LIPFORD COMMENTS

Governor's Commission on Climate Change

Proposed Findings – Discussion Document

***Draft*, October 17, 2008**

NOTE: This document has been edited to reflect the Commission's discussion on September 10th. Items that have not yet been reviewed by the Commission are highlighted in yellow.

The Commission is mindful of Governor Kaine's charge to us, and we accept his views on certain foundational issues as our starting point. As Governor Kaine stated, the fact that global climate change is happening and is largely human-caused is now widely accepted.*

We have used the IPCC's 4th Assessment Report as our reference point on the science of climate change. Governor Kaine also told us that because Climate Change is a global problem, a national solution is needed in order for significant reductions in GHG emissions to be achieved. However, because the effects of climate change on Virginia will be profound, we cannot wait for the federal government to act. We believe that the actions taken by U.S. states can have a significant effect on global GHG levels. The importance of the role of states in addressing climate change is illustrated by the World Resources Institute analysis that the emissions of Virginia, North Carolina and South Carolina are equivalent to those of South Korea or, perhaps more striking, the emissions from 10 Midwestern states are equivalent to those of India.

According to the IPCC, current climate models predict that global mean warming at the end of the 21st century (2090 - 2099) will range from 1.1°C to 6.4°C for various models and various scenarios, and the best estimate for one of the moderate emission scenarios (the so-called A1B scenario) is global warming of 2.8°C. Scientists from George Mason University, VA and Center for Ocean-Land-Atmosphere Studies, Maryland have examined the original IPCC data for the moderate A1B scenario for 15 global models and calculated the twenty-first century warming for Virginia and the adjoining areas (36.5°N-42°N; 73°W-84°W). It is found that the average warming for Virginia and the adjoining areas is 3.1°C and the increase in precipitation is 11%. The average warming for the bottom five, the middle five and the top five models is 2.2°C, 3.0°C and 4.2°C respectively. The warming will be higher for high emission scenarios. It is also found that the average increases in annual mean precipitation for Virginia and the adjoining areas for the bottom, the middle, and the top five models are: 2%, 8% and 24% respectively. (Shukla)

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* While we have acknowledged these points as being beyond debate in our deliberations, we have allowed those with a different viewpoint to make their views known to the Commission during public comment periods at our meetings.

In pursuing actions to combat climate change, Virginia is not acting in a vacuum. Indeed, we join 37 other states in preparing a climate change action plan. Based upon these concepts, what we have learned from the experts who have made presentations before the Commission, from our discussions, and from the many external documents we have shared with one another and posted on the Commission's website, we now make the following findings:

Effects on the Built Environment and Insurance

- Sea level rise is a major concern for Coastal Virginia, particularly the highly populated Hampton Roads region. The Chesapeake Bay Program's Scientific and Technical Advisory Committee projects that sea levels in the Chesapeake Bay region will be 0.7-1.6m (2.3-5.2 feet) higher by 2100. Specific impacts will vary by location, depending on changes in land elevation.

- Based on an analysis by RMS (a catastrophe modeling company) that has been reviewed and approved by OECD [should spell what OECD stands for], Virginia Beach-Norfolk Metropolitan Statistical Area is the 10th largest coastal city in the world in terms of assets exposed to increased flooding from sea level rise.

- Modeling and simulation tools are already being used to improve our understanding of how sea level rise and storm surge may affect certain areas of coastal Virginia. However, the fact that LIDAR (Light Detection and Ranging) elevation~~al~~ data does not exist for most of Coastal Virginia is a major obstacle to the ability to plan effectively for these changes.

- Climate change should be viewed as a threat to national security. Its impacts are likely to exacerbate instability and conflict in many areas around the world. In Virginia, there are several major military installations located in low-lying areas that will be affected by sea level rise and storm surge.

- The continued affordability and availability of insurance for Virginia's landowners is a concern as our climate changes. These effects are already being felt in Coastal Virginia. The frequency and severity of storms in the future are expected to exceed those of the past, and the insurance industry may not have the ability to handle several concurrent events. It is also important to make sure that federal flood insurance programs are not encouraging development in sensitive coastal areas.

Effects on Natural Systems

- Climate change will have a significant impact on Virginia's ecosystems. At varying rates, vegetation ranges are moving from current locations to higher altitudes and latitudes. The effect of this will be that suitable habitat for some species will decline, other species will become extirpated, and others species will become extinct. Climate change will also exacerbate threats already faced by Virginia ecosystems, such as invasive species and pollution.

- The effects of climate change on many of Virginia ecosystem and species will be better understood as more research becomes available. Research and conservation efforts will need to be increasingly focused on managing resources to maintain healthy, connected and genetically diverse ecosystems, and plant, wildlife, and fisheries populations.

- Some of the Chesapeake Bay's "foundation species," such as blue crabs, eelgrass and oysters, could decline or disappear as salinity and temperatures continue to increase and weather patterns continue to fluctuate widely from year to year. Foundation species support many other species, so these impacts would be felt throughout the ecosystem.

- Oxygen levels in the Chesapeake Bay are expected to decrease due to increasing temperatures and increasing storm runoff, which will have a negative impact on species like striped bass, blue crabs and oysters. Acidification of the Bay and Atlantic Ocean is also a concern as waters absorb more CO_2.

- Coastal wetlands, a critical habitat for many of the Chesapeake Bay's plants and animals, are being lost as sea levels rise, and freshwater coastal wetlands are similarly threatened by saltwater intrusion.

- Virginia's agriculture and forestry industries, as well as commercial and sport fishing industries and park land, will be impacted by climate change. More research on to determine specific effects is needed, because the lack of specific information on the impacts hinders Virginia's ability to adapt and prepare for these changes.

- Virginia's forestlands sequester approximately 23 million metric tons of carbon dioxide per year-. Unless current land conversion trends are reversed, however, this number will decline every year, as Virginia losses on average 27,000 acres of forestland annually to development.

Effects on Human Health

- Climate change is likely to have wide-ranging and mostly adverse impacts on human health. Climate change can affect the health of Virginians directly and indirectly. Extreme weather events (e.g., floods, droughts, hurricanes or windstorms, wildfires and heat waves) can directly affect health through injuries, drownings, or mental health problems. These extreme weather events could lead to compromised water and food supplies, resulting in increases in waterborne and food-borne illnesses. Climate change will lead to the alteration or disruption of natural systems, making it possible for vector-borne diseases (i.e., arthropod-borne diseases such as West Nile virus, malaria, dengue, Lyme disease) to spread or emerge in areas where they had been previously limited or non-existent. These alterations or disruptions could result in the disappearance of some vector-borne

diseases by making the environment less hospitable to the vector or pathogen. Climate change is also expected to increase the incidence of diseases associated with air pollutants and aeroallergens and exacerbate other respiratory and cardiovascular conditions. (Virginia Department of Health)

- Disease surveillance systems are capable of tracking and identifying changes in diseases and illness that might be associated with climate change; however, with the exception of heat-related deaths, establishing causality between these illnesses or deaths and climate change effects will not be possible. [While it is technically accurate to say that it will be difficult statistically to prove causality, such a situation is not usual. Suggest striking this proposed finding. Is the intent to say that because we can't prove direct cause, we don't have to respond or anticipate (that sentiment would conflict with the previous bullet), or is it to caution that we need to move forward only with inference, rather than certainty?] (VDH)

- The Emergency Preparedness and Response Program for Virginia is available to address and/or mitigate the impacts of extreme weather events on human health. (VDH) [This finding stands out a bit from the others; not sure if it is a finding on par with most of the rest in terms of importance, relevance, etc.]

- Certain groups of people are recognized as being more vulnerable to the health impacts of climate change. These vulnerable populations include the following: children and the elderly, people of low socioeconomic status, members of racial and ethnic minorities, people living in coastal areas and flood plains, and people with pre-existing health conditions and disabilities. (VDH)

- Climate change has potential impacts on human health and quality of life, including but not limited to more frequent or intense hurricanes, vector or water-borne diseases, heat wave and therefore can present a challenge to our collective efforts—both public and private—to keep ourselves and future generations healthy, safe and secure. [This finding reads like a condensed version on much of what is outlined above from VDH. Suggest tightening the language in the bullets above and probably deleting this bullet.]

General Principles Regarding Strategies

- The Governor's Executive Order 59 (2007) gives a greenhouse gas emission target of 30% below the business as usual. This is equivalent to zero percent reduction in emissions with respect to the 2000 level. This target not only falls far short of IPCC recommendations, it also makes Virginia the only major state which has no plans to reduce emissions from the 2000 level. (Shukla)

- Actions to combat climate change should be chosen in a manner cognizant of their costs with reference to benefits which are measurable and meaningful.

Costly recommendations with benefits that cannot be achieved within a Virginia context or which cannot accurately be measured should not be pursued. [There is certainly some value to the statement. Given limited resources, it generally does not make sense for us to invest in steps that are extremely costly and yield few tangible benefits. On the other hand, this statement could be used as a justification for doing very little to address the issue. As such, it reads more like a overarching strategic principle than it does a finding. And as a principle, it has several flaws. First, does not define "costly," which is likely to be a subjective judgment at some level. Second, at this stage, we have to concede that getting the sort of quantifiable data we would like for each and every recommendation is difficult, but we cannot let that be a reason for not moving forward on certain strategies. Lastly, as an operating philosophy, this would place measures with concentrated costs and diffuse (though potentially quite large overall) benefits at a considerable disadvantage. We would suggest deleting this recommendation or re-phrasing as follows: *Resources to mitigate and adapt to climate change impacts are finite. Thus, the Commonwealth should prioritize its response strategies according to their efficacy within a Virginia context and their cost and benefit ratio. Recommendations that are costly compared to other equally effective alternatives should generally not be pursued.*]

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- It is not possible to effectively address impacts of climate change without significant public and private investment. Either new funding sources, redirection of existing resources, or both, will be required.

- [Might be overall more accurate if first sentence were edited as follows:] Strategies that are focused on ~~increasing~~conserving existing natural carbon sinks and increasing the capacity of those ~~natural carbon~~ sinks represent an important and cost-competitive strategy to decrease net GHG emissions.~~are among the more cost-effective ways to abate climate change~~. Some strategies, such as conserving land and planting trees and other vegetation also produces a plethora of co-benefits like improving air and water quality, providing habitat for wildlife, assisting in stormwater management, minimizing impacts of sea level rise, producing food and fiber, reducing heat in urban areas, and providing recreational opportunities.

- The three largest sources of GHG emissions in Virginia are electricity generation, transportation, and non-utility uses of fuel in industrial, commercial and residential facilities. Emissions from all of these sources must be addressed in order for our climate-change mitigation efforts to be successful and fair.

- The nation's movement toward a GHG emission-constrained economy represents an opportunity for Virginia researchers, inventors, and investors to accelerate and deploy technologies in the areas of energy efficiency, indigenous renewable and low-emission energy as well as carbon capture and storage.

- Fossil fuels are a significant part of Virginia's current fuel mix. Carbon capture and storage technology offers the potential to reduce GHG emissions while continuing to producing energy from fossil fuels, but this technology is still in development and is not expected to be commercially available within the next ten years.

- As stated in the Virginia Energy Plan, energy efficiency and conservation provide the least costly and most readily deployable energy resource options available to Virginia. It is essential to identify and remove fiscal, regulatory and other barriers to investments in energy efficiency and conservation. Many of the technologies needed to reduce emissions are already available and are becoming more affordable every day.

- According to the US Energy Information Administration, annual per capital energy consumption in Virginia (345 million BTU) far exceeds European countries like the United Kingdom (165 million BTU), Germany (176 million BTU), France (182 million BTU) and Italy (138 million BTU). In California, annual per capita energy consumption is 232 million BTU.

- As stated in the Virginia Energy Plan, demand for electricity is expected to increase by nearly 2 percent per year, which would equal a __% increase by 2025. The plan further states that efficiency and conservation efforts should be accelerated, and that in addition to those efforts, new electricity generation capacity will be needed. How Virginia supplies this electricity will have a bearing on the Commonwealth's GHG emissions. ~~Additional supplies of other energy sources will also be needed to meet growing demand due to population growth.~~ [Last sentence appears duplicative of concept articulated earlier in bullet.]

- While recently-enacted federal fuel efficiency standards will reduce the level of GHGs that would otherwise be emitted by automobiles, if there is a significant increase in vehicle miles traveled, that would mean that transportation emissions would still grow over time. Regardless, near-term improvements in fuel efficiency, increased fuel costs and concomitant changes in driver behavior can significantly reduce emissions generated from VMT.

- Areas with compact development patterns and readily available transit services have lower vehicle miles traveled per capita than areas with sprawling development and limited transit, while conserving more fields, forests and farmlands. Indeed, areas of compact development generally have lower per-capita energy consumption overall.

- Local governments are the Commonwealth's critical partners in both reducing the level of GHGs and mitigating the impacts of climate change. Localities have authority over land use, zoning, and development decisions, the maintenance and operation of local infrastructure and vehicle fleets, and the enforcement of building codes. The response to climate change will be most effective if

mechanisms are in place to properly coordinate between state and local levels of government.

- Virginia does not currently have an institutional infrastructure to monitor impacts of climate change on Virginia, the effects of efforts to reduce GHG emissions, or to make Virginia-specific predictions of the future climate and its impacts.

- Climate change is a global problem that requires a global solution. That global solution is only achievable if the U.S. demonstrates a commitment to reducing emissions and exerts sustained public policy, political, diplomatic, business and technological leadership.

- The Commission anticipates that Congress will enact an economy-wide cap-and-trade program in the next four years. The development of new technology will be accelerated by the market demand created by a cap on GHG emissions.

LIPFORD COMMENTS

Overall Comments:

1. Would be helpful to number pages in document and number bullets for ease of reference during Commission's review of document.

2. Realize probably not time to incorporate prior to October 23 meeting, but prior to finalizing document, it would be good to organize these recommendations under several sub-categories. Roughly put, these sub-categories include, but are not necessarily limited to:

- Data Collection and Analysis
- Enhanced and Coordinated Research Efforts
- Climate Change Response Coordination (including outreach and education)
- Federal Legislation
- Clarification and Explanation of State and Local Authorities

Governor's Commission on Climate Change

Cross-cutting Recommendations

***Draft*, October 17, 2008**

- Virginia should adopt the IPCC recommendation of reducing greenhouse gas emission by 25% below the 1990 level by 2020, and 80% below the 1990 level by 2050. This will require a 35% reduction from the 2000 level by 2020. (Shukla)

- Virginia should establish a network of scientific and technological institutions which will monitor the impact of climate change on Virginia's agriculture, energy use, economy, health and ecosystems; produce Virginia-specific detailed-predictions of climate change at city, county and state level; and suggest optimal adaptation and mitigation strategies to the policy-makers. (Shukla)

- The Governor may wish to act in the most expedient fashion on those recommendations with which he concurs and no other approval is required. (Thomas) This is a good idea, but perhaps a more meaningful step would be for Commission to identify for all its recommendations (or as many as possible) whether they can be administered by agencies, require higher administration action (executive order, etc.), or require action by General Assembly.

- Create a new entity or empower an existing entity (such as CIT) to increase clean tech energy research and climate change related technology research through increased funding and collaboration among Virginia's research universities and private companies. (Greenleaf)

- Expand the Commonwealth's economic development marketing efforts to include "green industries" including (but not limited to) renewable energy providers, alternative fuels companies, energy audit and retrofit organizations, green building contractors, carbon sequestration entities, and research and development firms. Identify potential incentives for green business to locate in Virginia. Promote partnerships with Virginia colleges universities – including community colleges - -to create education and training programs to insure that green jobs can be filled by Virginia citizens. Promote Virginia as a green industry center for excellence. Examine existing organizations' potential for taking the leadership role for this initiative. (Freudberg)

- The Virginia Energy plan proposes a goal to reduce electricity consumption by 10% by 2022. This goal should take into consideration the impact of shifting the energy consumption from the transportation industry to the electric generation industry due to the increased use of electricity as a transportation fuel. Any electricity consumption for transportation should not be included in the total consumption of electricity for the purposes of calculating progress towards the 10% reduction by 2022. (Heacock)

- Requiring or expecting GHG emissions reductions at too fast a pace will increase the cost of transitioning to a low carbon economy. Equipment depreciates over time and has to be replaced or upgraded in periodic cycles. Requiring relatively new equipment to be replaced with more GHG efficient equipment is costly. A better approach is to require the replacement of equipment with best achievable technology when it is replaced after a reasonable depreciation period. This approach will also allow for the development and deployment of new more GHG efficient technology as it becomes available. (Fledderman)

- It is more efficient to built GHG efficiency into new facilities than it is to retrofit older facilities. GHG efficiency efforts should focus on the getting new buildings, facilities and equipment to high GHG efficiency levels rather than older buildings and facilities. Over time as the older facilities are replaced, we can grow a low GHG economy at the lowest cost. (Fledderman)

- The Governor's Commission on Climate Change recommends that Congress pass climate change legislation that includes the following key provisions: (not a complete list but a start)

    - Establishes a mandatory U.S. greenhouse gas cap-and-trade program;
    - Achieves at least an 80% reduction in U.S. emissions from current levels by 2050 nationally, with near term reductions of at least 20% by 2020;
    - Creates incentives to reduce emissions from deforestation and to absorb carbon from the atmosphere by restoring forests and other ecosystems;
    - Establishes dedicated funding of auction revenues from a cap and trade program or other mechanism to implement adaptation strategies for fish, wildlife, and natural systems impacted by climate change.

- Ensures that adaptation efforts for the built environment take into consideration and minimize resulting impacts on natural systems, particularly in coastal areas. These efforts should make use of nature-based strategies such as natural shorelines and should be coordinated with fish and wildlife adaptation strategies. (Lipford)

- Compare effect of cap-and-trade to a carbon pricing mechanism.

  - Is there a general recommendation that the state monitor and study the operation of cap-and-trade mechanisms that are being developed? The idea here is that the state should assess the relative costs, benefits, and effectiveness of various mechanisms to place a price on carbon emissions through a cap-and-trade or a pollution tax on GHG emissions that is linked to reduction of other taxes. (Pollard)

- Climate Change will require many state agencies to change their operations and there are many questions whether they have the authority to make these changes in operational programs and regulatory authorities. Likewise, local governments are on the front lines of many climate change adaptation approaches and, in a Dillon Rule state, may not have the authorities needed to put those in place. A review of authorities for state and local governments, and suggestions for additional authorities, is needed as part of a state climate change strategy. (Stiles)

- The Commission finds that several of its recommended actions compliment the Commonwealth's existing goals and commitments, such as those for land conservation and water quality. Therefore, the Commission finds that, where ever appropriate, it should utilize existing state programs to implement its recommendations in lieu of creating new state programs. This will, however, require ensuring that existing state programs are appropriately staffed and funded and that their authorities include consideration of climate change impacts. (Jennings)

- Add climate change as a component of the State Water Control Law.

  - My recommendation at the last Climate Commission meeting was offered in consideration of the impact of a changing climate on Virginia's water quality and aquatic resources, specifically the detrimental impacts of increasing water temperature, sea level rise (combined with subsidence), and altered intensity and frequency of precipitation. I suggest that the Commonwealth must begin to incorporate information about the impacts of changing climatic conditions into analyses and decision making regarding protection and restoration of our waters. A couple of quick examples that necessitate incorporating climate change into their development and/or implementation are TMDLs and VPDES permitting. My recommendation was focused on the State Water Control Board, but upon further consideration we should consider incorporating similar language in the statutory authorities of the Virginia Marine Resources

Commission and the Soil and Water Conservation Board. (Jennings) Very good points. Note that Adaptation and Sequestration Working Group has a more detailed discussion on relevant statutes and regulations and this good idea might be better captured within work group recommendations than here in cross-cutting.

- Create an infrastructure for enhancing and updating GHG emissions inventories and forecasts, monitoring the impacts of climate change, and tracking efforts to reduce GHG emissions. The state should assess progress toward achieving any GHG reduction goal that is set at least once every five years and report the results of this assessment to the public. There should also be a mechanism to evaluate current and projected emission levels, and assess the need to readjust GHG reduction goals that have been set and to adopt additional goals. (Pollard)

- [A few minor edits here based on subsequent changes to this recommendation through the Adaptation Work Group] The Commonwealth should establish the Governor's Office of Climate Change Response. The Director of the Office would serve as a member of the Governor's cabinet. The mission of this office would be disseminate critical information and data on climate change to elected officials, policy makers, and the general public and to coordinate the Commonwealth's response to all aspects of climate change in Virginia, using the Virginia Climate Action Plan as its initial work plan. Tasks of Office of Climate Change Response should include:

  - Facilitate development of coordinated programs and policies among state agencies and between state agencies, local governments, and regional commissions and authorities where their responsibilities overlap in key aspects of climate change response.
  - As necessary, facilitate drafting of Memoranda of Agreement or Memoranda of Understanding between state agencies and between state agencies, local governments, and regional commissions and authorities to formalize key aspects of coordinated climate change response. ~~Develop an MOU between relevant state agencies responsible for key aspects of Virginia's climate change response.~~
  - Develop a public engagement strategy for implementation of the Virginia Climate Action Plan, coordinate development of informational and educational materials on climate change mitigation and adaptation, and ensure public participation in development of detailed policies and regulations implementing the Virginia Climate Action Plan.
  - ~~Develop effective communication materials on key aspects of the climate change challenge.~~
  - Develop and maintain a dedicated website as key delivery platform for those materials and as clearinghouse on information for resource managers, policy makers, the private sector, -and the general public.

- Assess progress toward recommendations within Virginia's Climate Action Plan and provide annual report on progress to Governor and General Assembly.
- Recommend revised planning targets and guidance as more information becomes available.
- Serve as liaison between state and local governments on implementation and planning issues associated with climate change.
- Ensure local governments have the information and resources necessary to include climate change response in their comprehensive planning process.
- ~~Develop and maintain dedicated website, with emphasis on resource materials for policy makers.~~
- ~~Develop an Outreach and Education Plan for for elected officials and others involved with developing policies at the state and local levels. Education effort would focus on explaining the predicted climate change impacts to Virginia and how recommendations contained within Climate Action Plan (and Energy Plan?) address key aspects of climate change challenge.~~ (Lipford)

Recommendations for which more than one comment was received:

- Outreach and education. Build public support for legislative actions through these efforts.

  - In collaboration with other public and private sector partners, develop an outreach and education campaign directed toward citizens and businesses in the Commonwealth on the Commission's Climate Change report and recommendations. Focus on no-cost/low-cost greenhouse gas reduction strategies as well as strategies that are the most cost-effective. Promote strategies with co-benefits. Insure the public and businesses understand the consequences of climate change for Virginia and the leadership taken by Governor Kaine. Involve legislative members of the Commission as spokespeople for the outreach and education efforts as well as legislative champions for Commission legislative initiatives. (Freudberg)

  - Outreach and education to increase understanding of the sources, impacts, and measures to address climate change is critical to inform the public and to build support for individual, corporate, and governmental actions needed to mitigate and to adapt to climate change. The state should develop an outreach and education plan, fund outreach and education, and appoint a coordinator to promote and implement such activities. (Pollard)

  - We need to build public support for the inconvenient and perhaps costly changes any CC mitigation plan will entail, particularly a price for CO_2 emissions showing up in gasoline and electrical energy prices. We should enlist the press (in fact we should have been doing so at all our meetings) so that they can report on what is in store for the public and why. The legislature will not move without public support, and the public will not

move until it is informed and concerned. Members of the Commission can help if encouraged to do so. (Smart)

- Provide credits to landowners for reforestation and maintenance of forestland to provide carbon sinks. (Allowing harvest of long-lived species.)
    - The program would use a formula similar to land use taxes in ag and forestal districts. Every five years a landowner would sign up for the program and agree not to harvest timber on the property. For this, they would receive a small tax credit on state income taxes. If timber is harvested during this period, the landowner would owe money back to the state. At the end of the five year period, the landowner could opt out if they so desire. (Rordam)
    - Reward landowners who afforest or maintain their lands in forests and encourage them to manage for and harvest long-lived forest products. (Fledderman)
    - Overall, we think that including farmland and working forests along with no-touch forests in this basic recommendation is OK, provided that in its implementation, we are using sound science to determine the true extent of the sequestration benefits. There is a general misconception that old forests are not very effective at sequestering carbon and that is not correct. Thus, we don't want to provide perverse incentives of harvest, if the true carbon benefits do not justify that sort of management. (Lipford)
    - <u>One additional point: Adaptation and Sequestration Working Group has developed fairly extensive recommendations related to conservation and enhancement of forests, farmland, and other natural carbon sinks. While we are certainly not opposed to seeing a reference to this issue in the cross-cutting recommendations, it might make more sense to handle the issue in detail within the work group recommendations.</u>

<u>Recommendations for which no additional explanation was received:</u>

- Add climate change-related technology, research and development as a technology cluster investment area for the Center for Innovative Technology.
- (Rue proposal—multimodal.)
- State tax incentives to purchase residential solar energy.
- Support of nuclear power and engineering education. (Electricity Generation workgroup.)
- Establish a public benefits fund to aid in the installation of energy conservation and efficiency practices.

- Give local govts statutory authority to address climate change in comp plans, land use, infrastructure

- Formalize use of PDCs in interactions with local governments. Require them to develop regional plans. (Will cost $)

- Formalize climate change in local comp plan processes.

- Interim goals for 2015 so progress can be measured and revisited so that new goals can be set if appropriate.

- Focus on efforts that will have co-benefits such as land conservation and energy conservation that can be measured on a Virginia-specific level.

- Give particular consideration and recognition to those items that will create new jobs and will promote economic development in the Commonwealth.

<u>New cross-cutting recommendations raised after the September 10th meeting:</u>

- GHG Reporting

    - In order to have the most accurate information possible on GHG emissions and to be able to track Virginia's progress towards emission reduction goals, the Commonwealth should enact mandatory GHG emissions reporting for all major emitting sectors in Virginia. (Lipford)

    - Establish a GHG reporting system, requiring all stationary sources of air pollution already required to report air emissions to include GHG emissions in these reports, requiring VDOT to report on transportation emissions, and requiring DEQ to prepare an annual report of emissions in Virginia. (Pollard)

- Virginia should explore the feasibility of working with neighboring states, especially in the southeast, on a regional GHG emissions reductions strategies. (Lipford)

- The Commonwealth should develop an action plan for reducing other GHGs beyond CO_2 (e.g. methane). (Pollard)

- Increase the state requirement that localities recycle or divert at least 25% of their solid waste to at least 35%. Landfills generate significant amounts of methane, a potent GHG. (Pollard)

- The Commonwealth should work with retailers to eliminate the distribution of free plastic and paper bags in stores, provide programs for recycling plastic bags implement a public education program. (Pollard)

[POLLARD SUGGESTED CHANGES]

Governor's Commission on Climate Change

Proposed Findings – Discussion Document

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[IF THIS IS FIRST SECTION OF FINAL REPORT – NEED SOME OVERVIEW OF COMMISSION LIKE HAD IN INTERIM REPORT?]

The Commission is mindful of Governor Kaine's charge to us, and we accept his views on certain foundational issues as our starting point. As Governor Kaine stated, the fact global climate change is happening and is largely human-caused is now widely accepted.*

We have used the Intergovernmental Panel on Climate Change's (IPCC)~~'s~~ 4th Assessment Report as our primary reference point on the science of climate change. As Governor Kaine noted, ~~also told us that because~~ since c~~C~~limate c~~C~~hange is a global problem, a national solution is needed in order for many of the most significant reductions in greenhouse gas (GHG) emissions to be achieved. However, because the effects of climate change on Virginia will be profound, we cannot wait for the federal government to act. Moreover, some of the most promising steps to reduce GHG emissions require state action. We believe that the actions taken by U.S. states can have a significant effect on global GHG levels. The importance of the role of states in addressing climate change is illustrated by data that shows ~~the World Resources Institute analysis~~ that the combined emissions of Virginia and five other southern states (~~,~~ North Carolina, ~~and~~ South Carolina, Georgia, Alabama and Tennessee) are greater than those of all but five countries in the world ~~are equivalent to those of South Korea or, perhaps more striking, the emissions from 10 Midwestern states are equivalent to those of India~~.

According to the IPCC, current climate models predict that global mean warming at the end of the 21st century (2090 - 2099) will range from 1.1°C to 6.4°C for various models and various scenarios, and the best estimate for one of the moderate emission scenarios ~~(the so-called A1B scenario)~~ is global warming of 2.8°C. Scientists from George Mason University~~, VA~~ and the Center for Ocean-Land-Atmosphere Studies in~~,~~ Maryland have examined the ~~original~~ IPCC data for the moderate ~~A1B~~ scenario for 15 global models and calculated the twenty-first century warming for Virginia and the

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adjoining areas ~~(36.5°N-42°N; 73°W-84°W)~~. They~~It is~~ found that the average warming for Virginia and the adjoining areas is 3.1°C and the increase in precipitation is 11%. ~~The average warming for the bottom five, the middle five and the top five models is 2.2°C, 3.0°C and 4.2°C respectively.~~ The warming will be higher for high emission scenarios. ~~It is also found that the average increases in annual mean precipitation for Virginia and the adjoining areas for the bottom, the middle, and the top five models are: 2%, 8% and 24% respectively.~~ (Shukla)

In pursuing actions to combat climate change, Virginia is not acting in a vacuum. Indeed, we join 37 other states in preparing a climate change action plan. Based upon these concepts, what we have learned from the experts who have made presentations before the Commission,* [INSERT FN: See the Commission's Interim Report, which is attached to this report, for a summary of the presentations to the Commission] from our discussions, and from the many external documents we have shared with one another and posted on the Commission's website, we now make the following findings:

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- Sea level rise is a major concern for Coastal Virginia, particularly the highly populated Hampton Roads region. The Chesapeake Bay Program's Scientific and Technical Advisory Committee projects that sea levels in the Chesapeake Bay region will be 0.7-1.6m (2.3-5.2 feet) higher by 2100. Specific impacts will vary by location, depending on changes in land elevation.

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- Modeling and simulation tools are already being used to improve our understanding of how sea level rise and storm surge may affect certain areas of coastal Virginia. However, the fact that LIDAR (Light Detection and Ranging) elevational data does not exist for most of Coastal Virginia is a major obstacle to the ability to plan effectively for these changes.

- Climate changes such as sea level rise pose serious and growing threats to Virginia's roads, railways, ports, utility systems and other critical infrastructure.

- Climate change should be viewed as a threat to national security. Its impacts are likely to exacerbate instability and conflict in many areas around the world. In Virginia, there are several major military installations located in low-lying areas that will be affected by sea level rise and storm surge.

- The continued affordability and availability of insurance for Virginia's landowners is a concern as our climate changes. These effects are already being felt in Coastal Virginia. The frequency and severity of storms in the future are expected to exceed those of the past, and the insurance industry may not have the

ability to handle several concurrent events. It is also important to make sure that federal flood insurance programs are not encouraging development in sensitive coastal areas.

Effects on Natural Systems

- Climate change will have a significant impact on Virginia's ecosystems. At varying rates, vegetation ranges are moving from current locations to higher altitudes and latitudes. The effect of this will be that suitable habitat for some species will decline, other species will become extirpated, and others species will become extinct. Climate change will also exacerbate threats already faced by Virginia ecosystems, such as invasive species and pollution.

- The effects of climate change on many of Virginia's ecosystems and species will be better understood as more research becomes available. Research and conservation efforts will need to be increasingly focused on managing resources to maintain healthy, connected and genetically diverse ecosystems, and plant, wildlife, and fisheries populations.

- Some of the Chesapeake Bay's "foundation species," such as blue crabs, eelgrass and oysters, could decline or disappear as salinity and temperatures continue to increase and weather patterns continue to fluctuate widely from year to year. Foundation species support many other species, so these impacts would be felt throughout the ecosystem.

- Oxygen levels in the Chesapeake Bay are expected to decrease due to increasing temperatures and increasing storm runoff, which will have a negative impact on species like striped bass, blue crabs and oysters. Acidification of the Bay and Atlantic Ocean is also a concern as waters absorb more CO_2.

- Coastal wetlands, a critical habitat for many of the Chesapeake Bay's plants and animals, are being lost as sea levels rise, and freshwater coastal wetlands are similarly threatened by saltwater intrusion.

- Virginia's agriculture and forestry industries, as well as commercial and sport fishing industries and park land, will be impacted by climate change. More research ~~on~~ to determine specific effects is needed, because the lack of specific information on ~~the~~ impacts hinders Virginia's ability to adapt and prepare for these changes.

Virginia's forestlands sequester approximately 23 million metric tons of carbon dioxide per year . Unless current land conversion trends are reversed, however, this number will decline every year, as Virginia losses on average 27,000 acres of forestland annually to development.

Effects on Human Health

- Climate change is likely to have wide-ranging and mostly adverse impacts on human health. Climate change can affect the health of Virginians directly and indirectly. Extreme weather events (e.g., floods, droughts, hurricanes or windstorms, wildfires and heat waves) can directly affect health through injuries, drownings, or mental health problems. These extreme weather events could lead to compromised water and food supplies, resulting in increases in waterborne and food-borne illnesses. Climate change will lead to the alteration or disruption of natural systems, making it possible for vector-borne diseases (i.e., arthropod-borne diseases such as West Nile virus, malaria, dengue, Lyme disease) to spread or emerge in areas where they had been previously limited or non-existent. These alterations or disruptions could result in the disappearance of some vector-borne diseases by making the environment less hospitable to the vector or pathogen. Climate change is also expected to increase the incidence of diseases associated with air pollutants and aeroallergens and exacerbate other respiratory and cardiovascular conditions. (Virginia Department of Health)

- Disease surveillance systems are capable of tracking and identifying changes in diseases and illness that might be associated with climate change; however, with the exception of heat-related deaths, establishing causality between these illnesses or deaths and climate change effects will not be possible. (VDH)

- The Emergency Preparedness and Response Program for Virginia is available to address and/or mitigate the impacts of extreme weather events on human health. (VDH)

- Certain groups of people are recognized as being more vulnerable to the health impacts of climate change. These vulnerable populations include the following: children and the elderly, people of low socioeconomic status, members of racial and ethnic minorities, people living in coastal areas and flood plains, and people with pre-existing health conditions and disabilities. (VDH)

- Climate change has potential impacts on human health and quality of life, including but not limited to more frequent or intense hurricanes, vector or water-borne diseases, heat wave and therefore can present a challenge to our collective efforts—both public and private—to keep ourselves and future generations healthy, safe and secure.

General Principles Regarding Strategies

- The Governor's Executive Order 59 (2007) gives a greenhouse gas emission target of 30% below ~~the~~ business as usual projections by 2025. This is equivalent to a return ~~zero percent reduction in emissions with respect~~ to ~~the~~ 2000 levels. This target ~~not only~~ falls far short of IPCC recommendations, and it ~~also~~

makes Virginia the only major state that has adopted a GHG reduction goal which has no plans to reduce emissions from the 2000 level. (Shukla)

- Actions to combat climate change should be chosen in a manner cognizant of their costs with reference to benefits which are measurable and meaningful. ~~Costly recommendations with benefits that cannot be achieved within a Virginia context or which cannot accurately be measured should not be pursued.~~

- It is not possible to effectively address the impacts of climate change without significant public and private investment. Either new funding sources, redirection of existing resources, or both, will be required.

- Strategies that are focused on increasing the capacity of natural carbon sinks are among the more cost-effective ways to abate climate change. Some strategies, such as conserving land and planting trees and other vegetation also produces a plethora of co-benefits like improving air and water quality, providing habitat for wildlife, assisting in stormwater management, minimizing impacts of sea level rise, producing food and fiber, reducing heat in urban areas, and providing recreational opportunities.

- The three largest sources of GHG emissions in Virginia are electricity generation, transportation, and non-utility uses of fuel in industrial, commercial and residential facilities. Emissions from all of these sources must be addressed in order for our climate-change mitigation efforts to be successful and fair.

- The nation's movement toward a GHG emission-constrained economy represents an opportunity for Virginia researchers, inventors, and investors to accelerate and deploy technologies in the areas of energy efficiency, indigenous renewable and low-emission energy as well as carbon capture and storage.

- Fossil fuels are a significant part of Virginia's current fuel mix. Carbon capture and storage technology offers the potential to reduce GHG emissions while continuing to producing energy from fossil fuels, but this technology is still in development and is not expected to be commercially available within the next ten years.

- As stated in the Virginia Energy Plan, energy efficiency and conservation provide the least costly and most readily deployable energy resource options available to Virginia. It is essential to identify and remove fiscal, regulatory and other barriers to investments in energy efficiency and conservation. Many of the technologies needed to reduce emissions are already available and are becoming more affordable every day.

- According to the US Energy Information Administration, annual per capital energy consumption in Virginia (345 million BTU) far exceeds European countries like the United Kingdom (165 million BTU), Germany (176 million

BTU), France (182 million BTU) and Italy (138 million BTU). In California, annual per capita energy consumption is 232 million BTU.

- As stated in the Virginia Energy Plan, demand for electricity is expected to increase by nearly 2 percent per year, which would equal a __% [NEED TO FILL THIS BLANK] increase by 2025. The plan further states that efficiency and conservation efforts should be accelerated, and that in addition to those efforts, new electricity generation capacity will be needed. How Virginia supplies this electricity will have a bearing on the Commonwealth's GHG emissions. ~~Additional supplies of other energy sources will also be needed to meet growing demand due to population growth.~~[THIS IS MORE CLEARLY COVERED IN FIRST TWO SENTENCES OF THIS BULLET]

- While recently-enacted federal fuel efficiency standards will reduce the level of GHGs that would otherwise be emitted by automobiles, if there is a significant increase in vehicle miles traveled (VMT), that would mean that transportation emissions would still grow over time. Regardless of the rate of VMT change in the future, ~~near-term~~ improvements in fuel efficiency, increased fuel costs and concomitant changes in driver behavior can significantly reduce emissions generated from driving~~VMT~~.

- Areas with compact development patterns and readily available transit services have lower vehicle miles traveled per capita than areas with sprawling development and limited transit, while conserving more fields, forests and farmlands. Indeed, areas of compact development generally have lower per-capita energy consumption overall.

- Local governments are the Commonwealth's critical partners in both reducing the level of GHGs and mitigating the impacts of climate change. Localities have authority over land use, zoning, and development decisions, the maintenance and operation of local infrastructure and vehicle fleets, and the enforcement of building codes. The response to climate change will be most effective if mechanisms are in place to properly coordinate between state and local levels of government.

- Virginia does not currently have an institutional infrastructure to monitor impacts of climate change on Virginia, the effects of efforts to reduce GHG emissions, or to make Virginia-specific predictions of the future climate and its impacts.

- Although national, state, and local actions can make a significant difference, c~~C~~limate change is a global problem that requires a global solution. That global solution is only achievable if the U.S. demonstrates a commitment to reducing emissions and exerts sustained public policy, political, diplomatic, business and technological leadership.

- The Commission anticipates that Congress will enact some version of a~~n~~ ~~economy-wide~~ cap-and-trade program in the next four years. The development

of new technology will be accelerated by the market demand created by a cap on GHG emissions.

Commission on Climate Change – B. Smart comments on Draft Report as of 10/20/08

General Comments.

Generally, the draft seems to be a collection of many helpful ideas, without prioritization, timing or quantification of specific actions. Perhaps that is all it can be at present, given the lack of resources to employ consultants or staff to flesh it out, or the ability to work frequently in small groups across a table to thrash out ideas and reach consensus. But in its present form it is as yet less than I had hoped for.

I am unhappy to see the lack of attention paid to public comments, except to dismiss those who don't believe the threat is real (footnote, page 1, Proposed Findings – Discussion Document). We heard eloquent testimony from several students asking for an aggressive effort to address problems that they will inherit from us. Shouldn't the plan acknowledge and react to their deeply held concerns?

The specific issue on which we heard the most testimony – on both sides – was the Wise County coal-fired power plant. This was never discussed by the Commission, I believe a serious oversight in view of the strong public feelings expressed. As a Commissioner, I feel embarrassed by this lack of attention to what many believe to be a potentially costly mistake that could have been deferred until when (and if) CCS was proved reliable and commercial.

There is no mention, in either Energy Generation or The Built Environment, of the power distribution grid, despite the fact that the proposal to expand a Dominion power line has been the biggest environmental issue in the northern Virginia Piedmont during the last two years. Certainly changes in peaks through demand management, changes in fuel sources, a different balance of power source locations, and greater downstream efficiencies in electricity use call into question any process that designs the grid to accommodate a business as usual scenario. How about saying:

"Because the need to address climate change will alter the mix of fuels used to generate electricity, level electricity demand, and alter location of power sources, any investments in power distribution grid expansion in Virginia should await the formation of a regional power generation plan that is responsive to the climate change threat."

The following comments are made following the sequence of discussion outlined in the agenda for the Oct. 23 meeting.

Proposed Findings:

(Second paragraph, second sentence) Delete wording "Governor Kaine also told us that". The commissioners know without needing to be told that climate change is a global problem.

(Page 2, fourth bullet) Add to impacts "increase international migrations of endangered populations"

(Page 2, fifth bullet, line 6) Replace "are not encouraging" with "discourage"

(Page 3) "Effects on Human Health" should be a section heading, not the last words of the prior section

(Page 4, first bullet under General Principles ...) This is an excellent statement. It would be strengthened if it were quantified by using number of tons of CO2 in comparisons)

(Page 4, second bullet under General Principles ...) Remove words "or which cannot be accurately measured". No one knows for sure the costs of inaction, but that can't be used as a reason for no action.

(Page 5, third bullet, final clause) Change to "but this unproven technology is still in development, and even if it becomes commercially feasible it will add significant cost, and not be available within the next ten years." My fear is that more conventional coal plants will be built on the assumption that CCS will be available and cost competitive with nuclear and renewables. That may be Dominion's hope, but it's the ratepayers, not Dominion, who will suffer if it doesn't happen.

Cross-Cutting Recommendations:

(Page 1, third bullet) Change "may wish to" to "should". Remember, we are private citizens. The Governor is our servant, not the reverse. As Commissioners we have every right to tell him straight out what we think.

(Page 2, first bullet) I do not accept this premise. The sooner we transition to a low carbon energy system the lower will be our eventual costs for adaptation, because we will have reduced the amount of CO2 that has accumulated in the atmosphere. We have an urgent problem; let's not delay in addressing it. Many of the changes will pay for themselves over reasonably short periods.

(Page 2, second bullet) I don't agree. We should do both. They are not in competition with each other.

(Page 2, third bullet). "..reductions of at least 20%." Reductions from what base? Also, dedicated funding from permit auctions must go to many other uses than just wildlife. Otherwise, OK

(Page 3, first bullet) "compliment" should be spelled "complement."

(Last page, third bullet) This suggestion was mine. I believe the idea of emissions measurement and periodic bench marks against which to measure progress is well covered elsewhere. We do need to quantify what we expect to happen, and when, and then track how we are doing against those expectations. Otherwise the "plan" is just a wish list of good ideas.

Electricity Generation / Other Stationary Source: ("Our" working group)

[In reading these somewhat critical comments, please remember I was once a businessman running an international company that owned a US -regulated natural gas pipeline and knew how to lobby FERC to see it our way; drilled for oil and gas; owned and managed 1.5 million acres of forest; produced pulp and paper in mills which had large power plants running on wood wastes and either coal, oil, or natural gas; owned three insurance companies; and engendered public wrath because the cans we made were littered all over the roadsides by idiots – but the litter was our company's fault in the public's eyes. Then, as a government official I negotiated international trade agreements, and was besieged by lobbyists seeking business favors. I have also in the past been in direct charge of long range planning for a Fortune 100 company, a major environmental organization, a school, and our Church. Been there, seen and done that. Here, I'm trying to be helpful in a difficult situation that will call for many changes in life styles and how the world does business.]

I remain disappointed at the lack of quantification of our power generation problem with CO2 emissions, as I said in the last working group meeting. What would be the impact on emissions by various levels of downstream efficiency actions: if we make our 12% renewables goal and add 2 new nuclear reactors? if CCS works and is applied to Wise County? Or other coal-fired plants? I think a good plan needs to list and time specific future actions and measure results against predictions. This all should be easiest to do at the power generating level – only a few companies are involved, not millions of individuals. I'm disappointed that our power company members apparently didn't jump in to help on this, although you asked them to.

Specific comments:

(Page 2, Bullet Three) Save the first sentence and eliminate everything else. The use of overseas offsets has problems. It is hard to verify and open to gaming. It also defers US at-home action, which is a necessary precondition to getting China et al to do anything themselves. We need to bite the bullet here in the US, not hire surrogates abroad to do it for us, at least until there is a global program in place and to which the US is a signatory.

(Page 4, Research and Development) I don't remember discussing all this in any depth. While I endorse more nuclear power in Virginia, this is a relatively developed technology with expertise elsewhere which we can tap. Rather than imitating what others have done, we should concentrate Virginia R & D resources on emerging fields such as CCS, wind, solar, batteries and downstream efficiency opportunities (such as demand management, advanced metering, off-peak pricing) where power generators can help solve the problem. This calls for redirecting our R & D efforts. (What the Virginia Tobacco Commission has to do with energy R & D escapes me, but they are planning to spend almost half their money on nuclear.) Clearly there is need for some agency to coordinate the R & D efforts of the state's universities to set priorities and avoid overlap and duplication.

(Page 5, paragraph starting "Workgroup discussion regarding..") Third sentence should end with " an option for meeting the RPS." with the remaining 2 ½ lines omitted as they are unnecessary and serve to confuse the issue.

(page 5, footnote 1) Add a final sentence: "While 'advanced clean coal technology' does reduce up to 25%* of CO2 emissions from burning coal, that process still leaves coal as the most CO2-emitting fuel option." We should not hide coal's CO2 sins under the "clean" misnomer. The term "clean coal" originally referred to elimination of mercury and compounds of sulfur and nitrogen from power plant stack gasses, a worthy effort but unrelated to CO2. The only way to get rid of CO2 would be by some as yet unproven CCS technology. (* The 25% figure was advanced by Mr. Carson. I have no way of validating it.)

Finally, we have said almost nothing on industrial stationary sources such as pulp and paper mills.

Built Environment.

(Page 2) the paragraph starting with "These barriers ..." is well stated and very important as it points out the difficulty in getting consumers to make even the most obvious cost saving investments. Should it be elaborated on for those who do not understand the term "discount rates"? Should it be highlighted? See my comment on the first bullet, page 2 of "Cross-cutting."

(Page 6, third paragraph) I've lived in Virginia since 1985 and never heard of this. The utilities should promote it. Differential rates to encourage consumers to help with peak loads, etc., need to be used more. Should this and Section 2, Smart Metering and Section 4, Renewables, of Built Environment be integrated with the Energy Generation proposals?

(Page 9) I believe we should take a stronger position than just "consumer education".

Adaptation and Sequestration.

I like the format they have used: state and analyze the problem, followed by specific recommendations. I recommend we conform all the sections to this format.

They also have done more quantifying, perhaps because their mandate covers more conventional and describable problems such as storm damage, rather than complexities such as how much CO2 concentration will lead to what result.

(Page 7, paragraph beginning "The Commission Heard ... ") Change next to last word from "are" to "do".

(Page 11, third bullet) I'm a lot less satisfied than some enthusiasts that crop-based bio fuels are an answer. In most bio-fuels cases (algae is an exception) you are trading other crops and land fertility, usually with productive agricultural potential, for auto fuel. Of course the farmers like it, but listening to them has brought us a series of lousy national farm bills. Do we have on the Commission, or can we hear from someone, who knows this subject, and doesn't have a dog in the fight?

(Page 19) I'm glad to see serious attention being paid to enlisting public support.

Transportation and Land Use.

This section is the best at quantifying the problem. However, it seems to duck the issue of using fuel prices as a means of encouraging conservation, even after it notes the reduction in miles traveled after the recent hikes in gasoline prices.

Assuming there is a Federal cap and trade program, to be fully effective it will have to apply to transport, industrial, commercial and home heating fuels as well as electricity generation, or be supplemented by a carbon tax for those uses. We cannot get where we need to go without using the market mechanism of price to embed the environmental externalities of climate change and national security into the prices of energy. One place for Virginia to start is to raise its gasoline tax to the level of surrounding states. That would generate some funds to address the many costs any climate change mitigation program will incur.

(Appendix , item 47) The workgroup recommends AGAINST adopting California tailpipe standards, which it then describes in great detail, without explaining why it rejects them. Shouldn't the workgroup add the reasoning behind their decision, so other Commissioners can concur or not?

Bruce Smart 10/20/08

Electricity Generation Plan

To understand and then create a plan to manage the CO_2 emissions from electricity generation one must first quantify them per megawatt produced (in quantity and cost) under various scenarios of

Mix of fuel sources – base year and future years (say 2015 and 2025)
Coal (provide for each technology used in generation, if emission and cost differences are significant)
Oil (use probably negligible today)
Natural gas
Nuclear
Renewables (Hydro, wind, solar, bio-fuels, waves)

Demand for electricity, or more accurately, demand for electricity services, adjusted for efficiency in delivering them (base year, 2015, 2025)

To make these calculations we need reliable approximations of the following, which can most easily obtained from power generators (for simplicity we might use Dominion's figures as a proxy for all generators, and for the moment set aside industrial emitters – paper mills and cement plants):

Tons of CO_2 emitted per megawatt of electricity produced from each fuel source
Power lost in delivery of electricity to end user
Electricity demand in base year
Estimates of demand in 2015 and 2025 under BAU assumption

Once we have the above data we can calculate the CO_2 emissions under BAU in various years, and how they might change as we alter the mix of sources. We can also make estimates of electricity demand as our program to improve efficiency in the Built Environment takes hold, and allows the power generators to reduce the amount produced from the most CO_2-intensive source (coal).

All this is best presented using bar graphs to illustrate and compare alternatives.

If we add new power from nuclear and renewables our average CO_2 emissions per megawatt will decline, and factoring in better efficiencies in production, transmission and end use (the Built Environment) will add to reducing our total emissions.

Renewables such as wind and solar are tricky, as their availability is variable and unpredictable. Megawatts of capacity will far exceed megawatts of power produced. Ability to store this power (pumped storage, fuel cells, etc) will add both utility and cost to these alternatives. We probably need some numbers here, too.

Cost data will enable us to assess each source to help in deciding how best to move. I assume cost of fuel plus cost of capital (depreciation plus interest) could be a proxy for actual total costs. I suspect we might want to look at costs as now figured, and then at cost including prices to be paid for emission permits under cap and trade, say at $50 per ton of CO2. [Bear in mind that "cost of a ton of carbon" is different than "cost of a ton of CO2."] We should talk here using CO2 and CO2e (CO2 equivalents) as our units of measure.

If we decide to show the effect of CCS (should it prove feasible) we will also need to show some estimate of the substantial added costs it would entail.

In the case of renewables we should apply the 12% goal only against the fossil fuel base, not against the total generation including nuclear and hydro.

I believe we can present the Governor with a plan based on a timed program to

> Expand use of nuclear and renewables,
> Efficiency improvements in generation, transmission and end use, and
> Retirement of aging coal plants

that will make him smile.

If CCS proves feasible and cost effective it would be icing on the cake, but it should not be in the base plan because of the many uncertainties surrounding it.

Doing this will be very difficult without the active involvement of our power company Commissioners, or the retention of a consultant such as Pew or McKinsey. But without it we really don't have a plan for Electricity Generation.

B. Smart. 10/22/03

Rovner, Nikki

From: Robert J Fledderman [robert.fledderman@mwv.com]
Sent: Thursday, October 02, 2008 6:49 PM
To: Rovner, Nikki
Cc: Bryant, Preston
Subject: Additional Recommendations
Follow Up Flag: Follow up
Flag Status: Completed
Attachments: Additional recommendations.doc

Nikki:

Preston encouraged me to take my recommendations that didn't get a hearing at the EG Workgroup to the full Commission so I've written them up (and added a couple) to be put in the hopper for the Commission to consider. Some are not cross-cutting recommendations and probably go with one of the other Workgroups. I'll leave it up to you to figure out how to handle that.

I can't make it to the next meeting scheduled for October 23. Hopefully, I don't have to be there for the recommendations to be considered.

Thanks,
Bob F.

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1. Use monitoring and reporting the help drive down GHG emissions.
   Using federal GHG monitoring protocols after they are developed and approved; require entities (including public entities) emitting more than 10,000 tonnes of CO_2e per year in the Commonwealth to publicly report (after considering confidentiality concerns) those emissions. If you don't measure it, you can't manage it. Public reporting will put a spotlight on the efforts of the various entities to reduce their GHG emissions.

2. Build enabling low GHG infrastructure.
   A federal cap and trade program is not a complete answer to a transition to a low carbon economy. There is more heavy lifting required and much of it will need the leadership, coordination and financial assistance of government entities at various levels. Some examples are: efficient power transmission, upgraded rail systems, upgraded urban public transit systems.

3. Support (federal) and implement (state and local) measures to improve forest health on public lands in the Commonwealth.
   Reduce stocking to levels that maintain vigorous growth and aggressively remove disease and invasive species infestations. Adopt management strategies that are conducive to anticipated climate changes.

4. Monitor trends in forest carbon in forests <u>and</u> forest products.
   One of Commonwealth's most important assets in mitigating climate change is carbon sequestered in both its forests, in the products harvested from its forests, and the carbon emissions avoided by substituting woody biomass for fossil fuels. It is important to measure both forest carbon and forest product carbon to get a complete picture of the impact of the Commonwealth's forests. If you don't measure it, you can't manage it.

5. Establish power conservation and energy efficiency programs.
   Two of the most cost effective measures leading to reduced GHG emissions are power conservation and energy efficiency. The Commonwealth should provide low cost energy audits and incentives to implement energy efficiency measures to residential and commercial building owners. It should also require that all public buildings increase their energy efficiency as an example to the private sector.

6. Give energy consumers the appropriate signals to conserve energy.
   Power tariffs should be developed to provide energy consumers the benefits of the measures they take to conserve energy use and reduce peak demand, that is, reduced power consumption and shifting demand from peck loading periods should result in a commensurate reduction in power costs (anti-decoupling).

7. Establish mechanisms to prevent electric power generators from wholesale fuel switching to natural gas from coal if a price is put on GHG emissions.

If governments establish a price for GHG emissions, there will be an incentive for coal fueled facilities to switch to more GHG efficient natural gas. This in turn would likely cause a significant natural gas price increase for residential and commercial natural gas users.

8. Use revenues from offshore oil and gas extraction royalties to implement transition projects leading to a low carbon economy.

   Eventually, drilling for gas and oil off Virginia's coast may be allowed. The Commonwealth should invest those revenues in the research, technology development and infrastructure necessary to transition to a low carbon economy.

Cross-cutting Recommendation: How best to stimulate the deployment and adoption of solar and wind technologies to generate electricity in Virginia:

Create a feed-in tariff for renewables that is the same size in MW, the same cost in Kwh, and the same duration as the cost structure to ratepayers of any proposed nuclear plant.

Background: Of all the renewables, only solar and wind offer a real chance to make a major contribution to electric generation. They are both wide spread as resources; the resource base is large, larger than any other renewable. The technologies are proven as to science and engineering, and neither has any of the ancillary consequences and side effects of other renewables, such as biomass. Wind already provides more than 20% of generation in some European countries, notably Denmark. Solar is generally a good deal less than 1% of generation, although growing rapidly.

There is also an interesting argument in favor of the increased use of nuclear power for electricity generation, and Dominion in Virginia, and many other utilities elsewhere in the US are championing this option. Even some members of the environmental community have now dropped their opposition to this particular technology and are cautiously supporting it as a non-carbon based form of generation. Problems of the back end of the fuel cycle (how to dispose of the long lived radioactive waste), proliferation risks and uncertain cost, however, remain.

Solar in particular (I am referring only to photovoltaic technologies, solar thermal installations are an entirely different and unattractive alternative with land and water use consequences) is currently quite expensive to install. European prices run $7500 to $10,000 per KW. This compares unfavorably with gas turbines at $1000/kw and even coal plants at $2000 to $3000/kw, even though the fuel for solar plants is "free." Moreover, capacity factors are low, although this depends to some extent on the quality of the sun. But none of us have figured out how to make the sun shine at night. So you have high cost capital with a low utilization rate—15-25%. The good news is that there is substantial work underway in the manufacturing arena that should within several years yield much cheaper solar capital costs—probably $2000 per Kw. This puts solar closer to 10 to 15 cents per kwh, rather than the 30 to 40 cents that it currently costs.

Opportunity: The decreases in solar costs will be driven to some extent by better designs and some modest additional research, but mostly by gains in manufacturing efficiency and volume. The Europeans have led the way in creating a subsidy scheme that actually works and has significantly stimulated the installation of both wind and solar utility scale generating plants. These are

"feed-in tariffs," and what this means is the following: if you build and hook up a utility scale solar plant to the grid, you receive the tariff. No competition, no rationing, no nothing. The tariff is embedded in a 20 to 25 year contract with the utility, backed up by the government. No problems with the credit of the off taker. It is also usually escalated at some rate. This makes the contract very able to be financed, which is important to drive down the cost of capital. There is usually some limit to the amount of capacity that can be constructed—2400 MW in Italy, for example. There are also some countries, i.e. Germany, where there is no absolute limit, but the tariff decreases each year, although if you sign on in year X, you get that year's tariff for the length of your contract.

Competing ideas: The US subsidy pattern has been a pretty dismal failure for generating real solar installations. The tax credit only works for companies which have taxable income, which excludes many small and even some relatively large players. The RPS exhortations are even more useless. There are all sorts of definitional problems, all sorts of reasons why utilities could argue their way out of them, and in general an overall lack of effectiveness. And that is for the ones that are mandatory, unlike the RPS in Virginia. The feed in tariffs in Europe, by contrast, have been a major and substantial success, and the costs, unlike those of tax credits, can easily be limited.

What to recommend? There is an interesting bargain to be made here: I propose that the VCC couple the two technologies together and recommend:

A. Support for new nuclear power in Virginia, of whatever size the dominant utilities are willing to recommend and pursue, provided that, for each proposed nuclear unit--
B. A feed in tariff for the same amount of megawatts, and at the same price as that approved by the PUC and ultimately paid by customers for the nuclear power, also be paid for any wind or solar installations completed in Virginia, on a first come first served basis.

For example, if one assumes that a nuclear plant costs $8000 per KW, functions at an 80% capacity factor, has a 5% per year maintenance cost, a 3 cent per KWh fuel and operating cost, and a simple 10 year payback on capital, then the estimated cost per Kwh would be 16.65 cents per kwh. This same price would be offered to any solar or wind facility, up to the size (1000 MW or 1200 MW) of the proposed nuclear unit, in the form of a 30 year contract. If in actuality the nuclear price ended up being more due to construction overruns or other cost increases, then at that point the renewable facility would see a similar increase in its contracted price. If the nuclear unit came in at a lower price than estimated, then the renewable price would be lowered proportionately.

What would actually happen? If those concerned about the cost of renewables are right and there is no renewable resource in Virginia, at a reasonable price, then nothing will happen, and that is probably as it should be. If the nuclear

enthusiasts are correct and the price of nuclear energy is low, then there will be nothing lost by paying this same price for renewables. And if nuclear prices end up being higher, then developers will find renewable projects, manufacturers will drive down prices, and the renewable industry in Virginia will thrive. And all at a cost to ratepayers already determined by the designated authorities to be appropriate for a technology that imposes NO carbon burden on the State.

20 October 2008

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Rovner, Nikki

From: Paul Ferguson [Pferguson@arlingtonva.us]
Sent: Wednesday, October 22, 2008 9:54 AM
To: Rovner, Nikki
Cc: Bryant, Preston
Subject: RE: Materials for Next Week's Meeting

Nikki,

I would like to propose that Virginia have a 12 % mandatory RPS by 2022 rather than the voluntary one that exists now. This was discussed in my committee. There was not an interest for this in my committee but I believe it is something the entire commission might support. Preston has told me that he thinks we are on track to meet the goals anyway through the existing legislation. Thanks.

Paul Ferguson

From: Rovner, Nikki [mailto:Nikki.Rovner@governor.virginia.gov]
Sent: Friday, October 17, 2008 4:24 PM
To: ClimateChange
Cc: ClimateChangeAsst
Subject: Materials for Next Week's Meeting

Dear Commissioners,

Attached please find the following:
1. An agenda.
2. Revised findings. These have been revised to reflect the Commission's discussion at its last meeting. A few additional items have also been added for the Commission's consideration.
3. Proposed cross-cutting recommendations. I have compiled all the language I have received from commissioners since the last meeting.
4. Reports from the 4 workgroups. As you will recall from Secretary Bryant's September 15 email, next week's discussion of workgroup recommendations will be a preliminary one. The goal will be to identify the recommendations that can be approved quickly without additional discussion, so please keep this in mind as you are reviewing the reports. Recommendations requiring further discussion will be considered at the following meeting.
5. Secretary Bryant's September 15 email outlining the process going forward.

If, after reviewing the findings and cross-cutting recommendations, you wish to propose any alternative language, please provide your proposals in writing. This will facilitate the Commission's discussions greatly. You may either email the language to me by Wednesday, or bring 60 copies with you to the Commission meeting.

Thank you, as always, for the significant time and energy you are devoting to the Commission's work.

Nikki Rovner
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Rovner, Nikki

From: Skip Stiles [skipstiles@att.net]
Sent: Wednesday, October 22, 2008 2:09 PM
To: Rovner, Nikki; Bryant, Preston
Subject: Draft comments

Attachments: Stiles Comments on Work Group, crosscut.doc

Stiles
:nts on Work G

Preston and Nikki,

I am unable to make the meeting. I have read all the materials and have comments - appended. I am very sorry not to make it there - I think this is an important meeting for shaping the report, which is why I went over all the documents and put these comments together.

Best,
Skip

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General Observations

The 45 MMte in CO_2 reductions we are seeking has not yet appeared in these work group reports. There are no specific recommendations from which any reductions could be derived. We are running out of time. The built environment work group (with 70% of the energy use) report especially needs a great deal more specificity around which we can begin a discussion on whether we can make the reduction goals.

The task force reports are very uneven. Some groups grappled with specific recommendations and others seem to have left it to the full commission to write the details of their reports. Just an observation – some of these topics are more "charged" than others.

Cross Cutting

Overall goals – I agree with Shukla on taking the IPCC goal by 2050. (McCain has 60% by 2050.) I think we should be setting an interim goal at least as strong as NC and MD – back to 1990 by 2020. This is also the McCain goal in his platform.

Strongest support for outreach and education recommendations – we need to tackle that in a comprehensive way, starting with this report.

Suggestion to create a new entity or expand CIT to deal with energy research – I strongly object to using CIT based upon experiences with researchers who have had grants flow this organization. They offer little value-added to the research funding – in fact they make up their salary shortfalls by taking overhead off of grants, reducing the actual funding flowing to researchers, while providing little value added that a good research foundation could not provide on-campus.

I agree with the cross cutting recommendation at bullet five regarding the economic potential in doing this right. The first folks who manage to think their way out of the box we are in are going to make a lot of money – why not Virginia?

Agree with Pollard asking for comparison of cap and trade to pollution tax.

A public benefits fund is critical to reaching a large segment of the built environment and to insuring some equity in our efforts.

GHG reporting system is essential to this effort – fully support those recommendations.

Findings

Again, our goals are too timid. The draft findings document states – "The importance of the role of states in addressing climate change is illustrated by the World Resources

Institute analysis that the emissions of Virginia, North Carolina and South Carolina are equivalent to those of South Korea... " North Carolina's GHG reduction goal is a return to 1990 by 2020, South Carolina's GHG reduction goal is 5% below 1990 by 2020. Even South Korea set a goal of a return to 2005 by 2012 – about where Virginia is headed but 8 years in advance of our efforts. We must do better than our current goal.

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"Actions to combat climate change should be chosen in a manner cognizant of their costs with reference to benefits which are measurable and meaningful. Costly recommendations with benefits that cannot be achieved within a Virginia context or which cannot accurately be measured should not be pursued."

This statement has too many broadly defined terms that could cause trouble in the future. Especially troubling is the statement that we should not pursue, " *recommendations with benefits that cannot be achieved within a Virginia context or which cannot accurately be measured*" Nearly all of the benefits we are looking at are not within a Virginia context – our actions alone will not curb temperature increases or sea level rise rates. It takes many states acting in concert and federal efforts – indeed international efforts. But if we wait to be the last state to take action before we do – if we wait for certainty – it will be too late. The residence time of CO_2 is around 100 years so by the time we know with certainty, it will be too late. As well, measuring benefits can be hard, since many of them will be in the form of costs avoided, benefits very hard to measure.

A better approach is to insist that recommendations be prioritized on a cost-benefit basis and that the anticipated benefits of a state action be clearly identified and quantified to the best of our current ability.

Finally, it is time for Virginia to return to its roots. If the founding fathers had taken the attitude embodied in this statement, Patrick Henry, Thomas Jefferson, Peyton Randolph, George Washington, Richard Henry Lee, Edmund Pendelton, and Benjamin Harrison, would have been told by the Virginia Legislature to wait for certainty on the outcome of the Continental Congress before they ventured to Philadelphia. These times today call for bold leadership, not fearful, conservative thinking.

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The elimination of consideration of natural carbon sequestration methods deserves mention in the "General Principles" section. Some discussion regarding the state's inability to adequately inventory natural sinks and determine their condition and contribution into the future is needed. Then, some suggestions on how to address this shortcoming. (I say shortcoming because as flawed as sequestration estimations might be in other state reports, they are being incorporated into a majority of the other state climate change reports, so some mention needs to be made here lest we appear to have not considered them at all.) To not mention the "ground rules" for our calculations is a glaring omission.

There also needs to be a clear statement that until we can establish a baseline for natural carbon sequestration sources, it will be impossible to allow the use of natural carbon sequestration sources for either a mitigation offset or a carbon credit for sale or trade. We cannot be counting the baseline sequestration sources as fungible commodities in either the regulatory or marketplace settings. Any sequestration sources used in those setting have to be "above the line" and beyond the base. And the only way to draw that line is with a solid, agreed upon estimate of what the natural baseline is.

Transportation and land use – 30% of energy use

This work group report is well structured and detailed. The recommendations are to the point and very specific. There are no estimates of GHG savings, however.

Italicized items # 20 and 22 are important and I'd recommend their inclusion. Item 20 begins to collect a set of much richer indicators of progress toward changing the status quo in transportation in Virginia. Putting this responsibility on the Commonwealth Transportation Board is critical.

Similarly, having the Metropolitan Planning Organizations look at regional GHG impacts (item #22) is critical to integrating these factors into the regional transportation networks.

Built Environment Task Force – 70% of energy use (commercial, residential, industrial)

There is no mention of any GHG reduction from these actions, nor any mention of cost associated with any actions recommended here.

There is a need to quantify the size of the potential "market" for this work, through an inventory of housing, commercial, and industrial "targets." For example, in housing, how large is the housing stock, what is its age and level of energy efficiency, what are patterns of ownership, income, etc.? With the answers to those questions, you can develop a strategic approach to getting the low hanging fruit and then put campaigns in place to implement the strategic goals. But a baseline inventory needs to be done first so we can estimate the size of the effort and prioritize our programmatic activity. The compilation of such an inventory of the build environment follows from the cross cutting statement on the need for a GHG inventory.

There are lots of pieces of the puzzle buried in the text of this report that need to be brought out and amplified. For example, government "leed by example" proposal needs to be its own section – it is important and is amplified in other states' reports.

There needs to be a greater emphasis on local government, since they are the point of contact on land use, building permits, codes, etc.

There should be some mention of the ACEEE report on Virginia, since it is the only independent source of information on many of these issues. This report was not presented to the full commission and needs some "play" in our deliberations.

#3 Smart metering " While this may not directly reduce energy use or greenhouse gas emissions" Why is this in here, as the #3 priority, then? Put at end if it is, as stated, not directly effective

#5 Weatherization – "WAP has been able to improve around 2,000 families' homes each year." " Each $1 million increase in funding would allow an additional 200 homes to be weatherized." It appears that it costs $5,000 per house to weatherize. There are 2.9 million housing units in Virginia, of which 1.75 million were built prior to 1979 and, in theory, higher priority targets for weatherization programs. At a rate of 2,200 homes per year, and an average cost per home of $5,000 (from the above figures) it would take 795 years and $8.75 trillion to address the weatherization needs of Virginia's existing housing market.

However, large parts of the housing stock are homes outside of the income limits of these public programs. What is the size of the target for the WAP and what is the size of the rest of the weatherization need. How do we reach that other, non-WAP eligible sector – those folks with an inclination and income sufficient to do the work, but no incentive to put them over the top? Do we need a program for the commercial sector? Again, the need for a built environment inventory.

#7 Public funds for energy efficiency
"The Commonwealth should work with localities and community groups to provide a central, publicly administered capital fund for energy efficiency investments, with the energy efficiency projects implemented through local implementation organizations."

This is a vague statement that skates over a major issue: how are people who cannot afford to make energy efficiency investments going to improve their energy efficiency? (1/3 of owner occupied houses are in a value range < $150,000 indicating a limited investment potential – and this number does not include people living in rental housing, for which there is no incentive for the landlord to weatherize.) Is this an endorsement of a public benefits fund? If so, this needs to be clearly stated and the "could's" need to be "should's" in the other recommendations on capitalization and administration of the fund.

#8 Building Standards
This section deals with new housing and does not address the 2.9 million units of housing that have already been built. Where is a section on how to deal with those units? Should we require those built units to come up to newer codes upon significant renovation?

#9 Appliances – This should include appliances, (and plug load), lighting, and water heating – a significant potential savings in households. There needs to be a more complete analysis here – what is the impact of the "tax holiday" on Energy Star

appliances, what is the impact of private sector initiatives (Wal-Mart CF subsidy), and what in the ACEEE report indicates low hanging fruit?

Additional recommendations –

Energy audits for houses at time of sale are needed (make it optional if you must, but a third-party audit should be available). Also, there is a need for appraisal services that build energy savings into the property value at time of sale – providing a return on investment for the homeowner.

Electric Generation

This work group report is vague in its goals - what level of GHG reductions are being recommended and what are the strategies for reduction? We are supporting a federal cap and trade system, but what beyond that are we willing to tackle? The lack of specificity here seems to put the onus on the full Commission to finish the work of this Task Force.

Section on Nuclear Energy
A discussion of nuclear energy is germane and central to our discussions. The discussion on uranium mining is not germane and should be taken out. I cannot remember if we received testimony on this – it does not show up in the Interim Report Draft. I no not see the link between nuclear energy generation in Virginia and the need to mine uranium in Virginia. The Commerce Clause of the Constitution would allow "non-Virginia" uranium to be sold in Virginia.

Section on Research and Development
Was carbon capture the only specific research topic discussed in this work group? Should we be developing a broader list of research topics or end the section at the last full, un-bulleted paragraph?

Section on RPS
Yes, the RPS should be made mandatory. No, nuclear should not be in an RPS until we discuss what our goals are here – simply renewable energy or GHG reduction. If GHG reduction is the goal of an RPS, then nuclear is on the table.

The first bullet at the end is confusing. Are we to include the 12% RPS goal in a new baseline? It is already counted in the GHG reductions through 2020 from the energy plan (see Ballou presentation to Commission)

The second bullet is mushy – how much are we seeking in federal tax credits to make a difference? Simply stating that we should ask the congressional delegation to make sure that Congress "considers" financial incentives is pretty weak. What kind of financial incentives do we think are needed to allow Virginia to meet its stated goal? How have existing and past tax credits worked? At least some indication that more analysis is needed should be presented.

Rovner, Nikki

From: Bryant, Preston
Sent: Wednesday, October 22, 2008 11:03 AM
To: Rovner, Nikki
Subject: FW: Tomorrow

See below.

From: Jodi Gidley [mailto:jgidley@aglresources.com]
Sent: Wednesday, October 22, 2008 10:52 AM
To: Bryant, Preston
Subject: Tomorrow

We have our hearing tomorrow on our energy conservation filing so I will not be at the Climate Change Commission and I apologize since I know it is a very important meeting. I did have some thoughts I wanted to share though after another review of the proposed findings. In the section entitled General Principles Regarding Strategies, certain items should be recognized and included from Adrian Chapman's presentation:

In the bullet which begins, "As stated in the Virginia Energy Plan, energy efficiency and conservation provide the least costly and most readily deployable energy resources options available to Virginia." It goes on to talk about the identification and removal of fiscal and regulatory barriers and should mention the enactment of the natural gas decoupling legislation and the benefits of implementation of that statute moving forward.

In the bullet that discusses the increase in demand for electricity generation and has a general statement about the additional supplies of other energy sources being needed. It should detail that the direct use of natural gas reduces the emission of nitrous oxides by 87%, the emission of sulfur oxides by 100% and the emission of CO2 by 77%. It should also mention that natural gas is increasingly being used for electric generation because of it is the cleanest of the fossil fuels and that will also cause an increase in demand for natural gas supply.

To the extent that they are more comfortable including data directly from Adrian's presentation into the interim report that would be appropriate. It struck me that there is no mention of decoupling and its impact on conservation and that there is not anything from his presentation on the reduction in emissions received from the direct use of natural gas although they cite those same statistics for the use of various renewable energies. Thanks and good luck!