Air Climate and Energy Break-Out Group

Background:

ORD is reorganizing around sustainability and environmental solutions. Identified problems:

Multipollutant nature of air pollution

Impacts of climate change, adaptation/mitigation

Human health and environmental impacts of energy

Expanding/contracting scales of environmental problems

Social behavioral and economic factors that influence air quality and climate policies

Research Themes are: 1) Assess impacts on human and ecosystem exposures and effects for air pollutants and climate change at all scales; 2) Prevent and Reduce Emissions by providing data and models for atmosphere that are cost effective and innovative multipollutant; and 3) Respond to changes in climate and air quality (adaptation). A huge program in EPA ORD in greenhouse gas mitigation is really the domain of DOE (political aspect).

*Assess Impacts

*Prevent and Reduce Emissions

*Respond to Changes

Some General Observations:

There exists a fundamental disconnect between sustainability as a paradigm for driving research and the legislative mandates of the Clean Air Act. How do we marry (integrate) the two? This tension will become worse as budgets become worse.

Bring in senior academicians for 1-yr and get their suggestions how to transform to sustainability. Smart metering, for example, for energy and water conservation. Have meters read in dollars saved rather than kWhr.

Strengths of ORD efforts in the past on climate change have been on modeling climate interactions on water quality, and modeling climate interactions on air quality and health (asthma, allergens). USGS has had the primary role on water quantity.

Air Quality Monitoring has been a major strength of EPA ORD in the past and it contains a unique opportunity for changing the future. Sensor development and reporting networks opportunities are ripe if research is undertaken wisely. In the past, the agency has done monitoring for the sake of compliance. Can we shift that monitoring for decision-making and hypothesis testing also?

Biofuels is one area where EPA has a mandate to prepare an annual report to Congress on GHGs effects from biofuels and the Renewable Fuel Standard (RFS2). EPA really has no authority on energy (and little authority on climate other than that provided through the Supreme Court ruling and the Endangerment Finding). But the lack of legislative authority could free ORD to provide research of a more creative and unfettered nature (innovative research).

Charge Questions and Recommendations:

a. **To what extent do the draft research frameworks describe EPA's National Program and Regional Offices strategic science priorities? How well do ORD's research programs align with those priorities? If resources allow, what are the areas for increased emphasis? If resources decline, what areas might be appropriate for decreased emphasis?**

   The EPA Strategic Goals for 2011-2015 include: 1) Taking action on Climate Change and Improving Air Quality; 2) Protecting America's Waters; 3) Cleaning Up Communities and Advancing Sustainable Development; and 4) Ensuring the Safety of Chemicals and Preventing Pollution. With an increased emphasis on "systems thinking" as per Paul Anastas's presentation, essentially all the systems of interest to EPA include, or even terminate in human behavior. Thus, research on relevant aspects of human behavior is crucial to understanding the systems, and implementing solutions or programs that follow from them. Increased emphasis on social and behavioral authority within EPA ORD is needed for this realignment to be successful.

   Mostly, the Framework document does, indeed, reflect the strategic science priorities although it doesn't capture the transdisciplinarity desired.

   More emphasis is needed on climate change research to reduce GHG emissions, both from a technological standpoint (like carbon sequestration) but also from a social and behavioral standpoint (how to get the desired environmental behavior from people and industry without mandates or command-and-control legislation.

   Social science is needed on how people come to understand climate change, their risk perceptions of it, and what motivates them to take action. How do these attitudes develop? People value present goods far more than future goods (discounting). What would make technologies be perceived as being viable? How do we ensure adoption of sustainable technologies?

   Research should begin with the question in mind (clearly stated, framed properly). The "Silver Book" on risk assessment provides a good guide in this respect. Ask yourself, has the research solved the problem? Provide iterative feedback. Regular synthesis activities are needed to identify knowledge gaps.

Formulate the question (hypothesis) clearly and then research its every aspect holistically. One example: "carbon black should be the first pollutant to be regulated for overall ACE effectiveness including air quality/human health, climate change mitigation, and energy choices."

We recognize the importance of linking policy and science knowledge. Combining policy with science is itself a new way of doing EPA's business, and it is an area of research in and of itself.

Increased emphasis: *Energy choices*,the nexus between air, climate, water. Make sure it fits into EPA ORD's portfolio. Multipollutant emphasis integrates well with energy choices research.

EPA ORD should decide on its core values that it holds most dearly. SAB is in no position to recommend trimming back ORD's budget. Rather, we ask the question, "Does the document seem to make sense and can it be used as a framework for future research?" Our first judgment is that it does.

Research directed at single pollutants is being restructured within the multipollutant framework and that is appropriate.

ORD is being (relatively) favored with fewer cuts than EPA as a whole. One idea is that ORD could help mend the cuts in the EPA Agency budget by filling gaps as they are able. Also, aim ORD research in such a way as to decrease the cost of regulations to the regulated community. Shift to a performance standard rather than technology based standard. Performance standards lead to innovation.

Appropriately, programs that have fulfilled their original objectives, like the near road program, leave room for other program areas to grow, like biomass. Some modeling exercises like source apportionment may be ready for decreased emphasis. Biomass could be emphasized for a period, and then be sun setted. However, beware of unintended consequences like when biomass programs result in wood burning in a school boiler; smoke exposure to children does not make good policy.

Find ways to be responsive to both Regions and Programs. Regions need answers. Programs need principles for regulation.

b. How can ORD enhance coordination among its research programs, and better ensure that they complement one another?

ACE is closely related to Sustainable and Healthy Communities and also to Safe and Sustainable Water Resources. Integrated assessments can be used to bring them together.

Initial planning meetings. Framing the problem properly at the outset, enhances the ability of ORD to coordinate its research programs. Everyone should be present at the time of the

program formulation. Other research program personnel in addition to other stakeholders should be present at the table at the time of framing the problem and program.

Innovative solutions today solve problems before they arise tomorrow. Be proactive in your thinking.

Foster communication across research programs by forming teams. We understand that teams have already been developed in 9 topic areas, and this is to be lauded. The plan should be designed to enhance coordination among the research programs. But implementation is yet to come.

ORD should make better use of people with social science training and hire some within ORD. They can analyze the behavioral feedbacks and responses. They can identify institutional flexibility. They can frame the larger problems.

c. **How well do ORD's proposed research directions reflect its commitment to sustainably protecting human health and the environment?**
Proposed research directions and restructuring already reflect a commitment to sustainability. But ORD would benefit from a more specific definition of metrics for moving towards sustainability. Sustainability is a process, not an absolute state.

There is a disconnect between the ideal of sustainability and the practice of *regulating* human health and the environment. Sustainability metrics and how they articulate with regulations would help to better define *sustainability* in a realigned ORD, and how to achieve it.

ORD must do the research to define the benefits of moving from a more technology based regulatory system to a performance based regulatory system which would incentivize sustainable solutions.

ORD could design and analyze scenarios of various adaptation strategies to climate change and changing air quality. Consider the historical context of adaptation in the U.S.

Regarding Theme 3 in ACE, it is not clear that adaptation alone is sustainable. But any path to sustainability must include adaptation.

Sustainability as a new paradigm for driving research at EPA and ORD should be more explicity stated and reflected in the Vision Statement.

d. **How do the six programs fit together as an integrated environmental research strategy, charged with informing decisions on the nation's most-critical environmental issues? Are these programs positioned to address the nation's highest priority, emerging issues in the coming years?**

The six programs tend to fit together. There is the tacit possibility of addressing issues that go beyond the direct statutory mandates of EPA. This is a design that can be responsive and could be effective. Nutrients (nitrogen) and climate are cross-cutting and highlighted. They are making a roadmap for the issues and where ORD should go in the future. For example, they have a program on "extreme events" and the increasing hurricanes, floods, tornadoes, and forest fires? Water-cooler effect. They are encouraged to talk across programs and they do.

They should be referred to as SIX programs, not 4+2.

Although not the focus of ACE, we are concerned that ecosystems appear to be deemphasized in name and budget. They are not mentioned by name in the six research programs. The budget for ecosystems research (mostly ecosystems services) is down to only $60 million, about 10% of the EPA ORD budget. We view ecosystems structure, function, and services to be an integral part of sustainability.

e. Based on Board members' familiarity with efforts in the broader scientific community, how well do ORD's research programs appear to catalyze and complement environmental science programs elsewhere? What suggestions do the members have for how EPAs research programs could improve upon their leveraging with those of others?

EPA should catalyze and complement Social Science research to be done both intramurally and extramurally. Ecosystem services valuation is only one part of the social science research that is needed.

Roundtables could be done with the community. Visiting scientists could be brought into the labs for one year to cross-fertilize ideas on how to operationalize sustainability as an organizing principle at EPA.

ORD air quality models like CMAQ and data bases are used by researchers around the world and are well respected. Greater participation (authorship) on IPCC should be considered for ORD rather than just the program offices.

BOSC should review EPA ORD and question (e) after two years under the new restructuring.

There is a need for multigenerational tools like Twitter, Facebook, and LinkIn to reach young people within this new Framework.

Develop a mentoring and leadership development program. Advise young researchers on their projects, publications, career objectives, etc. Foster and cultivate the culture of the ORD. This could be a roadmap to successful recruitment of young scientists into ORD. In the process, cross program collaboration will also be fostered.

f. How does the SAB/BOSC view ORD's activities in stimulating innovative research and what other suggestions would the SAB/BOSC have to promote innovation in EPA research?

Take the principles of the PIP program and inculcate it into the mainstream of business at EPA ORD. Methods and measurements on acrolein is a good example which has been proposed as an external research challenge. Crowd sourcing is the way to go in some cases, and SAB/BOSC applauds these efforts.

EPA needs to drive innovative research within the community. EPA can create the institutional frameworks to stimulate the community and make these technologies sustainable on their own. EPA needs to lead the country toward the adoption of more sustainable practices.

EPA should encourage and stimulate relevant behavioral, social, cognitive and decision research both within the Agency and extramurally.

As an example, research is needed on how to persuade people to change their behaviors regarding energy use. Examples include being receptive to smart meters, converting to CFL bulbs, buying higher milage cars, etc. There is a huge amount of basic research on the psychology of persuasion, on the subjective time-discounting factors that affect people's willingness to spend resources now for future gains, and on risk communication. Bring in a few senior behavioral, social, cognitive, and decision science experts for one year visiting sabbaticals to cross-fertilize this new area.