup>12</sup> The United States Department of Energy, "Residential Code Change Proposals for the 2015 IECC," accessed November 8, 2015, <https://www.energycodes.gov/residential-code-change-proposals-2015-iecc>. The latest code increases attic insulation, improves window efficiency values, and requires 75% high-efficiency lighting in new construction.

<sup>13</sup> Governor's Office of Energy Development, "State Incentives," accessed November 9, 2015, <http://energy.utah.gov/funding-incentives/financing-for-infrastructure/>. The current Utah Investment Tax Credit is

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worth 25% of eligible system cost or \$2,000, whichever is less, for residential installations, and 10% of eligible system cost or \$50,000, whichever is less, for commercial installations. Eligible technologies include solar photovoltaic, solar thermal, wind, geothermal, hydro, and biomass.

<sup>14</sup> U.S. Energy Information Administration, "State Energy Production Estimates 1960-2013," accessed October 18, 2015, [http://www.eia.gov/state/seds/sep\\_prod/SEDS\\_Production\\_Report.pdf](http://www.eia.gov/state/seds/sep_prod/SEDS_Production_Report.pdf).  
<http://www.eia.gov/totalenergy/data/annual/index.cfm#renewable>.

<sup>15</sup> Environmental Protection Agency, "Clean Power Plan," accessed November 8, 2015, <http://www2.epa.gov/cleanpowerplan>. This plan proposes reducing CO<sub>2</sub> emissions by 32% by 2030. The government is also looking at reducing other greenhouse gas emissions including methane, nitrous oxides, and fluorinated gases. The Plan allows each State to choose the pathways of achieving the proposed goal. Given the likely impact of climate change on Utah's economy and water availability, Utah government and its citizens should join in this nationwide effort to reduce fossil fuel (coal, gas, and oil) consumption and move the economy to a sustainable renewable energy future.

<sup>16</sup> Office of the Legislative Auditor General, "A Performance Audit of Projections of Utah's Water Needs" (2015), accessed October 19, 2015, [http://le.utah.gov/audit/15\\_01rpt.pdf](http://le.utah.gov/audit/15_01rpt.pdf).

<sup>17</sup> Jim Steenburgh *et al.*, "Climate Change and Utah: The Scientific Consensus," A report by Governor Jon Huntsman's Blue Ribbon Advisory Council on Climate Change (2007), accessed October 15, 2015, <http://content.lib.utah.edu/cdm/ref/collection/wwu/id/25>. See also Mountain Accord, System Group Recommendation, "Existing Conditions and Future Trendlines of the Environmental System," accessed October 24, 2015, [http://mountainaccord.com/wp-content/uploads/2015/06/MA\\_Env\\_Existing\\_Conditions\\_Future\\_Trends\\_FINAL.pdf](http://mountainaccord.com/wp-content/uploads/2015/06/MA_Env_Existing_Conditions_Future_Trends_FINAL.pdf). Increased temperatures will lengthen the growing season, produce more heat waves, and reduce snowfall in the early and late winter, particularly in lower and mid-elevations, thus decreasing snowpack; it will also increase agricultural and residential irrigation, which will increase evaporation and change aquatic life, as lakes and rivers warm.

<sup>18</sup> Office of Legislative Research and General Counsel, "Population and Demographic Trends in Utah" (2015), accessed October 19, 2015, <http://le.utah.gov/interim/2015/pdf/00002536.pdf>.

<sup>19</sup> Craig Miller, Utah Department of Natural Resources, Division of Water Resources. Personal communication with author. This estimate comes from Dr. Miller's Great Salt Lake Elevation Model.

<sup>20</sup> University of Utah Genetics Science Learning Center, "Physical Characteristics of Great Salt Lake" (2015), accessed October 19, 2015, [http://learn.genetics.utah.edu/content/gsl/physical\\_char/](http://learn.genetics.utah.edu/content/gsl/physical_char/).

<sup>21</sup> Utah Division of Water Resources, "Statewide Water Infrastructure Plan," (2013), accessed October 19, 2015, <http://prepare60.com/Content/SWIP.pdf>.

<sup>22</sup> "A Performance Audit of Projections of Utah's Water Needs," i.

<sup>23</sup> *Ibid.*

<sup>24</sup> Office of Legislative Research and General Counsel, "How Utah Water Works. An Overview of Sources, Uses, Funding, and Pricing," (2012), accessed October 19, 2015, <http://le.utah.gov/interim/2012/pdf/00002706.pdf>.

<sup>25</sup> Utah Division of Water Rights, "Water Right Information" (2011), accessed October 19, 2015, <http://www.waterrights.utah.gov/wrinfo/>.

<sup>26</sup> "How Utah Water Works", 4, Figure 3.

<sup>27</sup> Molly A Maupin, et al., "Estimated Use of Water in the United States in 2010," United States Geological Survey (2014), accessed October 19, 2015, <http://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf>.

<sup>28</sup> Obviously, the citizens of Utah cannot reverse climate change acting on our own. However, given the economic impact to agriculture, the ski industry, and essential riparian and wetland habitats, it is in the State's best interest to adopt a leadership role rather than continue to be an example of the problem.

<sup>29</sup> Phasing out property tax subsidies of water supply would immediately reduce our water use by making large landowners pay for their full share of water, instead of forcing low-income populations to pay a tax on their homes. It would also send a message to water users not to water sidewalks or water while it is raining.

<sup>30</sup> Many farm water delivery systems--canals and ditches--were constructed over 100 years ago. As such, many of these systems are inefficient, using dirt canals that leak immense amounts of water into the ground. Converting these systems to pipes and sprinklers would save huge amounts of water.

<sup>31</sup> "Water Right Information." Utah law makes it "illegal" for a water-right holder to use his/her water by leaving it in the source river or stream. If a farmer saves water and puts that savings into the river, another farmer can divert that water because Utah law says water left in rivers is not a "beneficial use" of water rights. Thus, we need to amend our in-stream flow laws to mirror laws in other states, such as Montana, that allow conservation.

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<sup>32</sup> John T. Benedict, "Automotive Engineering," section 11-p 4, in Eugene A. Avallone and Theodore Baumeister, III., eds. *Mark's Standard Handbook for Mechanical Engineers, 10<sup>th</sup> ed.* (Mc Graw-Hill, 1978).

<sup>33</sup> John F. Thomas, B. H. West, and S. P. Huff, "ORNL Researchers Quantify the Effect of Increasing Speed on Fuel Economy," Fuels, Engines and Emissions Research Center, Oak Ridge National Laboratory, January 18, 2013.

<sup>34</sup> U.S. Department of Transportation, "Traffic Safety Facts," accessed October 18, 2015, <http://www-nrd.nhtsa.dot.gov/Pubs/812139.pdf>.

<sup>35</sup> Rocky Mountain Insurance Information Association, "Cost of Auto Crashes and Statistics," accessed October 30, 2015, [http://www.rmiia.org/auto/traffic\\_safety/Cost\\_of\\_crashes.asp](http://www.rmiia.org/auto/traffic_safety/Cost_of_crashes.asp).