EXHIBIT C

Arkansas Alternative Energy Commission

Second Report to

Governor Mike Beebe

Senate President Paul Bookout

House Speaker Robert Moore

December 10, 2012

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EXECUTIVE SUMMARY

Recent policy developments have positioned Arkansas as a regional leader in the new Clean Energy Economy. Directives from Arkansas' Governor Mike Beebe, the Arkansas Public Service Commission, the Arkansas Economic Development Commission, the Arkansas Energy Office, the creation of the Centers of Excellence to retool our workforce, as well as the development of the Governor's State Energy Plan, combine to signal to the region, and to private investment where Arkansas see its brightest and most prosperous future. These developments demonstrate the State's continued commitment to transition our statewide economy from the traditional industrial economy of the last century to the post-industrial clean energy economy of this century. The depth of this commitment will have a direct reciprocal effect on stimulating economic development, private investment and job creation far into the future.

Arkansas' future success will depend upon the will of its political leadership, combined with legislation focused on the emerging sectors to cultivate a climate of market certainty, and send a clear signal to private investors; ultimately resulting in a more robust energy mix and a more resilient, diversified economy.

The energy market is capital intensive, often times with rates of return 20 years out into the future. The stronger the signal; the more comprehensive, and strategic the long range plan; the more direct and reciprocal the private investment to follow.

Arkansas is at a turning point. We can either choose to depend upon the traditional, built-out sectors; continue to depend upon conventional, predictable aging energy resource generation; and continue to import our energy; or choose the emerging sectors that focus on Conservation, Energy Efficiency (EE) and Renewable Energy (RE), and encourage instate energy production and economic development.

Arkansas ranks 38th in the country in energy efficiency as scored by the American Council for an Energy Efficient Economy's (ACEEE) 2011 scorecard for energy efficiency. Effectively

plugging the leaks in our statewide economy should be our highest economic development priority. Why? This approach will net the highest rates of return with the shortest payback with the least amount of initial investment.

The AAEC is pleased with the progress that Arkansas has made, and proud to have been identified as a stakeholder in the development of the state's first State Energy Plan. The Commission continues to learn of the enormous opportunities in alternative energy within Arkansas, and offers the following recommendations:

1) That Arkansas develops a State Energy Plan.
2) The Commission (re) recommends an increase in the maximum generating capacity for residential Net Metered facilities.
3) The Commission (re) recommends that Arkansas develop a statewide Feed-in Tariff.
4) That the Arkansas Energy Office develops enhanced Energy Conservation Building Codes.
5) That state agencies and utilities continue to work together to encourage the development of energy efficiency programs.
6) That Arkansas develops Alternative Financing Mechanisms to encourage EE and RE retrofit projects, such as:
    a) Property Assessed Clean Energy (PACE).
    b) The creation of a Loan Loss Reserve to serve a Statewide Revolving Loan Fund.
7) That Arkansas cultivates incentives and programs within the Bioenergy / Biofuels sectors.
8) That Arkansas develops a comprehensive natural gas (CNG) utilization plan as an alternative transportation fuel source.

OPEN LETTER FROM THE CHAIRMAN

Over the past three years, the Commission has examined a variety of issues relative to Alternative Energy, and appreciates the opportunity to participate as a stakeholder, and serve as a resource to policy makers in the development of a State Energy Plan. During 2012, the AAEC focused on several key areas including Bioenergy, Alternative / Dynamic fuel sources, Energy Efficiency, Alternative Energy Education, and Energy Conservation Building Codes.

The Commission continues to study, research, and report on 'best practices,' and technologies in the field. We greatly appreciate the assistance provided by the Arkansas Public Service Commission, Arkansas Energy Office, the University of Arkansas Cooperative, and the office of Governor Mike Beebe; as well as professional consultants, and corporations engaged in real-time alternative energy practice. The AAEC remains convinced that alternative energy in the right amounts at the right times will assure a more secure energy future and a cleaner environment; and that all segments of our state must work together to educate and make the transition to a cleaner energy economy.

As an essential element of our state's economic development effort, and future-focused vision for educational and career opportunities, alternative energy holds a promise for Arkansas to lead in this ever-evolving arena.

The members of the Arkansas Alternative Energy Commission appreciate the opportunity to serve as a resource to executive, legislative and agency policy makers, and submit these findings as part of any on-going effort to advance our state's position and role in the production and utilization of alternative energy resources.

Sincerely,

Leo Hauser

Chairman, Arkansas Alternative Energy Commission

ARKANSAS ALTERNATIVE ENERGY COMMISSION (AAEC)

The Arkansas Alternative Energy Commission (AAEC) was created by Act 1301 (see appendices A) of the 2009 session of the Arkansas General Assembly, and is comprised of 15 members representing consumers and utilities, equally appointed by the Governor, Senate President and Speaker of the House.

The AAEC is charged to study:

(1) The feasibility of creating or expanding alternative energy sources in Arkansas.

(2) The effects of the use of alternative energy sources on economic development of the state.

(3) Other issues related to alternative energy production and use and the impact of alternative energy that the commission considers appropriate.

The Commissioners wish to express our sincere appreciation to Governor Beebe for identifying the AAEC as a stakeholder in the development of the State Energy Plan over the past year. The Commission wishes to acknowledge recent accomplishments under the leadership of the legislative and executive branches, as well as the tremendous efforts put forth by state agencies for the Arkansas Economic Development Commission's (AEDC) Arkansas Energy Office (AEO) and the Arkansas Public Service Commission (PSC) relating to the emerging sectors of alternative energy, energy efficiency and renewable energy. The Commission wishes to highlight a few of the more significant accomplishments achieved in Arkansas in the alternative energy sector since our "Initial Report" to the Governor, dated, November 23, 2010:

- The PSC establishes clear guidelines and goals for energy efficiency programs.
- Creation for the Centers of Excellence at Pulaski Tech and NWA Community College toward retooling the work force in the areas of Energy Efficiency and Renewable Energy.
- The PSC's recent ruling striking "indemnity" language from the net metering interconnection contracts between renewable energy producers and the utilities, allowing

for public building owners, such as state and federal agencies, counties, municipalities and school districts to legally enter into net metering interconnection contracts without unreasonable liability.

- Arkansas Energy Office grants for energy efficiency and renewable energy projects, start-ups, and economic development in the clean energy/clean tech sectors.

The Commission continues to examine a variety of issues relative to Alternative Energy and is aware that the State is moving forward to develop a state energy plan. This awareness influenced heavily the Commission's areas of study, and focused our research and reporting on issues prompted by the State Energy Plan Survey, (see appendices E), AEDC State Energy Plan Survey AAEC Response, dated February 29, 2012; as well as by expert testimony provided by the PSC, the AEO, the AEDC, the University of Arkansas Cooperative Extension Service, and expert testimony from individuals throughout the private sector.

The Commission wishes to extend our sincerest gratitude for their expertise in the areas of the emerging sectors for alternative energy, energy efficiency, renewable energy, and including compressed natural gas as an alternative transportation fuel source. We are of the conviction that alternative energy in the right amounts at the right times will assure a more secure energy future, create jobs, retain wealth, attract private investment, create economic development, and provide for a cleaner environment. All segments of our state must work together to educate and make this transition from the business-as-usual economy of the last century to the clean energy economy of this century with Arkansas leading the way.

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RECOMMENDATIONS from "Initial Report" dated 11-23-10

Since our 'Initial Report', the Commission has reexamined the two (2) previous recommendations for Enhanced Net Metering, and for a Feed-in Tariff. The Commission recommends for these two (2) previous recommendations again:

The Commission (re) recommends a revision to the Ark. Code Ann. 23-18-603(6)(b) (see appendices S) to increase generation capacity to not more than fifty kilowatts (50 kW) for residential use or three hundred kilowatts (300 kW) for any other use.

The Commission (re) recommends the state develop a Feed in Tariff.

The Commission (re) recognizes the need for the review of issues relating to alternative energy. Several such issues were identified and introduced in our 'Initial Report' as "Suggestions for Further Study":

- Energy efficiency program objectives relating to cost effectiveness for planning and operational purposes. In November of 2007, the first energy efficiency programs were introduced by the investor owned electric and natural gas utilities pursuant to the Rules for Conservation and Energy Efficiency Programs of the PSC. In July of 2009, the programs were renewed, and in July of 2010, the first comprehensive programs were introduced. Cost effectiveness has been a requirement since the adoption of the initial rules, and in July of 2011, the PSC adopted its Technical Resource Manual and established rules governing the evaluation, measurement, and verification process to examine the performance of all approved programs including consideration of the cost effectiveness of the existing, and any proposed programs. The cost effectiveness of the programs is a component of the PSC's review of the programs proposed by the utilities. The PSC has provided guidance regarding comprehensiveness and cost effectiveness to the utilities and has ongoing proceedings to continue evaluation of those topics.

- Loading order of efficiency relating to alternative and existing energy sources. The AAEC has learned that Energy Efficiency is not a dispatch-able resource that can be "loaded" for the purposes of economic dispatch. However, Energy Efficiency can and does serve to reduce the amounts of capacity and energy that would otherwise be required, but for the presence of the energy efficiency programs and the associated energy savings.

- Balancing energy efficiency with reliability, universality and affordability. In July of 2011, the PSC established specific performance goals for the electric and natural gas energy efficiency and conservation programs. The utility performance relative to the Commission's, goals is now a consideration in the PSC's evaluation of existing programs and in its review and approval of proposed utility energy efficiency programs.

- Economic disincentives currently faced by utilities when promoting energy efficiency. In December 2010, the PSC authorized utilities to modify the energy efficiency cost recovery rider to include recovery of the lost contribution to fixed costs. Beginning in July of 2011, the energy efficiency cost recovery rider has included a component to recover the lost contribution to fixed costs due to declines in usage caused by the energy efficiency programs. This serves as a de-coupling mechanism that directly addresses the disincentive. Further, the PSC has also approved modifications to include recovery of incentives for utilities that meet and exceed the PSC's goals, and recovery of those amounts began in November of 2012. Therefore, the disincentive issue has been addressed by the PSC.

- Short-term and long-term rate recovery mechanisms for participating entities. Since November 2007, each utility has recovered the costs of its energy program portfolio through the energy efficiency cost recovery rider which provides for the recovery of the program costs. Beginning in 2011, the PSC approved modifications to the energy efficiency cost recovery rider to also include recovery of the lost contribution to fixed costs and performance incentive payments. Therefore the recovery mechanisms have been established.

- Coordinating energy efficiency efforts with non-utility efficiency programs. Arkansas has seen the development of many energy efficiency programs such as the American Recovery and Retrofit Act (ARRA-stimulus funds), Qualified Energy Conservation Bonds (QECB's), Community Development Block Grants (CDBG's) that went toward energy efficiency improvements on municipal buildings, at least one instance of the creation of a municipal revolving loan funds for funding energy efficiency improvements, and the Home Energy Assistance Loan (HEAL) Arkansas program.

- Existing residential buildings codes for both rural an urban areas. The Arkansas Energy Office (AEO) has been conducting Energy Code Workshops across the state to educate building professionals about the 2009 IECC that will likely be deployed in the summer of 2013. Arkansas will then join 32 other states with more stringent energy codes.

- Manufacturer incentives to encourage adoption of energy efficiency measures. Since November of 2007, a number of energy efficiency programs offered by the utilities specifically target manufacturers, as well as other commercial and industrial customers. A number of these larger consumers of energy have participated in these programs.

- Consumer-based incentives, including low-interest revolving loans, rebates and tax incentives. A number of energy efficiency programs approved by the PSC include rebates for energy efficiency measures. The AEO and ADFA are considering a statewide revolving loan fund as an alternative financing mechanism at lower interest rates for borrowers interested in pursuing energy efficiency measures.

- On-bill Financing as a financial tool for cost-effective energy efficiency.

- General Disclosure Policies to ensure that consumers are fully informed as to the source of their energy.

- State Interconnection Policy Standards to encourage utility participation and ensure reliable energy resources from alternative and renewable energy producers. There were specific

federal interconnection standards adopted through the Public Utilities Regulatory Policy Act of 1978 (PURPA). Additionally, in 2002 the PSC adopted the rules for net metering which set interconnection standards for net metering facilities in Arkansas.

• Renewable Energy Access policies to examine the rights of both property owners and energy producers in relation to existing provisions of state and local governments, historic districts, and homeowner / property associations.

RECOMMENDATIONS from "Second Report" dated 12-09-12

The Commission recommends for the development of a State Energy Plan in 2013, as a basis for Arkansas to effectively participate in the alternative energy marketplace.

The Commission recommends that State Agencies, such as the Arkansas Public Service Commission (PSC), and the Arkansas Economic Development Commission's (AEDC) Arkansas Energy Office (AE) support and encourage the combined development and implementation of cost effective Energy Efficiency programs and strategies; and continue efforts to mitigate the persistent barriers for Energy Efficiency investments.

- A reduction in energy consumption through conservation, and energy efficiency measures would liberate money in the economy that could be used for other purposes.
- Arkansas ranks 38th in the country in energy efficiency as scored by the American Council for an Energy Efficient Economy's (ACEEE) 2011 scorecard for energy efficiency. Although the state is improving its ranking and is a leader in the Southeast region in energy efficiency, there continues to be potential for improvement in overall energy efficiency.
- The U.S. average residential energy consumption is approximately 920 kWh/mo. The Arkansas average is approximately 1107 kWh/mo. Arkansas is 20% higher than the national average. These are opportunities to improve upon the state's average monthly residential energy consumption.
- The total expenditure on electricity in Arkansas was approximately $3.5 billion in 2008.

Of that total, approximately $1.6 billion was for residential customers. Therefore, a ten percent reduction would yield savings of approximately $350 million overall and approximately $160 million for residential customers. Likewise, a twenty percent reduction would yield approximately $700 million overall and approximately $320 million for residential customers.

The Commission recommends that the Arkansas Energy Office continue to develop and enhance Energy Conservation Building Codes.

- The Arkansas Energy Office (AEO) is currently hosting Energy Code Seminars across the state to educate building professionals about the 2009 IECC International Energy Conservation Codes to be deployed in 2014.
- Building Codes are consumer protection mechanisms and including Energy Codes.
- Building Codes protect the public welfare and safety.
- Building Codes protect the insurance and finance sectors from unnecessary loss of life or of real property due to negligence, or greed.
- Energy Codes ensure that the building owner is aware of the monthly operational costs in energy consumption to own and operate their building - similar to Miles Per Gallon (MPG) standards when buying a new car.
- 32 other states have more stringent Energy Codes than Arkansas.

The Commission recommends that the State develop alternative financing mechanisms to encourage energy efficiency and renewable energy retrofit projects.

1) ***Property Assessed Clean Energy (PACE)***

- Would allow building owners to finance Energy Efficiency improvements at a lower interest rate.
- The participants repay the borrowed loan amount as a line item assessment thru their county assessor's office.

- The loan amount stays with the property, and does not follow the borrower in the event the property is sold or changes hands.
- Default rates are low, typically between 1 and 3 percent.
- The program is voluntary.
- The Real Estate, Finance and Insurance sectors should support PACE since it captures investment in real property through value added Energy Efficiency improvements, which translate into more value, higher resale, and higher commissions.

2) A Loan Loss Reserve to leverage the creation of a Statewide Revolving Loan Fund, (RLF).

The Commission recommends the creation of a statewide district for the purpose of achieving more attractive bonding capacity to encourage investors, while achieving more attractive interest rates for potential borrowers.

The Commission recommends that these alternative financing mechanisms be centralized through a single state agency, or the Arkansas Development Finance Authority (ADFA). ADFA would be responsible for development, bonding, marketing, deployment, and defaults.

The Commission recommends that ADFA apply the Qualified Energy Conservation Bonds (QECB) to create a Loan Loss Reserve to leverage the creation of a statewide Revolving Loan Fund as an alternative financing mechanism to encourage Energy Efficiency and Renewable Energy retrofit projects.

The Commission recommends that Arkansas develop and expand Bioenergy / Biofuel opportunities in Arkansas particularly given our abundant resources in agriculture and forestry.

The Commission recommends incentives and programs to encourage investments for:

- **Feedstocks, and Biomass feedstock supply chains;**
- **Biorefineries for producing Biofuels;**
- **Biopower for Stand-alone power, Co-firing;**

- **Co-generation; and biochar coproducts.**
- There are several commercial-scale bioenergy opportunities for Biorefineries, particularly for drop-in Biofuels; Biopower for co-firing; Co-generation; and Integrated Biorefineries, Combined Heat and Power (CHP) operations; as well as bioenergy and biochar coproducts.
- Action is needed for expanded efforts to attract Bioenergy projects and investment, and including a pilot Renewable Portfolio Standard (RPS) program.
- Arkansas needs an updated statewide feedstock assessment; Assessments of co-firing potential at Arkansas' four (4) coal-fired power plants; as well as support for farm-scale litter-to-heat-and-char systems.

The Commission recommends incentives and programs to encourage biomass and bioenergy production in Arkansas, particularly for converting low-value agricultural and forestry residuals into higher value energy products, as well as production of dedicated biomass energy crops.

- The Commission recommends support for biopower and biofuels production, as well as biothermal energy where feasible. Biopower options in Arkansas could include co-firing of biomass with coal at existing coal-fired power plants, stand-alone electrical generation from biomass, and combined heat and power (CHP), in which integration improves system efficiency. Biofuels options in Arkansas could include cellulosic ethanol or drop-in biofuels that are chemically the same as petroleum-derived liquid fuels; these biofuels could be made from a wide range of residues, purpose-grown energy crops, or even the biogenic fraction of municipal solid waste.

- Stand-alone electrical generation from biomass should be encouraged where feasible with an understanding that integration can improve efficiency significantly. If the cellulosic fermentation process is supported, then it should integrate with a host to improve

efficiency, for example, the pulp and paper industry in Arkansas may be a good fit for lignin precipitation, and further processing into biomass fuels.

- Oil-seed for Arkansas may make sense if feedstock is grown on marginal land and can be contracted for a low cost.
- Gasification or catalytic pyrolysis makes sense long term, but capital costs must come down to improve returns.
- Combining biomass to coal or natural gas production of liquid drop-in fuels makes sense economically.
- Arkansas should move forward with these Bioenergy options, but state policy, incentives and programs are critical. There are several federal support programs that already exist.

The Commission recommends the State develop a comprehensive natural gas utilization plan as an alternative transportation fuel.

- Arkansas has an abundance of natural gas resources. Compressed natural gas (CNG) represents an Arkansas natural resource that can be used as viable transportation applications, thereby reducing reliance on imported petroleum-derived fuels. CNG represents significant economic opportunities for Arkansas. Using natural gas for transportation energy represents savings opportunities for consumers by mitigating rising petroleum-derived fuel costs and utilizing indigenous resources. In some applications, CNG lowers vehicle maintenance costs, increases the useful life of CNG vehicles, and is ideally suited for CNG fleet vehicles with high mileage demand.
- CNG conversions will improve air quality by lowering greenhouse gas (GHG) emissions by as much as 25% per CNG vehicle conversion. Therefore, CNG supports improved environmental air quality through reduced smog emissions.
- The utilization of indigenous natural gas for transportation energy supports Arkansas' energy security. The use of CNG would make Arkansas more energy self-sufficient, and insulate our state economy from the potential shocks of market, price or commodity volatility experienced with traditional petro-chemical products.

- Since natural gas is a domestic resource, the drilling, transport, and operations of end user distribution facilities would create long-term, high-wage jobs.
- The use of natural gas in transportation applications support the federal mandate for the United States to become energy independent, and reduce our dependence upon imported fuels. Equally, Arkansas has an opportunity to become more energy independent through the utilization of an instate resource, natural gas. This will encourage our own energy independence, and reduce our dependence upon imported fuels, and create more energy security for Arkansas.

The Commission recommends a focus on public access infrastructure projects along key transportation corridors and population centers.

The Commission recommends incentives to mitigate the capital investment barriers for CNG's entry into the market for transportation and distribution.

The Commission recommends direct incentives and programs to mitigate the capital investment barriers for the infrastructure requirements toward encouraging the conversion of government owned, high mileage fleet vehicles to CNG.

The Commission recommends incentives and programs to encourage individuals and business owners to convert their vehicles from traditional gasoline/diesel fuels to CNG.

The Commission recommends incentives to certified CNG vehicle converter/installers to mitigate costs of CNG vehicle conversions from traditional gasoline/diesel fuels.

The Commission recommends providing repayable funding strictly earmarked for CNG infrastructure projects to create demand and mitigate the capital investment barriers to CNG's entry into the market place.

The Commission recommends expansion of exiting consumer education efforts and the expansion of current curriculum-based programs, as part of an overall mission to reduce consumption, and promote career training & employment options in the field of alternative energy.

Suggestions for Further Study -- The Commission recognizes the need for the review of issues relating to alternative energy that may include the following:

Hydro and Microhydro

Geothermal

Combined Heat and Power

Waste to Energy

Measuring the jobs creation potential within each of the emerging sectors of Conservation Energy Efficiency, Renewable Energy.

Transition from coal-based to renewable / alternative energy resources

Gas-To-Liquid (GTL) and X-to-Liquid to create alternative transportation fuels.

Public / consumer, and curriculum-based education program

Background - How the Commission arrived at the "Topics for Consideration"

The Commission learned from Mr. Chris Benson, Energy Advisor, to the Arkansas Economic Development Commission, that the Governor was pursuing a State Energy Plan. Mr. Benson stated that, "This plan is not a comprehensive plan, but a loose collection of strategies to guide the State's decisions as it transitions to a sustainable economy." Coincidentally, the Commission had previously identified 24 items as "Issues to Address," and discovered that they fell into four (4) discrete categories for: Energy Efficiency, Renewable Energy, Transportation, and as they might affect Finance & Budget. The Commission identified these recommendations as our '**Alternative Energy Plan'** so as to co-exist with the Governor's State Energy Plan. This 'Alternative Energy Plan' would serve as the overarching umbrella, or main theme that the four (4) sub-categories would fall under. Energy Efficiency was the 1st sub-category identified and studied, given its least up-front cost, least complexity, which therefore ensures the best rates of

return on investment, and shortest payback. The Commission identified and ranked specific mechanisms or policy pieces for each of the four (4) main sub-categories as follows:

Energy Efficiency:

1) Create a Statewide Energy Efficiency Program, such as:
   - Loan Loss Reserve toward leveraging a Revolving Loan Fund
   - PACE – Property Assessed Clean Energy
2) Adopt enhanced Arkansas Energy Codes
3) General Disclosure Policy
4) Public Benefits for Energy Efficiency
5) Sales Tax Incentives for Energy Efficiency Equipment (this would also fall under the 4th category for Finance/Budget).
6) Consumer-based incentives, such as utility rebates, state and federal tax credits. Since November of 2007, the PSC approved a number of energy efficiency programs, which include rebates for energy efficiency measures. In July of 2011, the Commission established performance goals for energy efficiency program portfolios of the jurisdictional utilities in Arkansas.

Renewable Energy:

1) Sales Tax Incentives for Renewable Energy Equipment (this would also fall under the 4th category for Finance/Budget).
2) Interconnection policy standards were provided for renewable energy resources that were designated as qualifying facilities pursuant to PURPA in 1978.
3) Expansion of current PSC rules for net metering, to include interconnection standards for net metering facilities in Arkansas.
4) Renewable Energy Access Policies
5) Feed-in Tariff and/or a Renewable Energy Portfolio Standard (RPS)
6) Transition options that will move Arkansas from coal-based to renewable-power resources

AAEC STUDY PRESENTATIONS

APPENDICIES

ACRYNOMS & ABBREVIATIONS

ACEEE	American Council for an Energy Efficient Economy
AEO	Arkansas Energy Office
ADFA	Arkansas Development Finance Authority
AEDC	Arkansas Economic Development Commission
AESP	Arkansas Energy Sector Partnership
APSC	Arkansas Public Service Commission
ARRA	American Recovery and Reinvestment Act of 2009
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning
BGY	Billion Gallons per Year
CDBG	Community Development and Block Grant
CHP	Combined Heat and Power
CNG	Compressed Natural Gas
DOE	U.S. Department of Energy
EE	Energy Efficiency
EPA	U.S. Environmental Protection Agency
EIA	Energy Information Administration [U.S. DOE]
EISA	Energy Independence and Security Act of 2007
GHG	Greenhouse Gas
GCGW	[Arkansas] Governor's Commission on Global Warming
HB	House Bill
HVAC	Heating Ventilation and Air-Conditioning
IECC	International Energy Conservation Code
IFR	In-Forest Residues
kW	Kilowatt
kWh	Kilowatt-hour
LLR	Loan Loss Reserve
LNG	Liquefied Natural Gas

MGY	Million of Gallons per Year
MW	Megawatt [one thousand kilowatts]
MWh	Megawatt-hour [one thousand kilowatt-hours]
NG	Natural Gas
NGO	Non-Governmental Organization
NREL	National Renewable Energy Laboratory [US DOE]
NRI	National Resources Inventory [USDA]
NFS	National Sciences Foundation
O&M	Operation and Maintenance
PACE	Property Assessed Clean Energy
PSC	Public Service Commission
PURPA	Public Utility Regulatory Policies Act
PV	Photovoltaic
QECB	Qualified Energy Conservation Bond
R&D	Research and Development
RE	Renewable Energy
REC	Renewable Energy Certificate
REFIT	Renewable Energy Feed-in Tariff
RFS	Renewable Fuel Standard
RPS	Renewable Portfolio Standard
RLF	Revolving Loan Fund
SB	Senate Bill
SEER	Seasonal Energy Efficiency Ratio
SPP	Southwest Power Pool
T&D	Transmission and Distribution
USGBC	U.S. Green Building Council
WTE	Waste To Energy

AAEC STUDY SUMMARIES

(Note: all summaries are comprised of materials supplied by the presenters and have not been edited, in an effort to ensure the integrity of the message.)

July 14, 2011 -- 2011 Legislation of Possible Interest to Alternative Energy Commission, Legislative Review, Representative Kathy Webb (see appendices B).

Representative Kathy Webb graciously presented a spreadsheet listing pertinent Legislation that had been introduced to Joint Energy, and Insurance and Commerce Committees during the 2011 General Assembly. Many of these legislative items were clearly within the purview of the Alternative Energy Commissions responsibility; to study the needs and impacts of various forms of alternative energy on the economic future of Arkansas. These Senate and/or House Bills were either passed into Acts, died at Sine Die adjournment, or moved into Interim Study. To find current status for all Bills/Acts that were introduced, go to the General Assembly's Website, www.arkleg.state.ar.us.

October 20, 2011 – Strategic Energy Planning for Arkansas, Status Report, Chris Benson, AEDC Energy Policy Advisor (see appendices C).

Devise a strategic energy framework for advancing the Governor's energy policy goals. The framework is not a comprehensive state energy plan for meeting the State's energy needs, rather a collection of strategies that will help to guide the State's decisions as it transitions to a sustainable economy. The framework will be supported by a series of initiatives and actions that are realistic, measureable and actionable that the State can use to accomplish its objectives.

Strategic Energy Objectives

Develop ***Clean*** and ***Secure*** sources of energy to ***meet*** future energy demand. Participate in the clean energy market economy to encourage ***jobs creation*** and ***private investment***. Introduce ***Sustainable Initiatives*** around: ***Competitiveness; Environmental Preservation; National and State Security; Economic Growth; Reduced Costs; Innovation; and Jobs***.

Where do we go from here?

Identify strategies that advance the Governor's energy priorities. Identify stakeholders in the state who have a role to play in each of these strategies. Identify barriers to implementing the strategies. Identify initiatives that address the barriers. Select initiatives that represent the best consensus solutions for reaching objectives. Measure, verify and evaluate!!!

Strategies

Encourage the adoption of energy efficiency practices and technologies. Develop alternative transportation fuels and vehicles. Pursue sustainable policies that create jobs and investments. Encourage the development of clean electric generation.

Barriers

High up front cost for energy efficiency and renewable energy systems. Transmission access is a potential limiting factor for EE/RE. Interconnection to the utility grid is a disincentive for renewable energy and cogeneration projects. Transaction costs are high for renewable and EE projects. Lack of a skilled work force to meet market demand requirements for EE and RE services. Difficulty in measuring and evaluating EE, results in perception of high risk by financial community. The supply-demand chain that supports advanced biofuels and biopower development is not well developed. Alternative fuel vehicles lack infrastructure for refueling. Split incentives between participants, and lower their interest. Transfer of ownership before investment is recovered. Low consumer awareness/knowledge leads to poor purchase and operational decisions. Utility revenue structures provide little incentive to promote energy efficiency. Lower income consumers spend a disproportionate amount of their income on energy bills.

Strategic Challenges

Arkansas lacks coordinated policies to promote alternative energy strategies; Arkansas has an energy or resource intensive economy; Arkansas imports a large share of its annual energy requirements; Arkansas has limited resources for public investment in energy programs; Many consumers and policy makers in Arkansas lack awareness of important aspects of energy and its issues.

<u>October 20, 2011 -- Building Energy Codes for Greater Efficiency,</u> Commissioner Lolley, Executive Director, Treadwell Institute (see appendices D).

Building Codes, and including Energy Codes are consumer protection mechanisms. History tells us that the insurance sector was a driving force behind the original building codes in the late 19th and early 20th centuries in this country. Building Codes were in direct response to tragic events like the Chicago Fire. They were designed to protect and prevent loss-of-life, and loss-of-real-property from future tragic events. Similarly, the finance sector, banks, could be relied upon to support the adoption of more stringent Energy Codes. Why? Protect the homeowner and their investment by controlling the monthly operating costs in energy consumption. By ensuring that they are not throwing good money after bad, banks ensure that the home owner can more reliably meet their monthly mortgage obligation. Enhanced energy codes will add negligible costs the purchase of a new home, but will not price certain people out of the market as some who argue against Energy Codes would have us believe. In fact, enhanced energy codes save the consumer money, lots of money in the costs to own and operate their new home over the length of the average mortgage. Therefore, the economic case is overwhelmingly in favor of enhanced building energy codes.

By advancing Arkansas' State Energy Code to meet or exceed 2009 IECC would allow Arkansas to join 32 other states with more stringent Energy Codes.

<u>October 20, 2011 – Report Subcommittee – "Issues to Address,"</u> Forwarded at the Request of Commissioner Allen.

A summary list of "Issues to Address" that the Commission may wish to study. Starting where we left-off with the section in the 11/23/10 "Initial Report" that points out where Arkansas lags behind other states, and the section of "Suggestions for Further Study."

1) An energy efficiency program for Arkansas.
2) Renewable Energy Portfolio Standards (RPS)

3) A State Energy Plan
4) Compressed Natural Gas (CNG) as “alternative” transportation fuel for motor vehicles
5) Arkansas Energy Code
6) Identify Persistent Gaps and Barriers to current Arkansas Energy Programs
7) General Disclosure Policy
8) Public Benefits Funds for Energy Efficiency
9) Sales Tax Incentives for Renewable Energy
10) Sales Tax Incentives for Energy Efficiency
11) Property Tax Incentives for Renewable Energy
12) Property Assessed Clean Energy (PACE)
13) Loading Order of Efficiency Relating to Alternative and Existing Energy Sources
14) Balance Energy Efficiency with Reliability, Universality and Affordability
15) Economic Disincentives Currently Faced by Utilities for Promoting Energy Efficiency
16) Short and Long Term Recovery Mechanisms for Participating Entities
17) Coordinating Energy Efficiency Efforts with Non-Utility Energy Efficiency Programs
18) Existing Residential Building Codes for both Rural and Urban Areas
19) Manufacturer Incentives to Encourage Adoption of Energy Efficiency Measures
20) Consumer Based Incentives
21) On-bill Financing as a Tool for Cost Effective Energy Efficiency
22) State Interconnection Policy Standards
23) Renewable Energy Access Polices
24) Feed In-Tariff (added at the request of Commissioner Kindberg)

Next Steps: Attempt to prioritize this "laundry list" into a workable few issues to study.

October 26, 2011 -- U.S. Energy Information Administration, (EIA), Arkansas Energy Fact Sheet, Forwarded at the request of Commissioner Moreland (see appendices E).

December 15, 2011 -- Handout C (Revised), Topics offered for consideration by the AAEC as subject matter for 2012 studies:

Renewable Energy Plan – The plan should support the generation of alternative energy through utilization of renewable energy sources. The sources of energy, including alternative energy, should represent fuels that are reliable, available and affordable with regards to power generation. Co-generation should be a major consideration when choosing fuels and generating facility sites. Issues appearing on the "issues list" include items 9,11,22 and 23.

Renewable Energy Portfolio Standards -- The study of renewable energy portfolio standards should keenly focus on the successes and failures of other states that have already implemented such standards and examine this information against REFIT actions taken by other states. . Item 13 is included under this heading from the "issues list".

Energy Efficiency Plan -- The study of an energy efficiency plan should include the efficient utilization and generation of energy. The effective generation of energy is often left out of energy plans but is a key part of the equation of reducing the demand on fuels. The plan should also support the Governor's current energy objectives. Issus falling under this heading include items 1,3,5,6,8,10,14,15,1617,18,19,20 and 21.

Natural Gas Utilization -- Use of natural gas should be studied with uses including vehicles and commercial and industrial facilities. Natural gas is a clean burning and efficient fuel. Natural gas is also currently a cost competitive fuel especially when assuming utilization by a new generating facility. The study should focus on the long term availability of this fuel source. This information has been compiled for the utilization by the Arkansas Alternative Energy Commission AAEC Issues Committee.

January 13, 2012 -- Report-out to Commission, State Energy Plan Stakeholder Meeting with Governor Beebe, Chairman Hauser, and Commissioner Lolley.

The Commission was identified as a stakeholder by Governor Mike Beebe, and participated in a meeting with him and his energy policy team on January 13, 2012. Chairman Hauser shared general themes regarding the development of Arkansas' first State Energy Plan. The Governor outlined his "all cards on the table" approach to the State Energy Plan development process; and his desire that stakeholders address current and future Energy Mix needs in Arkansas. Also present in the meeting was Commissioner Lolley, representing Treadwell Institute, Linda Smith, representing the U.S. Green Building Council, Ellen Fennel, representing Audubon Arkansas, and two members representing the Nature Conservancy. Governor Beebe's remarks reflected his depth of knowledge on the complex subjects of energy, energy efficiency, renewable energy, and bio energy potential for Arkansas; and were complimented by his acumen regarding the role and value of coal, natural gas and nuclear energy.

Chairman Hauser encouraged the Governor's support for more consumer-based education; and the opportunity to integrate school-based curriculums focusing on alternative energy, as part of the State' effort to create 21st century economic opportunities.

Commissioner Lolley respectfully requested that the Governor incorporate the return-on-investment opportunity of Energy Efficiency as part of his energy policy efforts. Commissioner Lolley also noted that energy efficiency is a very viable new economic development tool; causing monies not exported out of state for the purchase of wasted energy to be retained and re-invested in the local economies.

<u>February 02, 2012 -- Bioenergy Opportunities in Arkansas</u>, Jim Wimberly, President, BioEnergy Systems, LLC (see appendices F).

***An Overview of Bioenergy Options & Opportunities in Arkansas* -- Summary: Bioenergy is good for Arkansas.** Bioenergy has environmental benefits; economic benefits; benefits for Arkansas' businesses; and benefits for the State.

Bioenergy can be good for Arkansas, but, bioenergy is not easy…

Bioenergy has numerous logistical challenges: biomass feedstock supply chains are complicated; the economics are, generally, not attractive…; biofuels cannot currently compete with petro-derived fuels without support programs such as the RFS2; biopower cannot currently compete with power from coal or NG.

But, current conditions are expected to change, and we should move forward now with these energy options. Public policies are critical, and several federal support programs already exist. In order to pursue commercial-scale deployment -- *We need to understand the details of bioenergy options and opportunities in order to make informed decisions about public policies that stimulate (or constrain) commercial deployment.*

Bioenergy Terminology:

Feedstocks - Plant, or animal-derived material converted in value-added products. Examples: woody biomass, such as in-forest residues (IFR), ag-field residues, dedicated energy crops, and chicken litter.

Biomass feedstock supply chain - All of the activities associated with delivery of biomass, such as crop establishment, production & harvesting, storage & transportation, and pre-processing.

Biofuels - Liquid transportation fuels made from biomass, such as drop-in fuels, cellulosic ethanol, and renewable diesel (different from oil-derived biodiesel).

First generation biofuels are produced at a biorefinery. Facility size and production is typically measured in millions of gallons per year, (MGY), from Corn-derived ethanol, and soy-derived biodiesel. The average cellulosic biorefinery size is equal to 40 MGY per year.

Biopower **-** Electricity from biomass. Biopower facilities are more suitable for base-load (like coal), and include types of facilities, such as a Stand-alone powerplant, a dedicated biomass-to-electricity generating facility, and Co-firing, (biomass fuel is used to displace a fraction of coal), "Combined heat and power" (CHP), and Co-generation ("co-gen") which is thermal energy + electricity. Most large forest products manufacturing facilities in Arkansas already have a CHP system.

Biorefineries **-** The primary driving factor is RFS2, or policy. To produce 12 Billion Gallons per year (BGY), would take at least 200 new biorefineries, or an average of 4 per state. But, given Arkansas' resource base, we should be above average.

So, how many should we plan for?

One biorefinery… Imagine a hybrid paper mill and small oil refinery - Biomass feedstocks needed ~ 500,000 dry tons / year. On average, ~ 2/3rds will come from dedicated energy crops; the balance from woody/ag residues; Capital cost: ~ $270,000,000; Revenues from product sales: ~ $120,000,000 per year; Jobs created: ~ 960 (direct) for 30 years.

H*ow might Arkansas pursue biorefineries?*

First, understand that we are competing with every neighboring state. Biorefineries have been initiated in MO, TN, MS, LA, TX, OK, & KS. Understand that project developers seek to reduce project risks. They need to reduce uncertainties regarding feedstock supply chains. Therefore, Arkansas needs an updated biomass resource assessment. The research community needs help addressing key issues.

Developers cannot move forward without project financing. How can we help them secure project financing? Developers need to know who to contact within the State. There needs to be more coordination between state agencies and the private sector. A new report from Winrock will shed more light on the economics of a hypothetical biorefinery in northeast Arkansas, due out by early March, 2013.

Biopower

There are several types of biopower facilities: A Stand-alone powerplant, which is a dedicated biomass-to-electricity generating facility; Co-firing, where biomass fuel is used to displace a

fraction of coal and still maintain same capacity and power generation; "Combined Heat & Power (CHP), and Co-generation ("co-gen") which is thermal energy + electricity.

Co-firing

There are currently 4 coal-fired powerplants in Arkansas with a total installed capacity = 4,600 MW and a typical capacity factor (CF) = 83%, or 4,600 MW x 8760 hours/year x 83% = 33,500,000 MWh/yr ~ 1,200 train loads of coal per year.

Now let us look at a 2% biomass co-firing rate at all 4 facilities… This equates to ~100 MW of biopower, requiring ~750,000 tons/year of biomass, displacing ~25 train-loads per year with home-grown fuel with a value of home-grown fuel: ~$35,000,000 and job creation: ~200 (direct) for 30 years.

But, we need more details regarding co-firing options:

Understand that co-firing capabilities are specific to each site, and therefore the ability to co-fire will vary from one power plant to another. An assessment is needed for each of the 4 sites to evaluate the technical options: What co-firing levels could that particular boiler accommodate? What are the on-site logistics & other technical considerations? Also evaluating the potential feedstock supplies: What types of feedstocks would be available for that site? How might a feedstock supply chain be established for that site? Need to evaluate the potential economics for: Capital costs; Operating costs; Potential rate impacts (at various target co-firing levels); and for determining potential job creation.

Co-firing…how might we pursue for AR?

First, undertake assessments to determine co-firing options. Coordinate between the key parties, e.g.: At the state level: AAEC, AEDC, APSC, ADEQ; With the various utilities that own/operate the generating facilities; Consider a pilot renewable power program, such as an RPS = Renewable Portfolio Standard which amounts to a state-level program requiring a fixed % of all electricity to be generated from renewables. 33 states already have some type of RPS in place and several others are considering an RPS or a pilot program approach. Look at what has recently been done in LA and other nearby states.

Combined-heat-and-char

Uses chicken litter as fuel. Generates thermal energy to displace propane for space heating. Also, produces biochar, a valuable byproduct. It is a farm-based renewable energy system. After 20 years of R&D, the technology is now available and has multiple benefits, such as economic benefits to broiler producers, economic benefits from Arkansas-based manufacturing, water quality benefits (from avoided land application of litter), and displacement of fossil fuels with renewable biomass.

What's needed to move this forward?

Support for a full-scale on-farm test & demonstration, and support (to UA) for evaluations of using biochar, which will be essential for development of biochar markets.

In summary

There are several commercial-scale bioenergy opportunities for: Biorefineries – particularly for drop-in fuels; Biopower via co-firing; Integrated biorefinery and CHP operation; as well as combined heat-and-char.

Action is needed for: Expanded efforts to attract bioenergy projects, and including a pilot RPS program; An updated statewide feedstock assessment; Assessments of co-firing potential at AR's 4 coal-fired power plants; as well as support for farm-scale litter-to-heat-and-char systems.

February 29, 2012 -- "State Energy Plan Survey," UALR's Institute for Economic Advancement Questionnaire, and Commission Response (see appendices G).

April 19, 2012 -- 2011 Arkansas Energy Code, Scott Hamilton, Director, Arkansas Energy Office (see appendices H).

Three (3) Primary Components for the current Arkansas Energy Code:

1) **Commercial:** ASHRAE 90.1-2007 (Effective January 1, 2013), updated January 2011.
2) **Residential:** IECC 2003-revising to 2009 IECC
3) **Supplements and Amendments**

The 2009 International Energy Conservation Code (IECC) Residential Energy Standard will be adopted in first quarter of 2014.

Some key differences from 2003 IECC are: Mandatory duct pressure testing, maximum leakage rates; Requirement that 50% of lamps must be energy efficient; Consolidation of zones; Improvements to basic envelope requirements; Includes optional blower door, building pressure test; and High Efficiency equipment/insulation tradeoffs.

Energy Efficiency Financing:

Currently the Arkansas Energy Office and Arkansas Development Finance Authority are evaluating a potential Residential/Small Commercial Energy Efficient Upgrade Loan Program. They are looking at one potential funding source through Qualified Energy Conservation Bond (QECB) in particular: QECB's are one of the lowest cost public financing tools issued by the Department of Treasury. QECB's are designed to fund many types of energy conservation projects. AEO and ADFA are working together to explore programs and projects to utilize QECB funding.

Currently there are not any reasonable financing options available to residents. Arkansans need some sort of low interest – extended terms to allow for the energy cost savings to offset finance payments. The outcomes from these types of financing options would result in: Lower energy demand from suppliers (utilities); Create highly favorable State sponsored programs; Could serve as a model for utilities and co-ops toward adoption; and would result in improvements to Arkansans quality of life.

April 19, 2012 -- Un-Encumbered Wealth: Liberating Money to Stimulate the Economy and Create Jobs, Michele Halsell, Managing Director, Applied Sustainability Center, UofA Sam M. Walton College of Business (see appendices I).

Sustainability & Economic Prosperity

The Applied Sustainability Center (ASC) views sustainability as a pathway to enhanced economic prosperity, while simultaneously safeguarding our environment, and promoting the

health and well-being of all Arkansans. We are taking a page from Walmart's playbook.

It's simple: Energy costs money. When you save energy, you save money.

Encumbered Wealth

There is a significant amount of money in our economy that is encumbered for utility costs: In Business and Industry; in City, County; and State Government; in Schools, Churches; Non-profits, as well as in Homes.

How much money?

Total Energy $$ Spent in 2008: In the U.S. ~$363,649,643,000 (1/3 of a Trillion dollars). In Arkansas ~$3,506,799,000. Commercial & Industrial Energy $ Spent 2008: In the U.S. ~$208,216,609,000. In Arkansas ~ $1,893,991,000. Residential Energy $$ Spent in 2008: In the U.S. ~$155,427,208,934. In Arkansas ~$1,612,820,386. Fayetteville ~$26,782,507.

Hypothesis:

A reduction in energy consumption through conservation, and energy efficiency measures would free-up, or liberate money in the economy that could be used for other purposes. This would have a positive impact on local and state economies through: Saving jobs; Increasing disposable income; Increasing sales tax collections; Reducing foreclosures; Preventing loss of equity in residential real estate markets; as well as Creating new jobs.

Saving Jobs

Through reduced operating costs for businesses, schools, churches, and government offices. The savings can be significant. For example: the UofA is saving 30% on its annual $10 million budget for utilities. How many jobs does a $3 million reduction in energy costs save?

Reducing Foreclosures & Preserving Real Estate Equity

By reducing the cost of homeownership, we are making home ownership (and operation) more affordable. For example: Sonoma, California's energy improvement district (EID) allowed home owners to make energy efficiency improvements in their homes, reducing their utility bills. The result: Sonoma had a lower incidence of home foreclosures during the mortgage crisis, preserving the equity of ALL homeowners.

Increase Disposable Income

Through reduced utility expenses, translates in an increase in disposable income. Lower energy costs cause other forms of consumer spending, such as dining-out, or discretionary purchasing, to increase. For example: N. Charleston, SC – energy efficiency for low income families has resulted in an average annual savings of $1,500 on utility bills. These families have pent up demand, and spent their $1,500 at local stores and businesses, helping to boost the local economy. Every $1 saved on utilities has > $1 impact on the local economy due to a multiplier effect.

Sales Tax Collections

When people reduce their utility bills, their disposable incomes increase. When people spend their added disposable income in their local economy, they help local businesses increase sales and stay healthy, and avoid layoffs. When businesses increase sales, the city and county collect additional sales tax.

What is the size of the opportunity?

The U.S. Department of Energy estimates that energy efficiency could meet up to 50% of the future energy needs of this country. The U.S. has potential to reduce energy use by 23% by 2020, (Granade, HC, Creyts, J, Derkach, A, Farese, P, Nyquist, S, & Ostrowski, K, 2009, "Unlocking Energy Efficiency in the US Economy.") What that tells me is that we are currently wasting a lot of energy, therefore the opportunity is significant! Arkansas ranks 41 in the country according to the ACEEE 2010 scorecard for energy efficiency. This is the 11th – highest energy consumption per real dollar of GDP in the country. This indicates a significant energy intensity, and a significant potential for improvement in overall energy efficiency.

Residential Energy Consumption

U.S. average = 920 kWh/mo ~ Arkansas average = 1107 kWh/mo. Arkansas is 20% higher than the national avg.

Energy Efficiency is the "First Fuel"

As such, it is a resource that can be "mined" just like any other. Mining this resource creates jobs. Mining this resource saves money. Mining Energy Efficiency insulates our economy & hedges against energy price increases.

Arkansas electricity expenses 2008:

Total ~$3.5 billion Total; $1.6 billion Residential. A 10% reduction = $350 million; $160 million. A 20% reduction = $700 million; $320 million. 30% reduction = $1.05 billion; $480 million.

Analogy: Our economy is leaking . . . We are leaking energy . . . We are leaking money . . . Energy in-efficiency, and rising energy prices combine to erode budgets in businesses, homes, schools, and city government.

What if . . .

Jacksonville as a community had achieved a 20-30% reduction over the past 5 years? Fayetteville as a community had achieved a 20-30% reduction? What if we were as serious about energy efficiency as the Department of Defense? It may take 10 years or longer to achieve the full potential for EE, so what are we waiting for? For energy to get more expensive?

Create New Green Jobs

To achieve a 10%, 20%, or 30% reduction usually requires some sort of investment. Someone has to do this work! In duct sealing; Air infiltration sealing; Insulation – attic, walls, floor; High SEER Air Conditioners; Higher Efficiency Furnaces, New Windows, etc.

Energy Efficiency = Jobs!

Jobs that cannot be outsourced to Pakistan or China; Jobs that pay good wages to people in your community; Wages that will also be spent in your community.

Jobs for whom?

Graduates of our Centers of Excellence; NWACommunity College; Pulaski Tech

Energy Efficiency: Engine of Economic Growth

$16.8 billion invested in energy efficiency in 6 states in the north east would result in: A $162 billion increase in economic activity over 15 years; A $99 billion increase in Gross State Product; $73 billion returned to workers through increased real household income; 51,000 new jobs over 15 years.

Energy Efficiency Standards by State:

The Arkansas Public Service Commission established an Energy Efficiency Standard for Arkansas on 12/10/2010. Arkansas became the 27th state in the nation, the only southern state,

to have an Energy Efficiency Standards. IOU's must reduce kWh sold by a total of 1.5%: ~ .25% in 2011; ~ .50% in 2012; ~.75% in 2013.

How does Arkansas' EES compare? Range is 1.5% to 26.1%: Arkansas 1.5% over 3 years; Pennsylvania 2.98% over 3 years; Iowa 6.3% over 5 years; Texas 4.08% over 12 years; Washington 11.74% over 12 years; Massachusetts 26.1% over 12 years

Arkansas Utility Incentive Programs: Helps address the financial barrier to EE retrofits:. Entergy ($18 million 2011); AEP / SWEPCO ($1.6 million 2011); SourceGas (Arkansas Western Gas); Centerpoint. Incentives include Residential, Commercial and Farm, AC replacement, insulation, duct sealing, energy audits, etc.

Summary: 20%-30% IS a stretch, but it is possible. It requires an investment (insulation, ducts, high SEER AC, LED lights). That investment creates LOCAL jobs. There are utility incentives to help offset the upfront costs. The savings result in increased disposable income that benefits the local economy.

<u>April 19, 2012 – Property Assessed Clean Energy (PACE),</u> Mark Roberston, MESA (see appendices J).

What is PACE? PACE is a local government initiative that allows property owners to finance energy efficiency and renewable energy projects for their homes and commercial buildings. Interested property owners opt-in to receive financing for improvements that is repaid through an assessment on their property taxes for up to 20 years.

PACE financing spreads the cost of energy improvements, such as weather sealing, insulation, energy efficient boilers, cooling systems, new windows, and solar installations over the expected life of the measures, and allows for the repayment obligation to transfer automatically to the next property owner if the property is sold.

PACE is unique because it: Creates badly needed local jobs; Uses private capital, not taxes or government subsidies; Saves money for building owners and increases property values; Is voluntary – not a government mandate; Promotes energy security without driving up energy costs. Avoids the need to build costly new power plants; Reduces air pollution; Is a Local

government/community initiative that creates permanent private sector jobs in America and makes our nation more energy secure by promoting energy efficiency and renewable energy projects in our homes and commercial buildings.

PACE is voluntary and community based, not mandated by Washington. It provides long term funding from private capital markets at low cost and needs no government subsidies or taxes.

PACE raises property values by making buildings less expensive to heat and cool

PACE enjoys broad bipartisan support nationwide at state and local levels.

PACE enabling legislation has been adopted by a total of 27 states.

Why PACE ? PACE solves two key barriers to increased adoption of energy efficiency and small scale renewable energy: High upfront costs; Fear that project costs won't be recovered prior to a future sale of the property. The basic energy efficiency measures can cut energy costs by up to 35%. The annual energy savings will typically exceed the cost of the PACE assessments. The upfront cost barrier actually turns into improved cash flow for owners. Like OTHER property-based assessments, PACE assessments stay with a property upon sale, until they are fully repaid by future owners who continue to benefit from the improvement measures. ***PACE*** programs provide a way for local communities to sponsor programs that meet their individual needs.

Economic Benefits Of PACE -- If 1% of U.S. homes participated in PACE, the projects would generate*: ~226,000 jobs; ~$42 billion in economic output; ~$4.2 billion in combined Federal, state and local tax revenue.

* "Economic Impact Analysis of Property Assessed Clean Energy Programs (PACE)." Study conducted by EcoNorthwest, May 2011. Go to: www.pacenow.org

Benefits of PACE -- PACE promotes energy efficiency in ways that are good for America, our municipalities, building owners and mortgage lenders.

Benefits to Our Nation: Creates permanent private sector jobs – nationwide and across a range of skills; Uses private capital for funding – NO taxes or government subsidies; Saves owners

money – lower operating costs make their buildings more valuable; Promotes energy security – without federal regulation or taxes that drive up energy costs; Avoids costly power plants – increasingly difficult to site; No budgetary impact - voluntary participants pay all fees and expenses.

Benefits to Municipalities: Permanent local jobs – as many as 10 per $1 million in spending makes communities stronger; No debt or credit risk - bonds are secured solely by the assessment payments of op-in participants; Saves money for residents – PACE is the only assessment that creates positive cash flow; Voluntary participation – building owners who opt-in if they decide healthier.

Benefits to Property Owners: No upfront cost - PACE financing spreads costs over the life of improvements; Owners save money - programs are designed to ensure annual savings exceed assessments. Assessment transfers upon sale - new owner benefits from improvements that stay with the property; Safety - assured by best practices and guidelines established to protect all program participants; Broad applicability – residential and commercial properties can use PACE; Voluntary – only opt-in participants pay assessments (and benefit from improvements); Comfort – efficient buildings are healthier and more comfortable; Benefits to Existing Lenders; Lowers default risk – improved cash flow makes it easier for owners to pay mortgages; Improves Loan-to-Value Ratio - buildings that are less expensive to operate are worth more; Safety and soundness - best practices framework developed to meet all participants' concerns. Lien risk minimized - non-acceleration of assessments in default limits senior lien PACE exposure to less than $200 per home, on average.

Protects Taxpayers and Banks – Prequalifications:

Homes must have 15% or more positive equity to qualify; Projects are limited to 10% of the home value; Prohibits acceleration of non-delinquent payments; Projects must show a positive cash flow savings compared to the cost of the PACE investment; i.e., the estimated utility bill savings must exceed the assessment payments; Requires an energy audit or feasibility study prior to approval; Requires that the work must be performed by accredited professionals. Requires that, prior to levying a PACE assessment, the local government determine that there are no signs of an inability to pay.

Strong Bipartisan Support Continues for HR 2599

May 24, 2012 -- Report-out to Commission, Stakeholder Meeting at Arkansas Energy Office, Chairman Hauser, Commissioner Lolley (see appendices K).

The Arkansas Energy Office hosted a Stakeholder meeting to participate in input process for the Ten (10) Recommendations put forth by Governor Mike Beebe. The Stakeholders were to rate the recommendations based upon their impacts and if they would help to achieve policy goals:

1) Continue Energy Efficiency Resource Standard
2) Upgrade Energy Code
3) Amend Act 1494
4) PACE Funding Mechanism
5) Amendment 89 Energy Bonds
6) CNG/Electric Refueling Stations Credits/Rebates
7) CNG Fleet Conversion Credits/Rebates
8) Solar Photovoltaic Income Tax Exemption
9) Drop-in Biofuels Income Tax Exemption
10) Clean Energy Standard

June 21, 2012 -- DynamicFuels – Conversion of Fats, Oils & Greases Into Fuel, Andy Rojeski, Vice President of Renewable Energy, Tyson (see appendices L).

Background -- Macro Factors -- Throughout the past several years, various governmental mandates (notably RFS2) emerged to drive energy independence and growth of advanced biofuels.

Context: RFS mandate initiated in 2009. It involved a variety of alternative fuels, such as Ethanol (15B), biomass-based diesel (1B), and cellulosic, and anticipated growth over time. It identified obligated parties and volume requirements based on production and significant penalties for non-compliance.

Business Challenges: CapEx needed; Training; Geography: Cold weather climates, volatile conditions; RFS administrative compliance; Pump labeling for blends >5%

Joint Venture Formation: To capitalize on the opportunity, Tyson and Syntroleum agreed to form a joint venture, Dynamic Fuels through a 50/50 partnership.

A 50% share by Tyson founded in 1935, listed on the New York Stock Exchange as TSN; a member of the S&P; FY08 Sales of $27 Billion is the world's largest processor and marketer of chicken, beef and pork, and produces in excess of 20,000 bpd of animal fats and grease annually.

A 50% share by Syntroleum with 127 U.S. and foreign patents pending/issued is a leading synthetic fuels technology developer, and with $300 Million invested in technology and development to date; has provided fuels to the Department of Energy (DOE) and the Department of Defense (DOD),

Value Proposition – Feedstock Processing -- Designed with the expectation that it could process "low cost" feedstocks into finished product, including feedstocks from animal fats oils and greases, such as Red Palm Oil, Lard, Chicken, Tallow Blend, Poultry Fat, Yellow Grease, Inedible Tallow, Edible Tallow.

Value Proposition: Obligated Parties -- Could also meet the requirements of an obligated parties with a "drop in" fuel.

Value Proposition: Premium Markets -- Eventually, Dynamic Fuels would be able to leverage its unique product properties to "value up" into premium markets, such as the U.S. Military for Aviation fuel, and Emissions-challenged vehicles; Commercial aviation; European refining and marketing companies, such as Shell premium V-Power; Renewable petrolatum; Standby generation in California; Consumer Goods, such as Soaps, and Detergents; Blend stock; and R10 (Commodity).

Process Overview: Chemistry -- Renewable diesel chemistry is completely different from biodiesel. Animal Fat – Transesterification = Biodiesel.

Biofuels Production Processes Hydrodeoxygenation + Hydrocracking = Renewable Diesel.

Process Overview: Technology -- The fuels production process leverages Syntroleum's core technology suite.

Product Properties -- Renewable Diesel vs. Biodiesel Comparison -- Only renewable diesel is chemically virtually identical to conventional diesel.

Renewable Diesel -- Combine with Hydrogen; Hydrotreat & isomerize; C3 backbone converted to naphtha and LPG; Oxygen converted to H2O.

Biodiesel -- Combine with Methanol; Esterification; C3 backbone converted to glycerin

Key Takeaway:

Renewable Diesel -- Chemically identical to the best diesel components (no aromatics or olefins); Meets the diesel spec:ASTM D975

Biodiesel -- NOT diesel; •Does NOT meet the diesel spec; •NOT fungible with diesel

Properties & Specifications: Comparison **--** Renewable diesel is chemically identical to conventional diesel with significant product advantages compared to bio-diesel.

	Biodiesel (B100)	**Renewable Diesel (R100)**
Storage stability1	weeks	months / years
Cloud point	0° C	-20 to -29° C
Copper strip corrosion	No. 3 max	No. 1
Hygroscopic	Yes	No
Cetane	47	70

Implications: Simpler handling; No heating required; Carbon-steel compatible; Simpler handling; Upgrade off-spec diesel and save $$.

Properties & Specifications: Environmental Comparison **--** In addition, renewable diesel outperforms biodiesel on various environmental properties.

	Biodiesel (B100)	**Renewable Diesel (R100)**
NOX emissions	+10%	No change
Particulate matter	-47%	-96%
PAH emissions (carcinogens)	-80%	-100%1
Carbon Monoxide	-12% (B20)	-16% (R20)
Total Unburned Hydrocarbons	-20% (B20)	-48% (R20)

Implications: Non-attainment: ok; Cleaner fuel; Safer; Better for people / environment; Better for environment / people.

Properties & Specifications: Integration & Compliance Comparison -- Can significantly reduce integration and compliance costs.

	Biodiesel (B100)	**Renewable Diesel (R100)**
•Infrastructure costs:	High cost: terminal blending	Low cost: refinery blending
•Training:	Handling training required	Not needed
•RFS contribution:	1.5 / gallon	1.7 / gallon

Implications: Compared to SME; Renewable diesel performs better; Is simpler to handle; Saves time; and saves money. Cheaper / fewer gallons needed for RFS.

June 21, 2012 -- Energy Alternatives for Arkansas, Ben Thorp, Vice President and Board Chairman, Bioenergy Deployment Consortium (BDC), (see appendices M).

Bioenergy Deployment Consortium (BDC):

Mission: To promote an efficient and sustainable bioeconomy through education and brokering partnerships.

Goal: To help companies identify and deploy successful and sustainable bio-projects that will serve them, the industry, and the world well in the future.

Goal for Today: To share logic about opportunities for Arkansas, and the belief that the reliance on fossil fuels puts our nation at risk from a defense standpoint, and from an economic standpoint. Long term, the most cost effective processes will remain standing. It is logical to support projects in Arkansas that have the best chance of being cost effective long term.

Best Solution: Energy Reduction is the easiest and lowest cost solution toward the reduction of fossil fuel use within the state. Industry provides the best opportunity and benefit since they tend to be the largest consumers of energy, and present the best opportunities to utilize Combined Heat and Power (CHP) processes for efficient energy production.

Energy Consumption by Sector -- Industry Offers an Opportunity

Industry is about 65% Efficient. If industry efficiency achieved 80% energy efficiency, it would mean a savings of 2,000 trillion BTU's for the US and 25 trillion BTU's for Arkansas. Therefore, industry is a resource. We should work with Arkansas manufacturing. It makes sense to work with the sector that is the highest energy user, who has the largest opportunities, and is highly motivated and organized, such as Tyson Foods / Pilgrims' Pride; Domtar; Murphy Oil; Georgia Pacific; Nucor; Evergreen Packaging; Riceland Foods; Clearwater Paper; Cargill; Green Bay Packaging; Alcoa; and Graphic Packaging.

The Wisconsin Model works with Industry – Focus on Energy (FOE) works with eligible Wisconsin residents and businesses to install cost-effective energy efficiency and renewable energy projects. FOE has saved $2.50 for every $1.00 spent and saves residents and businesses over $319 million annually. The FOE program is open to all sectors of the economy. FOE works with industry to help them successfully deploy good projects that would, otherwise, have not been deployed. The FOE program focuses on deployment of both best practices (off the shelf technologies) and emerging technologies. FOE has developed creative financing models that fit customer needs.

Combined Heat and Power -- Efficiency depends on Use of Waste Heat. Combined Heat and Power (CHP) projects can provide steam and electricity from biomass or fossil fuels. The Pulp and Paper Industry uses this process universally to achieve high efficiency, and therefore lower costs. There exists a very significant difference in efficiency between CHP projects that have hosts over those that are stand-alone.

Renewable Energy: It's Complicated -- A critical review of potential projects must be considered before providing state funds to promote construction. Picking the right renewable projects will serve the state well. Recommend a review committee with significant industrial make-up to review potential projects.

Suggested Criteria for Review Process: Four Critical Factors --

1) Ensure that low cost feedstock is available long term.
2) Ensure that the product mix value is sufficient for a good ROI.
3) Ensure that process costs are sufficiently low enough, long term to be competitive. For example: Efficiency is important for low cost; Synergies / Integration with a host

industrial site can significantly reduce costs.

4) Ensure that the management team is top-notch.

Low Cost Feedstock: Typically 50% to 70% of Operational Costs

Arkansas Inventory

Bio-Oilseed -- Is a substantial cost of the process. The process is simple and has easy access. The big factor is the cost of the feedstock, and the value of the diesel. Feedstocks can include: any oil bearing seed, vegetable oil, waste oil is a low cost feedstock for the process, such as Future Fuels, in Batesville which produces biodiesel on a large scale mainly from waste oil and producing specialty chemicals along with the biodiesel to add value to their product mix.

Sugar-Based Crop Fermentation -- Food Crop costs negatively affect this process. Common feedstocks are Sugar Cane, Corn, Sorghum. This process is well understood, producing ethanol. The ethanol can be further processed to more valuable fuels and chemicals. Ethanol is a low value product, viable using food crops only because of government subsidy. Higher value products, such as butanol, will add value to the process.

Cellulosic Fermentation -- Feedstock costs are significantly lower. The process for Cellulosic Fermentation is the same, once the cellulose is converted to sugars through acid and enzymatic pretreatment. The feedstock costs are much lower. The process is limited to the portions that can be converted to sugars, which will affect yields.

Thermal Cellulosic: Gasification -- The process uses low cost cellulosic feedstock to produce a syngas that contains organic building blocks that can be converted to fuels and chemicals. The Fischer / Tropsch process converts the gas components to waxes and liquids that can be converted to the desired final product. Further processing can produce higher valued products. The gasification reaction is exothermic providing excess heat for use by a host mill to reduce costs.

Thermal Cellulosic: Pyrolysis -- The basic pyrolysis process produces bio-crude oil that can be burned or further processed. Fast pyrolysis with catalytic cracking produces a product more similar to Fuel Oil, but more processing has to be done to remove oxygen and convert to fuels and chemicals. Capital costs are low for the low value product, but may be high for the processes needed to convert to drop-in fuels and chemicals. Feed stock costs should be low,

unless cleanliness is an issue for catalyst life.

Hybrid Thermal-Fermentation -- The hybrid process uses gasification and fermentation. Syngas from a gasifier is bubbled through a column with bacteria designed to convert to ethanol. The mixture is separated and distilled to concentrate the ethanol. Feedstock cost should be low, but the product will have low value. Expertise is needed for the bacteria growth and maintenance.

Lignin Based Processes -- The lignin process has potential for integration with a pulp and paper mill that has recovery boiler limitations. However, precipitated lignin products are of low value at this time. If the lignin can be had at low cost, the chemicals can presumably be produced competitively.

X to Liquid (XTL) -- Feedstock includes fossil fuel such as natural gas or coal. A recent line of thinking is to combine biomass with fossil fuels, especially natural gas or coal, to gasify and convert to liquid fuels and chemicals. Coal or biomass can be gasified, and substituted, or combined with the natural gas. The advantage is that large-scale operations can be constructed, with substantial biomass conversion, but at lower capital risks.

Summary: Stand-alone electrical generation from biomass should not be supported. Integration improves efficiency significantly. Oil-seed for Arkansas may make sense if feedstock is grown on marginal land and can be contracted for a low cost. If the cellulosic fermentation process is supported, then it should integrate with a host to improve efficiency. There are likely to be niches that make sense. Gasification or catalytic pyrolysis makes sense long term, but capital costs have to come down to improve returns. With the pulp and paper industry in Arkansas, there may be a fit for lignin precipitation and further processing. Combining biomass to coal or natural gas production of liquid drop-in fuels makes sense economically.

<u>June 21, 2012 – Renewable Energy Portfolio Standards, The Big Picture,</u> Kristin Higgins, UA Division of Agriculture, Public Policy Center (see appendices N).

Defining Renewable Energy – Is a source of energy that is not depleted by its use. Must be environmentally friendly. "Energy resource that is naturally regenerated over a short time scale

and derived directly from the sun, indirectly from the sun, or from other natural movements and mechanisms of the environment. Renewable energy does not include energy resources derived from fossil fuels, waste products from fossil sources, or waste products from inorganic sources."

United States Energy Policy -- The U.S. does not have a federal policy. Therefore, states are crafting their own energy policies to guide energy infrastructure planning and to act as economic development tools through a patchwork of policies.

Renewable Portfolio Standards (RPS) -- Iowa was the first state to adopt what would become an RPS in 1983. An RPS is essentially a State law requiring electricity providers to generate a certain percentage of their energy from renewable sources by a certain date or face financial penalty. A policy tool to encourage renewable electricity generation, and to create a market demand.

RPS's in the United States:

Standards	**Goals**
•29 states & D.C. have adopted standards with set percentages, dates and penalties.	•8 states have adopted less-formal goals including percentages and dates.
•Eligible technologies and multipliers differ.	•Voluntary targets –no penalties.
•Some include municipal utilities, some exempt	•No two are alike

RPS Policies: 29 states + DC and PR have an RPS, (8 states have goals), and 13 states have neither.

*Source: www.dsireusa.org/ May 2012

Missouri -- Voters repealed goal in 2008 in favor of RPS for 15 % renewable energy by 2021 with a solar carve-out of 2 %. Eligible sources: solar thermal electric, photo voltaics, landfill gas, wind, biomass, municipal solid waste, anaerobic digestion, small hydroelectric, fuel cells using renewable fuels. Municipal, cooperative utilities exempt. Penalties. Net metering available.

Oklahoma -- Legislators adopted goals in 2010 for 15 % by 2015 (energy efficiency may account for 25 % of the goal). Eligible sources: wind, solar, hydropower, hydrogen, geothermal,

biomass and other sources approved by the Okla. Corporation Commission. Utilities must file annual report. Net metering available.

Texas -- Mandated 5,880 MW by 2015; goal of 10,000 MW by 2025. Eligible sources: solar water heat, solar thermal electric, photo voltaic, landfill gas, wind, biomass, hydroelectric, geothermal electric, geothermal heat pumps, tidal energy, wave energy, ocean thermal. Wind represents ½ renewables. Municipal and cooperatives exempt but can volunteer. Penalties authorized but not set. Limited net metering.

Louisiana -- No RPS or goal. Net metering available. RPS pilot study underway to determine cost effectiveness and best practices. Will issue RFPs for 350 MW. Eligible sources: solar thermal process heat, photo voltaics, landfill gas, wind, biomass, hydroelectric, geothermal electric, fuel cells, geothermal heat pumps, municipal solid waste, CHP, black liquor, small hydroelectric, wave energy, ocean thermal, fuel cells using renewable fuels, other distributed generation technologies, geothermal direct-use.

Mississippi -- No RPS or goal. Net metering not available.

Tennessee -- No RPS or goal. Net metering not available.

Arkansas -- No RPS or goal. 2009 Legislation, state agencies to reduce building energy usage by 20 % by 2014. 2012, Gov. Beebe initiated planning process for an energy plan, with biomass possibly playing a role. Net metering available.

De Facto RPS in Arkansas -- SWEPCO was required to buy renewable energy as part of Dec. 2011 settlement over Turk coal plant. Required: 400 megawatts of wind or solar. Response: Contracts signed for 407.85 megawatts of wind from KS, OK and TX; AR does not have grid. This quadrupled SWEPCO's wind portfolio. In 2010, energy portfolio was 84 % coal/lignite and 16 % natural gas. RPS had political benefit for SWEPCO. Part of settlement ending a 4-year legal battle over new Turk coal plant.

Advantages of RPS -- Environment benefits; Creates demand for renewable energy; Stimulates RECs market and technology development; Diversifies energy sources, safety; Promotes economic development; Boosts investor confidence in renewable energy; Can be tailored to local desires/policies.

Disadvantages of RPS -- Complex to design and implement; Costs not known until after

implementation; Utility costs passed on to customers in higher rates; Would dissuade use of natural gas; Promotes least-cost source development, not necessarily best source; Doesn't stimulate large volumes of capacity by itself; Jury still out on effectiveness.

August 16, 2012 – Compressed Natural Gas as a Motor Vehicle Fuel, Michael Gallup, Transportation Manager, SWN (see appendices O).

Natural Gas has economic benefits. Natural gas powered vehicles offer an economic return to fleets and individual users. Full cycle cost is lowered through reduced fuel price, fewer maintenance problems, and extended vehicle lives.

Natural Gas offers a clean alternative to traditional petroleum fuel powered vehicles. Natural gas vehicles ("NGVs") offer an immediate reduction of 25% in GHG and smog causing emissions; cleaner air.

Natural Gas is a local resource. Southwestern utilizes Fayetteville Shale gas at our Damascus, AR CNG station, to fuel CNG powered trucks many of which were converted by suppliers based in Arkansas.

Natural Gas provides Arkansas energy security, and is an abundant domestic fuel source, which reduces our nation's dependence upon import oil.

Goals: Transition SWN's fleet to CNG ~ 160 conversions completed to date. Goal: Minimum of 185 conversions to be completed by end of 2012. Support the development of public fueling infrastructure, such as the Damascus CNG Station, the City of North Little Rock & City of Little Rock. Incentivize employee adaptation of CNG, ie: 'The Big Give,' SWN Employee CNG program. More CNG advocacy and training, such as the 'Drive Natural Gas Initiative,' Houston NGV Alliance, ANGA. More certification & training for fleet maintenance group.

Summary: SWN supports CNG. See shale gas opportunities for Arkansas. Needs help in infrastructure development for CNG fueling stations. Makes sense for vehicle economics. CNG is abundant, clean, & domestic.

<u>October 24, 2012 – Home Energy Performance, The Fifth Fuel,</u> Matt Bell, Viridian (see appendices P).

Energy Efficiency -- Represents a significant largely untapped opportunity for meeting the dual goals of financial returns and environmental protection. By eliminating wasted energy, the U.S. can reduce its fossil fuel use, move toward energy independence, and reduce its greenhouse gas (GHG) emissions by almost 40% by 2030.

*Source: Rocky Mountain Institute

Arkansas Home Energy Costs -- There are 1,115,000 households in Arkansas. Their average utility cost are $1,900 per year. 62% of these households are below $50,000 median household income, and consequently spend 23% of their after tax income on energy.

Arkansas Average Annual Utility Costs ~ $1,900: $820 ~ Appliances and Light; $412 ~ Space Heating; $247 ~ Electric AC; $422 ~ Water Heating

Value of Energy Efficiency -- Approximately $2,000,000,000 spent annually on household utilities, therefore, 200 million dollars can be saved annually with just a 10% improvement.

Barriers to Energy Efficiency Implementation -- Uncertainty of Savings; Lack of Awareness and Knowledge; Access to Capital; Availability of Service Providers; A Complicated Process.

Uncertainty of Savings -- Concepts of energy efficiency are complex and the science is confusing to consumers. No standards of energy performance reporting. So, who do you trust?

Lack of Awareness -- You can't fix what you don't measure. Most home owners aren't aware if they have an energy efficiency problem. What uses energy in my home?

Lack of Knowledge -- Customers don't understand the science of energy performance.

Capital -- Lenders don't recognize the value of energy efficiency savings. Many energy efficiency measures don't result in an increase in property values. Individuals with the most energy poverty have the least access to funding. Audit costs and improvement cost are often too costly. Rebate incentives may not be available. Low cost of energy in Arkansas leads to longer payback periods and less ROI.

Availability Of Service Providers -- Who do I call? Very few trained home energy auditors in the state of Arkansas.

Service Providers -- Traditional Providers, HVAC Contractors, Insulation Contractors, Window Installers, Remodel Contractors, New Service Providers, Certified Energy Auditors, Home Performance Contractors, Duct and Air Sealing Professionals.

Traditional Process – 1) Contact utility provider for rebate programs; 2) Contact approved utility auditor; 3) Schedule home energy audit; 4) Review home energy audit recommendations; 5) Contact approved utility contractors for bids; 6) Obtain financing; 7) Hire multiple contractors; 8) Complete rebate documentation.

Problems with this Process – It's complicated and overwhelming to customers. It's limited to a small list of utility approved contractors. Many approved contractors are not cross trained in whole house energy performance (focused on HVAC, insulation, windows, etc.). Comprehensive low cost solutions are often overlooked.

Progress -- Some Arkansas utilities are providing incentives for home energy audits to increase education and awareness. New service providers are starting to offer comprehensive solutions to simplify the process. Utilities have adopted standardized building science protocols to measure performance (blower door, duct blaster, etc). Many of the utility incentives for energy efficiency measures are robust.

What We Need -- More public awareness on the financial impact of energy efficiency. More utility rebate incentives for comprehensive home energy audits. More trained home energy professionals. Lenders to recognize the value of energy efficiency. PACE legislation for the state of Arkansas.

<u>October 24, 2012 -- Apprenticeship Going Green,</u> Karen Breashears, President, National Training Program (NAPT), (see appendices Q).

Homeowners, Lenders, and appraisers do not understand the value of energy efficiency features; making it difficult for customers to afford or acquire loans to pay for them.

The Arkansas Energy Sector Partnership (AESP) is comprised of 20 two-year colleges and seven apprenticeship programs within Arkansas. The Department of Labor awarded AESP a three-year grant for implementing green training colleges and apprenticeship programs.

AESP purchased a trailer, training equipment, and created the "Green Mobile Training Unit." By exhibiting the unit at statewide events. AESP has provided about 6,000 members of the public with knowledge about "going green.: The trailer allows AESP to mobilize its training program. The 20 two-year colleges in Arkansas have integrated a "green" component in the technical training programs.

- Plumbers must complete 2,000 hours of on-the-job training and 16o hours of technical-related classroom training.
- Electricians must complete 8,000 hours of on-the-job training and 160 hours of technical-related classroom training.
- Standards for HVAC vary and there is a need to require similar licensure programs for technicians.
- Arkansas needs more statewide incentives for EE improvements.

APPENDICES