

Governor's Task Force on Energy Policy
UT Experiment Station (West TN Research & Education Ctr)
November 14, 2008

Meeting Summary

I. Welcoming and Opening Remarks

Commissioner Kisber opens the meeting: explains the Governor's absence (dealing w/ budget shortfall in Nashville).

- Notes that this is "the most challenging financial situation the state has seen in modern times."
- The Governor will be present at 12/16 Task Force mtg. in Nashville.

Dr. William Brown, UT Agriculture Experiment Station and Dr. Robert Hayes, West TN Research and Education Center

TN is a leader in biofuels and "bio-based energy", and UT Jackson (West TN Research & Education Center) is part of nationally recognized research and development effort in bio-fuels

- WTREC received \$70 million from TN legislature to develop 'biofuels facility', develop a feedstock system – 720 acres of switchgrass will be harvested this fall, 2000 acres to be developed in 2009, another 2000 acres in 2010.
- Partnership with DuPont to drive biofuels refinery and feedstock appropriation
- Bio-refinery had its groundbreaking "a couple weeks ago", and is set to begin production of biofuels in 2009
- Other biofuels developments (from legislative funding): renovation of lab space at UT Knoxville,
 - Displays a very small amount of biofuel made from switchgrass

II. Update: Cellulosic Ethanol Initiative

Dr. Kelly Tiller, Director of External Operations, UT Bioenergy Programs:

- Biofuels development program at UT is extremely integrated: "farms-to-fuel stations".
- UT Bioenergy is working on developing new forms of bioenergy feedstocks, including switchgrass
- Project structure: State provides \$70M; UT works on switchgrass production (at farms), and research in new feedstocks; UT Research Foundation created new private company that is partnering w/ DuPont/Denesco and other corporations;

- The new biorefinery is a “research and development-oriented, pilot-scale biorefinery”;
 - Designed not to be a commercially-viable facility, but to be a flexible research-based facility
 - Currently have a 20-year research pipeline
 - This facility should lead the nation in biofuels development
 - Will lead directly to a commercial-scale facility (25 million gal/year)
 - About half of the people present at biorefinery groundbreaking were farmers. Farm community is excited about potential of biofuels development in TN.
- Biomass will drive the development of the biofuels industry; developing the biomass (farms) in TN will make it a “no-brainer” decision to locate biorefining in TN
 - TN grows biomass very effectively, because of soils, weather, especially switchgrass
 - Switchgrass characteristics:
 - Average 6-8 tons/acre/year; hope for 12 tons/acre/year in near future
 - Native, perennial plant: tolerates poor soils, floods, drought, requires little fertilizers
 - Some challenges in establishing switchgrass: e.g., competition from weeds but have developed 2 new herbicides to combat weeds
 - UT has lots of experience with switchgrass, including some plots more than 20 years old
 - Farmers have little incentive to convert land to switchgrass production, if there is not an established market
 - First 2 years have diminished yield for farmers
 - Feedstock farmer incentive program: includes 3-year contracts (\$450/acre/year) with farmers within 50-mile radius of the biorefinery to produce switchgrass
 - Providing seeds and technical expertise to farmers, through UT Extension Service
 - Program enrolled 723 acres in Spring 2008, and plans to scale up to ~6000 acres in the next 2-3 years
 - Many landowners in program with no experience in farming – converting new land to farming
 - Research program to assess crop production looked at farmer experience, farm location and soil qualities, and previous field condition (weed control)--farms in the program encompass a wide range of the above conditions
 - Soil samples from these farms allows UT to assess environmental impacts of switchgrass farming
 - 6000 acres of switchgrass could produce up to 5 million gallons of ethanol/year; this is demonstration/research scale, not commercial scale

- Commercial scale production will entail 25,000 – 100,000 acres of switchgrass production
 - How to address the scale-up from demonstration- to commercial-scale? Challenges:
 - Switchgrass seed costs: More than tripled, as a result of research efforts – a short-term supply-demand problem, UT is working to develop a switchgrass seed industry in TN
 - Equipment availability: Many farms don't have the planters/sprayers/etc.
 - Herbicide availability : 2 new herbicides are useful, but more are needed
 - Machinery limits: Expecting yields of 6-12 tons/acre/year, but harvesting machinery cannot handle such volume
 - Partnership with John Deere to develop better harvesting machinery
 - Transport efficiency: Lots of room for improving efficiencies in harvesting, transportation of feedstock (currently on truckbeds, in bales)
 - Modules (densely packed bales, similar to cotton) are a way to address this
 - Storage: farm cooperatives can help with storage and early-stage pre-processing, capture more of the value of the biorefining process
 - Research Funding: Public investment is critical in addressing these types of challenges that are difficult to mobilize traditional research funding to investigate
 - Risk management: Major challenge for new crops like switchgrass. Crop insurance and other ways to spread and manage that risk will help farmers to enter switchgrass production
 - There is an important need to grow the biofuels industry in a sustainable way. Environmental work is an important piece of biofuels industry development.
- In addition to switchgrass, UT looking into using cob as a feedstock at the biofuels research refinery.
 - DuPont has had \$100M in funding to look at using corn cob/stover to be used as a cellulosic ethanol feedstock
 - Cob and switchgrass can be processed in a very similar manner, and can both be processed at the new research refinery
 - Corn harvesting is very efficient, logistics: to slow harvesting to collect cob can be a problem to farmers
 - Cob is a less efficient feedstock than switchgrass: roughly 250,000 acres of corn-cob is needed to produce 25 million gal of cellulosic ethanol, and so this is viable only where corn production is quite dense

- TN has available pastureland to support many 25 million gal/year switchgrass ethanol refineries; several counties in Western TN have a sufficient density of corn production to support cob-based biofuels refineries
- TN, and several other Southeastern states show some of the greatest potential nationally for switchgrass production
 - TN has potential to produce ~19 million dry tons of switchgrass per year, state-wide, by 2025
 - First gallon of switchgrass-based ethanol will be produced in 2009; first commercial-scale biorefinery in TN will be constructed in 2012, through partnership with DuPont/Denisco
 - Switchgrass pellets can be co-fired with coal to generate electricity, to grow the switchgrass industry in TN
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- **Cellulosic Ethanol Initiative Questions:**
 - Will “Grassoline” or other fuels under development at the UT Biorefinery be E-85?
 - What will be produced will be E-99. It is then up to the distribution industry to develop blends, including E-85. The majority of cars on the road cannot burn higher blends (i.e. E-85), so much of this ethanol, initially, may be used in lower blends (i.e. E-10, possibly E-20 in the future).
 - Focus right now is within 50-mile radius of the biorefinery, but what kind of outreach are you engaged in, and what level of interest have you encountered elsewhere in the state?
 - Interest among farmers, across the state, has been great. Farms are very interested and excited. This represents great opportunities to diversify the farm-economy base. We are working with farm-bureau state-wide, to help farmers understand how to produce switchgrass, and what the opportunities are. We also need to be smart, and temper those expectations, to grow this industry at the right pace.
 - On the regional switchgrass production potential issue: you show about 19 million tons of potential state-wide in TN. So we could have a refinery, or a network of refineries right be here in West TN?
 - We envision a network of these biorefineries. We used the development of the corn ethanol industry to instruct our expectations of what kinds of production and capacity. We now believe we can exceed these expectations (20-25 million gallons per facility per year). To meet the state’s goals for ethanol production and use, we would need about 40 of these plants. And that represents a lot of economic development, supplying local markets. Fuel may be the high-volume, but low-value product coming out of these refineries. Other products could come out of this, too. It’s a whole new

- bio-based products network, wherever the biomass is available.
- The ethanol facilities that are in production today: how much investment will be needed to transform those into the scale that you're talking about today?
 - Switching from corn ethanol production to cellulosic ethanol requires some extra steps in the processing to make that conversion (pre-treatment, enzymatic hydrolysis). But we don't know much about capital investment requirements for this kind of conversion.
 - You mention a billion gallons of ethanol needed by 2025. What percentage of the state's petroleum usage would that supplant?
 - At our current expectations, that would replace up to about 30% of the state's demand for gasoline.
 - Do you have a clear idea about what the product cost (cellulosic ethanol) would be, when it hits the market at a commercial scale?
 - Assuming that about half of the production cost is tied-up in the feedstock. Improving efficiencies there can do a lot to drop the price. Assuming a feedstock cost, then, of \$50-60/ton, we think we can produce ethanol for about \$1.50/gallon.
 - What is your #1 environmental concern in growing this industry?
 - Not necessarily a concern, but more of an opportunity: switchgrass can improve the soil and be used in conservation. It stores a lot of carbon in that root structure, so we think that there are some environmental goods that can come from this. However, doing anything at a large-scale raises all kinds of challenges, so we need to monitor the growth of this industry to see that it grows in a sustainable way. Also, we must acknowledge that growing anything in a monoculture system is just inherently unsustainable. Over time, some of this acreage might not all be used for switchgrass, and diversifying the energy feedstock base we can improve the environmental performance and the economic base.
 - Could you speak to the water requirements of a 25 million gallon facility, and how this might go as we scale this up?
 - We have got some water-saving technologies that work great for us in the lab, but until we begin to really scale those up, it is difficult to say definitively what those requirements will be. This will require significantly less water than is required in corn ethanol production. Also, new research and development has greatly reduced the water use of corn ethanol. We expect to be able to drop below that level, as well, very quickly into the production process.

- Can you speak more to what might be the best-and-highest use of switchgrass, between using it for co-firing (w/coal) for electricity production, vs. using it as a transportation fuel?
 - Markets will have to sort this out and it is difficult to make projections around this issue. Switchgrass has a lower btu value than coal, but it is very cost-competitive with coal. If you add in the emissions reductions, it represents a great opportunity. There are issues with ash content that need to be addressed. A lot of other biomass can be co-fired as well, representing many different markets for co-firing and transport fuels.

III. Clean Tech WG Update

Miles Burdine, Kingsport Chamber of Commerce [Chair Clean Tech, WG]

- The Governor appointed the Clean Tech working group at the 7/16 Task Force meeting
 - The working group has had 2 meetings and several conference calls, and participated at the Governor's Summit on Clean Energy Technology, 10/14-15
- The Governor's Clean Energy Summit had over 325 attendees from throughout government, public policy, education and the clean tech fields
 - The Summit had 37 world-class speakers, moderators and panelists
 - Key observations from the Summit include:
 - Clean Tech represents a great opportunity in the guise of a problem
 - TN needs a diverse portfolio of resources, energy efficiency should be highest priority
 - TN can lead U.S. in sustainable mobility
 - Clean energy advancement will require leadership and public policy innovation
 - 89% of Summit attendees rated their level of satisfaction as 'very satisfied' or 'moderately satisfied'
- 5 areas of likely recommendation from Clean Tech Work Group:
 - Growing clean tech businesses in TN
 - Education and training for a Clean Tech citizenry & workforce
 - Incentives for Clean Tech products/services
 - Regulations and standards
 - High-level energy leader with adequate staff

Dr. Jonathan Raab, Raab Associates and MIT [Consultant & Facilitator to the Task Force]

- Clean Tech working group recommendations represent a shift in the Task Force's attention away from what actions state government can take in own buildings and facilities to policies directed at citizens and businesses of TN
- Many actions from other states geared to electric utility regulation cannot easily be applied to TN, because in TN the state does not regulate electricity distributors. The focus here is on TVA (which is federally regulated) and the publicly-owned distributors
 - This means that for electricity related actions, the Task Force needs to look at programs and policies that can dovetail with federal policies, and TVA's actions and plans
- Existing Clean Tech policies and incentives in TN include:
 - A green energy tax credit
 - Green Corridors program (to develop biofuels stations along interstate corridors in TN)
 - Small business Energy Loan program
 - Clean Energy Technology grant program
 - Biodiesel infrastructure grants
- Growing green tech businesses:
 - Clean tech is focused on energy efficiency, renewables, and distributed generation
 - Growing this industry in TN will involve directly working to assist local businesses to grow, and to installing more clean tech products in TN, to grow the market for those businesses
 - *Recommendations:*
 - Identify the Clean Tech sector as a "Qualified Business Enterprise"
 - Provide additional incentives to businesses
 - Spearhead Clean Tech RD&D
 - Educate and train the workforce around clean tech
 - Clean Tech business incentives:
 - Providing early-stage seed capital to clean tech start-ups
 - TN has unique alignment of resources for clean tech RD&D, with ORNL, universities, businesses and TVA; there is great opportunity to leverage state investment in RD&D in TN
 - Clean Tech Education & Training:
 - Upgrade energy education for K-12 students, using science, math, social sciences
 - Expand public education to grades 13 & 14, beginning with clean tech focus, to transition between education and workforce
 - Establish certificate-based trainings for clean tech tradespeople and students at community colleges (HERS raters, building codes inspectors, contractors/installers)

- State Workforce Development Board might be the best office to oversee these advancements
- Incentives for energy efficiency & renewable energy:
 - Sales tax exemption for qualifying equipment and automobile technology
 - Qualify certain equipment as “certified pollution control equipment” (confers some tax benefits)
 - Incentives for retailers, specifiers and installers (engineers, architects, HVAC installers) – this area could have large effect, but issue is quite complicated
 - Smart meters & time-sensitive pricing – allows electricity distributors to use time-sensitive rates, lower costs and improve efficiency
 - This will involve TVA and the distributors, but there is a support role for the state focused on the underlying communications infrastructure
 - Electric vehicle recharging at park-and-ride lots and public parking; and expand the Green Corridors program to include rapid electric recharging (Nissan proposing 25-minute quick-charge technology along interstates), to support emerging automobile technologies (electric and plug-in hybrids)
- More than half of U.S. states have sales tax exemptions of some kind for qualifying clean tech equipment (energy efficient appliances/equipment and renewable energy)
 - Energy Star product market share in TN is variable (26%-90% market share depending on type of appliance), but there is room for improvement for many appliances
 - Any sales tax incentive should be targeted to those products without strong existing market share
 - Sales tax reduction fiscal impacts for the state can be minimized by good design
 - Sales tax recommendation:
 - On-going exemptions (year-round rather than tax holiday)
 - Eligibility: renewables (solar, wind, geothermal), Energy Star products w/o mature market penetration, and electric and plug-in hybrid vehicles
 - List of measures should be updated annually by appropriate TN agency
 - Exemption should “sunset” or ramp-down over time, as market shares mature
- Regulations & Standards:
 - Streamline siting and permitting for renewables and distributed generation grid-interconnection
 - Interconnection standards for small-scale renewables and distributed generation should be made clear and accessible
 - Encourage a state renewable portfolio standard

- Clean vehicle fuel standard (regulating carbon content of vehicle fuels)
 - Support the clean tech sector regulations and standards advocated in the forthcoming Residential working group recommendations (e.g. building codes, residential energy labeling)
 - Leadership and staffing:
 - TN businesses and citizens are spending \$15-20 billion on energy every year
 - Working group recommendations should reduce energy use, save money, and create jobs in TN
 - Need on-going state involvement, strong leadership, adequate staffing and appropriate positioning within state government.
- **Clean Tech Questions and Comments:**
 - For K-12 education, it might be important to consider both a clean tech focus and an energy literacy focus. Have you given any thought to how that might work?
 - Both are important. We have looked at some other states that have well thought-out curricula. But frankly I don't know what greater level of detail we are going to be able to get with these recommendations. Instead our role may be to lead an agency or organization to develop this curriculum on their own, possibly using what we've found from other states as models.
 - If the sales tax incentives were greatly successful, it would be interesting to see what the energy savings generated would be from that.
 - It is also worth noting that an energy reduction of just 1% from the residential and business sectors would equal a savings of all of the money that state government spends on energy each year.
 - The 'leadership and staffing' point may be the most important item on the list. The leadership is necessary to see implementation of all of the rest of these items.
 - Miles, your community has been a leader in the K-14 development, and knowing what you know, do you start by developing a more general curriculum for the target industries that we've identified, or would it be better to partner directly with a company to help do that work for us?
 - I think that depends on the community. It depends on what jobs businesses located in that community need. Clean tech is a bit unique, in that it could be a focus statewide. We literally asked the businesses 'What do you need?' the answers will probably be different across the state, but they will give you answers. We tried to do K-14 a couple years ago in the state, but it didn't make it through our budget. It didn't cost us that much in my

- county, and we are developing the first K-14 system in the country.
- Is the theory with sales tax exemption for consumer equipment going to help grow jobs by growing the consumer market for these products?
 - On the renewables side, it will grow the sector because for each purchase you need contractors/installers to go out and install the products, as well as the manufacturing. For the appliance side it is less direct, because those are supplied mostly by large companies. But you are growing the efficiency ethic that translates to other things (insulation, lighting, installers). Also by generating savings for residents and businesses, this increases the amount of money available to be re-spent in TN which leads to general job creation and increased competitiveness.
 - We haven't had a working group looking at education and commercial buildings, but I'd hope that we could keep that in mind. It is important that our school and other buildings be efficient, healthy places to learn and work.

V. Residential WG

Mike Vandenberg, Vanderbilt School of Law, [Chair Residential Energy Task Force]

- Lead-by-example, Clean Tech, and the Residential work group recommendations are really beginning to dovetail and overlap in productive and useful ways.
- Residential working group has met four times already, and we participated in the public listening session, which was also very helpful.
- Recommendations fall into 3 buckets:
 - Residential energy use goal
 - Energy use in buildings
 - Energy use in transportation
- The Residential energy use goal might help us think about what kind of policies we need to adopt.
 - Residential energy use in TN (for all fuels together) should either not exceed the use level for year 2007 by 2013 or load growth should level off to 0% in 2013. In both cases residential energy use should decrease 1%/year after 2013.
 - Current yearly electricity load growth has averaged about 1.8-1.9%, so if we do nothing at all TN load will continue to grow at that kind of rate. So by 2015 we will have grown by 9%. If by 2013 we want to be at the same level that we are at in 2007, that means we would have to end that current load growth of 1.8%. A somewhat less aggressive goal might be to reach zero load growth in 2013, and decline sometime after that. Those are the approaches that we are looking at.

- And note that this represents aggregate energy use, not per capita energy use.
- We suggest, also, that both commercial and industrial sectors should have goals as well.
 - We should track and report progress against these goals over time. Leadership in the energy area involves processing and making public this data, for the citizens to see and understand.
 - We have 5 different categories of recommendations on the building side, including:
 - Education and outreach
 - Building codes
 - Residential energy labeling
 - Natural gas efficiency
 - Incentives for energy efficiency and renewable energy
 - Education and outreach:
 - The same type of building has been shown to have a 300% difference in energy use in that building, based on the occupants in that building, and their knowledge and behavior.
 - So we need to design and implement a public information campaign on energy saving practices, including developing a website with information and program/event announcements.
 - Encourage energy distributors to use a common energy information platform, integrating existing TVA information
 - Update, improve and implement an energy curriculum for K-12 education

Jonathan Raab, Raab Associates, Ltd. and MIT, [Consultant & Facilitator to the Task Force]

- Building codes,
 - Automatically update its building codes, in coordination with the IECC code cycle (every 3 years).
 - Allow for up to a 2-year lag time between IECC publishing the code and TN adopting it
 - Codes would automatically take effect unless Commerce and Insurance acts to stop the code update
 - TN should begin with the 2009 building standards
 - Codes would apply to all new construction and major remodeling

- Implement a parallel process for commercial codes, using the IECC standards and timeline
 - We need also to encourage local enforcement of codes. Without good enforcement you don't get good compliance.
 - To do this we need to train local code officials, builders and tradespeople
- Home labeling, similar to car and appliance labeling,.
 - Labeling system would include a HERS score normalized for house size plus expected energy usage and cost information.
 - Labeling voluntary in 2009, mandatory for new homes in 2011, and mandatory for existing homes prior to resale when practicable.
 - In the meantime require a simple audit prior to resale which delineates energy saving actions w/paybacks, and also require 2 years of billing history.
- Natural gas energy efficiency: comparable to TVA/distributor electricity programs but on the gas side.
 - About 1/3 of residential gas sold in TN is sold through state-regulated utilities, so the state is able to require energy efficiency programs from those utilities.
 - Those utilities should begin by spending around 1% of their annual revenues on energy efficiency programs, which is about in the middle of current successful gas utility efforts across U.S.
 - This could help with the growing problem of defaults on bill payments
- Incentives for energy efficiency and renewables:
 - Provide incentives for wholesalers, specifiers, and installers of energy efficient equipment.
 - Allow local government to provide property tax incentives if they choose
 - Use a portion of the Unclaimed Property Fund to create a revolving loan fund for energy efficiency and renewables
 - Encourage utility on-bill financing for energy efficiency – reducing up-front cost of measures for residents
- Transportation sector energy efficiency:
 - Adopt EcoDriving website with recommendations for how to reduce fuel use through driving and maintenance practices. Pursue EcoDriving recommendations for how states can further those goals by incorporating education into drivers education and other means
 - Encouraging VMT reduction at businesses
 - Incentives for public transit: transit expenditures by the state have been declining in real terms year-to-year. State transit funding should receive small yearly increase, to keep pace

- with inflation, and have that money from a dedicated source, rather than fluctuate year-to-year
 - Establish Smart Growth commission, this is a long-term strategy that is worthy of a separate commission
 - Look at highway speeds, educate the citizenry about savings from driving more slowly, and look at ways to better enforce speed limits
- **Residential Questions and Comments:**
 - I have heard it suggested that low-income homeowners are some of the least energy efficient. Have you looked at ways to try to help improve that statistic?
 - Low-income houses are typically less efficient and there is less capital to make them more efficient. Also, low-income homeowners spend a greater percentage of their income on energy, so that makes this a very important area. Many states have strong weatherization programs, which typically pay 100% of weatherization costs. We are waiting to see what TVA rolls out in the low-income area. The extent to which we can help people get more efficient, rather than just help them pay their energy bills, we are making long-term positive changes.
 - We could have a study done of all mass transit in each municipality, and seek ways to systematically increase mass transit. Also, we could try to organize a system of neighborhood carpools. Finally, Gainesville FL has a great 501(c)3 program, where they go into neighborhoods with compact fluorescent light bulbs, and install the new bulbs.
 - That reflects what we know about program effectiveness, the state could play a strong roll coordinating communities, utilities and others. When employers are involved, carpooling can be far more effective. So if we engage in the information piece in a good way, we can get a lot done on this.

Will Pinkston

- The Southern Governors' Association launched a conversation on climate change this year. That conversation is beginning to ramp up in December. The governor has asked Paul Sloan to be his representative, and we look forward to hearing updates from that process.

- The next Task Force meeting will be December 16th in Nashville. We will try to get all of these recommendations finalized, vetted and approved at that meeting.
 - We are moving toward a mid-January public release of a consolidated version of all of these recommendations, whatever they end up being. This will come in the form of a public report, put together by Dr. Raab.
 - The report will likely be accompanied by an executive order from the Governor. Other recommendations will require legislative approval, and so a next step will involve putting these recommendations into legislation, including 3 major areas: lead-by-example, clean tech industry growth, residential energy.
 - The budget situation is very grim and this may impact what can be done in the near term.
 - The Governor wants to reserve the right to ask the Task Force to continue to meet, beyond the final meeting scheduled for December 16th.

Comments from the Public

- Discovery Park will make a marvelous opportunity for public education on energy and other issues. . How is it going to be made fun for kids, and make parents want to bring the kids back? . Anyone who has ideas, or who would like to come speak to our group (Discovery Park Board), that would be very welcome.
- Public transportation has got to be more functional. For instance, a train or bus from Bradford, that could be met by a car or bike that could be rented by the hour, that would allow me to do more of my errands in a more convenient way.