AGENDA

UNIFORM BUILDING CODE COMMISSION
MECHANICAL ADVISORY COMMITTEE

January 13, 2015, 2:00
Room 474
Heber M Wells Bldg
160 E 300 S Salt Lake City, UT

This agenda is subject to change up to 24 hours prior to the meeting.

ADMINISTRATIVE BUSINESS:

Sign attendance sheet

1. Approval of the minutes from the December 9, 2014 meeting

DISCUSSION ITEMS

2. Review 2015 IMC and current amendments

Next Scheduled Meeting: February 10, 2015

If you do not plan on attending this meeting, please call Sharon at 530-6163 or email at ssmalley@utah.gov or dansjones@utah.gov.

In compliance with the Americans with Disabilities Act, individuals needing special accommodations (including auxiliary communicative aids and services) during this meeting should notify Dave Taylor, ADA Coordinator, at least three working days prior to the meeting. Division of Occupational and Professional Licensing, 160 East 300 South, Salt Lake City UT 84115, Phone 530-6628 or toll-free in Utah only 866-275-3675.

UNIFORM BUILDING CODE COMMISSION
MECHANICAL ADVISORY COMMITTEE

December 9, 2014
Heber M Wells Building Room 474
160 E 300 S
Salt Lake City, Utah
MINUTES

STAFF:
Dan S. Jones, Bureau Manager
Sharon Smalley, Board Secretary

MECHANICAL ADVISORY COMMITTEE:

David Wilson	Tyler Lewis
Trent Hunt	Brent Ursenbach (absent)
Dennis Thatcher	Roger Hamlet (absent)
Randy Beckstead	Kevin Bell (absent)

MINUTES

A motion was made by David Wilson to approve the minutes from the November 4, 2014 meeting as written. The motion was seconded by Dennis Thatcher and passed unanimously.

REVIEW 2015 IMC AND CURRENT AMENDMENTS

The committee members reviewed the current amendments and compared them to the new code and the following recommendations were made.

A motion was made by Dennis Thatcher recommending that the current amendment for Section 1101.10 be kept. The motion was seconded by David Wilson and passed unanimously.

A motion was made by David Wilson recommending that the current amendment for Section 202, definition for conditioned space, be deleted as it is now addressed in the 2015 code. The motion was seconded by Randy Beckstead and passed unanimously.

A motion was made by David Wilson recommending that the current amendment for Section 403.2.1 be deleted as it is now covered in the new code. The motion was seconded by Randy Beckstead and passed unanimously.

A motion was made by David Wilson recommending that the current amendment for Table 403.3

Note b be deleted as it is now covered in the new code. The motion was seconded by Randy Beckstead and passed unanimously.

A motion was made by Dennis Thatcher recommending that the current amendment for Table 403.3 Note h be deleted. The motion was seconded by Randy Beckstead. During the discussion on the motion it was recommended that the motion be modified to include that the code provision of the amendment are addressed in the 2015 code. Both the first and seconded concurred and the modified motion passed unanimously.

A motion was made by Dennis Thatcher recommending that the current amendment for Section 403.8 be deleted as it is now covered in the new code. The motion was seconded by David Wilson and passed unanimously.

The recommendation for the current amendment for Section 603.4 was tabled until next meeting.

A motion was made by David Wilson recommending that the current amendment for Section 1004.2 be kept. The motion was seconded by Randy Beckstead and passed unanimously.

A motion was made by David Wilson recommending that the current amendment for Section 1004.3.1 be kept. The motion was seconded by Randy Beckstead and passed unanimously.

Randy Beckstead asked the committee to reveiw Section 1209.3 for a possible new amendment. Following the discussion on the section, a motion was made by Dennis Thatcher to add a new amendment for this section that would add the words "or other methods approved for the application" to the end of the section. The motion was seconded by Randy Beckstead and passed unanimously.

Trent Hunt passed out a handout that covers the changes to the 2015 IECC for the committee to review for the discussion and review of the new code.

The meeting adjourned at 3:17.

Note: These minutes are not intended to be a verbatim transcript but are intended to record the significant features of the business conducted in this meeting. Discussed items are not necessarily shown in the chronological order they occurred.

Commercial Code Change Proposals for the 2015 IECC

This page provides archival documentation relative to DOE participation in the 2015 IECC. For official results, visit the ICC web site.

DOE Proposals for the IECC

The U.S. Department of Energy (DOE) supports the International Energy Conservation Code (IECC) by participating in the code development process administered by the International Code Council (ICC). As a participant in this process, DOE considers and evaluates concepts to be submitted as proposed changes to the IECC ("code").

DOE participates in the IECC development process by:

1. Developing code change proposals for submission to the ICC
2. Gathering public input on DOE code change proposals from interested parties prior to submitting to the ICC
3. Conducting necessary technical analyses to document the validity of DOE code change proposals
4. Participating in the ICC code development hearings

A Notice is published in the *Federal Register* further outlining DOE participation in the ICC code development process. Interested stakeholders may also choose to receive updates on DOE code development activities.

DOE Proposal Development

DOE seeks to advance energy efficiency in the IECC by strengthening the code where cost-effective, and improving the criteria to be more easily understood, applied, implemented and enforced. Prior to submitting proposed code changes ("proposals") to the ICC, DOE publishes draft proposals that it has developed, along with documentation of concepts, for public review and comment. DOE will not provide responses to individual comments, but will consider any and all comments timely submitted in developing final proposals. DOE draft proposals, along with additional concepts still under consideration, are further developed based on stakeholder feedback received. Final proposals are posted for public viewing prior to submitting to the ICC.

Submitting Comments on DOE Proposals

In the current code cycle, the ICC will be considering revisions to the 2012 IECC which will result in the 2015 IECC. In order to allow adequate time to incorporate feedback prior to the ICC submission deadline, interested parties are asked to submit any and all comments on DOE initial concepts, draft code change proposals, and public comments by the deadlines specified below. Early feedback is appreciated in order to maximize the opportunity for revisions and enhancements.

Timeline

- Feedback on DOE concepts and draft proposals due **October 19, 2012**
- DOE code change proposals posted for public viewing **early December, 2012**
- *ICC deadline for submission of proposals for the 2015 IECC is **January 3, 2013***
- Feedback on draft DOE public comments due **June 28, 2013**
- DOE public comments posted for public viewing **mid-July, 2013**
- *ICC deadline for submission of public comments for the 2015 IECC is **July 15, 2013***

Instructions

Comments on DOE proposals for the 2015 IECC and IEBC can be submitted by email to EnergyCodeDevelopment2012BC0030@ee.doe.gov.

All submissions received must include the agency name (U.S. DOE), docket number (EERE-2012-BT-BC-0030), *and any/all applicable DOE concept numbers or ICC reference numbers (see table below) in the subject line of the message.*

DOE Technical Analysis

In developing proposals for submission to the ICC, DOE conducts a series of analyses to evaluate energy savings and economic impacts of its potential revisions, as applicable. However, many proposals submitted to the ICC do not require analysis as they represent minor corrections or alignments between the code language itself, or referenced standards, changes to the format of the code, or have no cost impact. Where appropriate, DOE conducts life cycle cost analysis as described in Commercial Energy and Cost Analysis Methodology. DOE is not able to provide technical assistance at the request of outside parties, but reserves the right to conduct analysis in support of proposals DOE is considering for submission to the ICC. While DOE cannot enter into joint proposals (outside of proposals submitted jointly with another federal agency), DOE supports efficiency proposals from the perspective of its own analysis.

DOE references all analysis and supporting documentation as required by the ICC. Analysis performed by DOE or its contractors for the purpose of developing proposals should be considered on a technical basis, and does not represent an endorsement of any particular individual or organization. DOE also publishes the results of its analysis, along with supporting energy simulation models, for review and use by outside parties. Any interested party wishing to review or build-upon the DOE analysis can access it via Development.

DOE Participation in the ICC Code Development Hearings

At ICC hearings, DOE communicates its opinion on proposals as follows: DOE will defend its proposals. To the extent that DOE has prepared a technical analysis of a proposal other than a DOE proposal, consistent with the discussion above, DOE may present the results of the analysis. Again, presentation of technical reviews does not constitute an endorsement of any proposal. DOE may also recognize a proposal to the extent that the proposal or provisions within the proposal are the same as a DOE proposal or provisions within a DOE proposal. DOE may alter its proposal based on information it obtains at the code hearings and may publish amendments to its proposals for public review and comment at: Development. Final amendments to DOE proposals are posted at the same web address for public viewing prior to submitting to the ICC.

Ex Parte Communications

DOE anticipates that it or its contractors may be contacted regarding code concepts, ideas or change proposals through phone, mail, or email. While DOE code change proposals to the IECC are not regulations, DOE will follow ex parte communication policy for such communications. Guidance on ex parte communications was published on January 21, 2009 (74 FR 4685). Note that such communications will be reflected in the public docket consistent with the ex parte guidance.

Commercial Proposals for the 2015 IECC

To foster review, proposals are organized by type of change:

- Proposals that increase energy efficiency (CA)
- Proposals that extend flexibility and usability of the code (CB)
- Proposals applicable to the IEBC (E)

Residential proposals DOE is considering for the 2015 IECC.

The final proposals linked from this page are as submitted to ICC. In some cases the proposals have been modified in the ICC process, and official proposals can be viewed at the ICC website . *The order in which the proposals are presented should not be construed to represent any prioritization of the proposals.*

Where a formal analysis is not required, notes rather than a link are provided in the analysis column. Draft and final proposals, as well as supporting analysis files, are added as they become available.

Also note that proposals that would extract criteria from American Society of Heating, Refrigerating, and Air-conditioning Engineers / Illuminating Engineers Society (ASHRAE/IES) 90.1-2010 or any published addenda to that standard would be addressed by ASHRAE pursuant to procedures that guide ASHRAE involvement in development of model codes and standards.

Draft and final proposals are available to view/download as separate individual files from the tables below, or as a complete package:

iecc2015_Commercial_draft.zip
iecc2015_Commercial_final.zip
iecc2015_Commercial_public_draft.zip
iecc2015_Commercial_public_final.zip

Proposals that increase energy efficiency (CA)

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Supporting Analysis	Draft Public Comments	Final Public Comments
CA-1	**Simplify Opaque Envelope Tables (C402).** Simplify the opaque envelope tables to include only one requirement for each assembly type (e.g., walls, roof, and floor).	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-2	**Change Interior Design Conditions (C403.2.1).** Increase the minimum design cooling temperature and decrease the maximum heating design temperature.	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-3 (CE210)	**Enhance Requirements for Demand Controlled Ventilation (C403.2.5.1).** Reduce thresholds associated with space size and design occupancy density at which demand controlled ventilation is required.	CA-3 Draft Proposal	CA-3 Final Proposal	*Discussed in proposal*	*None*	*N/A*
CA-4 (CE217)	**Increase Duct and Plenum Insulation (C403.2.7).** Increase all minimum insulation levels by R-2 or an appropriate level for climate and duct location.	*None*	CA-4 Final Proposal	CA-4 Supporting Analysis	*None*	*N/A*
CA-5a	**Commission the Entire Building (C408).** Increase commissioning scope beyond Heating, Ventilation and Air Conditioning (HVAC) and lighting to also include the building envelope and service water heating systems, and provide detailed provisions for each of them. Develop a simplified process for buildings under 25,000 square feet in floor area. Include provisions to allow for building commissioning compliance verification to	*None*	*N/A*	*N/A*	*N/A*	*N/A*

DOE # (ICC) IDENTIFIER	CONCEPT NAME, (CODE SECTION), DESCRIPTION	DRAFT PROPOSAL	FINAL PROPOSAL	SUPPORTING ANALYSIS	DRAFT PUBLIC COMMENTS	FINAL PUBLIC COMMENTS
	be performed through special inspections using approved third parties.					
CA-5b (CE284)	**Commission Service Water Heating (C408).** Increase HVAC commissioning scope to also include the building service water heating systems.	CA-5b Draft Proposal	CA-5b Final Proposal	*Discussed in proposal*	*None*	*N/A*
CA-6	**Interior Lighting Allowance Reduction Package (C406.3).** Add package to provide for an additional reduction in lighting power density (LPD) by 10% over minimum code.	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-7	**Commercial Buildings to meet ASHRAE/IES 90.1 (C101.4).** Replace all of the IECC Commercial provisions with a reference to ASHRAE/IES 90.1.	CA-7 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-7b (CE195)	**Commercial Complex HVAC Systems to meet ASHRAE/IES 90.1 (C403.4)** Replace all of the IECC commercial complex HVAC system provisions with a reference to ASHRAE/IES 90.1 Section 6. Simple system prescriptive and mandatory requirements will remain in the IECC.	*None*	CA-7b Final Proposal	*Discussed in proposal*	*None*	*N/A*
CA-8 (CE73)	**Reference Appendix G from ASHRAE/IES 90.1 as Performance Path (C401.2/C407).** Replace Section C407 with a singular reference to ASHRAE/IES 90.1 for the criteria applicable to the performance path to compliance, and require compliance be based on a 26% reduction in energy cost for the proposed design over the standard design building.	CA-8 Draft Proposal	CA-8 Final Proposal	*Discussed in proposal*	*None*	*N/A*
CA-9 (CE164)	**Continuous Air Barrier Compliance Path Continuity (C402.4).** Modify the continuous air barrier requirements so all three compliance options are comparable.	CA-9 Draft Proposal	CA-9 Final Proposal	*Discussed in proposal*	CE164 Draft Comment	CE164 Public Comment
CA-10	**Envelope Commissioning (new).** Add provisions covering commissioning of the building envelope.	CA-10 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-11	**Increase Scope for Additions and Alterations (C101.4.3).** Increase the scope of what must meet the provisions of the IECC for additions, rehabilitations, renovations or repairs (e.g., reducing the exceptions in that area).	CA-11 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-12	**Re-Roofing (C101.4.3).** Add criteria to ensure adding insulation is required at the time a building is re-roofed.	CA-12 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-13	**Outcome-Based Compliance Path (C401.1).** Add an outcome-based path for office buildings from 20,000 to 50,000 square feet in floor area.	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-14	**Multifamily Residential Classification (C101 and C202).** Revise the definition of residential building so only attached and detached one and two family dwellings and townhouses are considered residential, and all others commercial.	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-15	**Small Simple Building Compliance Path (C402).** Develop a simplified approach for	*None*	*N/A*	*N/A*	*N/A*	*N/A*

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Supporting Analysis	Draft Public Comments	Final Public Comments
	envelope, mechanical, service water heating, and lighting that will apply to small simple buildings.					
CA-16	**Rewrite Lighting Criteria (C405.2).** Completely rewrite Section C405.2 to be better organized, clarify intent, enhance energy efficiency, and provide a better basis for the ICC International Green Construction Code (IgCC) lighting provisions.	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-17	**Water Heating. (C404).** Require use of more efficient service water heating, including solar, heat recovery, condensing water heater, or heat pump water heaters for buildings with significant hot water usage (e.g., hospitals, restaurants, dormitories, hotels, laundries, fitness centers, apartment buildings). Consider system size, system efficiency, etc. as part of the proposal. Include alternative path for point-of-use water heating sources for low use fixtures that provide hot water (e.g., lavatory sinks).	*None*	*N/A*	*N/A*	*N/A*	*N/A*
CA-18 (CE249)	**Water-side Economizer for Non-Fan Cooling Systems. (C403.4.3).** Require water-side economizer for water-cooled chilled water systems for non-fan systems (e.g. radiant cooling, passive chilled beam systems), and for systems with small individual fan systems served by chilled water (e.g., fan coils, possibly chilled beams).	*None*	CA-18 Final Proposal	CA-18 Supporting Analysis	*None*	*N/A*
Proposal by others (CE241)	**Eliminate Distinction Between Simple and Complex HVAC Systems.** Without changing requirements, removes the distinction between simple and complex systems and presents prescriptive HVAC requirements all together. This proposal was disapproved by committee, but approved by floor action. It will cause an unintended weakening of economizer requirements and undoes an economizer clarification in DOE's approved proposal CE249. This comment applies the corrective language from CE249 to CE241.	*N/A*	*N/A*	*N/A*	CE241 Draft Comment	CE241 Public Comment
CA-19	**Limited Application of Air-Cooled Chillers. (C403.4.8 new).** Require buildings with 300 tons or greater peak cooling load to have no more than 100 tons served by air-cooled systems. Include exceptions for high-efficiency air-cooled systems and systems with thermal storage.	CA-19 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-20 (CE146)	**Toplit Daylighting Area Threshold. (C405.2.2.3).** Reduce the area threshold for daylighting control requirements in skylit areas to 1000 square feet.	CA-20 Draft Proposal	CA-20 Final Proposal	CA-20 Supporting Analysis	*None*	*N/A*
CA-21	**Increase Visible Transmittance (VT). (C303.1.3).** Increase VT requirements to improve daylighting effectiveness.	CA-21 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
CA-22	**Lighting Controls. (C405.2.2.2).** Require occupancy sensors be installed in all buildings and act at the primary lighting control for interior lighting.	*None*	*N/A*	*N/A*	*N/A*	*N/A*

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Proposals that extend flexibility and usability of the code (CB)

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Draft Public Comments	Final Public Comments
CB-1	**Compliance Checklist (Resource Appendix A (new)).** Add a new Resource Appendix to the IECC that contains a checklist, forms and instructions to facilitate compliance documentation and verification.	CB-1 Draft Proposal	*None*	*N/A*	*N/A*
CB-2	**Add Exempt Buildings (C104.1).** Add exempted project types for buildings such as greenhouses that do not appear to be capable of complying or add criteria that specifically apply to them.	CB-2 Draft Proposal	*None*	*N/A*	*N/A*
CB-3 (CE38, Part 1)	**Inspections (C104).** Improve/enhance details governing inspections of construction.	CB-3 Draft Proposal	CB-3 Final Proposal	CE38 Draft Comment	CE38 Public Comment
CB-4 (CE69)	**Scope to Include Building Sites (C401.1).** Include building sites in the scope of the IECC (consistent with C101.2).	CB-4 Draft Proposal	CB-4 Final Proposal	CE69 Draft Comment	CE69 Public Comment
CB-5	**Fenestration Product Rating (C303.1.3).** Remove default values for fenestration thermal properties (U-factor, Solar Heat Gain Coefficient (SHGC) and Visible Transmittance (VT)) resulting in a requirement that all fenestration have those properties determined by an accredited independent laboratory and labeled and certified by the manufacturer.	CB-5 Draft Proposal	*None*	*N/A*	*N/A*
CB-6 (CE153)	**Fenestration Haze Factor (C402.3.2.2).** Clarify the testing requirements for haze factor to reference Procedure A of ASTM D 1003 or other ASTM standards as applicable.	CB-6 Draft Proposal	CB-6 Final Proposal	CE153 Draft Comment	CE153 Public Comment
CB-7 (CE57)	**Add Definition for Rooftop Monitor (C202).** Provide a definition of the term *Rooftop Monitor* as used in Section C402.3.2.1 (4).	CB-7 Draft Proposal	CB-7 Final Proposal	*None*	*N/A*
CB-8 (CE59, Part 1)	**Application of Fenestration Provisions (C202).** Clarify application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.	CB-8 Draft Proposal	CB-8 Final Proposal	CE59 Draft Comment	CE59 Public Comment
CB-9 (CE118)	**Roof Solar Reflectance and Thermal Emittance (C402.2.1.1 and C202).** Edit to better present the criteria and add a definition for the term "low slope roof".	CB-9 Draft Proposal	CB-9 Final Proposal	*None*	*N/A*
CB-10 (CE114)	**Skylight Curbs Insulation Exemption (C402.2.1).** Clarify the language that provides when a skylight curb can be exempted from meeting the requirements for insulating the curb.	CB-10 Draft Proposal	CB-10 Final Proposal	*None*	*N/A*
CB-11 (CE124)	**Define Wall Types (C402.2.2, C402.2.2.1, C402.2.2.2 and C202).** Move the text indicating how to determine wall classification and replace current text with a formal definition of each wall type.	CB-11 Draft Proposal	CB-11 Final Proposal	CE124 Draft Comment	CE124 Public Comment
CB-12 (CE155)	**Fenestration U-Factor and SHGC Provisions (C402.3.3).** Clarify the provisions in the code.	CB-12 Draft Proposal	CB-12 Final Proposal	*None*	*N/A*
CB-13 (CE163)	**Area weighted U-Factor (C402.3.4).** Clarify the provisions in the code.	CB-13 Draft Proposal	CB-13 Final Proposal	*None*	*N/A*
CB-14 (CE126)	**Above-Grade Walls (C402.2.3).** Clarify the provisions in the code.	CB-14 Draft Proposal	CB-14 Final Proposal	*None*	*N/A*
CB-15 (CE167)	**Continuous Air Barriers (C402.4.2).** Clarify the language pertaining to the sealing of penetrations in the building envelope.	CB-15 Draft Proposal	CB-15 Final Proposal	CE167 Draft Comment	CE167 Public Comment
CB-16 (CE128)	**Below-Grade Wall Insulation (C402.2.4).** Clarify how insulation is to be installed and how deep. The term "installed in or continuously on" is potentially	CB-16 Draft Proposal	CB-16 Final Proposal	*None*	*N/A*

DOE # (ICC) IDENTIFIER	CONCEPT NAME, (CODE SECTION), DESCRIPTION	DRAFT PROPOSAL	FINAL PROPOSAL	DRAFT PUBLIC COMMENTS	FINAL PUBLIC COMMENTS
	confusing in that it infers that the insulation could be inside the wall but not necessarily continuous. Also clarify where the depth of burial measurements are to be made.				
CB-17 (CE130)	**Floor Insulation (C402.2.5).** Revise the code to ensure that insulation applied in floors over outside air or unconditioned spaces is in contact with the underside of the floor deck above.	CB-17 Draft Proposal	CB-17 Final Proposal	*None*	*N/A*
CB-18 (CE133)	**Opaque Doors (C402.2.7).** Clarify when doors are considered part of the opaque wall and subject to thermal requirements for the wall, and when doors are fenestration and subject to those requirements.	CB-18 Draft Proposal	CB-18 Final Proposal	*None*	*N/A*
CB-19 (CE134)	**Radiant Heating Panel Insulation (C402.2.8).** Clarify that panels installed in building thermal envelope assemblies must be insulated per the requirements of the assembly in which they are installed. Require insulation of at least R-3.5 on the non-radiant surface when installed in interior assemblies. Refer to the other applicable sections of the code for insulating heated slabs.	CB-19 Draft Proposal	CB-19 Final Proposal	*None*	*N/A*
CB-20 (CE149)	**Minimum Skylight Fenestration Area (C402.3.2).** Clarify the language pertaining to requiring skylights in roofs covering areas greater than 10,000 square feet.	CB-20 Draft Proposal	CB-20 Final Proposal	CE149 Draft Comment	CE149 Public Comment
CB-21 (CE139)	**Daylighting Controls for Skylights (C402.3, C402.3.1.2 and C402.3.1.1 (2)).** Clarify daylighting control provisions and locate in a more appropriate subsection.	CB-21 Draft Proposal	CB-21 Final Proposal	*None*	*N/A*
CB-22 (CE183)	**Access Doors and Openings (C402.4.4).** Clarify the components covered are subject to air leakage provisions as components of the building thermal envelope, and provide a distinction between these doors and other doors that are already covered within the scope of fenestration assemblies.	CB-22 Draft Proposal	CB-22 Final Proposal	CE183 Draft Comment	CE183 Public Comment
CB-23 (CE184)	**Consolidate Damper Provisions (C402.4.5).** Consolidate all provisions associated with leakage rates, sealing, dampers, etc. of mechanical system openings, vents, grills, etc. in one place in the code.	CB-23 Draft Proposal	CB-23 Final Proposal	*None*	*N/A*
CB-24 (CE193)	**Recessed Lighting Sealing (C402.4.8).** Clarify the language for sealing recessed lighting that is located in the building thermal envelope.	CB-24 Draft Proposal	CB-24 Final Proposal	*None*	*N/A*
CB-25 (CE196)	**Reference ASHRAE 183 for Thermal Load Calculations (C403.2.1).** Simplify the language requiring heating and cooling load calculations to simply reference ASHRAE 183.	CB-25 Draft Proposal	CB-25 Final Proposal	*None*	*N/A*
CB-26 (CE198)	**Equipment and System Sizing (C403.2.2).** Delete the words "and system" from the title as the provisions are written to apply to the output capacity of the equipment that provides heating or cooling functions.	CB-26 Draft Proposal	CB-26 Final Proposal	CE198 Draft Comment	CE198 Public Comment
CB-27 (CE202)	**Chiller Exception (C403.2.3.1).** Clarify the language on the type of systems that need not comply with the requirements.	CB-27 Draft Proposal	CB-27 Final Proposal	*None*	*N/A*
CB-28	**Chiller "Listed/Labeled" Compared to "Certified"(C403.2.3.2.).** Clarify the code on the issue of "listed" and "labeled" equipment compared to "certified".	CB-28 Draft Proposal	*None*	*N/A*	*N/A*
CB-29	**Shutoff Damper Controls (C403.2.4.4).** Cover only the types of controls that are required for dampers because other damper requirements are covered elsewhere in the code.	CB-29 Draft Proposal	*None*	*N/A*	*N/A*
CB-30 (CE223)	**Low-Pressure Duct Systems (C403.2.7.1.1).** Clarify that continuously welded and locked construction methods for duct systems meets the code, and delete	CB-30 Draft Proposal	CB-30 Final Proposal	CE223 Draft Comment	CE223 Public Comment

DOE # (ICC) IDENTIFIER	CONCEPT NAME, (CODE SECTION), DESCRIPTION	DRAFT PROPOSAL	FINAL PROPOSAL	DRAFT PUBLIC COMMENTS	FINAL PUBLIC COMMENTS
	text indicating what must be provided on the drawings because that is already covered in C103.2.				
CB-31 (CE225)	**High Pressure Duct Systems (C403.2.7.1.3).** Consistency in presentation of criteria for duct systems.	CB-31 Draft Proposal	CB-31 Final Proposal	*None*	*N/A*
CB-32 (CE235)	**Allowable Fan Floor Horsepower (C403.2.10.1).** Editorial clarification and simplification.	CB-32 Draft Proposal	CB-32 Final Proposal	*None*	*N/A*
CB-33 (CE237)	**Motor nameplate horsepower exceptions (C403.2.10.2).** Simplify exceptions by replacing with a positive statement of requirements.	CB-33 Draft Proposal	CB-33 Final Proposal	*None*	*N/A*
CB-34 (CE303)	**Exterior Lighting Controls (C405.2.4).** Simplify code provisions.	CB-34 Draft Proposal	CB-34 Final Proposal	CE303 Draft Comment	CE303 Public Comment
CB-35 (CE309)	**Total Connected Interior Lighting Power (C405.5.1).** Simplify to present as an equation what is now text that guides how the connected lighting power is calculated.	CB-35 Draft Proposal	CB-35 Final Proposal	CE309 Draft Comment	CE309 Public Comment
CB-36 (CE312)	**Sleeping Unit Lighting Control (C405.5.1, Exception 1.2).** Simplify by removing redundant text.	CB-36 Draft Proposal	CB-36 Final Proposal	CE312 Draft Comment	CE312 Public Comment
CB-37 (CE320)	**Exterior Lighting Zone (Table C405.6.2 (1)).** Clarify to indicate that Zone 3 includes all areas that are not classified as lighting zone 1, 2, or 4.	CB-37 Draft Proposal	CB-37 Final Proposal	*None*	*N/A*
CB-38 (CE322)	**Dwelling Unit Electric Metering (C405.7).** Simplify to indicate that the dwelling units in Use Group R-2 buildings must be separately metered.	CB-38 Draft Proposal	CB-38 Final Proposal	*None*	*N/A*
CB-39 (CE335)	**Additional Efficiency Options (C406.1, 406.2 and 406.3).** Simplify and clarify the code.	CB-39 Draft Proposal	CB-39 Final Proposal	*None*	*N/A*
Proposal by others (CE337)	**Additional Efficiency Options (C406.1, 406.2 and 406.3).** This public comment adds clarifying language from CE335 (CB-39) to an approved proposal in this section.	*N/A*	*N/A*	CE337 Draft Comment	CE337 Public Comment
CB-40 (CE355)	**Acceptance of Commissioning Report (C408.2.4.1).** Revise the commissioning provision so that buildings cannot be considered for a final inspection (do not pass the mechanical inspection) until the owner indicates in writing they have the required commissioning report.	CB-40 Draft Proposal	CB-40 Final Proposal	CE355 Draft Comment	CE355 Public Comment
CB-41 (CE353)	**Mechanical Commissioning Scope (C408.2).** Simplify and clarify the exceptions to required commissioning.	CB-41 Draft Proposal	CB-41 Final Proposal	*None*	*N/A*
CB-42 (CE352)	**Mechanical Commissioning Order of Events (C408.2).** Clarify the order in which commissioning events take place.	CB-42 Draft Proposal	CB-42 Final Proposal	*None*	*N/A*
CB-43 (ADM51, Parts I II)	**Alteration Definition (C202).** Clarify alterations including changes to HVAC, SHW or lighting systems involving extension, addition or change to arrangement, type or purpose.	CB-43 Draft Proposal	CB-43 Final Proposal	*None*	*N/A*
CB-44	**Repair Definition (C202).** Revise term to be specific as to intent and meaning and so it can be readily applied in compliance verification.	CB-44 Draft Proposal	*None*	*N/A*	*N/A*
CB-45 (CE206)	**Snow Melt Provisions (C403.2.4.5).** Align snow melt provisions with expansion of IECC scope to include building site and delete unneeded language.	CB-45 Draft Proposal	CB-45 Final Proposal	*None*	*N/A*

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Commercial Proposals for the IEBC

The order in which the concepts are presented should not be construed to represent any prioritization of the concepts. Draft and final proposals will be added as they become available.

Draft and final proposals are available to view/download as separate individual files from the table below, or as a complete package:

iebc_draft.zip
iebc_final.zip

Commercial Proposals for the IEBC (E)

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Draft Public Comments	Final Public Comments
E-1 (ADM51, Part I)	**Alteration Definition (202).** Expands definition of "alteration" to include retrofits and changes to energy systems.	E-1 Draft Proposal	E-1 Final Proposal	*None*	*N/A*
E-2 (ADM59)	**Repair Definition (202).** Expands definition of "repair" to include retrofits and changes to energy systems.	E-2 Draft Proposal	E-2 Final Proposal	*None*	*N/A*
E-3	**Addition Energy Requirements (402.1).** Requires additions considered on their own to meet the provisions of the IECC.	E-3 Draft Proposal	*None*	*N/A*	*N/A*
E-4	**Alteration Energy Requirements (403.1).** Requires alterations considered on their own to meet the provisions of the IECC.	E-4 Draft Proposal	*None*	*N/A*	*N/A*
E-5	**Fenestration Energy Requirements (406.1).** Requires fenestration in repairs, alterations or additions to meet the provisions of the IECC.	E-5 Draft Proposal	*None*	*N/A*	*N/A*
E-6	**Occupancy Change Requirements (407.5).** A change in occupancy would require the building to either meet the provisions of the IECC or have no increase in connected power load.	E-6 Draft Proposal	*None*	*N/A*	*N/A*
E-7 (EB13)	**Repair Energy Requirements (403.1).** Requires equipment installed during repairs to meet the provisions of the IECC and insulation to be upgraded to current IECC requirements when structural components are exposed.	E-7 Draft Proposal	E-7 Final Proposal	*None*	*N/A*
E-8 (EB56)	**Demand Increase Requirements (1011.1).** A change in occupancy resulting in increased connected power load would require the building to meet the provisions of the IECC.	E-8 Draft Proposal	E-8 Final Proposal	*None*	*N/A*
E-9	**Performance Path (1401.5 & 1401.6).** Exempt upgrade of alterations, additions, changes in occupancy, or repairs to meet the provisions of the 2012 IECC when a registered design professional documents energy performance in conformance to the IECC performance provisions.	E-9 Draft Proposal	*None*	*N/A*	*N/A*
E-10	**Documentation (new at 106.2.5).** Requires plans and specifications to provide detailed information needed to verify compliance with energy efficiency provisions.	E-10 Draft Proposal	*None*	*N/A*	*N/A*
E-11	**Insulation and Air Leakage Inspection (new at 109.3.5).** Provides for inspection of insulation fill and air barriers while components are still accessible for inspection.	E-11 Draft Proposal	*None*	*N/A*	*N/A*

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Residential Code Change Proposals for the 2015 IECC

This page provides archival documentation relative to DOE participation in the 2015 IECC. For official results, visit the ICC web site

DOE Proposals for the IECC

The U.S. Department of Energy (DOE) supports the International Energy Conservation Code (IECC) by participating in the code development process administered by the International Code Council (ICC). As a participant in this process, DOE considers and evaluates concepts to be submitted as proposed changes to the IECC ("code").

DOE participates in the IECC development process by:

1. Developing code change proposals for submission to the ICC
2. Gathering public input on DOE code change proposals from interested parties prior to submitting to the ICC
3. Conducting necessary technical analyses to document the validity of DOE code change proposals
4. Participating in the ICC code development hearings

A Notice is published in the *Federal Register* further outlining DOE participation in the ICC code development process. Interested stakeholders may also choose to receive updates on DOE code development activities.

DOE Proposal Development

DOE seeks to advance energy efficiency in the IECC by strengthening the code where cost-effective, and improving the criteria to be more easily understood, applied, implemented and enforced. Prior to submitting proposed code changes ("proposals") to the ICC, DOE publishes draft proposals that it has developed, along with documentation of concepts, for public review and comment. DOE will not provide responses to individual comments, but will consider any and all comments timely submitted in developing final proposals. DOE draft proposals, along with additional concepts still under consideration, are further developed based on stakeholder feedback received. Final proposals are posted for public viewing prior to submitting to the ICC.

Submitting Comments on DOE Proposals

In the current code cycle, the ICC will be considering revisions to the 2012 IECC which will result in the 2015 IECC. In order to allow adequate time to incorporate feedback prior to the ICC submission deadline, interested parties are asked to submit any and all comments on DOE initial concepts, draft code change proposals, and public comments by the deadlines specified below. Early feedback is appreciated in order to maximize the opportunity for revisions and enhancements.

Timeline

- Feedback on DOE concepts and draft proposals due **October 19, 2012**
- DOE code change proposals posted for public viewing **early December, 2012**
- *ICC deadline for submission of proposals for the 2015 IECC is **January 3, 2013***
- Feedback on draft DOE public comments due **June 28, 2013**
- DOE public comments posted for public viewing **mid-July, 2013**
- *ICC deadline for submission of public comments for the 2015 IECC is **July 15, 2013***

Instructions

Comments on DOE proposals for the 2015 IECC and IEBC can be submitted by email to EnergyCodeDevelopment2012BC0030@ee.doe.gov

All submissions received must include the agency name (U.S. DOE), docket number (EERE-2012-BT-BC-0030), *and any/all applicable DOE concept numbers or ICC reference numbers (see table below) in the subject line of the message.*

DOE Technical Analysis

In developing proposals for submission to the ICC, DOE conducts a series of analyses to evaluate energy savings and economic impacts of its potential revisions, as applicable. However, many proposals submitted to the ICC do not require analysis as they represent minor corrections or alignments between the code language itself, or referenced standards, changes to the format of the code, or have no cost impact. Where appropriate, DOE conducts life cycle cost analysis for IECC proposals as described in Residential Energy and Cost Analysis Methodology. DOE is not able to provide technical assistance at the request of outside parties, but reserves the right to conduct analysis in support of proposals DOE is considering for submission to the ICC. While DOE cannot enter into joint proposals (outside of proposals submitted jointly with another federal agency), DOE supports efficiency proposals from the perspective of its own analysis.

DOE references all analysis and supporting documentation as required by the ICC. Analysis performed by DOE or its contractors for the purpose of developing proposals should be considered on a technical basis, and does not represent an endorsement of any particular individual or organization. DOE also publishes the results of its analysis, along with supporting energy simulation models, for review and use by outside parties. Any interested party wishing to review or build-upon the DOE analysis can access it via Development.

DOE Participation in the ICC Code Development Hearings

At ICC hearings, DOE communicates its opinion on proposals as follows: DOE will defend its proposals. To the extent that DOE has prepared a technical analysis of a proposal other than a DOE proposal, consistent with the discussion above, DOE may present the results of the analysis. Again, presentation of technical reviews does not constitute an endorsement of any proposal. DOE may also recognize a proposal to the extent that the proposal or provisions within the proposal are the same as a DOE proposal or provisions within a DOE proposal. DOE may alter its proposal based on information it obtains at the code hearings and may publish amendments to its proposals for public review and comment at: Development. Final amendments to DOE proposals are posted at the same web address for public viewing prior to submitting to the ICC.

Ex Parte Communications

DOE anticipates that it or its contractors may be contacted regarding code concepts, ideas or change proposals through phone, mail, or email. While DOE code change proposals to the IECC are not regulations, DOE will follow ex parte communication policy for such communications. Guidance on ex parte communications was published on January 21, 2009 (74 FR 4685). Note that such communications will be reflected in the public docket consistent with the ex parte guidance.

Residential Proposals for the 2015 IECC

To foster review, concepts are organized by type of change:

- Proposals that increase energy efficiency (RA)
- Proposals that extend flexibility and usability of the code (RB)

Commercial proposals DOE is considering for the 2015 IECC.

The final proposals linked from this page are as submitted to ICC. In some cases the proposals have been modified in the ICC process, and official proposals can be viewed at the ICC website . *The order in which the proposals are presented should not be construed to represent any prioritization of the proposals.*

Where a formal analysis is not required, notes rather than a link are provided in the analysis column. Draft and final proposals, as well as supporting analysis files, are added as they become available.

Draft and final proposals are available to view/download as separate individual files from the tables below, or as a complete package:

iecc2015_Residential_draft.zip
iecc2015_Residential_final.zip
iecc2015_Residential_public_draft.zip
iecc2015_Residential_public_final.zip

Proposals that increase energy efficiency (RA)

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Supporting Analysis	Draft Public Comments	Final Public Comments
RA-1	**Fenestration U-factor and SHGC.** U-0.40 to 0.35 (CZ 2), U-0.32 to 0.20 (CZ 4-8); SHGC-0.25 to 0.2 or 0.15 (CZ 1-3). The lower SHGC would not apply if the orientation is advantageous or appropriate shading devices in place.	RA-1 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
RA-2 (RE64)	**Roof/ceiling resistance to heat gain (R402.2).** Require either radiant barrier or cool roof in the hottest climate zones.	RA-2 Draft Proposal	RA-2 Final Proposal	*Discussed in proposal*	RE64 Draft Comment	RE64 Public Comment
RA-3	**Heat recovery ventilation (R403.5).** Require heat recovery in colder climate zones when mechanical ventilation is required.	RA-3 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
RA-4	**Domestic water heating (R403.4).** Require a desuperheater, tankless water heater, heat pump water heater, solar water heater, or improved energy factor on a standard water heater.	RA-4 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*
RA-5	**Lighting Controls (R404.1).** Require occupancy sensors or other automatic controls for lighting in selected areas of the home (closets, bathrooms, garages, outdoor lighting, etc.).	RA-5 Draft Proposal	*None*	*N/A*	*N/A*	*N/A*

Proposals that extend the flexibility and usability of the code (RB)

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Draft Public Comments	Final Public Comments
RB-1	**Direct performance compliance path.** This would be a pure performance metric not	*None*	*N/A*	*N/A*	*N/A*

DOE # (ICC) Identifier	Concept Name, (Code Section), Description	Draft Proposal	Final Proposal	Draft Public Comments	Final Public Comments
	referenced to any prescriptive baseline (an energy use intensity [EUI], a HERS rating, etc). Could replace the existing prescriptive and performance paths or be an alternative compliance path.				
RB-2	**Restoration of equipment tradeoffs (R405, R402).** To foster the use of systems-design concepts and whole-house analysis tools and in light of recently increased Federal minimum equipment efficiencies, restore the ability to do equipment efficiency trade-offs to the code in such a manner as to increase flexibility in compliance without compromising overall efficiency.	*None*	*N/A*	*N/A*	*N/A*
RB-3 (RE167)	**Correct thermal distribution system specifications in performance-path [Table R405.5.2(1)].** Add standard reference design specification for thermal distribution systems.	RB-3 Draft Proposal	RB-3 Final Proposal	*None*	*N/A*
RB-4 (CE61, Parts I&II)	**Addition of Broomfield County, Colorado, to county/zone list (Table R301.1).** Supply missing county.	RB-4 Draft Proposal	RB-4 Final Proposal	*None*	*N/A*
RB-5 (RE133)	**Elimination of ambiguity in ¾-in hot water pipe insulation requirements (R403.4.2, Table R403.4.2).** Modify code text to match 5-foot lower limit of Table R403.4.2.	RB-5 Draft Proposal	RB-5 Final Proposal	RE133 Draft Comment	RE133 Public Comment
RB-6	**Correction of section reference in Heating Systems row of performance path [Table R405.5.2(1)].** Change "R403 of the IECC–Commercial Provisions" to "C403…".	RB-6 Draft Proposal	RB-6 Final Proposal	*None*	*N/A*
RB-7 (RE63)	**Clarification of footnote "h" (Table R402.1.1).** Clarify its meaning and applicability, possibly by eliminating the footnote in favor of a more detailed textual treatment in R402.2.	RB-7 Draft Proposal	RB-7 Final Proposal	*None*	*N/A*
RB-8 (RE12)	**Addition of lighting specifications to performance path [Table R405.5.2(1)].** Clarify the applicability of mandatory lighting requirements to the performance path.	RB-8 Draft Proposal	RB-8 Final Proposal	RE12 Draft Comment	RE12 Public Comment
RB-9 (RE171)	**Addition of sunroom specifications to performance path [Table R405.5.2(1)].** Reference R402.2.12 and R402.3.5 to clarify tradeoff allowances.	RB-9 Draft Proposal	RB-9 Final Proposal	RE171 Draft Comment	RE171 Public Comment
RB-10 (RB100)	**Elimination of gap in ventilation requirements (IRC R303.4).** Clarify what is required when envelope leakage is *exactly* 5 ACH50.	RB-10 Draft Proposal	RB-10 Final Proposal	RB100 Draft Comment	RB100 Public Comment
RB-11	**For envelope and duct leakage testing, re-categorize maximum allowable leakage rates from mandatory to prescriptive (R402.4 and R403.2.2).** Allowing performance-path trade-offs for these would extend flexibility and mitigate risk associated with unexpected post-construction pressure test failures.	RB-11a Draft Proposal RB-11b Draft Proposal	*None* *None*	*N/A*	*N/A*
CB-3 (CE38, Part 2)	**Inspections (R104).** Improve/enhance details governing inspections of construction.	CB-3 Draft Proposal	CB-3 Final Proposal	CE38 Draft Comment	CE38 Public Comment
CB-8 (CE59, Part 2)	**Application of Fenestration Provisions (R202).** Clarify application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.	CB-8 Draft Proposal	CB-8 Final Proposal	CE59 Draft Comment	CE59 Public Comment
Proposal by others (RE72)	**For envelope leakage testing, re-categorize maximum allowable leakage rates from mandatory to prescriptive (R402.4).** Allowing performance-path trade-offs for these would extend flexibility and mitigate risk associated with unexpected post-construction pressure test failures	*N/A*	*N/A*	RE72 Draft comment	*None*

Last Updated: Wednesday, January 8, 2014 - 4:57pm

Envision Utah

Dear Governor Herbert, President Niederhauser, and Speaker Lockhart,

As you know, Utah's air quality is an issue that matters to everyone. While poor air quality during the winter ranks as Utahns' greatest concern about their quality of life, poor air quality during the summer is also becoming an issue. Our air quality affects our health and the health of our families. It also impacts our economy as we seek to recruit and retain businesses and a high-quality workforce.

On October 15, 2013, Governor Herbert asked Envision Utah to convene and facilitate the Clean Air Action Team. The individuals on the team represent a broad spectrum of interests and expertise in our community, including representatives from health care, business, nonprofit organizations, government, academia, transportation, and others. This independent Team was tasked with working to provide a set of broadly supported recommendations to improve our air quality.

The Team was asked to work throughout 2014 to provide recommendations. At the beginning of 2014 the Clean Air Action Team recommended several interim strategies. These and other strategies have been refined over the past year to comprise a set of comprehensive recommendations that will significantly improve Utah's air quality in the winter and summer. These recommendations are intended to complement and add to the actions proposed in the current State Implementation Plan process.

We encourage policymakers, businesses, and individuals to study and implement the recommendations of the Clean Air Action Team.

Sincerely,

Lonnie Bullard	Michelle Hofmann, MD, MPH	Robert Grow
Chairman	Medical Director	President and CEO
Jacobsen Construction	Riverton Hospital's Children's Unit	Envision Utah
Team Co-Chair	Team Co-Chair	Team Facilitator

YOUR FUTURE ENVISION UTAH

Envision Utah

Clean Air Action Team Recommendations

Poor air quality during certain periods of the year ranks as Utahns' greatest concern about their quality of life, and it threatens not only our health but our economy as we seek to recruit and retain businesses and a high-quality workforce.

On October 15, 2013, Governor Gary Herbert asked Envision Utah to convene and facilitate the Clean Air Action Team, which includes representatives from health care, business, nonprofit organizations, government, academia, transportation, and more. This independent team was tasked with working to provide a set of broadly supported recommendations to improve our air quality.

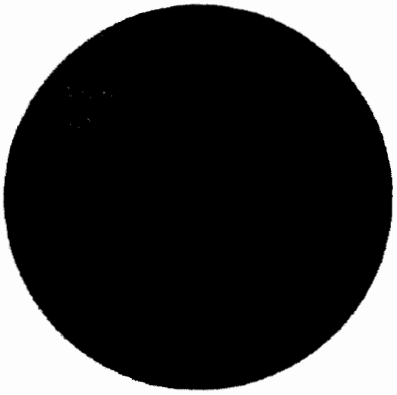
The team's consensus recommendations are set forth below. Combined with the controls that are already being put into place through the state's State Implementation Plan efforts, these recommendations will make a substantial difference in the amount of emissions we put into our air. Moreover, the projected cost to Utahns is fairly minimal (see Figure 2).

With about half of our emissions coming from automobiles and another 40% coming from buildings and other "area sources," most of our air pollution originates from our own cars, homes, and businesses. These recommendations target those emission sources, with particular emphasis on strategies that (1) result in substantial reductions in emissions, and (2) require relatively little expense. With concerted action, together we can clean our air.

As Utah's population continues to grow, these actions become even more imperative. By 2050, the Governor's Office of Management and Budget estimates that the state's population will nearly double. In our urban areas where air quality is a challenge, that translates to roughly doubling the number of miles we drive and the number of buildings that need to be heated. To improve our air quality, we will need to significantly reduce the amount of pollution each person produces.

Emission Inventories

2008
PM2.5 + NOx + SO2 + VOC
Typical Winter Day in
Salt Lake, Davis, Utah, Weber Counties



2014
PM2.5 + NOx + SO2 + VOC
Typical Winter Day in
Salt Lake, Davis, Utah, Weber Counties

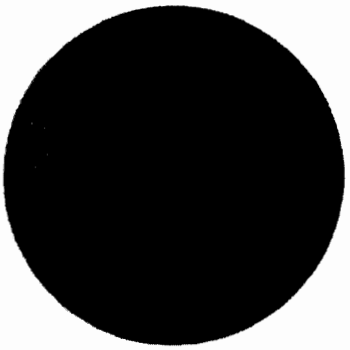


Figure 1. Source: Utah Division of Air Quality

Summary of Recommendations

1. Ensure Utahns have access to low-sulfur Tier 3 fuel as soon as possible.
2. Accelerate the transition to cleaner Tier 3 cars. If all cars and fuel were Tier 3 by 2050 we would remove approximately 62% of mobile emissions per day from our air.
3. Reduce the amount of wood burning that occurs during inversion periods. Eliminating residential wood burning would decrease daily area source emissions by about 5% in 2050.
4. Invest additional resources in public transportation and facilities that make "active transportation" modes like biking and walking more convenient. By 2050, if we reduce the number of miles driven per capita by 10% we would reduce daily mobile emissions by roughly 8%.
5. Allow the Air Quality Board and Division of Air Quality to adopt rules that are more stringent than federal regulations and continue to give the Division of Air Quality sufficient budget to continue effectively achieving its mission.
6. Adopt a rule to require suppliers to sell only ultra-low NOx water heaters. Replacing all water heaters with ultra-low NOx models would reduce daily area emissions by about 5.3% in 2050.
7. Increase the energy efficiency of our existing and new buildings. Increasing the efficiency of existing buildings could reduce area source emissions by about 1.7%. Increasing new building efficiency by 50% would eliminate approximately 2.4% of our area source emissions by 2050.
8. Continue current efforts to reduce emissions from the oil & gas operations within the Uintah Basin.

Strategy	Annual Cost Per Household
Tier 3 Cars and Fuel	$ 11
Eliminate Wood Burning	$ -
Ultra-Low NOx Water Heaters	$ -
Improve Energy Efficiency of All Older Buildings	$169
Improve Energy Efficiency of All New Buildings by 50%	Net savings of $95

Figure 2. Source: US EPA, Utah Division of Air Quality, and Utah Clean Energy

How Our Pollution is Formed

In Utah's urban areas, wintertime particle pollution creates the greatest air quality concerns. Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. The particles that cause the most concern to Utahns in the winter are commonly referred to as PM2.5, meaning that each particle is 2.5 micrometers or smaller in size, or significantly smaller than the diameter of a human hair.

While some of our PM2.5 is put into the air directly from things like wood burning and cars, much of it is formed in the air through chemical reactions. The two types of emissions that contribute most to these reactions are NOx (Nitrogen Oxides) and VOCs (Volatile Organic Compounds). Most NOx is produced from burning fossil fuels. VOCs are emitted as gases from certain solids or liquids. Organic chemicals are widely used as ingredients in household products. Paints, varnishes, and wax all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing, and hobby products. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

Ozone pollution can also be a concern in Utah's urban areas during the summer months, or in the Uintah Basin during the winter. Ozone (O3) naturally occurs high in our atmosphere, where it blocks harmful ultraviolet rays from reaching earth's surface. In contrast, ozone in the lower atmosphere is unnatural and harmful to health. VOC and NOx emissions, combined with heat and sunlight, allow for chemical reactions that produce ozone. The summers in Utah create a perfect environment to produce high levels of ozone in the lower atmosphere.

Reducing our PM2.5 emissions results in a direct improvement in our air quality and a direct reduction in the PM2.5 that we breathe. Reductions in gases like NOx and VOCs also reduce the PM2.5 and ozone that we breathe. Reducing NOx and VOC emissions will improve our air in the winter and summer. As a result, while the discussion herein primarily focuses on wintertime emissions, the recommended strategies will also reduce summertime ozone pollution.

Vehicles and Fuel

Vehicles make up approximately half of local emissions, a proportion that is decreasing as older cars are phased out and newer, cleaner cars are phased in (see Figure 1). Reductions in the pollution emitted by our cars–through "Tier 3" cars and fuel–are projected to have a significantly greater impact in emissions reductions than any other strategy.

Tier 3 refers to an integrated system of vehicle and fuel standards nationwide that the EPA has adopted to replace the prior Tier 2 standards. The standards are being phased in from model year 2017 to model year 2025. With both the vehicles and fuel working together, the Tier 3 standards will reduce volatile organic compounds (VOC) and nitrogen oxides (NO_x) emissions by 80% on a fleet average basis and direct particulate emissions by 70% on a per vehicle basis. These reductions are achieved through improved vehicle emissions standards and by reducing the amount of sulfur in fuel from an average of 30 ppm to 10 ppm. The low-sulfur fuel is important because sulfur reduces the effectiveness of the advanced pollution control equipment in the vehicles.

The greatest short-term benefit comes from lower-sulfur fuel, because using it would reduce emissions even in the cars we drive today. Tier 3 standards are projected to reduce total NO_x emissions by 10% and total VOC emissions by 2.8% in 2018, primarily due to lower-sulfur fuel, assuming such fuel is available in Utah. As more people buy the cleaner cars, Tier 3 cars will provide an even greater benefit over time, resulting in reductions by 2030 of total NO_x emissions by 24.7% and total VOC emissions by 15.5%. Under Tier 3 standards, there is no place in the US that stands to benefit as much as Utah, with 7 counties projected to have some of the largest 24-hour fine particulate improvements in the US relative to all other US counties (Figure 3).

Tier 3 cars are projected to cost on average $72 more than current Tier 2 cars. Tier 3 gasoline standards are estimated by the EPA to increase the cost of gasoline by less than a penny per gallon on a national basis. The actual cost to produce the cleaner fuels in Utah is unknown.

The EPA has adopted Tier 3 for phase-in beginning in model year 2017. Utah's refineries would likely have several years to comply after that date, and many will not actually be required to produce or sell Tier 3 fuels in Utah at any date. The EPA's proposed fuel standards include an "averaging, banking, and trading" system that allows refiners and importers to spread out their investments, which means they would only need to meet a nationwide average to satisfy the fuel standards; if a large gasoline producer decides to produce cleaner fuel in another state, it may be able to average that out by producing fuel that is not as clean in Utah. The Clean Air Act also contains provisions that generally prevent an individual state like Utah from adopting its own fuel standards.

Without the lower-sulfur fuel, a significant portion of the emissions reductions from Tier 3 cars will not occur because sulfur from the fuel "fouls" the emissions control equipment and causes it to function sub-optimally.

Recommendation 1: Work with the applicable refineries to ensure Utahns have access to low-sulfur fuel as soon as possible. Most of the fuel sold in Utah is produced by a handful of refineries in Utah and Wyoming. While a few of these refineries will be required to produce fuel below 10 parts per million sulfur, others can average out their sulfur content with refineries elsewhere. Working with these refineries to ensure Utahns can buy lower-sulfur fuel is critical to improving our air quality, in both the short- and the long-term.

Recommendation 2: Accelerate the sale and purchase of cleaner cars in Utah even sooner than model year 2017 through public education and other means. These cars are already being manufactured and sold in the United States; a car with a smog rating of 8 or higher generally meets Tier 3 emission standards. (Smog ratings run from 1 to 10, with 10 being the cleanest. Smog ratings for all new cars are shown on the window stickers.) To encourage

those who buy cars between now and 2017 to purchase cleaner cars, educational efforts are needed, as well as conversations with auto dealers. Incentives should also be considered.

Reductions in PM2.5 Due to Tier 3 in 2030 by County

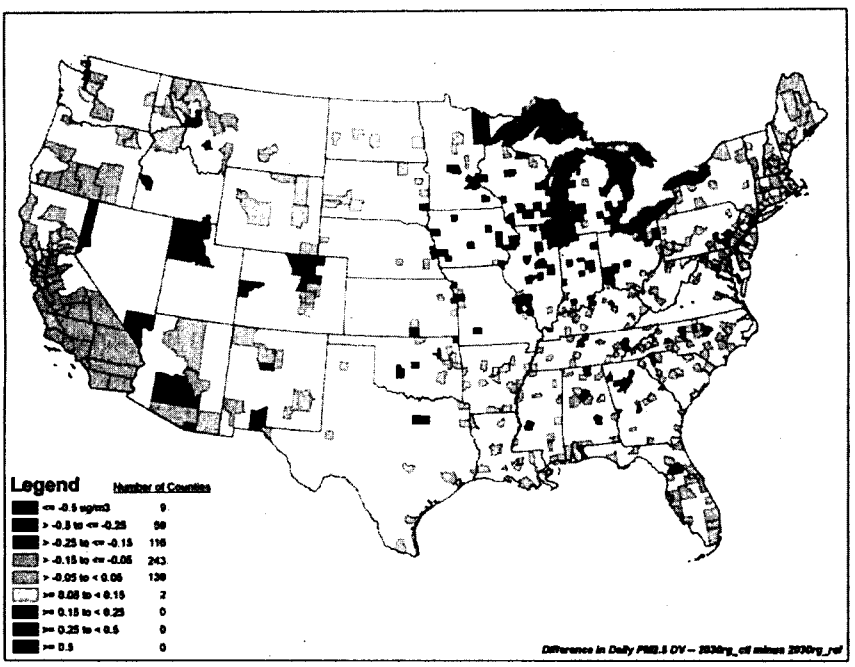


Figure 3. Source: United States Environmental Protection Agency

Wood Burning

Wood burning has a large impact on air quality. Along the Wasatch Front, it may contribute somewhere between 5 and 15% of total direct fine particulate matter emissions during inversions. While we also experience a significant amount of additional particulate pollution that is formed through chemical reactions in the atmosphere, reducing direct emissions of particulates has a direct benefit. Based on EPA emission factors, heating one home with a wood burning stove as a sole heating source is equivalent to 200 homes heated with natural gas in terms of direct fine particulate and 500 homes in terms of volatile organic compounds.[1] Not only does wood burning have implications for poor air quality in the ambient air shed, it also has health implications for air quality within the homes in which the wood burning occurs.

[1] Kelly, Kerry et al. "Contribution of Woodsmoke to $PM_{2.5}$ During Wasatch Front Inversions." PowerPoint presentation. Salt Lake City, UT. 15 Jan 2014.

Since the Clean Air Action Team issued its preliminary recommendations in January 2014, significant progress has been made on this issue. The standard has been changed so that burning will be restricted earlier in an inversion when poor air quality is forecast. The list of homes registered as having wood burning as their sole source of heat - and therefore as being able to burn even on restricted days - is being shortened, and money has been appropriated to convert these homes to other forms of heating.

The extent to which wood burning occurs in homes, other than those that are registered as sole-source homes, or in commercial establishments, is not fully known, but it is estimated that sole source homes account for only a fraction of the emissions due to wood burning.

Recommendation 1: Continue to reduce the need for a "sole source" exemption to wood burning restrictions, with the goal of eventually eliminating the exemption. This may require additional funding to replace wood burning stoves and fireplaces with other heating sources in those homes that are currently registered as sole source. Eliminating the exemption would improve air quality and simplify enforcement of wood burning restrictions.

Recommendation 2: Increase the enforcement of wood burning restrictions. Increased enforcement could take the form of additional inspectors as well as increased fines. In addition, phone numbers and other methods for reporting violations should be simplified and widely publicized, such that it is easy for people to report violations and reports result in swift action.

Recommendation 3: Provide widespread public education about the air quality and health impacts of wood burning. Much is already being done on this front, and these efforts need to be continued and enhanced.

Reducing Driving Through Public and Active Transportation

Our roads are already congested with traffic. As the population continues to grow, how will our transportation infrastructure handle the increase in cars? Reducing average personal vehicle miles traveled per day will reduce emissions; one of the best ways to clear the air is to take cars off the road. When a cold engine is started it takes a couple minutes for the "emissions control equipment" to warm up and function efficiently. About 24% of daily vehicle emissions come from the first few minutes of driving, from the "cold start." Shifting trips from cars to public transportation, walking, bicycling, and carpooling would reduce the number of cold starts.

In addition, shifting trips away from cars–or even shortening the trips we drive–will reduce traffic congestion. This has significant benefits for air quality, and it also improves our quality of life and reduces the amount of money we need to spend on roadway infrastructure.

How can we accomplish this? One key is to make travel by modes other than the automobile more convenient. This involves investing in infrastructure and equipment for public transportation and "active transportation" like biking and walking.

Recommendation 1: Invest additional resources in public transportation. Currently, public transportation replaces 120,000 car trips each day and carries 25% of commuters to downtown Salt Lake City. According to the Utah Transit Authority, this eliminates 2,000 tons of emissions each year, and an additional ¼ cent sales tax for public transportation could expand service in a way that would immediately increase ridership by over 50%, and by almost 90% within five years, resulting in an annual emissions reduction of 3,600 tons.

Recommendation 2: Invest additional resources in facilities that make "active transportation" modes like biking and walking more convenient. These facilities could include trails, sidewalks, bike lanes, "wayfinding," pedestrian safety investments, and other infrastructure. Particularly important is improving the convenience of biking and walking in proximity to passenger rail and bus rapid transit stations.

Grant Sufficient Budget and Authority to the Division of Air Quality and the Air Quality Board

Increased budget and authority would allow the Division of Air Quality to more effectively take action to clean the air. The Division could use the funding to increase research and analysis, enforcement, and public education. Added authority would enable effective regulation and enforcement.

Recommendation 1: Allow the Air Quality Board and Division of Air Quality to adopt rules that are more stringent than federal regulations. Utah problems require Utah solutions, not one-size-fits-all federal mandates. Because of our unique geography and climate conditions, Utah may need to adopt solutions unique to Utah, where such solutions are cost-effective (or cost-free) and make sense.

Recommendation 2: Continue to give the Division of Air Quality sufficient budget to continue to effectively achieve its mission. Recently, additional funding has been provided to DAQ for research and other activities, and this increased funding level should continue.

Ultra-Low NOx Water Heaters

Burning natural gas in homes, whether in furnaces, water heaters, or other appliances, produces nitrogen oxides (NOx), which react with other gases in the air to form particulate matter. Water heaters make up approximately 45% of a building's emissions. Ultra-low NOx

water heaters emit 70% less NOx than their counterparts. If every water heater were replaced with the ultra-low NOx variety, building emissions would be reduced by about 37%. The average life of a water heater is 7 years, and it is estimated that within 10 years almost all our water heaters could be ultra-low NOx models. Although ultra-low NOx water heaters do not increase energy efficiency, they do not cost more to manufacture than standard water heaters, and it is estimated that if the demand for ultra-low NOx water heaters in Utah increased this product would be brought to local stores, making the cost and availability comparable to what Utahns experience today with standard water heaters.

Recommendation: Adopt a rule to require suppliers to sell only ultra-low NOx water heaters as of a date 2-3 years in the future, to allow suppliers to move out their current inventories of water heaters. This rule would be adopted by the Air Quality Board.

Existing Building Energy Efficiency Improvements

In Utah's urban areas where air quality is an issue, there are about 750,000 buildings (both homes and businesses), and the emissions from natural gas heating produce about 12 tons of emissions on a typical winter day. Retrofitting residential homes can increase their energy efficiency by approximately 30%, which would subsequently decrease emissions by 30% and save homeowners on utility costs. Improvements may include improving weather stripping, adding or upgrading insulation, upgrading windows, replacing furnaces, or other actions. Average costs for retrofits of residential homes are approximately $5,000. Retrofitting multi-family buildings and businesses can increase efficiency by 12.5% to 15.8% depending on the measures taken. Some of the measures that can increase a building's efficiency include retrocommissioning, energy audits, lighting upgrades, and upgraded equipment. The average cost for these commercial building improvements varies depending on the measures implemented. Actions such as retrocommissioning and energy audits are relatively inexpensive and have a payback period of less than one year. Upgrading heating and cooling equipment has a larger effect on a building's efficiency but also has a longer payback period of five or more years. The sooner these buildings become more efficient the sooner our emissions will be reduced.

Recommendation 1: Amend the State Code to include enabling legislation for Residential PACE programs to finance home energy efficiency improvements. PACE is a financing program to help with the upfront cost of energy efficiency improvements and renewable energy measures. Local governments provide loans to home owners who would like to improve the energy efficiency of their home; these loans are paid back through property assessments. The annual utility savings are greater than the annual payments would be under a PACE program, making building improvements completely affordable. In 2013, Senate Bill 221 authorized local governments to adopt PACE for commercial buildings in Utah; we

recommend amending this bill to also include PACE for homes and other residential buildings.

Recommendation 2: Educate the public about existing energy efficiency financing programs and expand these programs. For example, Questar's Thermwise and Rocky Mountain Power's Wattsmart programs provide rebates to home builders, businesses, and homeowners for a plethora of qualifying energy efficiency improvement efforts. Their websites outline the specific options including choosing to build more efficient, upgrading appliances, replace windows and insulation, or simply downsize energy use. Wattsmart provides free weatherization services to income-qualifying home owners; Thermwise has Home Energy Plans and Personalized Energy Comparison Reports readily available on their website. The more widespread this information becomes, the more people will opt to retrofit their homes.

New Building Construction

By 2050 Utah's air quality-challenged urban areas are projected to have nearly 800,000 new buildings. As we more than double the number of buildings in these areas, nitrogen oxide (NOx) emissions from area sources will become a larger portion of the overall emissions. Improving the energy efficiency of new buildings will decrease these emissions as well as save on energy use. The technology and designs are readily available. Every building that is built to a higher energy standard today is a building that won't need to be retrofitted later.

Recommendation 1: Update the state building code to include the energy efficiency standards of the 2015 International Energy Conservation Code. This would increase new home energy efficiency by close to 50%. On average, building to the 2015 code adds around $10,000 to building costs for a single family home. Accounting for the increase in monthly mortgage payments and the decrease in monthly utility bills the average annual savings would be about $12.

Recommendation 2: Require that a Home Energy Rating System (HERS) score be included in MLS listings. HERS is a nationally recognized system that sends certified home energy raters to inspect and calculate a home's energy performance. The U.S. Department of Energy has established the average resale score at 130 HERS. The more efficient a home is, the lower HERS score it will have. Lower scores also allow for a higher resell price on a home. HERS teaches homeowners and builders how to analyze and improve energy efficiency and thus the value of a home. Multiple Listing Service (MLS) is a free, national search engine for finding real estate for sale by realtors. Showing a HERS rating on MLS would allow energy efficiency to be factored into a home's value, providing information to prospective purchasers and facilitating free market responses to improve energy efficiency.

Uintah Basin

While ozone is typically a summertime problem in urban areas, the Uintah Basin experiences increased ozone levels in the winter. Most of the emissions that cause elevated ozone levels are associated with oil and gas operations on public, private, and tribal lands in the area. The majority of the oil and gas emissions contributing to ozone are from oil tanks and pneumatic devices and pumps.

In order to improve air quality in the Uintah Basin, we express support for continued and enhanced efforts, working closely with stakeholders in the Uintah Basin.

Recommendation 1: Continue current efforts to regulate emissions from the oil & gas industries within the Uintah Basin on lands over which the state can exercise jurisdiction. This includes Rule UAC R307-401-19, which allows for quicker approvals in exchange for agreement on stricter standards and compliance. We also express support for the following four proposed rules that, if approved, would improve air quality in the Uintah Basin.

> **R307-501,** which establishes general requirements for emission prevention and good air pollution control practices for all oil and gas exploration and production operations, well production facilities, natural gas compressor stations, and natural gas processing plants.
> **R307-502,** whose purpose is to reduce emissions of volatile organic compounds from pneumatic controllers that are associated with oil and gas operations by requiring existing pneumatic controllers to meet the Federal standards established for new controllers.
> **R307-503,** which establishes conditions to ensure that combustion devices used in the oil and gas industry are operated effectively.
> **R307-504,** which establishes control requirements for the loading of liquids containing volatile organic compounds at oil or gas well sites.

Recommendation 2: Continue collaborating with and supporting tribal and Federal jurisdictions to reduce emissions on tribal lands in the Uintah Basin.

Recommendation 3: Continue to work with private industry to reduce emissions from oil & gas operations on public, private, and tribal lands in the Uintah Basin.

About the Clean Air Action Team

On October 15, 2013, Governor Gary Herbert announced that he was asking Envision Utah to convene and facilitate the efforts of a Clean Air Action Team. The Action Team includes representatives from health care, business, nonprofit organizations, government, academia, transportation, and more. This independent team was tasked with working to provide a set of broadly supported recommendations to improve our air quality. These recommendations

can then be implemented by government, businesses, and individuals. It is the broadest group ever assembled in Utah to evaluate strategies and develop a holistic approach to solving our air quality issues. All ideas were on the table for evaluation.

Clean Air Action Team members:

- Lonnie Bullard, Jacobsen Construction (co-chair)
- Dr. Michelle Hofmann, Physician, Breathe Utah, University of Utah (co-chair)
- Stuart Adams, State Senator
- Patrice Arent, State Representative
- Ralph Becker, Mayor Salt Lake City
- David Brems, GSBS Architects
- Rebecca Chavez-Houck, State Representative
- Jeff Edwards, Executive Director, Economic Development Corporation of Utah
- Robin Erickson, Utah Clean Cities
- Ryan Evans, Salt Lake Chamber
- Matthew Eyring, Chief Strategy and Innovation Officer, Vivint Inc.
- Dr. Robert Gillies, State Climatologist
- Andrew Gruber, Executive Director, Wasatch Front Regional Council
- Susan Hardy, Mountainland Association of Governments
- Roger Jackson, FFKR Architects
- Ron Jibson, President and CEO, Questar
- Linda Johnson, Citizen
- Terry Marasco, Executive Director, Utah Moms for Clean Air
- Alan Matheson, State Planning Coordinator and Governor's Environmental Advisor
- Ben McAdams, Mayor Salt Lake County
- Nancy McCormick, State President, AARP
- Dr. Robert Paine, Pulmonologist, Program on Air Quality, Health, & Society, University of Utah
- Angelo Papastamos, UDOT Travelwise
- Dr. Edward Redd, State Representative and physician
- Dr. Bob Rolfs, Deputy Director, Utah Department of Health
- Steve Sands, Kennecott, Air Quality Board
- Joseph Shaffer, Director of Health, Tri-County Health, Uintah Basin
- Matt Sibul, Utah Transit Authority
- Amanda Smith, Executive Director, Dept. of Environmental Quality
- Lowry Snow, State Representative
- Dr. Charles Sorenson, CEO, Intermountain Health Care
- Peter Stempel, Stempel Form Architects
- Cody Stewart, Governor's Energy Advisor
- Kathy Van Dame, Air Quality Board
- Vicki Varela, Director, Utah Office of Tourism
- Ted Wilson, Executive Director, UCAIR
- Sarah Wright, Executive Director, Utah Clean Energy

About Envision Utah

Envision Utah is a non-profit, nonpartisan organization committed to exploring the challenges and opportunities of growth in Utah. We engage people to create and sustain communities that are beautiful, prosperous, healthy and neighbourly for current and future residents. With the right vision, we can accommodate Utah's growing economy and increasing population without sacrificing the incredible quality of life that makes Utah great.

In 1997, Envision Utah launched an unprecedented public effort that brought together residents, elected officials, developers, conservationists, business leaders, and other interested parties to make informed decisions about how we should grow. Through a historic series of workshops and surveys, Envision Utah helped lay the groundwork for actions including:

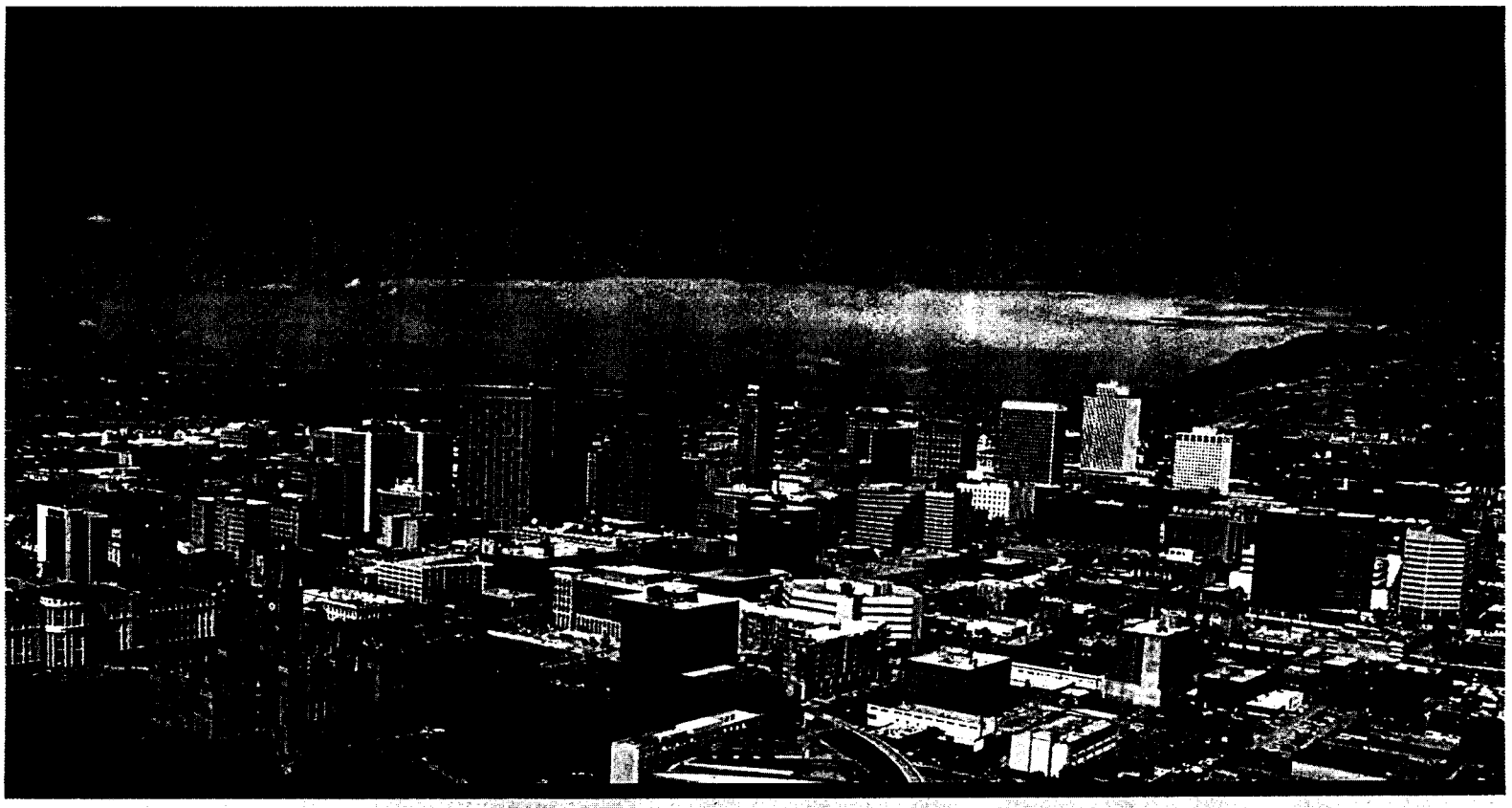
- Development of TRAX and Frontrunner to add 140 miles of light rail, streetcar and commuter rail to Utah
- Creation of innovative housing and commercial projects like Daybreak and City Creek
- Dramatically slowing the rate of development of Utah's lands to preserve more open space for agriculture and recreation
- Decreasing household water consumption by 25%
- Decreasing our emissions by 47% among all pollutants
- Saving billions in reduced infrastructure costs

With Utah's population projected to grow by 2.5 million in the next three decades, Envision Utah is making history again with the Your Utah Your Future project, a statewide process that invites the public to get involved and decide how Utah will grow. Governor Herbert kicked the effort off in October 2013 and will kick off the public involvement effort this fall. The Clean Air Action Team is one element of the Your Utah, Your Future process.

Learn more at www.envisionutah.org.

UTAH ENERGY EFFICIENCY & CONSERVATION PLAN

Preparing for Utah's Energy Future



GOAL 6

"Promote energy efficiency, conservation and peak consumption reductions."

- Utah's 10-Year Strategic Energy Plan

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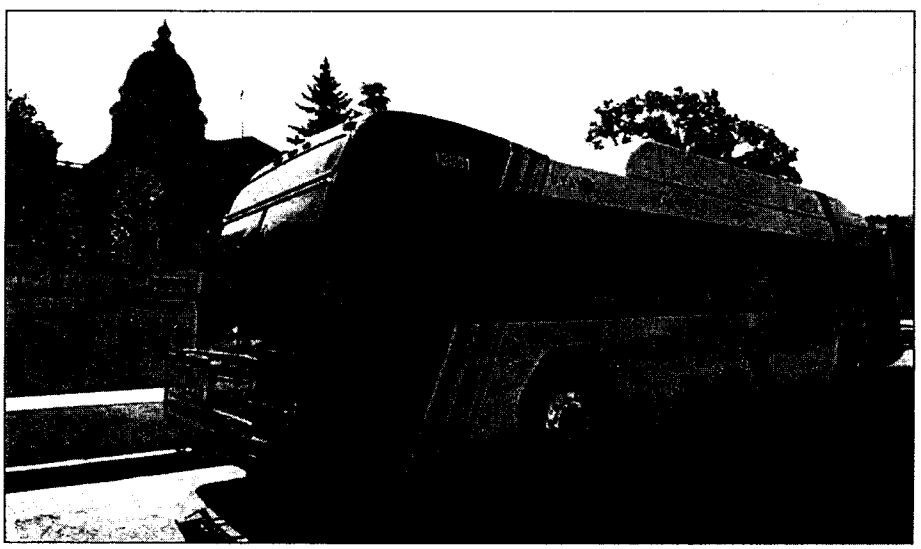


UTAH TRANSIT AUTHORITY BUS
CREDIT: UTAH TRANSIT AUTHORITY

Executive Summary

Governor Gary R. Herbert's 10-Year Strategic Energy Plan's sixth recommendation states that "Utah should have a statewide plan for reducing energy consumption." In order to fulfill this recommendation, in August of 2013 the Governor's Energy Advisor and the Office of Energy Development launched a truly stakeholder-driven process aimed at creation of the ***Utah Energy Efficiency and Conservation Plan.*** The various stakeholders were tasked with developing a specific set of recommendations for programs, public outreach, and policy measures that could help the State realize its energy efficiency and conservation potential. During the collaborative process unfolded, the Plan was organized into the following sectors: Residential and Commercial Buildings, Alternative Transportation and Fuels, Agriculture, Industry and Public Education and Outreach.

GOVERNOR GARY R. HERBERT

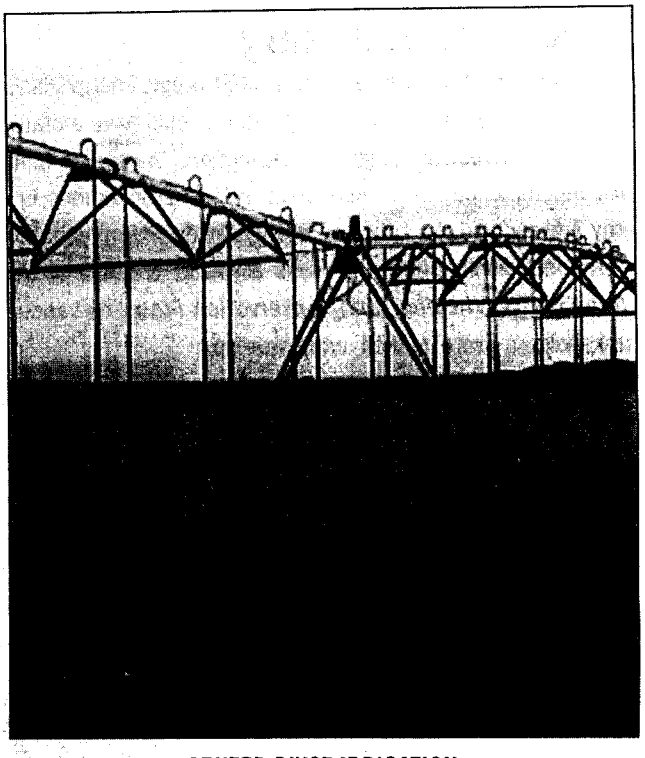
The ***Utah Energy Efficiency and Conservation Plan*** was launched with a Steering Committee meeting held on August 21, 2013. The fifteen member Committee, chaired by the Governor's Energy Advisor and co-chaired by the Director of the Office of Energy Development, included the Governor's Senior Environmental Advisor & State Planner and representatives of Rocky Mountain Power, Questar Gas, the Utah Public Service Commission, the Utah Division of Public Utilities, the Office of Consumer Services, Energy Strategies LLC, the Utah Transit Authority, the Utah Associated Municipal Power Systems, the Utah Department of Agriculture and Food, and the Offices of Outdoor Recreation and Rural Programs, two divisions of the Governor's Office of Economic Development. The Committee was crafted to ensure that every important perspective and issue would be represented, including those of utilities and their regulators, environmentalists, rural advocates, economic development and transportation specialists, and energy experts and consultants.

Members of the Steering Committee helped to establish and oversee subcommittees for each of the Plan's five designated sectors, and it was those subcommittees that would meet regularly in partnership with the Office of Energy Development to develop the ideas and recommendations that comprise the substance of the ***Utah Energy Efficiency and Conservation Plan.*** The Residential and Commercial Buildings Subcommittee was chaired jointly by GSBS Architects and Utah Clean Energy, the Industrial Sector Subcommittee was chaired by ETC Group, the Agriculture Sector Subcommittee was chaired by the Utah Farm Bureau Federation, the Alternative Fuels and Transportation Subcommittee was chaired jointly by Utah Clean Cities and D and S Services, and finally the Public Outreach and Education Subcommittee was chaired by the National Energy Foundation. These subcommittees had an average of 15 members, who met an average of 5 times, not including the dozens of phone calls and attachment-laden emails. Altogether over 95 stakeholder groups including higher education, non-governmental organizations, state agencies, municipal governments, trade associations, and others were represented in the six month collaborative process.

The ***Utah Energy Efficiency and Conservation Plan*** highlights the existing energy efficiency and conservation efforts of both the state and the utilities operating in it, including regulated investor owned utilities, municipal utilities and rural electric cooperatives. The report includes guiding principles, a section with definitions and a basic overview of energy efficiency and conservation, as well as a section which details current consumption levels and characterizes energy efficiency as a resource. The report also includes sections focused on the "outputs" or end results which the Committee expects the Plan's recommendations to help achieve, which include positive benefits for air quality and water distribution.

Finally, the ***Utah Energy Efficiency and Conservation Plan*** includes 26 recommendations for the Governor's Office, the Utah State Legislature, businesses and households to consider adopting, whether through initiatives and partnerships, programs and statutes, financial or other market tools, or simply through lifestyle choices. The recommendations in the report are the ones that rose to the very top of each subcommittee's priority list. Those actions or recommendations that did not make it to the top 26 may nevertheless come into play at a later date, as the ***Utah Energy Efficiency and Conservation Plan*** is intended to be a living document to be updated in the future.

JORDAN SCHOOL DISTRICT CNG BUS
CREDIT: SALT LAKE CHAMBER



CENTER PIVOT IRRIGATION
SOURCE: UTAH DEPARTMENT OF AGRICULTURE

Introduction

Energy touches virtually every aspect of daily life and the entire modern economy, from schools and municipal governments to agriculture and business – everyone needs reliable and affordable energy. Recognizing the central role that energy plays and to plan for the future of Utah's energy needs, in 2011 Governor Gary R. Herbert worked with his Energy Task Force to draft and publish Utah's 10-Year Strategic Energy Plan.[1] The Plan identifies promotion of energy efficiency and conservation as objectives that have the potential to significantly strengthen Utah's economy. In particular, Recommendation #6 of the Plan states that Utah should "have a state-wide program aimed at reducing energy consumption."[2]

Since the launch of the 10-Year Strategic Energy Plan, the State has administered or supported a variety of energy efficiency programs. The Energy Efficiency and Conservation Plan (EECP) was drafted to unify these efforts and foster state-wide, public-private collaboration. The EECP is meant to serve as both a guidebook for households and businesses in the State, and to provide a call to action for individuals, including the school teachers, farmers, factory workers, elected officials, and others whose hard work and conscientiousness make Utah great. When it comes to the responsible use of our energy resources, we are all stakeholders. Through the EECP, the State will have the opportunity to implement programs and policies that demonstrate a commitment to substantively advancing our stated energy efficiency and conservation goals. The accelerated development of energy efficiency and conservation resources through the recommendations presented in this plan will provide many benefits to Utah; namely:

1. **Drive Utah's position as an economic leader.** Increasing energy efficiency and conserving energy will help keep energy bills as low as possible and should enhance business competitiveness. Low energy costs have helped bring world-renowned businesses to the State including companies such as Adobe, eBay, Proctor & Gamble and the National Security Agency's data center.

2. **Prepare Utah to meet our future energy demand. By 2040, the State expects a population growth rate of 60%.**[3] This population growth is expected to drive energy demand higher. Implementation of cost-effective energy efficiency and conservation measures should help the state meet projected increases in demand for

energy services at the least cost. Expansion of energy efficiency and conservation programs will support the State's goal of energy independence even as the population increases.

3. **Support Utah's 10-Year Strategic Energy Plan goal to have adequate, reliable, affordable, sustainable and clean energy resources.**[4] Models and studies, (such as the recent American Council for an Energy Efficient Economy annual report among many others) recognize energy not consumed as a result of efficiency programs as a cost-effective resource.[5] Implementation of energy efficiency and conservation programs will support Utah's energy goals through significant reductions in demand, thereby helping to ensure adequate, affordable and reliable energy resources for the future.

METER CHANGE
CREDIT: ROCKY MOUNTAIN POWER

4. **Reinforce Utah values of resourcefulness and thrift.** Utah's motto is "Industry," and the state's coat of arms is a beehive, which is indicative of Utahns' ethic of hard work. Utah residents value resourcefulness and self-sufficiency. Adoption of energy efficiency and conservation measures by the State will support these values.

5. **Continue to support Utah's unparalleled quality of life.** Stable and affordable energy provides for basic functionality and comfort in homes, offices, schools, hospitals and other facilities. Reliable and low-cost energy drives industry, is vital to the transportation sector and is a determining factor for economic growth. Expansion of energy efficiency and conservation programs should play a key part in supporting the high quality of life that Utahns are proud of and have come to expect.

Governor Gary R. Herbert's Four Cornerstones

Governor Herbert is focused on four cornerstones to strengthen Utah's economy: Education, energy, jobs, and the ability of the State to solve its own problems. As a result, Utah is a premier destination for business, jobs, with an enviable quality of life. These cornerstone priorities include:

- Education
- **Energy**
- Jobs
- Self-Determination

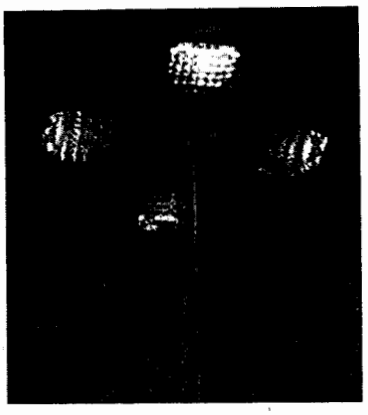
Energy efficiency is intertwined in all four cornerstones. It supports jobs and self-determination and is an integral part of education for the next generation. Energy efficiency is a developable energy resource.

Under the leadership of Governor Herbert's administration, the Office of Energy Development (OED) and other state agencies have implemented several energy efficiency and conservation projects in Utah and have advocated for energy efficiency across the State among both the public and the elected officials who represent them.

To **advance Utah's commitment to the use of alternative transportation and fuels**, Governor Herbert has requested that state agencies review vehicle requirements and consider an expanded role for Hybrid Electric Vehicles (HEV) or Compressed Natural Gas (CNG) vehicles. Further, in a 2012 Executive Order the Governor's Office directed State employees to reduce automotive idling.[6] In 2012 Governor Herbert also began to address air quality through the creation of the Utah Clean Air Partnership (UCAIR), whose mission is to educate the public on ways they can reduce emissions, including making more efficient transportation decisions. Finally, most recently, the Governor called

for an air quality task force to be organized that will address the potential for air quality improvement; including reviewing efficiency and conservation options.

The State of Utah, Salt Lake City and Salt Lake County support the Clear-the-Air Challenge, a program designed to encourage residents to drive less during a month-long competition.[7]



LED LIGHTING - PARKING LOT

The State has also demonstrated energy efficiency leadership in the area of **building energy efficiency.** The Utah Division of Facilities, Construction and Management's State Building Energy Efficiency Program requires High Performance Building Standards for all new construction and encourages retrofitting for older buildings through an energy efficiency revolving loan fund.[8]

These actions have only begun the conversation, and it is evident that there is significant potential for greater energy efficiency and conservation to be implemented across Utah. The EECP was prepared to guide the state in meeting future energy demands in a forward thinking and cost-effective manner that is specific to Utah's unique needs and based upon public-private collaboration. This document is not static, but will be updated as conditions change and innovation occurs to continue support for Utah in its energy efficiency and conservation goals.

To learn more about these efforts, please see Appendix A, which details "Currents Efforts in Energy Efficiency and Conservation."

Energy Efficiency and Conservation Plan

As the primary resource for advancing energy development in Utah, the Office of Energy Development coordinated the effort to produce a State Energy Efficiency and Conservation Plan. OED's process, which was designed to support the development of a comprehensive plan, was consensus-based and stakeholder-driven.

Plan Methodology and Approach

The Office of Energy Development was tasked with developing a suite of energy programs and policy recommendations that could be adopted over time and with identifying implementation options for each. Due to the complexity of the issues at hand, the breadth of policy options, and the significant potential for real progress, OED approached the development of the plan systematically by outlining the various process steps needed to ensure the plan would be both comprehensive and adequately vetted.

Fifteen energy leaders in the State were asked to oversee development of the planning document and to support implementation as Steering Committee members. The Steering Committee provided feedback throughout the process. The Committee was co-chaired by Cody B. Stewart, the Governor's Energy Advisor and Samantha Mary Julian, Director of the Office of Energy Development.

The Steering Committee members approved five main sectors by which the document would be organized: Commercial and Residential Buildings; Alternative Transportation; Industrial; Agriculture and Public Outreach & Education. Experts from government, utilities, industry, academia, trade associations and non-profit organizations were invited to participate in Team Committees for each of the five sectors. The Team Committees were chaired by a leader in the particular sector and OED staff served as facilitators to help guide the process. A process work flow is presented as Figure 1.

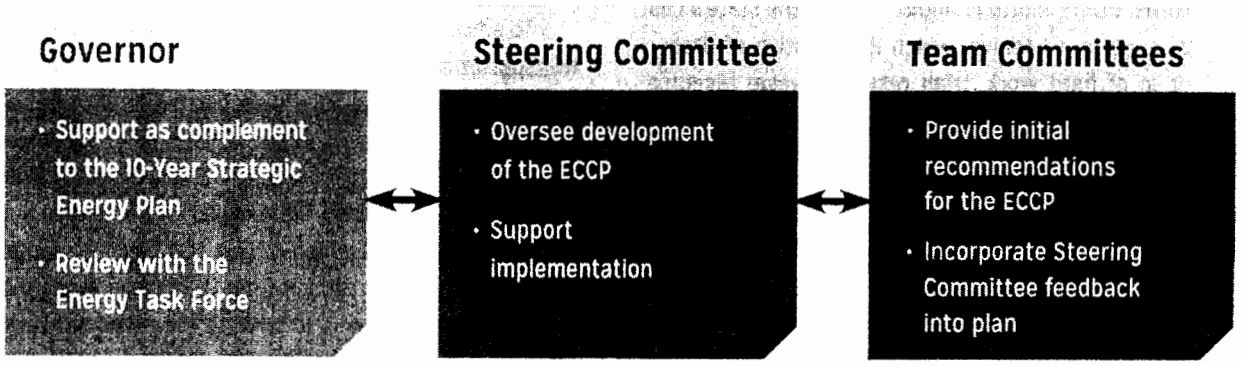


FIGURE 1 PROCESS WORK FLOW DIAGRAM BETWEEN COMMITTEES

A multi-voting, team consensus approach was used with each team conducting brainstorming and working sessions to develop initial ideas and to solicit input from the sectors that they represented. These ideas were discussed, vetted and prioritized during working sessions, conference call sessions, online surveys and through electronic communication.

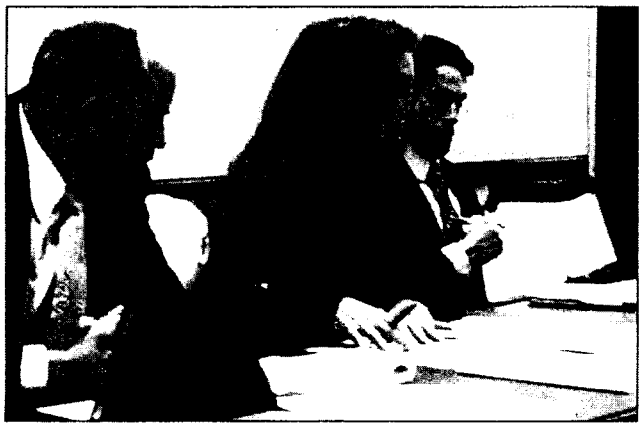
To build accountability into the recommendations with respect to implementation, Team Committees were tasked with developing a responsibility matrix. This matrix, presented later in the report, designates top agencies or partners that the teams considered as the best organization to lead efforts for each recommendation.

After the list of recommendations was created, the Steering Committee vetted the final ideas and the plan was provided to Governor Herbert's Energy Task Force to accept as part of Utah's energy strategy and to complement Utah's 10-Year Strategic Energy Plan.

Stakeholder Engagement

To utilize the knowledge and expertise of those in the energy field, and to take advantage of public-private partnerships, the Office of Energy Development assembled well-rounded Team Committees. The Steering Committee and Team Committees were comprised of representatives of key energy and public policy stakeholders, including:

- Office of the Governor,
- Utah Public Service Commission,
- Utah Division of Public Utilities,
- Office of Consumer Services,
- Regulated utilities,
- Municipal and cooperative utility associations,
- City government,



ENERGY EFFICIENCY AND CONSERVATION PLAN MEETING

- U.S. Department of Agriculture,
- Utah Transit Authority,
- Private sector, including businesses and industry,
- Non-profit organizations,
- Academia, and
- Other key energy leaders.

Energy Efficiency Versus Conservation

Energy efficiency is generally achieved through adoption of more efficient technology or production processes, while maintaining the same or increased level of output. An efficiency measure such as adding insulation to a home results in the structure using less energy to maintain a comfortable temperature. Installing light emitting diode (LED) lighting, another efficiency measure, reduces the amount of energy required to attain the same level of illumination compared with older lighting options, such as incandescent light bulbs.

The conservation of energy is different from energy efficiency. While both efficiency and conservation are energy reduction techniques, conservation is advanced through individual and organizational participation and is behavioral in nature. For example, driving less, or turning off lights as people exit the room, are examples of energy conservation.

As part of the Team Committee process, each energy sector developed an interpretation of energy efficiency versus conservation. While efficiency and conservation are often seen as similar across all sectors, as shown below, each Team developed slightly different definitions. Interpretations by sector are described below:

Buildings

Although buildings are diverse in their structure and use (e.g. residential, commercial, institutional, etc.), the concepts of efficiency and conservation are consistent across building types. Whether a building is a living space or a work space, energy saving measures fall broadly into two categories:

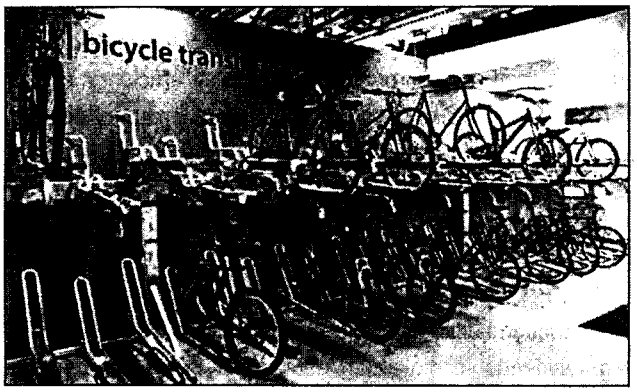
- Building energy efficiency is using less energy to do the same amount of work. This is often technology based. An example is using LED lighting in place of incandescent.
- Building energy conservation is using less energy by doing less work or changing behaviors. An example is turning off lights when the space is not in use.

In practice, efficiency and conservation measures need not be mutually exclusive; some measures may involve aspects of both. For example, a school may install LED lighting in conjunction with a control system that turns off the lights when a room is unoccupied. The technology itself is an efficiency measure, but the behavior and utilization of the control system to restrict lighting solely to when it is needed would be a conservation measure.

Alternative Transportation

Transportation is one of the country's largest energy-use sectors and arguably the least efficient. Buses, cars and trucks, while much more efficient than they use to be, still convert a large percentage of fuel into heat and by-products rather than useful movement. The Transportation Team Committee viewed the use of alternative transportation fuels, mass transit and alternative transportation such as biking or walking options as opportunities to increase the overall efficiency of the entire transportation system.

Therefore, the Team Committee felt that a comprehensive understanding of energy efficiency in transportation would require not only looking at the efficiency of vehicles and fuels, but also at the efficiency of travel itself. In keeping with this understanding, the Team Committee created the definitions below:



BICYCLE TRANSIT CENTER FOR PUBLIC TRANSPORTATION
CREDIT: UTAH TRANSIT AUTHORITY

- Energy conservation involves changes in human behavior, and
- Energy efficiency as driven either by advances in technology or by regulation.

Carpooling would fall into an energy conservation activity while long-term decisions about how best to plan, organize and permit cities for efficient travel would fall within energy efficiency.

Energy Efficiency Jobs:
Energy Efficiency as an Energy Industry

Jobs having to do with energy efficiency and conservation are difficult to classify. Often they are labeled as construction, engineering or manufacturing.

The Utah Department of Workforce Services (DWS) administered a survey to over 11,000 businesses and industrial entities. The survey identified energy efficiency jobs and activities. The survey results have helped the State begin to understand and evaluate the impact that energy efficiency plays in the job market.

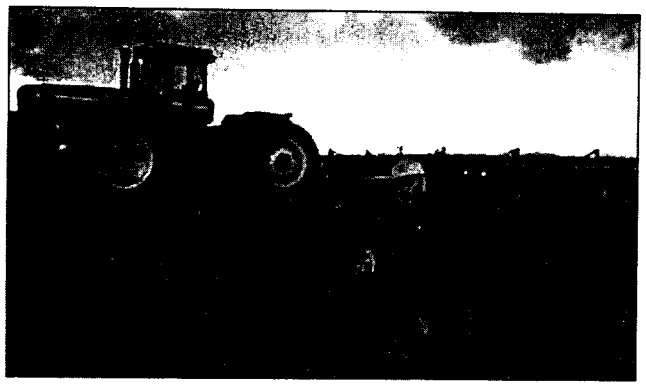
Energy efficiency jobs are projected to grow at an annual rate of about 2% a year, according to survey results. DWS estimates that Utah can expect an average of 1,100 openings per year, about half from growth opportunities and half from replacement needs. These jobs are expected to have above average wages and will cross many sectors.

Industrial

In the industrial energy sector, the terms energy efficiency and energy conservation are often used interchangeably and share some commonalities; however, there are distinct differences. For example, turning off an air compressor when it is not being used is considered energy conservation, while purchasing and operating an efficient air compressor instead of running a less efficient model is considered energy efficiency. Based on this, the industrial sector views:

- Energy conservation as a by-product of improved organizational procedures and is primarily behavioral in nature, and
- Energy efficiency as a byproduct of improved technology within equipment and controls and is primarily mechanical in nature.

Industrial energy efficiency differs from other sectors in how energy efficiency is viewed and calculated. In industrial energy efficiency, energy intensity is calculated by energy used per unit of product produced. For example, the energy intensity of aluminum production may be measured in BTU per pound of aluminum. This is an important distinction to make when discussing energy intensity within the industrial sector.



FARMER DEMONSTRATING EFFICIENT TILLAGE TECHNIQUE

Agriculture

The agriculture industry in Utah has seen remarkable change over the last 20 years, increasing the need for energy on farms and ranches in an already energy-intensive sector. Farm energy applications include farmstead operations such as dairy machinery, and landscape processes such as irrigation and fertilizer application.

Perhaps due to farmers' and ranchers' close connection to the land, efficiency and conservation are viewed by this sector as primarily tied with environmental benefits. The Agriculture Team Committee made the following distinctions:

- Energy efficiency is seen as maximizing resource use, including time and labor, and
- Energy conservation is considered as focusing on saving natural resources through reduced use.

State Energy Perspective

A strong energy industry has helped Utah maintain its economic leadership. Direct energy jobs account for roughly 1.4% of Utah's overall employment and provide high-quality careers with wages that are almost double the State's average.[9] Utah's careful planning and abundant natural resources have provided Utah with some of the lowest energy costs in the nation.[10] Utah has the nation's third lowest natural gas prices and 16th lowest electricity prices.[11] This has helped attract prominent employers to the State and further supported the growth of Utah's economy. By avoiding or deferring the need for costly new power plants and transmission lines, energy efficiency and conservation is expected to help play a significant role in keeping Utah's energy prices low.

Energy Production and Consumption

Utah's current energy production is primarily fossil-fuel based, although renewable energy resources are increasing. Utah residents, businesses and industries consume, on average, 29,723 gigawatt hours (GWh) of electricity, 24,369 billion cubic feet (BCF) of natural gas, and use 6,890 million barrels of petroleum.[12] These resources provide energy for:

- 1,072 Public and Private Schools;[13]
- 25 Institutions of Higher Education;[14]
- 993,060 Housing Units;[15]
- 53 Hospitals;[16]
- 68,740 Businesses & Industrial Organizations;[17]
- 16,600 Farms;[18] and,
- 2,377,552 Cars and Trucks.[19]

Due to the projected growth of Utah's population and economy over the next fifty years, a significant increase in energy demand is anticipated. The state's projected fossil fuel

Utah's Projected Fossil Fuel Energy Growth - Next 10 Years

	2013	2022	Percentage Change	Annual Rate
Electricity Load (RMP) MWh)*[1]	25,153,750	29,514,597	17.9%	1.8%
Natural Gas (Questar) (million Dth)[2]	173	214	23.7%	2.4%
Petroleum/Transportation (mbbl/yr)[3]	47	53	12.8%	1.3%

*RMP provides about 80% of the State's electrical power, the balance coming primarily from public municipals. Thus, the values stated will be low.

TABLE 1 UTAH'S PROJECTED FOSSIL FUEL ENERGY GROWTH FOR THE NEXT 10 YEARS

SOURCES 1-ROCKY MOUNTAIN POWER IRP FORECASTED ANNUAL LOAD GROWTH 2-QUESTAR GAS COMPANY IRP FORECAST 3-PROJECTION BY OED USING UTAH GEOLOGICAL SURVEY ENERGY STATISTICS

energy growth over the next ten years is presented in Table 1. Implementation of energy efficiency measures and conservation programs will help the State meet energy demand challenges of the future.

Energy Efficiency as a Resource

Energy efficiency and conservation are often cited as low-cost, clean resources with reduced risk. Specific benefits that go beyond simple energy savings include:

Yielding Economic Benefits: Implementing energy efficiency programs can help organizations reduce their energy costs, allowing them to direct the savings to their employees, shareholders, and communities. Efficiency and conservation program have the potential to allow utilities to meet projected increases in energy demand without the need for investment in additional energy generation.

Leveraging Other Resources: The adoption of energy efficiency measures can deliver reductions in resource use while providing the same performance or product output; this allows for a given quantity of a finite resource to add more to our economy.

Increasing Energy Security: Energy efficiency and conservation programs can reduce consumption of imported fossil fuels, which lessens the potential risk to Utah of supply disruptions. Energy efficiency is a local resource that does not require infrastructure or add additional stress to the power delivery system and can support greater reliability of the system.

Providing Environmental Benefits (See "Efficiency, Conservation and the Environment"): Energy efficiency and conservation efforts have the potential to support regional air quality improvement. Efficiency in water systems can decrease water losses and reduce the amount of energy needed to process and distribute water.

Recommendations from Team Committees

The following sections present the Team Committee recommendations. There are 26 recommendations that range from programs, policies, and financing methods, to education, outreach and collaboration. A responsibility matrix follows the recommendation list. This matrix contains an outline of primary and secondary organizations that could play a leading role in implementation of the suggested policies, programs, and projects.

Energy Efficiency and Conservation Recommendation List

Buildings	1 - State of Utah Should Lead by Example
	2 - Support Cost-effective Building Energy Management by Streamlining Building Owners' Access and Use of Utility Data
	3 - Incorporate Building Energy Performance Information Into Market Transactions
	4 - Support and Promote Statewide Commercial PACE Financing
	5 - Promote Best Practices in Non-Residential Energy Efficiency Through a Statewide Benchmarking Challenge & Recognition Program
	6 - Increase Understanding and Enforcement of Current Energy Code
	7 - Adopt Current and Future Energy Codes
Transportation	1 - Address Fleet Management Specific Issues
	2 - Support Infrastructure Development for Alternative Transportation
	3 - Promote Alternative Transportation Through Private Sector
	4 - Expand the Successful TravelWise Program
	5 - Support Mixed-Use Districts Located by Mass Transit Hubs
	6 - Expand Community-Based Alternative Methods of Transportation
Industrial	1 - Expand Options for Industrial Energy Efficiency Financing - Create an Energy Efficiency Tax Credit
	2 - Expand Options for Industrial Energy Efficiency Financing - Establish a State Revolving Loan Fund
	3 - Expand Education and Training for Industrial Energy Efficiency
	4 - A Call to Action - Energy Management Planning
	5 - Create a Combined Heat and Power Policy Working Group
Agriculture	1 - Create a Unified Partnership Collaboration
	2 - Provide Statewide Outreach and Training
	3 - Establish Program Funding and Producer Incentives
Public Outreach and Education	Overall - Develop a Governor-Led Community Education Initiative for Energy Efficiency and Conservation
	1 - Catalog and Share Best Practices Online
	2 - Showcase Incentive Programs Online
	3 - Support Public Outreach and Education Campaign(s)
	4 - Develop a State-Sponsored Energy Efficiency Challenge
	5 - Offer Training Opportunities

Responsibility Matrix

The Responsibility Matrix was developed to help identify organizations with the potential for EECP leadership roles. Those roles have been designated by each Team Committee as either primary – potential for active participation or secondary – contributing in a supporting nature.

Building Team Committee		
Recommendations	**Primary Organizations**	**Secondary Organizations**
Recommendation #1: STATE OF UTAH SHOULD LEAD BY EXAMPLE	Governor's Office, Office of Energy Development	State agencies, media and communication partners
Recommendation #2: SUPPORT COST-EFFECTIVE BUILDING ENERGY MANAGEMENT BY STREAMLINING BUILDING OWNERS' ACCESS AND USE OF UTILITY DATA	Office of Energy Development with support from local utilities.	Utah PSC, BOMA Utah and other commercial building groups such as NASFA, APPA and AEE Utah Chapter
Recommendation #3: INCORPORATE BUILDING ENERGY PERFORMANCE INFORMATION INTO MARKET TRANSACTIONS	Governor's Office, Office of Energy Development, Utah Department of Commerce, Real Estate Division	BOMA Utah, NAIOP, Utah Association of Realtors, Appraisal Institute, Home Builders Association, AEE - Utah Chapter, utilities, residential and commercial building efficiency stakeholders
Recommendation #4: SUPPORT AND PROMOTE STATEWIDE COMMERCIAL PACE FINANCING	C-PACE workgroups: local governments, Utah League of Cities and Towns, Utah Association of Counties, lenders	BOMA Utah, Office of Energy Development, utilities, energy efficiency industry
Recommendation #5: PROMOTE BEST PRACTICES IN NON-RESIDENTIAL BUILDING ENERGY EFFICIENCY THROUGH A STATEWIDE BENCHMARKING CHALLENGE AND RECOGNITION PROGRAM	Governor's Office, Office of Energy Development	BOMA Utah and other large commercial real estate groups, DFCM, school districts, local governments
Recommendation #6: INCREASE UNDESTANDING AND ENFORCEMENT OF CURRENT ENERGY CODE	Office of Energy Development, ICC Chapters, AIA Utah	Division of Occupational and Professional Licensing, Utah Home Builders Association, ASHRAE Utah
Recommendation #7: ADOPT CURRENT AND FUTURE ENERGY CODES	Utah Legislature	Uniform Building Code Commission and Advisory Committees, Utah Home Builders Association, ASHRAE, AEE - Utah Chapter, utilities, other interested parties

Transportation Team Committee		
Recommendations	**Primary Organizations**	**Secondary Organizations**
Recommendation #1: ADDRESS FLEET MANAGEMENT SPECIFIC ISSUES	State Fleet and Office of Energy Development	Private Fleet Managers and Trade Organizations
Recommendation #2: SUPPORT INFRASTRUCTURE DEVELOPMENT FOR ALT. TRANSPORTATION	Utah Legislature, Governor's Office, Code Officials	Representatives from electric and gas utilities, transportation non-profit organizations, state and local government
Recommendation #3: PROMOTE ALTERNATIVE TRANSPORTATION THROUGH THE PRIVATE SECTOR	Private Sector Support	UDOT, Office of Energy Development
Recommendation #4: EXPAND THE SUCCESSFUL TRAVELWISE PROGRAM	State Legislature	UDOT, Office of Energy Development, UCAIR
Recommendation #5: SUPPORT MULTI-USE DISTRICTS LOCATED BY MASS TRANSIT HUBS	State, local government and non-profit organizations along with the building community and Utah Transit Authority	Office of Energy Development, UCAIR, Metropolitan Planning Organizations
Recommendation #6: EXPAND COMMUNITY-BASED ALTERNATIVE METHODS OF TRANSPORTATION	Local government and non-profit organizations	Office of Energy Development, UCAIR

Industrial Team Committee		
Recommendations	**Primary Organizations**	**Secondary Organizations**
Recommendation #1: EXPAND OPTIONS FOR INDUSTRIAL ENERGY EFFICIENCY FINANCING – CREATE AN ENERGY EFFICIENCY TAX CREDIT	Governor's Office, Office of Energy Development	Support from State Legislature
Recommendation #2: EXPAND OPTIONS FOR INDUSTRIAL ENERGY EFFICENCY FINANCING – ESTABLISH A STATE REVOLVING LOAN FUND	Governor's Office, Office of Energy Development	Support from State Legislature
Recommendation #3: EXPAND EDUCATION AND TRAINING FOR INDUSTRIAL ENERGY EFFICIENCY	Salt Lake Community College, Applied Technology Colleges	Industry Associations, Office of Energy Development, Utilities
Recommendation #4: A CALL TO ACTION – ENERGY MANAGEMENT PLANNING	Utah Manufacturers Association, Manufacturing Extension Partnership, Utah Energy Users Association	Office of Energy Development, Utilities, Non-profits
Recommendation #5: CREATE A COMBINED HEAT AND POWER (CHP) POLICY WORKING GROUP	Office of Energy Development	Industrial Stakeholders, Department of Energy CHP Technical Assistance Partnership

Agriculture Team Committee		
Recommendations	**Primary Organizations**	**Secondary Organizations**
Recommendation #1: CREATE A UNIFIED PARTNERSHIP COLLABORATION	State Dept. of Agriculture and the Utah Farm Bureau	Support from State Legislature, USDA, OED, Conservation Districts
Recommendation #2: PROVIDE STATEWIDE OUTREACH AND TRAINING	Utah State University Ext. Service	State Dept. of Agriculture and the Utah Farm Bureau
Recommendation #3: ESTABLISH PROGRAM FUNDING AND PRODUCER INCENTIVES	Support from State Legislature, State Dept. of Agriculture, and USDA	Industry Associations, OED, Utilities

Public Outreach and Education Committee		
Recommendations	**Primary Organizations**	**Secondary Organizations**
Recommendation #1: CATALOG AND SHARE BEST PRACTICES ONLINE	Office of Energy Development	Applied Technology Colleges, Community Colleges, Department of Workforce Services, NGO's, Utilities, Corporations, Industry Trade Associations (i.e. Home Building Associations, ASHRAE, AIA, Appraisal Institute, BOMA Utah
Recommendation #2: SHOWCASE INCENTIVE PROGRAMS ONLINE	Governor's Office	Office of Energy Development and Utilities
Recommendation #3: SUPPORT PUBLIC OUTREACH AND EDUCATION CAMPAIGN(S)	Governor's Office	Office of Energy Development
Recommendation #4: DEVELOP A STATE-SPONSORED ENERGY EFFICIENCY CHALLENGE FOR INDUSTRIAL, BUILDINGS AND TRANSPORTATION SECTORS	Governor's Office	Office of Energy Development and Utilities
Recommendation #5: OFFER TRAINING OPPORTUNITIES	Governor's Office and Utah's Energy Cluster Acceleration Partnership	Applied Technology Colleges, Community Colleges, Department of Workforce Services, NGO's, Utilities, Corporations, Industry Trade Associations (i.e. Home Building Associations, ASHRAE, AIA, Appraisal Institute, BOMA Utah)

Buildings

Overview: Residential, Commercial and Institutional

Buildings are responsible for a major share of energy use in the United States. Our homes, schools, and workplaces consume energy in order to provide a comfortable environment. According to the U.S. Energy Information Administration, "... nearly 40% of total U.S. energy consumption in 2012 was consumed in residential and commercial buildings."[20]

Opportunities and Considerations

Reducing energy costs through efficiency allows homeowners, institutions, and companies to use cost savings for other purposes. Energy efficiency measures can help protect companies against vulnerability from economic fluctuations due to energy price volatility.

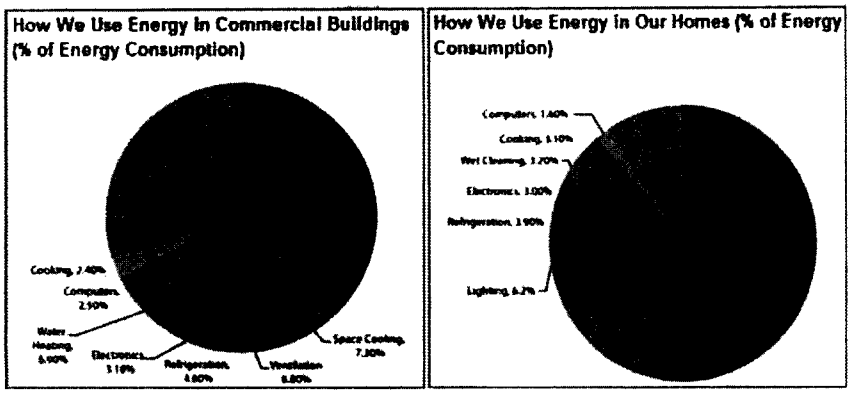


FIGURE 2 ENERGY USE IN COMMERCIAL BUILDINGS AND RESIDENTIAL HOMES
SOURCE: 2010 BUIDING ENERGY DATA BOOK

Commercial buildings account for 36% of electricity use and nearly 20% of natural gas consumption in Utah.[21] Studies show that in spite of past progress, there is potential for large energy savings in commercial buildings at a cost of less than 3 cents per kWh and $2.50 per million Btu saved.[22] Cost-effective savings are available in all major end uses: heating, cooling, lighting, refrigeration, electronic equipment and other plug loads.

Residential buildings represent over one-third of all electricity and natural gas use in Utah.[23] Significant additional energy reductions are possible through adoption of highly-efficient lighting, appliances, heating and cooling systems, and envelope improvements in new and existing buildings. Highly efficient new homes can save over 30 percent of the energy used by typical homes constructed in recent years.[24] Energy use in commercial and residential by percent of consumption is shown Figure 2.

The Buildings Committee consisted of stakeholders representing a wide range of backgrounds, including architects, contractors, non-profit and industry associations, local government, hospitals, energy managers, home builders industry and school district representatives.

Plan Recommendations

The following recommendations are the result of the Building Team Committee's group effort.

RECOMMENDATION 1: STATE OF UTAH SHOULD LEAD BY EXAMPLE

Communicate all State efforts regarding improvements to energy efficiency in State buildings to the general public, building owners and managers, and architecture, engineering and construction industries. This would be conducted through a campaign that provides full-transparency and presents building-specific case studies. This recommendation could be coordinated as part of the Education and Public Outreach effort.

How will this recommendation be implemented? This campaign would showcase the State's building energy efficiency practices, such as energy management strategies, high performance building standards, budgeting for energy efficiency retrofits, energy savings performance contracting, etc. through case studies, building tours and positive media exposure highlighting Utah's leadership. As part of the promotion, the State would provide leadership in building and retrofit design. This campaign could easily be implemented within a 6-24 month time-frame.

What are the benefits of this recommendation? This campaign demonstrates that the State is committed to using taxpayer dollars wisely by leveraging lessons learned and by identifying successful pathways to cost-effective energy efficiency. Compiling the information from multiple programs into one point of access would reduce the cost and increase the effectiveness of the campaign.

RECOMMENDATION 2: SUPPORT COST-EFFECTIVE BUILDING ENERGY MANAGEMENT BY STREAMLINING BUILDING OWNERS' ACCESS TO AND USE OF UTILITY DATA

Support and expand ongoing utility efforts to simplify customer access to their utility data. Seek cost-effective op-

Building Performance Standards: High Performance, Net Zero, LEED and Energy Star

High performance buildings greatly exceed minimum performance standards for energy conservation. The Utah Division of Facilities Construction and Management uses high performance building standards that exceed minimum standards by approximately 10%. Use of these enhanced building standards results in lower operating cost, saving Utah taxpayer dollars and reducing demand for energy.

The goal of a "net zero" building is to generate as much energy as it uses. Typically, when a building is designed as net zero, the design incorporates highly-efficient systems to reduce the amount of power and fuel needed then incorporates renewable energy measures to meet the building's remaining energy requirement. Salt Lake City's Public Safety Building was designed to meet a net zero goal.

Building certification programs, such as LEED (Leadership in Energy and Environmental Design) and ENERGY STAR, provide third-party verification of a building's design, construction, and performance. The U.S. Environmental Protection Agency's ENERGY STAR program provides non-residential building certification with energy performance in the top 25% of buildings nationwide. The U.S. Green Building Council administers the Leadership in Energy and Environmental Design (LEED) certification program, which certifies that a building is designed to achieve above-code energy costs savings and is operated at a higher than average energy efficient level.

portunities to further automate utility data access. Improving access to building energy usage data is a market-driven strategy to foster uptake of energy management practices, including energy benchmarking, and encourages additional building energy efficiency improvements. This recommendation builds on current programs underway at Rocky Mountain Power and Questar Gas to provide customers with online access to their utility data.

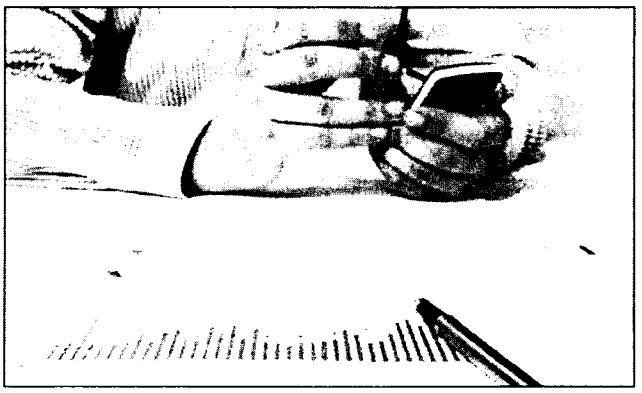
How will this recommendation be implemented?

Improve convenience of accessing utility data: Cost-effective utility data access should be automated to save time and prevent data-entry errors. This type of program is currently in place at 10 utilities nationwide.[25]

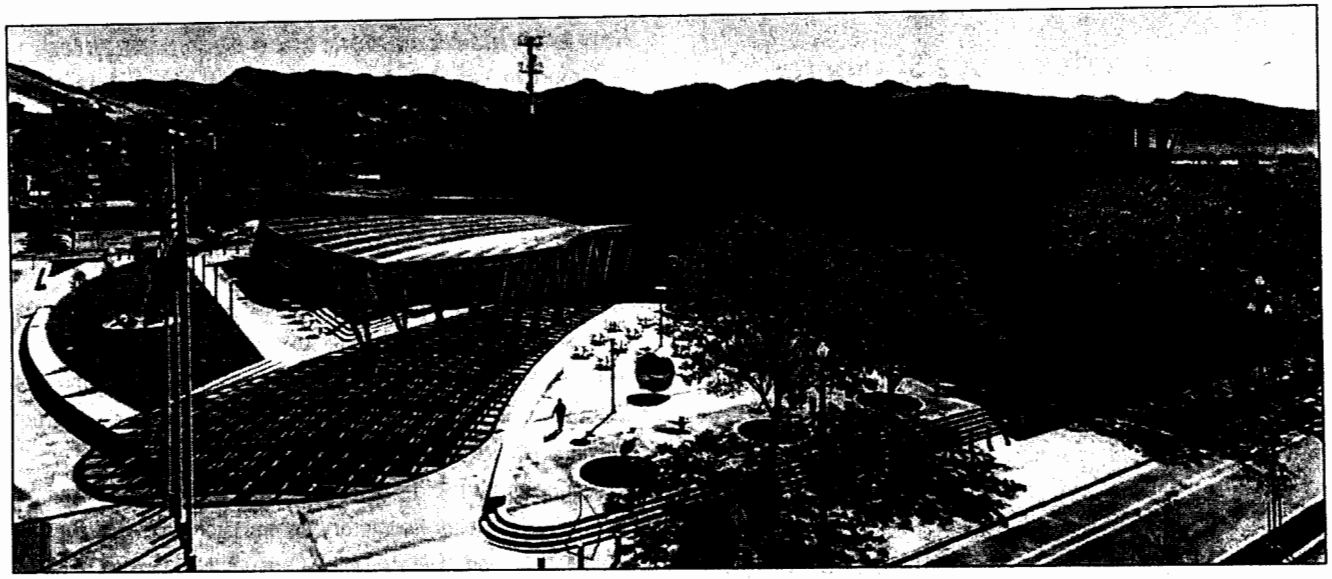
Safeguard customer privacy: For building owners with multiple tenants, obtaining permission from individual tenants can be a time-consuming process. To overcome this challenge, utilities should adopt practices to provide aggregated whole-building data for building owners and managers with multiple tenants, while maintaining individual tenant privacy. A small, but growing, number of utilities currently offer this service,[26] which is recognized by the U.S. Department of Energy,[27] the National Association of Utility Regulatory Commissioners,[28] and the National Association of State Utility Consumer Advocates,[29] BOMA International,[30] and others to be an important component for successful benchmarking and building efficiency improvements.

Increase building data and benchmarking education and training: Increase promotion of energy management practices through trainings and workshops targeted to building and facility owners/managers about how to access and use utility data to manage energy use in commercial buildings and maximize energy efficiency. Trainings could focus on steps to set up automated benchmarking (including how to access "Green Button" data), how to use energy benchmarking services like ENERGY STAR Portfolio Manager, gauging the energy performance of your buildings. The Green Button initiative, launched in January 2012, is a program that allows electricity customers to securely download their own electricity usage information in a standardized format from their utility or electricity supplier for use in energy management practices. Rocky Mountain Power offers Green Button data access.

Because similar services have been offered by other states throughout the country, best-practices and benchmark-



ANALYZING ENERGY USE BY MOBILE PHONE



SALT LAKE CITY PUBLIC SAFETY BUILDING – NET ZERO DESIGN
CREDIT: JEFF GOLDBERG

ing tools should be reviewed as part of the implementation process. Utilities should hold focus groups with building and facility owners/managers to determine what data access efforts will optimally support increased benchmarking activities and building efficiency investments.

What are the benefits of this recommendation?

Understanding and measuring building energy usage is the first step to improving building energy efficiency. Readily available access to building utility data is needed for measuring building energy use and for widespread adoption of benchmarking and building energy management practices in Utah.

Utility-sponsored benchmarking programs have been found to stimulate additional energy savings in buildings,[31 32] and may also improve the customer service experience of building owners and reduce administrative costs of implementing utility incentive programs.[33] Standardized processes that allow the utility customer to obtain aggregated energy use data can help the owner to make building-wide energy efficiency decisions.

RECOMMENDATION 3: INCORPORATE BUILDING ENERGY PERFORMANCE INFORMATION INTO MARKET TRANSACTIONS

Increase consumers' ability to use building energy performance information to accurately understand the value of energy efficient buildings. This would be accomplished through education programs for appraisers and real estate agents and also by increasing consumer awareness of the relative energy performance of homes and commercial buildings being considered for purchase or lease.

How will this recommendation be implemented? Offer continuing education classes targeted at teaching appraisers to use tools that accurately value energy efficient commercial and residential buildings. For example, the Appraisal Institute has a suite of online and in-person classes that could be leveraged through partnerships with local Appraisal Institute chapters.

Developing an educational booklet or software applications for home and commercial building buyer would help increase consumer energy efficiency awareness. It should include the following:

- Information about how to understand building performance metrics such as energy use index (EUI), HERS Rating, Home Energy Score etc.,
- Resources for local professionals who can provide industry-recognized energy efficiency measurements of homes and commercial buildings.
- Information about how building energy efficiency should be reflected in the appraisal process.

This booklet would be made available to all consumers considering leasing or purchasing a home or commercial building. This recommendation could easily be accomplished within a one year timeframe.

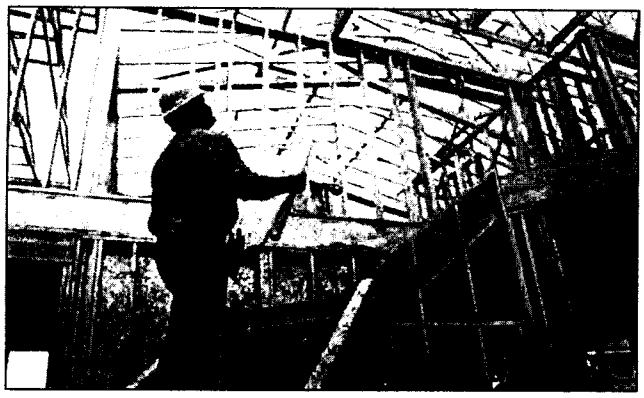
What are the benefits of this recommendation? This recommendation would help develop energy efficiency awareness for buyers, sellers, real estate agents, appraisers and other professionals engaged in real estate transactions. This

would also capture the improved value of energy efficient buildings in market transactions. This increased awareness would create a market incentive for home and building owners to increase energy efficiency.

RECOMMENDATION 4: SUPPORT AND PROMOTE STATEWIDE COMMERCIAL PACE FINANCING

Support and promote a statewide commercial Performance Assessed Clean Energy (C-PACE) financing program as per passage of Senate Bill 221 (2013), "Assessment Area Act Amendments" that helps municipalities create ordinances to allow implementation.

C-PACE programs allow building owners to finance qualifying energy efficiency and clean energy improvements through placing a voluntary assessment on their property tax bill. Property owners pay for the improvements over time through this



ENERGY EFFICIENT BUILDING DESIGN

additional charge on their property tax bill and the repayment obligation transfers automatically to the next owner if the property is sold.

Similar to a sewer tax assessment, capital provided under the C-PACE program is secured by a lien on the property, so low-interest, long-term capital can be raised from the private sector with no government financing required. C-PACE financing is a quickly growing method to finance building energy improvement across the U.S., representing over $50 million in funded projects and over $130 million in pending projects.[34]

How will this recommendation be implemented? The implementation would include:

- Review C-PACE programs that have been implemented efficiently in other states.
- Provide C-PACE specific legal, financial and programmatic guidance to municipalities. For example, a state effort targeted towards municipalities to develop resolutions/ordinances and internal procedures.
- Support program design at the local government level.
- Collaborate with utilities on marketing programs.
- Coordinate C-PACE programs among jurisdictions to foster statewide uniformity in program design, administration, marketing, etc.

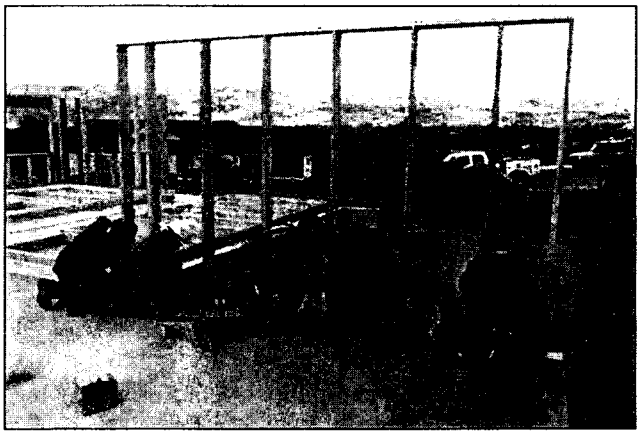
Implementation of this recommendation will likely require a multi-year effort.

What are the benefits of this recommendation? Commercial PACE financing has the potential to reduce capital constraints for commercial building energy improvements by providing competitive, long-term property-based financing. C-PACE loans are designed to provide 100% financing for improvements that reduce energy costs. This voluntary financing option could also benefit lending institutions by opening opportunities for innovate energy financing.

RECOMMENDATION 5: PROMOTE BEST PRACTICES IN NON-RESIDENTIAL BUILDING ENERGY EFFICIENCY THROUGH A STATEWIDE BENCHMARKING CHALLENGE AND RECOGNITION PROGRAM

Create a partnership between the State of Utah and non-residential building and facilities owners/managers, such as the Building Owners and Managers Association of Utah (BOMA Utah), K-12 schools, local governments and hospitals, to establish a voluntary energy efficiency benchmarking program that challenges owners and managers to reduce energy use over time and that recognizes building efficiency leadership.

How will this recommendation be implemented? The program would consist of a series of energy benchmarking competitions that challenge owners and managers to reduce energy. In partnership with utilities and energy efficiency firms, building benchmarking workshops would be provided that identify and prioritize building energy-savings opportuni-

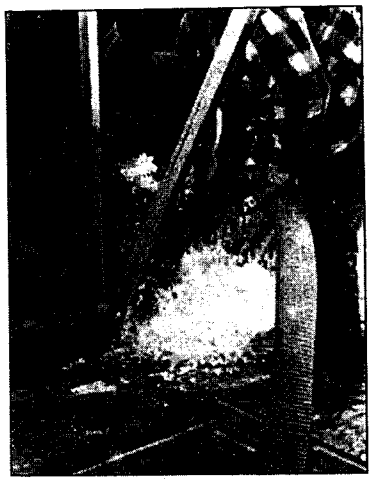


RESIDENTIAL CONSTRUCTION

CREDIT: STATE ENERGY SECTOR PARTNERSHIP

ties. This recommendation could be implemented through Public Outreach and Education Team Committee's programs.

What are the benefits of this recommendation? One of the most important outcomes of this recommendation would be to increase the number of buildings and facilities in Utah that are actively using energy benchmarking programs, such as ENERGY STAR™ Portfolio Manager, to measure their energy use, identify opportunities for energy savings, and encourage concrete actions to reduce energy consumption throughout the state. This should lead to a better understanding of how building(s) perform in the market, possibly increasing competition among energy managers and ultimately improving energy performance.



ADDING ATTIC INSULATION TO A RESIDENTIAL HOME

RECOMMENDATION 6: INCREASE UNDERSTANDING AND ENFORCEMENT OF CURRENT ENERGY CODE

Increase the effective use and enforcement of the International Energy Conservation Code (IECC) by jurisdictional authorities and the design and construction industry through ongoing and expanded education, training and credential licensure.

How will this recommendation be implemented? Expand energy code training for officials and contractors and coordinate training with all relevant stakeholders to improve understanding by design professionals, contractors and code officials about professional licensing and continuing education criteria. It is expected that this recommendation will be ongoing, with updated training as new model energy codes are adopted.

What are the benefits of this recommendation? The implementation of this recommendation will promote the development of a highly-trained workforce that is conversant with the latest energy codes.

RECOMMENDATION 7: ADOPT CURRENT AND FUTURE ENERGY CODES

Adopt current and future International Energy Conservation Codes in full, amending out only provisions that can be proven to not pay for themselves on a cash flow basis or life cycle cost-effective basis (safety items should be measured independently from this calculation). Create and communicate, especially to the design and construction industries, a clearly scheduled process for potentially amended portions of the code.

How will this recommendation be implemented? Use and enhance the existing structure of Architectural and Mechanical Advisory Committees (advisory to the Uniform Building Codes Commission) and Uniform Building Code Commission to study changes to the IECC and make recommendations for adopting and amending energy codes in Utah. Regularly scheduled reviews should be conducted as model energy codes are published.

When an energy code change is proposed, permit time to study or adopt in phases. This would allow educators, design professionals, contractors, code officials and owners time to become educated on new features. Invite ICC Code Development Committee participation in Advisory and Ad Hoc Committee deliberations. This recommendation is anticipated to be an ongoing program.

What are the benefits of this recommendation? Energy efficient building practices implemented at the time of new construction are often considered to be the most cost-effective method in attaining energy efficiency over the 50-100 year lifetime of buildings. It is easier and more cost-effective to implement energy efficiency practices when a new home or commercial building is being built, rather than trying to retrofit later.

Alternative Transportation

A Sector in Transition

Utah's transportation requirements are significant, consuming one-third of total energy use in the state, as shown

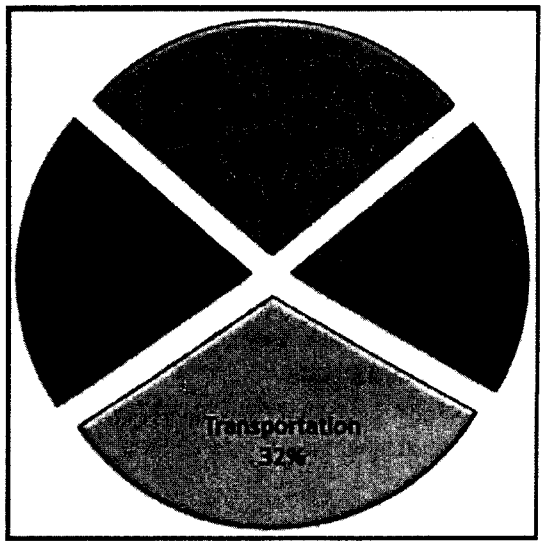


FIGURE 3 ENERGY CONSUMPTION BY END USE
CREDIT: UTAH GEOLOGICAL SURVEY

in Figure 3.[35] Passenger travel and freight movement account for the bulk of the energy demand. However, this is a sector undergoing change. New transportation technologies and programs are expanding rapidly and could provide support for more efficient fleet options, alternative fuel choices, and greater opportunities for mass transit.

Opportunities and Considerations

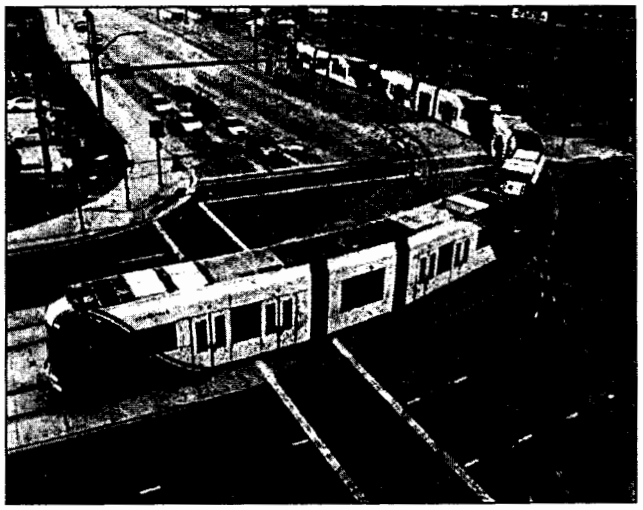
In recent years, Utah has recognized the importance of alternative transportation options. The State is often cited in national publications as leading the nation in the number of compressed natural gas fueling stations per capita.[36] Three examples of recent lead-by-example State transportation initiatives include:

- **Executive Order EO/005/2012—Automotive Idling Reduction:** This Executive Order was issued to reduce fleet idling by State employees;
- **Multi-state Memorandum of Understanding (MOU):** Governor Herbert signed a MOU that supported a joint solicitation, multi-state Request for Proposal that aggregated annual fleet vehicle procurements to promote functional and affordable CNG vehicles; and,
- **Executive Branch Memo:** The memo was sent to all state agencies to review vehicle requirements and to consider an expanded state fleet role for hybrid electric or CNG vehicles.

The recommendations presented above direct the State to focus on expanded fleet diversification and increased transportation efficiency efforts. In a similar manner, in order to fully support transportation sector efficiency, the Team Committee sought to identify best practices and opportunities in technology, infrastructure development, and alternative modes of transportations.

Plan Recommendations

The Transportation Team Committee was fortunate that several of the members have also been involved with transportation issues as part of the Wasatch Choice for 2040. The Team Committee members represented state and local government, non-profit organizations, private sector participants and fleet managers. The diversity of backgrounds helped spur idea generation and resulted in the following recommendations for transportation-specific energy efficiency and conservation projects and programs.



TRAX TRAIN
CREDIT: RICHARD GREEN

RECOMMENDATION 1: ADDRESS FLEET MANAGEMENT SPECIFIC ISSUES

Provide outreach and education programs for fleet managers directed at increasing transportation diversity and efficiency.

How will this recommendation be implemented? Offer workshops for fleet directors to develop a business case for energy efficiency that can be broken down by fleet type. To support this program, create a Fleet Ambassador Program that would provide oversight and workshop specific support. This would include, under existing State's administrative rule, addressing right-sizing of vehicle fleets as a Lead-by-Example action for fleets statewide. It is anticipated that an outreach program could be started within one year. It is expected that programs would continue over a multi-year timeframe.

What are the benefits of this recommendation? Fleet rightsizing is a practice that can help build and maintain sustainable and fuel-efficient fleets. Providing targeted information to fleet managers through a peer-to-peer network will help this group of professionals make informed fleet choices and will support Utah's leadership in fleet efficiency.

RECOMMENDATION 2: SUPPORT INFRASTRUCTURE DEVELOPMENT FOR ALTERNATIVE TRANSPORTATION

In order to realize the future benefits offered by alternative transportation, fueling infrastructure expansion should be supported through incentives, outreach, additional funding and standardization in codes and licensure.

How will this recommendation be implemented? There are several ways that this recommendation could be implemented. These include:

COMPRESSED NATURAL GAS VEHICLE
CREDIT: QUESTAR GAS COMPANY

- Modify incentives to address transportation-specific issues, such as site preparation,
- Promote expansion of infrastructure to encourage multiple fuel types,
- Incentivize trucks stops to adopt electrification,
- Provide expanded funding for the existing grant and loan program through special plates or fees, and,
- Standardize codes and licensure, such as NFPA 52 AND 58 (Fire Marshall – natural gas and propane).

It is anticipated that the implementation of actions identified in this recommendation would require a multi-year effort.

What are the benefits of this recommendation? Diversification of vehicle fuel options increases energy security, provides opportunities for fleet restructure, and could reduce impacts to the environment. In order to realize this diversification, there is a need to expand public charging and fueling infrastructure for all-electric and CNG vehicles.

RECOMMENDATION 3: PROMOTE ALTERNATIVE TRANSPORTATION THROUGH THE PRIVATE SECTOR

Private sector involvement will support wider adoption of advanced transportation technologies. This recommendation presents multiple opportunities to development public-private partnerships.

How will this recommendation be implemented? While it is recognized that there are numerous approaches that could be used to develop public-private partnerships in this sector, two examples are listed below:

- Encourage corporate buy-in through discounts and incentives such as Chamber of Commerce membership discounts, tax credits and revenue sharing, and
- Expand the Utah Department of Transportation's (UDOT) TravelWise program to promote and incentivize businesses which support mass transit and alternative transportation (tied in with Recommendation 5).

It is anticipated that implementation could begin within a one-year timeframe, but would take multiple years to fully adopt.

What are the benefits of this recommendation? This would support a Call-to-Action theme throughout the private sector to encourage greater involvement in transportation issues and increase collaboration between public-private entities.

RECOMMENDATION 4: EXPAND THE SUCCESSFUL TRAVELWISE PROGRAM

Expand the successful TravelWise program. To address transportation challenges created by state growth, the Utah Department of Transportation developed TravelWise – a set of strategies that encourage Utahns to use alternatives over driving alone.[37]

How will this recommendation be implemented? TravelWise could be expanded through a focused marketing campaign directed in collaboration with the Utah Clean Air Partnership (UCAIR). Such a campaign would include messaging specific to Idle-Free Campaigns, Clear-the-Air Challenges and various private sector programs such as those run by the Utah Transit Authority and the Jazz Green Team. Development of transportation efficiency champions under this program presents another opportunity. In addition, a toolbox could be created to support access through local schools and which would contain K-12 level messaging.

It is anticipated that this program could be expanded within a few months based upon the availability of increased funding.

What are the benefits of this recommendation? This program would encourage individuals, businesses, communities and organizations to implement TravelWise strategies in an effort to reduce energy consumption, optimize mobility and improve air quality, ultimately improving the quality of life in Utah.

RECOMMENDATION 5: SUPPORT MULTI-USE DISTRICTS LOCATED BY MASS TRANSIT HUBS

Development of multi-use districts that are located by mass transit hubs should be supported to ensure that future housing and commercial projects take full advantage of opportunities in mass transit. Additionally, this urban-planning focus also supports walking and bike paths within the design concept.

How will this recommendation be implemented? To support multi-use districts, planning and collaboration would be required by State, local government and non-profit organizations along with the building community through workshops and outreach. Adoption of form-based codes will be a key element in evolution of planning for multi-use type of districts. One tool that could support implementation through the cities would be the Wasatch Choice 2040 toolbox. It is anticipated that this will be a multi-year effort.

What are the benefits of this recommendation? While this approach to planning is being implemented in a few areas, this recommendation would expand those efforts statewide. Form-Based Code considers the many components in plan development. Unlike traditional zoning which tends to segregate the use of space, Form-Based Codes take into account the form and design of buildings, streets, parking, and open spaces, making it a pleasant place to live, work, and play.[38]

RECOMMENDATION 6: EXPAND COMMUNITY-BASED ALTERNATIVE METHODS OF TRANSPORTATION

Programs like Salt Lake City's successful bike share program should be supported and expanded. Community-based alternative modes of transportation allow cities to engage a wide range of the population in low-cost and sustainable transportation options.

How will this recommendation be implemented? To implement bike-sharing on a larger scale, additional funding and outreach should be provided. The funding could be obtained through fundraising campaigns carried out by non-profit organizations or local government. Because bike share and other programs have been launched in some Utah cities, implementation of similar programs could be readily adopted in a fairly short timeframe.

What are the benefits of this recommendation? Bike sharing is an innovative transportation program, ideal for short point-to-point trips providing users the ability to pick up a bicycle at any self-serve station and return it to any other bike station located within the system's service area.[39] The program helps educate a community on options to move traditional modes of transportation.

Industrial

Industry - Backbone of Utah's Economy

According to the 2013 Utah Manufacturing Industry Profile, Utah's manufacturing industry is currently the State's third-largest employer and comprises the largest payroll through employment of about 114,700 workers on an average monthly wage of $4,240 (22% higher than the statewide average monthly wage).[40] This sector benefits from some of the lowest energy prices in the nation; however, energy costs can make up a significant portion of company operating expenses, which is often a substantial controllable cost to the facility and why energy efficiency matters to this sector.

GREENBIKE STATION
CREDIT: SALT LAKE CITY

Utah Industrial Energy Profile

Utah's industrial sector is made up of a diverse set of industries including: food, paper products, chemicals, metals, minerals, machinery, electronics, mining and construction. Energy is consumed in the industrial sector for a variety of purposes, such as processing, assembly, steam, heating, cooling, pumping, pneumatics and lighting. Figure 4 shows the breakdown of energy consumption by end-use, from all fuel sources combined for all industrial facilities in the U.S. Census Region West, which includes Utah.

Nationally, the industrial sector is the largest consumer of energy, consuming approximately one third of total delivered energy.[41] In Utah, the industrial sector is second only to transportation in its consumption of energy at 28% of total primary energy.[42]

U.S. DEPARTMENT OF ENERGY PLANT TOUR
CREDIT: OAK RIDGE NATIONAL LABORATORY

Plan Recommendations

The following recommendations were developed by a diverse committee of industrial sector stakeholders, such as trade associations, industry, higher education, engineering firms, utilities and manufacturing. The recommendations provide opportunities to promote increased adoption of energy efficiency and conservation practices and could strengthen the competitiveness of Utah's industry as a whole. The recommendations cover the following themes: Energy Management Planning, Education and Training, Financing, Utility Demand-side Management, and Combined Heat and Power.

RECOMMENDATION 1: EXPAND OPTIONS FOR INDUSTRIAL ENERGY EFFICIENCY FINANCING – CREATE AN ENERGY EFFICIENCY TAX CREDIT

Introduce an industrial energy efficiency tax credit as a percentage of project installation costs to incentivize industrial energy users to invest in energy efficiency.

How will this recommendation be implemented? Set clear criteria for proposed efficiency projects. The recommended criteria could include a simple project payback period of less than 10 years, not including other types of credits, incentives, or grants and should establish a minimum project cost and a maximum credit cap. The proposed tax credit would:

- Be based on the percentage of the total project cost for qualifying projects and claimable upon project completion and approval;
- Be available statewide and complement existing utility programs;
- Be offered for a variety of fuel types (electricity, natural gas, diesel, etc.); and,
- Include Combined Heat and Power (CHP) technology that meet defined performance standards.

The program would likely take several years to reach maturity and require state legislation to implement.

What are the benefits of this recommendation? The credit would complement existing energy efficiency programs

Industrial Energy Efficiency in Action: 2013 Industrial Energy Efficiency Challenge Awards

On March 27, 2013 the Utah Industrial Energy Efficiency Challenge and the Office of Energy Development recognized three Utah industrial firms for their remarkable successes in reducing energy demand through energy efficiency initiatives.

Fresenius Medical, ATK, and Boart Longyear were presented with awards during a ceremony held at the Utah State Capitol Rotunda.

Fresenius Medical, the first place award winner, is the world's largest manufacturer of dialysis treatment equipment and has had operations in Ogden for over twenty years.

The combination of a strong reduction in energy intensity and the variety and depth of energy savings projects made Fresenius the stand out award winner.

SOURCE: OFFICE OF ENERGY DEVELOPMENT

offered by utilities, but would be especially valuable to those businesses not served by utility incentive programs. The tax credit would benefit the state by increasing the energy competiveness of industrial operations. This would help increase company profitability and promote economic activity.

RECOMMENDATION 2: EXPAND OPTIONS FOR INDUSTRIAL ENERGY EFFICIENCY FINANCING – ESTABLISH A STATE REVOLVING LOAN FUND

Re-establish a State revolving loan fund for industrial energy efficiency projects. This could be structured similar to a $5 million fund that was established in 2008 for school energy efficiency.

How will this recommendation be implemented? House Bill (HB) 351, which was signed in 2007, created a revolving fund to provide loans for K-12 school energy efficiency projects. The bill

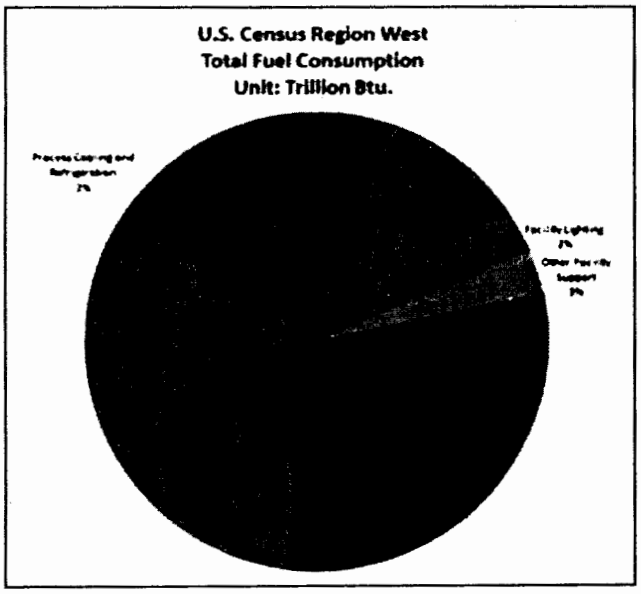


FIGURE 4 THIS FIGURE SHOWS THE BREAKDOWN OF ENERGY CONSUMPTION BY END-USE, FROM ALL FUEL SOURCES COMBINED (IN BTU), FOR ALL INDUSTRIAL FACILITIES IN THE U.S. CENSUS REGION WEST

SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION, 2010 MANUFACTURING ENERGY CONSUMPTION SURVEY (MECS).
http://www.eia.gov/consumption/manufacturing/data/2010/pdf/Table5_8.pdf

was later amended under HB 318 to include counties, cities, and towns. This recommendation proposes that either the existing fund and scope amount be expanded to include industrial sector projects or a new revolving loan fund (separate from the aforementioned fund), be established specifically for industrial energy efficiency projects. It is anticipated that the implementation of this recommendation would be a multi-year activity – from modifying legislation to development of program guidelines.

What are the benefits of this recommendation? This recommendation especially benefits companies who are not able to participate in existing utility incentive programs. Other benefits would include a potential for reduced environmental impacts such as improved emissions, as well as contributing to the deferral of energy infrastructure projects, supporting continued low energy costs. Lastly, once established, this fund would be self-perpetuating and would be sustainable into the future.

RECOMMENDATION 3: EXPAND EDUCATION AND TRAINING FOR INDUSTRIAL ENERGY EFFICIENCY

Expand opportunities to educate industrial companies about how energy efficiency increases profitability and long term competitiveness. Improve skills of the existing and future energy efficiency workforce.

How will this recommendation be implemented? Expanding or adapting existing programs, such as those offered by Salt Lake Community College and Utah Colleges of Applied Technology, to include industrial energy efficiency components. Additionally, expanding internship opportunities and job shadowing programs for industrial staff interested in energy management planning options. Holding regional seminars for upper management on current energy efficiency approaches and providing collaborative outreach through directed marketing by stakeholders to grow education opportunities within the industrial community. This recommendation could be implemented in collaboration with the Public Outreach and Education Team's recommended activities. It is anticipated that implementation could be started within a one year time-frame and would continue over multiple years through stakeholder involvement.

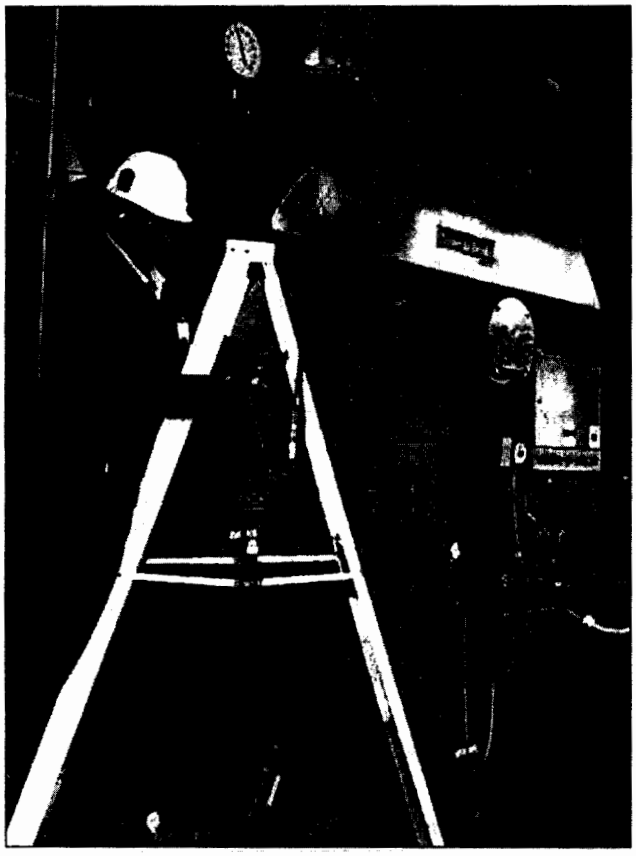
What are the benefits of this recommendation? The educational opportunities presented would advance marketable skills in energy management. These training programs could strengthen utility and trade-association partnerships as well as federal, regional and state partnerships and help bring new knowledge and a range of industrial technologies and practices to the industrial community.

RECOMMENDATION 4: A CALL TO ACTION – ENERGY MANAGEMENT PLANNING

Encourage upper-level management to develop and implement energy management plans in order to create a culture of continuous energy improvement.

How will this recommendation be implemented? Industrial customers without an energy plan would be encouraged, through a call-to-action, to voluntarily establish a facility ener-

gy management plan. Those organizations with an existing energy management plan would be encouraged to update their plan and to offer guidance to other companies. Stakeholders would be encouraged to form public-private partnerships that



STEAM EXPERT WATCHING READINGS FROM AN EXHAUST STACK
CREDIT: OAK RIDGE NATIONAL LABORATORY

would promote this call-to-action. State and regional meetings would be organized so that companies could share peer-to-peer guidance and case study examples. It is anticipated that implementation could be started within a one year time-frame and continue over multiple years through stakeholder involvement.

What are the benefits of this recommendation? An energy management plan is one of the best ways for industrial owners to lay the groundwork for consistent and strategic energy efficiency practices within their facility. Increasing the number of industrial-sector energy management plans and energy improvement projects will benefit Utah's industrial sector. Simply having a facility energy management plan often results in energy savings and economic benefits, and supports the ideal practice of continuous energy improvement at facilities. The peer-to-peer nature of this effort also promotes increased buy-in from and relationship-building within the industrial sector.

RECOMMENDATION 5: CREATE A COMBINED HEAT AND POWER POLICY WORKING GROUP

Create a CHP Policy Working Group to advance the adoption of CHP as a viable and important resource for both distributed generation and industrial energy efficiency.

How will this recommendation be implemented? Combined Heat and Power can be a complex subject involving multiple interest groups. Implementation of this recommendation could occur through the creation of a Policy Working Group. This group would focus on uniting key energy stakeholders to advance the deployment of new CHP projects by collaborating on areas of shared value and interest, including identifying barriers to expansion of cost-effective CHP projects and options for overcoming those barriers. Possible topics for consideration may include CHP-friendly standby utility rates, streamlined CHP permitting procedures, output-based emissions standards, and inclusion of CHP in utility Demand Side Management programs. It is anticipated that a Policy Working Group could be established within a few months.

What are the benefits of this recommendation? Market forces have shifted enough in the past decade, especially with the advancement of natural gas production, so that a renewed look at Combined Heat and Power may offer benefits to Utah through reduced industrial energy costs, improved emissions and benefits to increased distributed energy production. This policy working group would work to collaboratively and incrementally make practical changes to help move CHP deployment forward in Utah.

Agriculture

Food for Thought-Agriculture's Impact in Utah

Utah's agriculture sector is a major contributor to the state's economy. Utah agriculture production and processing accounts for $17.5 billion in total economic activity or 14.1 percent of the state's total gross domestic product (GDP).[43] The agriculture sector employs nearly 80,000 workers and contributes $2.7 billion in local wages and salaries.[44] This sector supports urban and rural areas through $285 million in state and local taxes.[45] Much like energy, this is a core sector that affects all other sectors.

Opportunities and Considerations

In the past, agriculture production and processing have largely been under-represented with respect to efficiency and

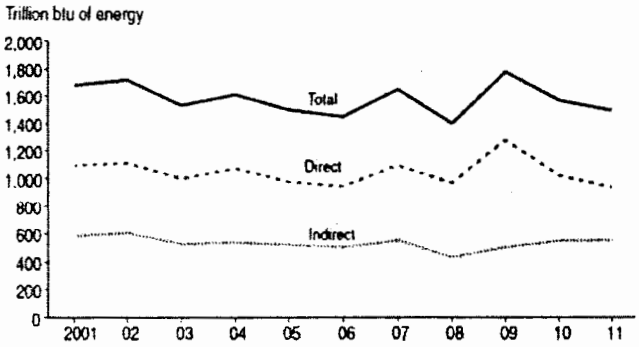


FIGURE 5 ENERGY CONSUMED ON U.S. FARMS, 2001-2011
SOURCE: U.S. DEPARTMENT OF AGRICULTURE

conservation programs, including incentives, education and outreach. "The agricultural sector is one of the most energy-intensive sectors of our nation's economy, relying on direct sources of energy, such as fuels or electricity that power farm activities, and indirect energy sources, such as fertilizers or other agricultural chemicals".[46] National farm-based energy consumption, both direct and indirect, over a 10 year period is summarized in Figure 5.

When energy prices fluctuate or increase, farming communities can be adversely affected.[47] During a time in which Utah farmers and ranchers are actively looking for creative and innovative ways to remain sustainable, efforts to reduce energy expenses could have a big impact on these farms. A conservative estimate is that the national energy efficiency savings for this sector would be over 34 trillion BTUs and one billion dollars per year.[48]

Plan Recommendations

There is significant opportunity in this sector for energy efficiency and conservation. For energy measures to advance in the agricultural community, as other conservation programs have in the past, there is a need for targeted outreach, funding opportunities and partnership development. Agriculture energy programs must be designed that are sustainable, adequately funded, incentive-based and voluntary.

The Agriculture Team Committee consisted of eight members. Originally the Team Committee was part of the Industrial Team Committee, but due to the unique culture and needs of the agriculture sector, the group set up a separate committee. The Team was comprised of members that included the Utah Farm Bureau Federation, Utah Association of Conservation Districts, Utah Department of Agriculture and Food, farm equipment industry, Natural Resources Conservation Service (NRCS), OED and the State Rural Development Office. The recommendations developed address four broad themes: Programs and Partnerships; Education; Finances and Incentives; and, Technology.

RECOMMENDATION 1: CREATE A UNIFIED PARTNERSHIP COLLABORATION

It is recommended to create a unified partnership collaboration called the Energy Agriculture Team (EAT) and to develop an approach that unites the many groups that support the agricultural sector into one voice for energy efficiency and conservation on the farm.

How will this recommendation be implemented? Energy Agriculture Team members would be represented by key stakeholders and partners from local, state, and federal government; public and private utilities; non-profits; private sector; and farmers and ranchers. The agriculture community would be more likely to accept and adopt programs that are voluntary, incentive-based and promoted and administered by local outreach representatives. The EAT would discuss funding

Utah's Agriculture Sector: Natural Stewards of the Land

Utah farmers and ranchers are natural stewards of the land.[1] They make major contributions to open space, clean water, recreation, hunting and fishing through conservation measures. Utah farmers and ranchers understand the importance of developing water to sustain agriculture. Today, more than 80 percent of the state's developed water resources are managed by agriculture.[2]

Within the sector, the careful use of natural resources could be extended easily to include energy efficiency and conservation. The agricultural community is closely-tied to natural resources and will often seek to improve these resources. With targeted outreach and education, energy efficiency and conservation have the potential to positively impact this sector.

[1] Utah Agriculture Sustainability Task Force, 2011. Agriculture Sustainability in Utah.

[2] Utah Division of Water Resources, 2010. Municipal and Industrial Water Use in Utah.

and resources for other Agriculture EECP recommendations and would create metrics for measuring progress. It is anticipated that this recommendation could be implemented within a few months and would be ongoing.

What are the benefits of this recommendation? Through enhanced coordination, many of the Agriculture Team Committee's recommendations will be better realized, including partnerships, coordinated financial mechanisms and collaboration on education.

RECOMMENDATION 2: PROVIDE STATEWIDE OUTREACH AND TRAINING

It is recommended to provide workshops to farmers and ranchers locally and in person. The trainings would help develop skills needed to implement energy measures on the farm and promote a greater awareness of efficiency and conservation overall. The education efforts should be able to address the unique situations of diverse farm commodity groups such as dairy and other livestock, poultry, pork, crop, orchards, etc. This effort should support existing programs.

How will this recommendation be implemented? Provide in-person workshops through the Utah State University Extension, a proven and integral education provider for the agriculture community. The Energy Agriculture Team de-

DAIRY MILKING OPERATION

scribed in the previous recommendation would provide staffing support for the workshops. The education and training workshops would be promoted by stakeholders and should include demonstration farms, pilot trainings and technology classes. Marketing for educational programs, energy efficiency best practices, case studies and success stories should also occur through website and brochures or handouts. It is anticipated that this could be started within a one-year timeframe and be ongoing.

What are the benefits of this recommendation? Outreach and educational workshops, along with on-the-ground demonstrations, would support the adoption of energy efficiency and conservation measures by the agriculture sector.

RECOMMENDATION 3: ESTABLISH PROGRAM FUNDING AND PRODUCER INCENTIVES

Establish adequate and ongoing program funding and producer incentives to implement energy efficiency measures in the agriculture sector. Program funding is needed for education and outreach efforts, including statewide workshops, website development and brochures.

How will this recommendation be implemented? Funding sources could provide opportunities for producer incentives and for agriculture sector program outreach and implementation. Funding mechanisms for producers could:

- Provide funding for audits needed to access USDA funding. A local technical service provider would be needed to assist this effort.
- Offer grants/rebates statewide for energy efficiency and conservation projects to farmers and ranchers.
- Establish a low-interest revolving loan fund, which would provide a perpetual funding source, for farmers and ranchers to adopt energy efficiency measures. This includes using loan mechanisms that might already be in place, but expanding the programs to have an energy efficiency and conservation focus.

It is anticipated that implementation of this recommendation would occur over a multi-year period.

What are the benefits of this recommendation? Producer incentives and financial mechanisms are crucial in maintaining sustainable farm and ranching operations. While many cost factors cannot be reduced, energy is a key area where small changes can have big impacts. An initial investment for agriculture sector projects would provide momentum to springboard agriculture energy efficiency and conservation. Most agriculture sector programs are spread by word-of-mouth through producers who have had successful projects.

Public Outreach and Education

Creating Connections

Providing organized, effective and targeted outreach and education expands awareness and improves implementation of energy efficiency and energy conservation programs and

recommendations. Outreach and education can emphasize the importance of efficiency and conservation to individuals, businesses, communities and the State, teach skills to incorporate better technology, enhance awareness of energy use, and increase adoption of successful tools, techniques and programs.

Communication, Coordination and Focus

The Public Outreach and Education Team recognized a number of overarching themes that were crucial in crafting the committee's recommendations and will be valuable tools to generate additional recommendations in the future. These themes are:

- Identify Goals and Target Audience;
- Consider Convenience;
- Demonstrate Value and Effectiveness; and,
- Leverage Social Motivators.

IDENTIFY GOALS AND TARGET AUDIENCE: Develop measurable goals that distinguish between recommendations aimed at awareness versus action. Identify a clear, target audience and utilize the most appropriate media for that group.

CONSIDER CONVENIENCE: Recommendations seeking action should be as convenient as possible. This includes simplifying, clarifying and consolidating information, and making it readily available. Program design and messaging should be tailored to the specific challenges of low income and other user groups.

DEMONSTRATE VALUE & EFFECTIVENESS: Programs and incentives should have a defined return on investment with a clear explanation of costs and benefits. Metrics should be defined, whether qualitative or quantitative. Economic and non-economic values of energy efficiency improvements should be made transparent.

LEVERAGE SOCIAL MOTIVATORS: Design and deliver challenges, competitions and comparisons that connect individuals with others to drive improved efficiency and energy conservation. Understand and leverage relationships to effectively communicate messages and encourage adoption of efficiency practices, e.g. effective K-12 education will result in the education of parents by students.

Plan Recommendations

Building on the Governor's 10-year Energy Plan, the Public Outreach and Education Team generated guiding themes and recommendations for advancing effective energy efficiency and conservation public outreach and education. The Team was composed of members from media groups, government, educators, non-profit organizations and utilities. Drawing on the expertise and insights of Team members, the committee identified and prioritized practical recommendations for improving the overall engagement and education of the public and stakeholders.

OVERALL RECOMMENDATION: DEVELOP A GOVERNOR-LED COMMUNITY EDUCATION INITIATIVE FOR ENERGY EFFICIENCY AND CONSERVATION

This would be a Governor's Office "brand" that supports existing energy efficiency and conservation initiatives in the State of Utah, bringing a centralized focus to these efforts and supporting deserving programs and organizations through a credible Governor's brand.

ENERGY WORKSHOP
CREDIT: UTAH CLEAN ENERGY

RECOMMENDATION 1: CATALOG AND SHARE BEST PRACTICES ONLINE

Develop an online catalog of best practices for energy efficiency and conservation and promote it to residents, businesses and other organizations seeking information.

How will this recommendation be implemented? This recommendation will be accomplished by engaging a stakeholder team to determine categories of resources to be featured on a comprehensive website. Partners and sponsors will be identified to fund and develop a website that will serve as a clearinghouse of information to help consumers make informed decisions about energy efficiency and conservation.

What are the benefits of this recommendation? This online resource will help community members find resources they are looking for in an easy to navigate format and identify important campaigns and initiatives taking place in the State.

RECOMMENDATION 2: SHOWCASE INCENTIVE PROGRAMS ONLINE

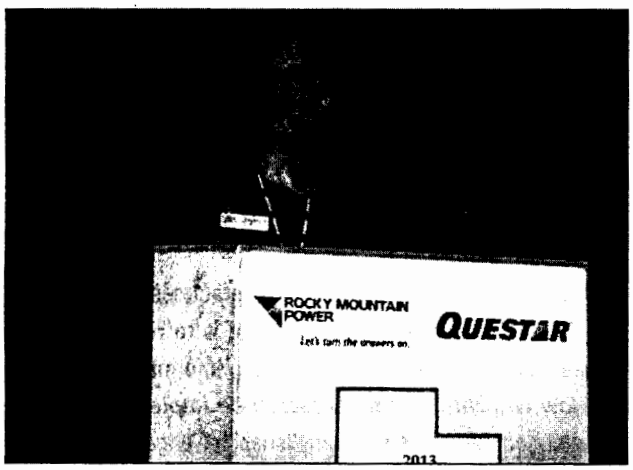
Showcase incentives and energy financing opportunities offered by government, utilities and other groups online.

How will this recommendation be implemented? Working with stakeholder groups, OED will catalog existing incentives online and provide links to the private and/or public organizations providing the incentives. A public/private partnership between government, utilities and businesses will be formed to fund and develop this online resource. It is anticipated that the development of an online showcase for incentive programs could be implemented within a one-year timeframe, dependent upon funding.

What are the benefits of this recommendation? The implementation of this recommendation will support increased participation in incentive programs and better outcomes for individuals, families, communities, businesses and industry.

RECOMMENDATION 3: SUPPORT PUBLIC OUTREACH AND EDUCATION CAMPAIGN(S)

Launch statewide education campaigns focused on increasing visibility of complementary programs in Utah and developing literacy and a culture of energy efficiency and conservation.



GOVERNOR'S ENERGY DEVELOPMENT SUMMIT 2013
CREDIT: ANDREW GILLMAN

How will this recommendation be implemented? An effective outreach and education campaign would start by identification of specific goals for various groups, such as K-12, higher education, industry, public sector and government. The campaign would work through public-private partnerships to promote utility, business and community initiatives and take lessons learned from successful programs. This would help capitalize on audiences with high potential for influencing and educating others, an example would be K-12 education programs for students who in turn educate their families and friends. The campaign should explore corporate sponsorship, grant opportunities, and public/private partnerships for funding.

It is anticipated that implementation could begin within a one-year timeframe. However, a multi-year effort will be needed to fully cover all the educational recommendations.

What are the benefits of this recommendation? Education has a key role to play in increasing adoption of energy efficiency and conservation practices. Greater awareness of opportunities will increase the involvement in energy efficiency and conservation initiatives programs for both new programs and those already in place.

RECOMMENDATION 4: DEVELOP STATE-SPONSORED ENERGY EFFICIENCY CHALLENGES FOR THE INDUSTRIAL, BUILDINGS AND TRANSPORTATION SECTORS

Engage stakeholders in healthy competition that provides opportunities for program optimization and recognition of energy champions.

How will this recommendation be implemented? Efficiency challenges would leverage existing social norming research and educational programs such as ThermWise™ or wattsmart™ to support the implementation of other energy efficiency programs. Buy in to efficiency challenges would be encouraged by sharing success stories at local levels - schools, cities etc. Best practices from successful programs could support design of new challenges. Examples of successful programs include:

- Clear The Air Challenge – a State-sponsored challenge that engaged multiple stakeholders and used competition effectively,
- Kilowatt Crackdown- an example of how to drive efficiency in the commercial building space, and,
- Energy Education for Institutions of Higher Learning - a residence halls energy efficiency competition conducted at Utah State University Eastern in Price, UT.

It is anticipated that this recommendation could be implemented within a six-month timeframe and continue over multiple years.

What are the benefits of this recommendation? The efficiency challenges will address the highlighted priorities in the Utah Energy Efficiency and Energy Conservation Plan to encourage leaders in best practices and establish a culture

Energy Education in K-12:

Foundation for an Energy Literate Future

Over 600,000 students enrolled in the K-12 education systems in the past school year.[1] Enrollment is expected to grow at an estimated 19% a year, which will increase the number of students in Utah's schools by 109,000 in under 10 years.[2]

Education provides the foundation for building an energy-literate society. School-to-home energy efficiency and conservation education programs provide an opportunity to engage parents and children to build awareness and thus influence the community on a wide scale.

Utah has been proactive on the energy education front. The first Science, Technology, Engineering and Math (STEM) Action Center has been created. This center's focus is to prioritize initiatives that will implement STEM curricula in schools and increase the number of STEM educators and professionals.

The Office of Energy Development has partnered with the National Energy Foundation (NEF) to provide energy efficiency and renewable energy education to students and teachers for many years. Through this partnership, over the past four years, complete lesson kits were provided to 340 teachers, reaching over 121,400 students. Recently, NEF has paired with the Utah Jazz Green Team to bring the Jazz Bear Mascot to K-12 schools to promote energy saving behavior.

[1] Utah State Office of Education, 2012. Utah State Public School Enrollment and Population 1976-2012 and Projected 2013-2022.

[2] Same as above.

of energy efficiency. The challenges should help to increase awareness of how energy efficiency and conservation measures benefit consumers and support a better quality of life.

RECOMMENDATION 5: OFFER TRAINING OPPORTUNITIES

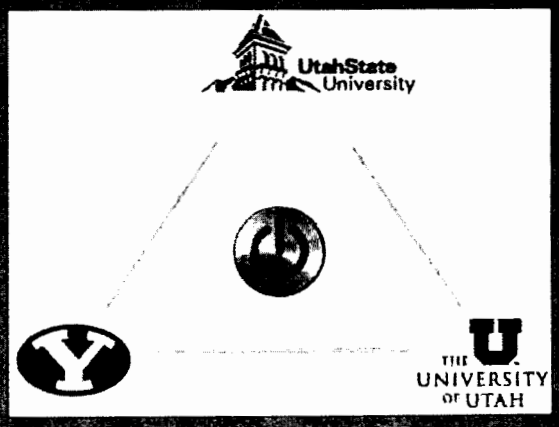
Offer targeted training and workshops online and in person to advance specific competencies, such as familiarity with new building codes.

How will this recommendation be implemented? Training opportunities would include industry recognized certification and continuing education programs such as appraiser training and residential efficiency retrofit courses. The training should engage institutions such as Salt Lake Community College and Utah Colleges of Applied Technology in collaboration with the State Energy Sector Partnership, Utah's Energy Cluster Acceleration Partnership, Manufacturing Extension Partnership, industry and other interested parties. These public-

Utah Energy Research Triangle:

A Powerful Collaboration

The Utah Energy Research Triangle is a unique component of Governor Gary Herbert's 10-Year Strategic Energy Plan. The Triangle connects world-class researchers and facilities at Utah's three main research universities into a powerful energy research collaboration. The Triangle seeks to address the challenges involved in developing Utah's substantial energy resources and supports Utah's strategy for innovation and self-reliance in energy. By developing new technology, such as in efficiency, energy production, energy transportation and energy use, we will use Utah's resources in an effective, least-cost and environmentally-sensitive manner.



private partnerships should identify what training is already available and identify gaps to develop new programs, including workshops for homeowners. It is anticipated that the implementation of this recommendation could begin within a one-year timeframe and be ongoing.

What are the benefits of this recommendation? Training programs and workshops would help provide professional development opportunities and expand energy efficiency skills across all sectors. In addition, these training opportunities would support a knowledgeable pool of candidates for the expanding energy efficiency job sector.

Efficiency, Conservation and the Environment

The Energy Efficiency and Conservation Plan, through implementation of the recommended policy and program objectives, supports the State's continued efforts to work with industry, businesses and communities to discover new ways to improve our air quality and to use water resources efficiently. Increasing the adoption of energy efficiency and conservation measures will help reduce the demand for and consumption of fossil fuels by power plants, homes, businesses and vehicles. This, in turn, will reduce pollutant emissions, help improve air quality and provide other broad environmental benefits. It will also reduce water consumption for power generation, thus conserving a precious resource in our arid state. The potential for energy efficiency and conservation programs to help lessen impacts from Utah's growing population on our environment is discussed in the following sections:

- Utah's Water-Energy Nexus, and
- Energy Efficiency: The Potential for Air Quality Improvement.

Utah's Water - Energy Nexus

Water conservation and resource development strategies are addressed for the State through the Utah Division of Water Resources (UDWRe). The division recently published a report entitled "The Water Energy Nexus in Utah"[49] that explored the relationship between water supply and energy use. UDWRe was a significant contributor to the Energy Efficiency and Conservation Plan's stakeholder process, and has provided relevant highlights from that report below.

Water provision can be a highly energy intensive. Utah's water and energy relationship is as unique as the State itself. Expenses related to water and energy have historically been quite low compared to the rest of the United States. This has in turn helped Utahns enjoy a high standard of living and a low cost of doing business. However, the state's population is growing, which will necessitate new ways of thinking about both of these resources.[50]

Utah is the second driest state in the United States, receiving an average of thirteen inches of annual precipitation.[51] Meeting future water demand will require a host of strategies and tools, not just one solution. Some of the possible approaches to meeting future water demand could require pumping water over longer distances and from greater depths. These resources could also require more rigorous treatment to reach potable drinking water standards. Reclaimed water will likely need additional infrastructure to deliver it to new points of use. Future development-oriented water resources will likely cost more and be more energy intensive than projects of the past since much of Utah's less expensive water sources have been developed.

It takes a substantial amount of energy to pump water, and the greater the flow-rate and elevation, the greater the energy requirement. For example, California's State Water Project is that state's largest energy consumer; using an average of 5 billion KWh each year to pump water over the Tehachapi Mountains. No water system in Utah is quite so large, but local water utilities do use large amounts of energy to move

WATER SUPPLY

and treat water. Pumping water is usually a utility's largest operational cost. In some rural areas of Utah, pumping groundwater for irrigation is one of the largest costs for farming and agricultural communities.

When trying to understand how much energy is consumed to acquire and use water, it is helpful to define different stages or segments of municipal and industrial water supply and consumption. Figure 6 presents a conceptual diagram of

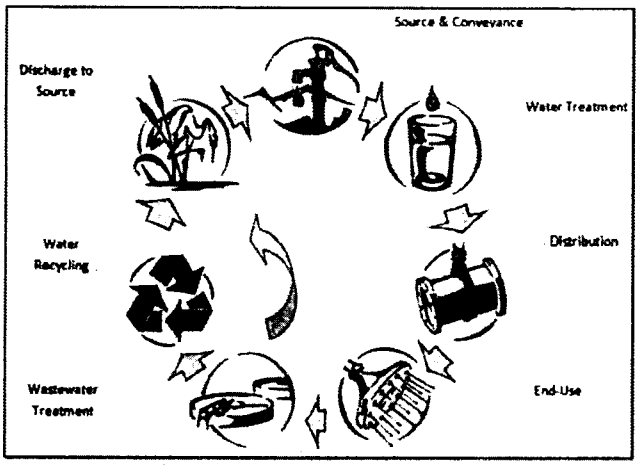


FIGURE 6 WATER SUPPLY CYCLE
SOURCE: UTAH DIVISION OF WATER RESOURCES

the breakdown of commonly occurring water supply and consumption cycle. It illustrates how water is first gathered from a source, conveyed to a point-of-treatment, and then distributed to a point-of-use. After the water is put to use, remaining water typically flows to a wastewater facility and, after treatment, flows back into the natural environment. If water reuse is utilized, additional treatment may be required before the water is eventually discharged.

Utah's topography provides residents with an important benefit – a significant portion of water supply systems use gravity to pressurize their distribution systems, which would otherwise require a great deal of energy for mechanical pumping. Additionally, some agencies use water released from reservoirs to generate electricity, which they sell or use. In order to maintain constant pressure, many municipal systems along the Wasatch Front have installed pressure reducing valves to dissipate the energy of their gravity-fed systems.

Beyond water supply, possible future requirements for wastewater treatment may lead to much more energy intensive processes to remove nutrients and other contaminants. If it is true that Utah's easily developable water supply and wastewater treatment is at an end, the issue of energy consumption takes on a new importance and should play a role when considering water and wastewater policies, guiding water planning and deciding which water projects to fund.

Energy efficiency and water conservation go hand-in-hand. A number of cost-effective energy efficiency measures such as low-flow showerheads and ENERGY STAR clothes washers and dishwashers save both energy and water. In addition, all measures that save electricity also save water through reduced water consumption in electricity generation. In Utah, it is estimated that about 0.6 gallons of water are saved for each kWh of electricity savings by households, businesses or public sector entities.

The following paragraph highlights some of the conclusions that were highlighted in the "The Water – Energy Nexus in Utah" report.

"Utah will need to confront new challenges on the horizon concerning its water and energy resources. An abundance of both resources and inexpensive pricing has led to a relaxed attitude about water and energy use. New ways of thinking about energy and water will be needed to meet future demands for both. ***When using estimated energy values to evaluate usage on a statewide scale, energy costs used for water-related services comprised about 7% of the state's total non-transportation energy budget."***

Below are suggestions from the report that could facilitate cooperative and adaptive management of water and energy resources:

Integration of Resource Management and Planning

Traditionally, water and energy resources have been managed separately. Often water use is not considered in energy research, development programs and initiatives. Similarly, energy has not often been considered of primary importance, or viewed simply as an operation and maintenance cost, when considering new water projects. Without plan-

WATER PIPELINE

ning for the energy-intensity of water over a longer time horizon, it could quickly become a more expensive resource. To this end, Utah policy makers and water and energy planners should look for ways to manage the two jointly to optimize their full potential.

The development of a statewide plan for water and energy resource planning could assist local and regional shareholders with a framework for coordination. Likewise, convening broad-based stakeholder meetings amongst local water and utility managers, state, federal, academic and other interested agencies could facilitate greater integration. Such meetings would further inform water and energy managers of what challenges lie ahead in terms of availability, meeting future demand and mitigating possible climate impacts. At the same time Utah water managers could convey to their academic and research counterparts what their needs are in terms of basic data gathering and models that would benefit both day-to-day and long-horizon water and energy plant operation.

TEACHING WATER VALUES AT HOME

Increased Funding for Basic Water/Energy Science, Data and Models

Currently, water and energy managers rely heavily on models that use a variety of parameters as vital input. U.S. Geological Survey water programs on consumption and sector uses, snow pack surveys, stream flow data, climate and air quality sensor data all figure heavily into models that help managers make decisions. There are new data needs related to water quality, groundwater modeling, and how watersheds and sub-watersheds will respond to a changing climate, which require a higher resolution than is currently available. Improved planning and decision-support tools are also needed to help both urban and more rural communities increase their resiliency and sustainability.

Foster Energy and Water Values at Home

Saving water saves energy and saving energy saves water. Heating and cooling at the end-use phase is the largest user of energy in the water supply and consumption cycle. Demand-side management for both resources is an important policy tool for achieving more sustainable levels of consumption. Additionally, incentives, conservation programs and education can have beneficial effects on consumer's pocketbooks, the environment and delaying the need for major capital improvement projects.

Expand Use of Non-traditional Water Supply

Reclaimed water and brackish water of lesser quality can be used to either replace water supplies for some applications or replace treated water completely in industrial sectors. Treatment of this non-traditional water supply requires additional energy to treat the water to a higher standard, but the total amount is generally less than that needed for development of freshwater sources. Education, research and infrastructure development for added water reuse projects should be fostered, especially if the intended use is for energy generation.

Incorporate Energy Efficiency into Water Planning

The withdrawal, conveyance and treatment of water can be highly energy intensive. When viewed over a long timeline, water planning choices made today can impact energy use immensely. Even though Utah has been fortunate to have a primarily gravity-fed water supply thus far, the future of water development is likely to be more expensive and energy intensive.

Energy planning such as utility integrated resource planning and DSM program planning can and should better incorporate water consumption impacts into the various scenarios considered. Maximizing water efficiency and savings should be one of the goals of the energy planning processes.

Energy Efficiency: The Potential for Air Quality Improvement

As Governor Herbert's 10-Year Strategic Energy Plan[52] observes, a vibrant economy is dependent on reliable and affordable supplies of energy. Energy provides the fuel that drives our transportation systems; heats, cools and lights our homes and offices; and powers our industries.

The production and consumption of energy can also have environmental impacts, particularly for air quality. From industrial operations to the consumption of petroleum by our cars and buses, these processes and actions can emit air pollutants permitted and regulated by the State of Utah under the

Governor Gary Herbert's Clean Air Action Team

Governor Herbert recently announced the creation of a Clean Air Action Team (CAAT). This diverse group of individuals will gather research, work with the public and recommend practical and effective strategies to improve Utah's air quality. Members of the CAAT come from the legislature, healthcare community, industry, local businesses, advocacy groups and research institutions, representing various perspectives on air quality.

Clean air is essential for a healthy economy and continued quality of life. Utah's air quality, while largely impacted by topography and seasonal factors, is everyone's responsibility. To that end, the CAAT will review and recommend regulatory or statutory remedies to policymakers to improve Utah's air quality statewide.

Clean Air Act (CAA). These pollutants include particulate matter (PM), oxides of nitrogen (NOx), sulfur dioxide (SOx) and carbon monoxide (CO).[53]

Meeting energy needs without compromising economic development and environmental quality is an ongoing challenge for Utah and energy efficiency could be considered as offering one strategy to meet regulatory requirements of the CAA, while also providing an opportunity to trim energy costs.

There are a number of characteristics of energy efficiency programs that present attractive opportunities when considering the overall suite of compliance measures in Utah's air quality plans. End use energy efficiency does not require large upfront capital expenditures. Energy efficiency programs are scalable and can be expanded as needed to comply with changing regulations. Moreover, because Utah already has energy efficiency policies and programs in place, emissions reductions from these programs can be counted toward compliance with air quality standards without the administrative burden of creating an entirely new compliance strategy. Finally, from an environmental perspective, energy efficiency has the added advantage of addressing multiple air pollutants simultaneously with a single strategy.

Energy Efficiency as an Air Pollution Control Strategy

There is historical precedence for incorporating energy efficiency as a compliance strategy under the Clean Air Act. Congress and the Environmental Protection Agency (EPA) have recognized the nexus between energy efficiency and reduced air emissions. Different sections of the Clean Air Act and a number of EPA rulemakings and guidance documents provide the opportunity to incorporate energy efficiency into air quality plans as a compliance measure.[54] Air quality programs that recognize energy efficiency as a compliance measure include the Title IV Acid Rain Trading Program, the NOx State Implementation Plan (SIP) Call, and the National Ambient Air Quality Standards program (NAAQS).

The Title IV Acid Rain Trading Program included an energy "Conservation and Renewable Energy Reserve" (CRER) set aside.[55] The CRER set aside 300,000 allowances that could be used for compliance by covered utilities who implemented energy efficiency or renewable energy measures. Utilities earned CRER allowances by sponsoring energy efficiency programs and by measuring and verifying the energy savings in accordance with EPA guidance and protocols.

EPA guidance on the NOx SIP Call model rule included a compliance mechanism that allows states to award allowances for emissions reductions achieved through end-use efficiency measures. In states that adopted this model rule provision, these set-aside credits were available to utilities or third parties that sponsored energy efficiency programs. The energy savings from these programs could be converted into a ton of NOx-equivalent and traded or retired for compliance purposes. EPA established a recommended list of technologies that could qualify for energy efficiency allowances, but it was up to each state to make the final determination of the energy efficiency technologies and programs that qualified for SIP credit. Several states, including Indiana, Maryland, Massachusetts, New Jersey, New York, and Ohio created energy efficiency "set-aside" pools of energy efficiency and renewable energy allowances in their NOx emissions budgets.

In July 2012, the EPA published the ***Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans*** (EERE Roadmap).[56] The EERE Roadmap clarifies prior guidance EPA issued in 2004 to jurisdictions incorporating energy efficiency and renewable energy policies and programs as compliance measures into state and tribal implementation plans for achieving NAAQS. Under this plan, States have different options or "pathways" for including energy efficiency

and renewable energy in their SIPs. The EERE Roadmap also identifies methods for estimating emission impacts, which is critical for quantification and verification purposes and getting SIP emissions credit from energy efficiency and renewable energy measures.

An opportunity exists to adopt energy efficiency as an emissions reduction measure for air quality State Implementation Plans under the NAAQS program. In allowing energy efficiency to qualify towards emissions reductions, Utah will need to address three issues. First, energy efficiency programs will require compliance entities to demonstrate a link between the efficiency measure and an individual emissions source or a group of sources. Although it can be difficult to estimate, two cities Dallas-Ft. Worth and Washington D.C. have proposed emission reductions from energy efficiency or renewable energy as a control measure in submissions to the EPA as part of their SIPs.[57] Second, state regulators and policy makers will need to determine how to accurately and reliably measure the energy savings that result from energy efficiency programs. Fortunately for Utah, the states' largest electric and natural gas utilities have robust energy efficiency programs and are required by Utah's Public Service Commission to monitor program performance and annually measure and verify energy savings achieved by these programs. Finally, once the energy savings are accurately measured, their emissions impacts must be quantified.

State and federal regulators have relied almost exclusively on pollution control strategies to improve air quality in the past. In recent years energy efficiency has increasingly been viewed by EPA as a viable emissions reduction strategy. Given the advantages it has over more traditional pollution control strategies, it make sense to further investigate and evaluate the opportunity to use energy efficiency as a first order strategy in efforts to get SIP credit in air quality plans and improve air quality.

Four suggestions are presented below that could facilitate a broader approach to regulating air and energy issues and help develop a deeper understanding of the relationship between air quality and energy production and use in Utah.

Develop a Better Understanding of the Utah Air-Energy Nexus

Developing a better understand of the Utah Air-Energy Nexus through support of a study similar to the Water - Energy Nexus in Utah would allow further exploration of the relationship between air quality and energy use.[58] This would enable energy planners and regulators to design and prioritize energy efficiency programs to address specific air quality challenges.

Support Collaboration between Air and Energy Planning In Utah

Air regulators' decisions to impose pollution controls on power plants have direct impacts on power costs and utility regulators authority to manage rates. Utility regulators approval of power plant siting decisions can expose utility customers to more stringent air emissions regulations in the future. There are regulatory synergies and efficiencies to be gained through joint discussions around resource planning strategies and costs associated with different environmental control strategies and the regulatory tools utility regulators have to minimize compliance cost. For example, such discussions could lead to utility regulators being better able to evaluate the benefits of additional energy efficiency programs against the alternative, and typically more expensive emissions control strategies air regulators would otherwise have to require.

Invest in Building Cross-Functional Energy Expertise and Modeling Capability

In order to realize air quality SIP benefits offered by energy efficiency measures, support for the development of new modeling approaches and adoption of protocols in air quality plans that will quantify emissions reductions from energy efficiency is needed. This would allow a more rigorous and systematic evaluation and enable Utah to obtain NAAQS credit for emissions reductions that result from utility and community investments in energy efficiency and renewable energy programs.

Innovate and Improve on the EPA EERE Guidance

EPA's ***Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation*** is an important first step in creating an opportunity for Utah to qualify for SIP credit for verified emissions reductions associated with energy efficiency programs. However, the EPA has evaluated emissions reductions from energy efficiency programs in the same manner as traditional stack-emissions controls. In order to improve the methodology, state regulators could review the application methodology with the agency and request that emissions reductions from energy efficiency be accounted for and credited in the same way as mobile and area emissions sources and measures.

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Reviewing Organizations

National Association of State Energy Officials
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Utah Department of Environmental Quality
Southwest Energy Efficiency Project

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Appendix A: Current Efforts in Energy Efficiency and Conservation

Below are a variety of programs through which state, federal, utility and other partners that promote efficiency and conservation:

State Government and Quasi-State Government

Utah Governor's Office

Executive Order EO/005/2012: Automotive Idling Reduction[1]: Executive order issued by Governor Gary R. Herbert to limit idling by State vehicle drivers and increase public awareness through Utah State Employees of the benefits of not idling vehicles.

Four Cornerstones (Governor Herbert's Administration Priorities)[2]: Energy is one of the four cornerstone priorities. Objective #3 states that Utah will aggressively pursue technology innovations in energy efficiency and development.

Office of Energy Development (OED)

Implementation of the Governor's 10-Year Strategic Energy Plan[3]: OED is tasked with implementing the recommendations of the Governor's 10-Year Strategic Energy Plan. The Plan includes several goals for energy efficiency and conservation.

Alternative Vehicles and Fuels Advisory Group: A committee established by OED to promote the use of alternative fuels and vehicles in the State of Utah.

Agricultural Producer Energy Efficiency Program: OED encourages energy efficiency among agricultural producers through outreach, education regarding best practices, and guidelines, grant support and energy audits.

U-Save Revolving Loan Fund: Loans of up to $1 million to help finance energy-related cost reduction retrofits for publicly owned buildings including those of state, tribal and municipal governments, public and charter schools, and public colleges and universities.

K-12 Public School Energy Efficiency Education: OED partnered with the National Energy Foundation to provide energy efficiency education to educators and students. Recent program outreach included instructional packets that emphasized energy efficiency behaviors, and lesson plans to assist in teaching household energy efficiency practices to students.

Governor's Energy Development Summit[4]: An annual event that reaches over 1,400 energy stakeholders from throughout the State and the Intermountain West. Each year, several sessions are dedicated to the latest hot topics in energy efficiency.

Department of Administrative Services - Division of Facilities Construction & Management (DFCM)

State Building Energy Efficiency Program[5]: DFCM strives to carry out the goal of improving energy efficiency while reducing the energy cost for state facilities. The program aims to reduce operating costs and lower maintenance costs, and thereby extend the life of the building equipment. The efficiency programs include:

Department of Administrative Services - Division of State Fleet

Vehicle rightsizing program: The compact sedan is the default replacement vehicle class for the State's light duty vehicle fleet. State agencies requesting a vehicle other than the compact sedan must provide vehicle justification information to state fleet officials for a larger vehicle.

Increased use of efficient hybrid vehicles: As of December 2013, the state fleet contains 578 hybrid vehicles. This represents 13% of the light duty fleet managed by the Division of Fleet Operations.

Idle reduction campaign: State fleet officials have placed signage in strategic parking locations throughout the state at facilities housing concentrations of state fleet vehicles.

Department of Environmental Quality - Division of Air Quality (DAQ)

Air Quality[6]: DAQ has an extensive program for improving air quality including an outreach and education program called "Choose Clean Air" all of which is, of course, inaddition to its regulatory authority.

Clean Fuels Program[7]: This program includes grants and loans for clean fuel vehicles and the administration of the clean fuel vehicle tax credit. Additionally, Utah Clean Diesel Program to promote emissions reduction strategies through a grant program. Finally, the program establishes guidelines for CNG retrofits including safety and emissions requirements.

Department of Natural Resources - Division of Water Resources (DWRe)

Water Conservation[8]: DWRe has a dynamic water conservation program including the Municipal & Industrial Water Conservation Plan.

Department of Commerce - Office of Consumer Services (OCS)

Energy Efficiency Outreach[9]: The Office of Consumer Services is Utah's consumer advocate in the realm of utility regulation, and

represents residential, small commercial and agricultural consumers of natural gas, electric and telephone service before the Utah Public Service Commission.

Utah Department of Transportation (UDOT)

Optimize Mobility[10]*:* UDOT is optimizing traffic mobility through a number of measures, including adding roadway capacity, innovative roadway design, managed lanes, and signal coordination. These measures conserve energy by increasing mobility and reducing congestion.

TravelWise[11]*:* The Utah Department of Transportation (UDOT) developed the TravelWise program – a set of strategies that encourage Utahans to use alternatives to driving alone, including ridesharing, car sharing, carpooling, can pooling, active transportation (biking, walking) teleworking, e-traveling and using transit. UDOT is encouraging businesses, organizations and individuals to implement TravelWise strategies in an effort to reduce energy consumption and optimize mobility.

Integrated Transportation: UDOT is actively working to best meet the needs of cars, bikes, pedestrians, mass transit and freight when studying and applying transportation solutions. UDOT strives to provide Utahans with balanced transportation options while planning for future travel demand.

Utah Transit Authority (UTA)

Increased Mass Transit Structure[12]*:* UTA's completion of the 2015 FrontRunner, Streetcar and TRAX expansion now provides more comprehensive mass transit services to a larger area.

Discounted Fare Programs to Promote Mass Transit Use[13]*:* UTA has partnered with many organizations to provide discounted fares for students and employees, and will soon make discounted fares available to all Salt Lake City residents.

Bike Program[14]*:* UTA promotes the use of bicycles to travel to and from train stations through resources and information on bicycle commuting, bike locker rental program and a bike racks on buses and trains. UTA is also a supporter of the Salt Lake GreenBike Share program, launched in spring 2013.

UTA Carpool and Vanshare Programs[15]*:* UTA has both a carpool matching program and a van share program that allows up to fifteen people to carpool together.

Enterprise CarShare Programs: UTA currently manages the contract with Enterprise CarShare, an hourly car rental service with more than two dozen locations from Ogden to Provo. Cars are located everywhere from center city streets to University campuses to UTA rail station parking lots.

RideClear Pass Program: Launched in July 2013, this program was underwritten by Zions Bank and provided 5,000 free transit passes, good for one week. July is a typically a poor air quality month (ozone), and UTA offered the passes as an alternative for those interested in trying out transit as an alternative to driving their personal vehicles.

CNG-Fueled Buses: UTA has acquired 24 new CNG buses. The CNG buses are operating on routes within the Salt Lake City area.

Utility Programs

Questar Gas Company

ThermWise™ Program - Residential[16]*:* The ThermWise™ Residential program provides tools for home energy planning as well as incentives for energy efficient natural gas appliances, new construction and weatherization measures. The program also offers comparison reports which allow customers to see how their home's natural gas usage compares to homes with similar characteristics in the neighborhood. Additional program details can be found at Thermwise.com.

ThermWise™ Program - Commercial[17]: The ThermWise™ Business prescriptive program provides incentives for business efficiency measures, retrofits, new buildings and natural gas equipment. ThermWise™ Business Custom program offers rebates for projects which are not part of the prescriptive Business programs offerings. Additional program details can be found at Thermwise.com.

Rocky Mountain Power

wattsmart™ Program - Residential[18]*:* The wattsmart™ program offers incentives for energy efficiency measures in the home.

wattsmart™ Program - Business[19]*:* The wattsmart™ program offers incentives for business efficiency measures, retrofits, new buildings, and equipment. The wattsmart™ programs are included below:

- *wattsmart™ Energy Management*[20]*:* This wattsmart™ program support energy management to create reliable and persistent electric energy savings through improved operations, maintenance and management practices in facilities.
- *wattsmart™ Energy Project Manager Co-Funding*[21]*:* This wattsmart™ programs supports commercial, industrial and agriculture customers with their facility energy efficiency projects through co-funding an Energy Project Manager position.

- *Energy Profiler Online*[22]: Energy Profiler Online monitors electricity funding and converts the data into easy to understand graphs and reports.
- *Irrigation Load Control*[23]: Rocky Mountain Power is partnering with EnerNoc to provide a long-term irrigation program that offers a pay-for-performance structure that rewards irrigations for their participation in events and their average available electricity use during program hours.
- *Business Solutions Toolkit*[24]: Online tools to provide businesses with customized information to make sound energy decisions and make money.

Cool Keeper[25]: This wattsmart™ program helps manage electricity at peak times in the summer and when electricity is the most expensive to produce or purchase.

Green Button[26]: With Green Button, customers can quickly and easily download their monthly electricity usage data through Rocky Mountain Power's secure website.

Utah Associated Municipal Power Systems (UAMPS)

Smart Energy™ Initiative[27]: UAMPS Smart Energy™ Initiative emphasizes energy conservation and wise energy development. This program helps both utilities and their customers based on best practices, energy data management, and availability of tools and resources to support energy efficiency and conservation.

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Appendix B: Abbreviations and Definitions

Btu – British thermal unit: A unit of energy traditionally used to measure power.

Buildings Sector – End-use sector comprised of residential and commercial buildings. The residential sector consists of living quarters for private households. The commercial sector consists of service-providing facilities and equipment of: businesses; federal, state, and local governments; and other private / public organizations.

CHP – Combined Heat and Power: on-site production of electricity and thermal energy from a single fuel source, most often natural gas, usually used in industrial processes to boost efficiency and save on utility costs.

CNG – Compressed Natural Gas: Methane stored at high temperature, used as an alternative transportation fuel.

DAQ – Division of Air Quality: Part of the Department of Environmental Quality and the primary agency responsible for regulating air quality and providing associated information and outreach in the State.

Demand – The amount of power consumers require at a particular time.

DFCM – Division of Facilities, Construction & Management: Division of the Department of Administrative Services responsible for overseeing the management and construction of all State buildings.

DOE – U.S. Department of Energy: The federal agency that is responsible for addressing energy, environmental and nuclear challenges through transformative science and technology solutions.

DSM – Demand-side Management: The practice of utility providers to plan, develop, implement and measure the progress of a set of programs intended to reduce customer energy use.

Dth - Decatherm: A unit of energy equal to 100,000 BTUs, primarily used in the energy industry.

DWRe – Division of Water Resources: Division of the Department of Natural Resources responsible for the planning, conservation, development and use of Utah's water resources.

EIA – U.S. Energy Information Administration: Division of the U.S. Department of Energy, responsible for gathering, analyzing and disseminating energy information.

Energy Conservation – Reducing energy through using less of an energy service.

Energy Efficiency – Producing the same services with less energy input, or delivering more services with the same energy input.

Energy Intensity – The amount of energy used in producing a given level of output or activity expressed as energy per unit of activity measure of service.

EV – Electric Vehicle: A vehicle that is powered by electric power instead of gasoline.

Fossil Fuels – Sources of energy/fuel formed by natural processes such as anaerobic decomposition of buried dead organisms. The primary fossil fuels are crude oil, natural gas and coal.

GDP – Gross Domestic Product

H.B. – House Bill: A bill that originated in a House of Representatives.

HEV – Hybrid Electric Vehicle: A vehicle that is powered by both an electric battery and a standard internal combustion engine.

Industrial Sector – An end-use sector that includes all facilities and equipment used for producing, processing, or assembling goods. The sector may include manufacturing, agriculture, forestry, fisheries, mining and construction.

IRP – Integrated Resource Planning: A report required of Utah's regulated utilities every two years by the Public Service Commission. The IRP provides a 20 year plan, with the emphasis being on the first 10, and the document must be updated every two years.

kW – Kilowatt: a unit of electrical power equal to 1,000 watts.

kWh – Kilowatt-hour: A unit of energy that is typically used by electric utilities when they bill their customers equal to 1,000 watt-hours.

Mbbl – Million barrels

MW – Megawatt: a unit of electrical power equal to 1 million watts.

MWh – Megawatt hour: A unit of energy that is typically used by electric utilities when they bill their customers equal to one megawatt of power used for one hour.

NRCS – Natural Resources Conservation Service: A federal agency that is part of the U.S. Department of Agriculture.

OCS – Office of Consumer Services: Part of the Utah Department of Commerce, responsible for advocating to the Public Service Commission on behalf of consumers.

OED – Utah Office of Energy Development: Part of the Governor's Office whose goal is to serve as the primary resource for advancing responsible energy development in Utah.

Petroleum – A naturally occurring, yellow-to-black liquid found in geologic formations beneath the Earth's surface, which is commonly refined into various types of fuels.

PSC – Utah Public Service Commission: The Commission is responsible to ensure safe, reliable, adequate and reasonably priced utility service.

Power – The amount of energy consumed per unit of time.

PV – Photovoltaic: The solar panels used to convert energy from the sun into electricity.

Renewable Energy – Energy that comes from resources which are replenished on a human – as opposed to geologic – timescale. Examples of renewable energy include: wind, solar, hydro, geothermal and biomass.

Revolving Loan Fund – A pool of money that may be loaned and when repaid may be loaned to another entity.

S.B. – Senate Bill.

STEM – Utah Science, Technology, Engineering and Math program.

Therm – A unit of energy, used to measure the potential energy for natural gas.

Transportation Sector – An end-use sector of all vehicles that transport people and/or goods from one location to another.

UAMPS – Utah Associated Municipal Power Systems: A municipal utility association that provides utility management and administration services to its members.

UMPA – Utah Municipal Power Agency: A consumer-owned electrical utility corporation that provides utility management and administration services to its members.

USDA – U.S. Department of Agriculture: A federal agency responsible for leadership on food, agriculture and natural resources for policy, science and management.

UTA – Utah Transit Authority: A provider of public transportation operating throughout the Wasatch Front and surrounding areas, providing service through fixed route buses, express buses, ski buses, light rail, commuter rail, and streetcars.

Utility – A facility that generates, transmits, distributes and sells electric energy or natural gas.

Watt – A unit of energy, equal to one joule per second, used to measure power for the electrical generation.

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