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**The New Green Economy**  
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**DRAFT RECOMMENDATIONS – Prepared by breakout groups and subject to review. These recommendations are the result of group processes and do not necessarily represent that positions of NCSE, which served as the enabler of the process that generated the recommendations.**

**April 9, 2010**

**Breakout Session 1: Educating Interdisciplinary Business Leaders for a Sustainable Future**

1.1. The Executive Office of the President (CEQ, CEA, OSTP, NSC etc) should develop a vision of a sustainable future that could be communicated by the President. It should incorporate interdisciplinary values of “natural capital” i.e. cost/benefits of ecosystem services and human capital, interdependent to economic systems.

1.2. Federal agencies should support development in the business sector to commercialize practices and product prototypes that leverage technologies to support long-term sustainable outcomes. This would include investments in education and job creation programs that engage next generation students and leaders in the development process.

1.3. The executive branch should give preference in its service contracting and product procurement policies to businesses that demonstrate sustainability, who then serve as models, plus stimulate increased demand for sustainably generated services and goods.

1.4. The federal government should provide incentives for the business sector to develop collaborative interdisciplinary teams with academic institutions and not-for-profits. These teams would contribute to innovative projects that would promote systems thinking and operational metrics incorporating ecosystem services, human capital, and renewable productivity in cost benefit analyses.

1.5. The National Science Foundation (NSF) should integrate business dimensions into existing interdisciplinary grant programs such as Integrated Graduate Research, Education and Training (IGERT) and other Science Technology Engineering and Math (STEM) funding opportunities.

1.6. An *interagency* task force should conduct a collaborative gap analysis of federal programs to clarify and support sustainable business practices. These practices should demonstrate operational systems that integrate natural capital measures with other economic measures over the long term.

1.7. The Department of Education in partnership with an interdisciplinary advisory board should facilitate a review of existing and potential education models promoting business sustainability, corporate ethics and social responsibility, and determine a process for certification and/or accreditation.

1.8. Federal agencies should attach financial aid, scholarships, federal subsidies or grants to education and business programs that include “theory-to-practice” and/or “integrated work-based learning” curricula at various academic levels (undergraduate, graduate, professional adult, PhD). These should include partnerships between teachers, professional mentors, students of varied disciplines, applied in a community context to achieve enriched learning processes, which simultaneously will reinvest this federal funding into business and community development.

### **Breakout Session 2: The Greenhouse Gas Professional: The State and Future of Climate Policy's Practitioner Class**

2.1. Congress should pass comprehensive cap-and-trade legislation.

2.2. The Environmental Protection Agency should oversee the creation of a process for professional accreditation for individuals working in Greenhouse Gas (GHG) accounting, verification, mitigation and adaptation and for organization-level GHG accounting, verification, mitigation and adaptation.

2.3. The Department of Education should provide funding and other incentives for climate change education at the K-12 and university levels.

2.4. The Department of Commerce should identify industries and organizations with high potential for GHG professional job creation.

2.5. The Environmental Protection Agency and the Department of Commerce should encourage state and local partnerships by promoting information-sharing (i.e. compiling a database of case studies of best policy practices).

### **Breakout Session 3: A New Generation of Sustainability Leadership: The Role of Higher Education in Building a Green Economy**

3.1. Universities as individual institutions and as a collective sector should adopt a comprehensive strategy and holistic approach to the development of sustainability leaders (including metrics that assess impact).

3.2. Higher education institutions should make sustainability a part of their cultural identity, modeling and prototyping best practices, value systems, measurement (impacts, effectiveness) as living laboratories of sustainability.

3.3. The higher education community should define what it means to be a sustainability-literate graduate.

3.4. Funding agencies and higher education institutions should institute procedures to provide incentives and rewards for faculty that encourage interdisciplinary scholarship and research (e.g. funding, tenure and promotion requirements, awards, connecting research areas with institutional practices, reducing risk from trying new concepts) that include metrics of sustainability literacy impact.

3.5. Faculty and staff should be mentors of sustainability leadership by modeling best practices and innovation in their actions (e.g. create multi-level leadership opportunities, give guidance, provide resources, give recognition, reach across class, race, cultural and economic barriers, etc.).

3.6. Faculty should receive professional development in sustainability.

3.7 Accreditation bodies should include sustainability literacy and practices in their evaluation criteria.

3.8. All higher education institutions should adopt STARS as a mechanism for measuring tangible progress.

3.9. Researchers, government agencies, NGOs, think tanks, etc. should forecast jobs that will be part of a new green economy and link them to educational programs. They should identify current successful sustainability-literate professionals and determine the skills and knowledge that has made them successful and provide that information to educational institutions.

3.10. K-12 teachers should be enabled to teach sustainability literacy at the K-12 level. Funding agencies and professional organizations should help to establish models for communicating sustainability effectively to create cultural transformation.

#### **Breakout Session 4: Green Collars and Green Places: Engaging Higher Education to Train the New and Diverse Generation of STEM Environmental Stewards**

4.1. Colleges and universities should focus on preparation of teachers, administrators, and students in green economy content, skills, mind sets.

- 4.2. Colleges and universities should use informal methods to prepare teachers, administrators, and students, using connections with communities, organizations, internships, and partnerships.
- 4.3. Communities should use formal methods to prepare teachers, administrators, students including through research, Research Experiences for Undergraduates (REUs) and for Research Experiences for Teachers, (RETs), internships, student engagement, service, and assessment metrics.
- 4.4. Communities should provide outreach about ecological awareness to the community, to people of all economic strata, in academic recruitment and retention processes and with new tools, targeted awareness and outreach.
- 4.5. There should be engaging curricula on sustainability to attract students.
- 4.6. Students must master the basic skills of writing, math, and other core subjects.
- 4.7. Educators should use interdisciplinary learning to teach people about the green economy.
- 4.8. Educators and educational institutions should show students that green curricula will allow them to benefit personally and to be of service to society, and should provide incentives to students to participate in green courses.
- 4.9. Educators and educational institutions should develop improved capacity to enable students to succeed in the green economy.

### **Breakout Session 5: Aligning Science, Education, and Economic Markets**

- 5.1. Colleges and universities should provide teacher development training in systems thinking (including economic, social and environmental issues and interactions), dialogic models of education, and student-centered and problem-based learning.
- 5.2. Colleges and universities should develop linkages with cutting-edge sustainability initiatives and businesses and involve local agencies and businesses in educating teachers, students, and the general public.
- 5.3. Colleges and universities should have general education requirements that include a sustainability course or a cluster of courses that covers economic, environmental and social issues and interactions, systems and interdisciplinary thinking, case studies, scenario building, and the study of life cycles of production systems.

5.4. Colleges and universities should develop online resources (with dynamic feedback) so that teachers and the public can keep current on sustainability issues.

5.5. Colleges and universities should provide incentives for teachers to integrate sustainability into courses, provide official recognition of master teachers in sustainability and implement university-wide sustainability initiatives led by sustainability coordinators that integrate sustainability into all courses.

5.6. Media professionals should promote sustainability. For example, the televised weather broadcast could be used to promote sustainable practices.

5.7. Colleges and universities should recruit and provide funding for a more diverse range of educators who are trained in science and business.

5.8. Universities should provide study abroad programs that focus on sustainability successes in other countries and have service-learning requirements for pre-service teachers.

### **Breakout Session 6: Greenforce Training: How Community Colleges Fill a Vital Role in Education of Clean Energy Workers**

6.1. Colleges (presidents/faculty/staff) should improve sustainability and ecoliteracy standards and increase student engagement with the environment by:

- enhancing intellectual, interdisciplinary dialogue;
- working with K-12 organizations to create standard environmental systems and education classes with real world applications;
- building ecological literacy and sustainability into curricula;
- including green building and clean technology;
- and incorporating sustainability across curricula, looking at job opportunities.

6.2. Community colleges and their communities should develop partnerships to help to build sustainable economies by:

- capturing labor market information on where jobs should and could be, and incorporating that information into curriculum planning;
- securing funding for stipends and graduate continuing education credits to educate community college faculty about sustainability;
- and forming strong employer partnerships to secure funding and provide opportunities for apprenticeships and internships.

6.3. Collaborations among state, local and federal groups should enhance academic and career pathways by:

- facilitating articulation along a continuum from no-credit students to community college programs to 4-year colleges;
- creating pathways into credit programs for lower skilled adults while maintaining academic rigor;

- helping people learn what jobs they are qualified for;
- and tracking students' interests and matching careers by their abilities before they reach the community college-level.

6.4. Educators should leverage existing ideas and best practices by aligning outcomes and accountability measures.

6.5. Federal agencies (Departments of Energy, Labor, Education, and others) should convene to align outcomes that will build a sustainable economy and a sustainable work force by:

- communicating among agencies and creating a federal dialogue around green training programs outcomes;
- asset mapping;
- participating in creation of national curriculum;
- increasing incentives via federal funding for professional development for educators and students moving into the green workforce;
- increasing funding to educate for community college educators;
- supporting sustainability education;
- conducting analysis in each region to understand potential job opportunities in renewable energy, energy efficiency, green construction, agriculture, etc.;
- and creating regulations and marketing necessary for massive implementation of bundled projects, including energy-efficient and renewable energy.

6.6. Congress and the President should consider providing incentives such as tuition, subsidized books, and a national scholarship program (akin to the GI bill) for students going into green fields.

### **Breakout Session 7: Transforming Federal Education Programs to Support the Transition to a Green Economy**

The federal government currently has the resources needed and there is the possibility of those resources being supplemented to advance education for a green economy. Therefore, we recommend that:

7.1. Departments of Education and Commerce should establish a public/private partnership for the purpose of creating a professional network and sustainable learning community of stakeholders to facilitate the transition to a green economy.

7.2. The White House should provide a mandate and forum for agency and administration staff from all federal agencies involved in education for a green economy to work cooperatively to create and support education for a green economy.

7.3. The President should include education in all green economy transition plans and solutions.

7.4. The President should endorse allocating revenues from carbon permits or tax proceeds to education for a green economy.

### **Breakout Session 9: Green Accounting for the Green Economy: Improving GDP and the National Accounts of the United States**

9.1. Congress should provide federal funding for Genuine Progress Indicator (GPI) pilot projects at the state level (VT, MD, MN, OH, and UT have projects already).

9.2. A coalition of nonprofits and professional societies should create a GPI Network to increase capacity building and establish stronger data consistency and credibility.

9.3. The GPI Network should create planning resources for government-led GPI studies.

9.4. The GPI Network should compile a report that rates the states on multiple metrics to illustrate the advantage of adopting alternative indicators.

9.5. Mayors and city governments should establish community-level initiatives that tie job creation strategies to alternative economic indicators.

9.6. The National Academy of Sciences should conduct a meta-study of green accounting methods and applications.

9.7. The President should create an intergovernmental committee on economic indicators.

9.8. The intergovernmental committee should interface with national and international efforts to establish alternative indicators.

9.9. The GPI Network and intergovernmental committee should work together to create an information clearinghouse that can provide data resources and techniques for estimating alternative indicators of economic progress.

### **Breakout Session 10: Perverse Incentives, Subsidies, and Tax Code Impediments to a Sustainable Economy**

10.1. As part of the effort to reduce the deficit, Congress and the Administration should give priority to eliminating subsidies to polluters.

10.2. Congress should establish a tax credit pass-through for non-profits and tribal groups for energy-efficient and alternative energy projects.

10.3. Congress should raise gasoline taxes and neutralize revenue effects by concurrently decreasing (regressive) payroll taxes.

10.4. Congress should establish a period of less than 15 years for all tax subsidies (i.e., credits and deductions); review and renew the subsidy if appropriate.

10.5. Congress should eliminate subsidies for fossil fuels.

10.6. The President and Congress should establish a Bureau of Population and Consumption.

10.7. Congress should phase out mortgage interest and property tax deductions by converting deductions to credits and limit in credit to one home.

10.8. Congress should put a price on carbon to account for environmental externalities.

10.9. Congress should encourage affordable and compact development through property tax reform by reducing tax rates on building values and increasing tax rates on land values.

10.10. Congress should eliminate the business expense deductions for owning Hummers.

### **Breakout Session 11: Greening Federal Land Managing Agencies – Working With and Learning from Each Other**

The federal government is the nation's largest energy consumer and greenhouse gas emitter. As the nation's largest primary employer and purchaser of goods and services, the federal government should drive demand for green technologies and practices. This includes:

11.1. Developing regional interagency "green teams" at multiple scales.

11.2. Agency and bureau chiefs should form climate change councils such as exist in the Department of the Interior (DOI).

11.3. Implement multi-scale, multi-disciplinary coordination among agencies.

11.4. Enhance existing federal efforts to make messaging about climate change mitigation and adaptation consistent (in regions) and across agencies.

11.5. Synchronize climate change adaptation and mitigation strategies within the Executive Office of the President (Federal Environmental Executive and the Office of Energy and Climate) and build upon existing federal laws and guidance to provide linkages to existing agency missions, obligations and operations. E.g. lead agencies must include climate change in environmental impact analysis.

11.6. Create a framework for communicating and engaging internal and external audiences (within agencies, between agencies, and to youth and the public) with the goal of mitigation. An example is EPA Region 10's Federal Green Challenge.

11.7. Develop regional templates for strategies that agencies can use to green their agencies, such as a common climate change education curriculum, best practices wiki, greenhouse gas inventory and action plan.

11.8. Allow agencies to pool funding sources to accomplish common projects related to climate change.

11.9. Leverage under-utilized employees to engage them in climate change projects.

11.10. Make scientific information available to other agencies and the public in a user-friendly fashion.

### **Breakout Session 12: Sustainable Forest Management at Multiple Scales: Underpinning and Advancing the Green Economy**

12.1. States and counties should perform forest sustainability assessments ideally based on explicit criteria and indicator sets such as the Montréal Process Criteria and Indicators For Forest Sustainability (<http://www.rinya.maff.go.jp/mpci/>).

12.2. States, local governments and counties should discourage placement of waste wood and brush in landfills.

12.3. The U.S. Forest Service and academia should continue to pursue research in bio-energy and develop guidelines for the sustainable harvesting of biomass.

12.4. The Forest Service and other responsible entities should support enhanced data collection and reporting activities as a foundation for sustainable management and related green economic activity.

12.5. More states and counties should maintain existing wood product infrastructure and markets where possible.

12.6. The USDA Office of Ecosystem Services should develop national and regional inventories of ecosystem services.

12.7. States, regions and businesses should explore ways to develop new markets for ecosystem services (including waste-wood diversion, ecosystem services bundling) through web-based applications and similar mechanisms.

12.8. Counties and municipalities should develop government and private sector partnerships in order to promote tree planting for ecosystem services, such as the

Baltimore County tree coupon program

(<http://www.baltimorecountymd.gov/Agencies/environment/growinghome/>).

12.9. All states should enact and enforce some form of forest loss-mitigation and sustainability laws (e.g. the State of Maryland Forest Conservation Act - <http://www.dnr.state.md.us/forests/programapps/newFCA.asp>).

12.10. The Forest Service should continue to support the Roundtable on Sustainable Forests in its role as a clearinghouse for information on local applications of forestry for ecosystem services.

### **Breakout Session 13: Does the Payment for Ecosystem Services (PES) Model Hold Promise? Building on Lessons from Available Evidence**

13.1. The federal and state governments should consider a Payments for Ecosystem Services (PES) mechanism when existing regulations are ineffective for resource conservation.

13.2. Even when “command and control regulation” is feasible, it may not be appropriate to impose it if the cost on the ES provider is high.

13.3. A strong regulatory structure is needed for PES to be feasible and effective.

13.4. User-financed programs are more effective than government-financed programs (due to user-finance being contingent on delivery of services)

13.5. Program managers should ensure that adequate metrics are in place before program implementation.

13.6. PES may be particularly effective for water because water has relatively few alternative uses.

13.7. PES programs can be used to create service markets or mitigation markets. Agency leaders should ensure that the regulations are more stringent and well defined in the context of mitigation markets.

13.8. Policymakers should make policies that are spatially contextual. Proximity doesn't matter when ecosystem services can be commodified (such as carbon credits). But in general, **space and place** matter.

13.9. Regulations should not insist on additionality. Insistence on additionality can be counter-productive due to high transactions cost, set up perverse incentives, and can seem

to reward only environmental degraders.

13.10. PES mechanisms should not be used to attain non-environmental objectives, such as equity goals. Other measures may be used to supplement these other objectives.

#### **Breakout Session 14: Strategies to Promote Sustainable Urban Planning and Development: Partnerships between Academia, Citizens, and Local Government**

14.1. Local governments should create predictable and efficient paths for developers that create incentives for meeting community sustainability goals.

14.2. Local governments should make use of all available resources that provide information about best practices, based on experiences in other communities, such as publications available from ICLEI—Local Governments for Sustainability—or similar organizations.

14.3. States should define priority growth areas and conservation areas and fund growth-related projects.

14.4. Local governments should monitor construction and post-construction to ensure implementation of sustainability goals.

14.5. The federal government should provide funding to establish sustainability cooperative extension programs with colleges, universities, and non-profit organizations.

14.6. Universities and colleges should establish liaisons to connect university resources on sustainability with the greater community.

14.7. Local governments should include the participation and perspectives of typically disenfranchised groups, such as people of modest means, in their sustainability efforts.

14.8. The Environmental Protection Agency should expand micro-grants to facilitate outreach.

#### **Breakout Session 15: Trading Material Affluence for Time Affluence: A Critical Step toward the New Green Economy**

15.1. There should be new indicators to supplement GDP. These indicators should treat leisure time as a positive and measure for it as suggested by economist Joseph Stiglitz.

15.2. The U.S. should follow E.U. standards in which employers pay for benefits on the entire payroll rather than on individual workers. Providing benefits on a worker by worker basis encourages companies to hire fewer workers and work them longer hours. Some payroll taxes should be lowered and supplemented by green taxes. It would be preferable to tax more what we want less of us (e.g. pollution) and tax less what we want more of (e.g. jobs). Healthcare should be provided as a single-payer system so it does not encourage longer working hours.

15.3. The federal government should provide annual reports on worker-friendly business practices to encourage emulation. The President should use his bully pulpit to encourage businesses practices that allow workers more time for families, health, community activity and environmental stewardship and to promote legislation as in Europe that trades productivity increases for leisure time rather than consumption.

15.4. The minimum wage should be increased to E.U. standards so that low-income workers do not need to work several jobs to provide for their families.

15.5. Part-time workers should receive parity in hourly salary with full-time workers doing the same tasks, as is law in the European Union. The U.S. should adopt a version of the Netherlands' Hours Adjustment Act, allowing workers to choose shorter work hours while keeping their hourly salary, pro-rated benefits, right to promotion and health care. As in the Netherlands and Germany it should be required that employers allow this unless they can prove a financial hardship for their firms.

15.6. The United States should mandate paid vacations for all workers as is law in every other industrial country. A place to start is the Paid Vacation Act of 2009, already in Congress. The Obama administration should actively support this and the legislation below. This can be done as an addition to the Fair Labor Standards Act. The President should encourage workers to take their vacation time and make clear to the public the health benefits of vacation time.

15.7. Congress should pass the Healthy Families Act, mandating seven paid sick days for all workers. All other industrial countries mandate paid sick leave.

15.8. Congress should make at least a portion of the Family and Medical Leave Act a paid benefit for all workers. Every other industrial country mandates paid maternity or family leave. A bill by Congressman Pete Stark would provide up to three months of paid leave.

15.9. Congress should pass the Work Sharing bill proposed by Senator Jack Reed and Congresswoman Rosa DeLauro, allowing unemployment funds to be used to supplement pay for workers whose workweeks are shortened during the recession. This policy, called KURZARBEIT in Germany, would encourage employers to share work by shortening hours, rather than lay off workers. Even the American Enterprise Institute has supported this. The President should include funds for this purpose in a new stimulus bill as an effective way to reduce unemployment.

15.10. The President should use his bully pulpit to encourage schools to resist calls to eliminate or reduce recess time and physical education as part of Michelle Obama's LET'S MOVE campaign.

15.11. The President should use his bully pulpit to encourage citizens to use more of their free time for community involvement, volunteerism, healthy exercise and environmental stewardship rather than spending time in front of the television.

### **Breakout Session 16: Small Scale Distributive Energy Systems and Sustainability**

16.1. Congress should enact legislation to allow for Advanced Renewable Tariffs (ARTs) or Feed-In Tariffs (FITs) or homegrown energy systems, including amending the Public Utility Regulatory Policies Act (PURPA).

16.2. Congress should design incentive or production tax credit systems for energy that is produced, owned and used in a local community; export of ownership nullifies the incentive.

16.3. There should be a federal repository of local standards and programs of technologies, organizations and policies used in local communities.

16.4. There should be model rate structures to create incentives for local generation of energy.

16.5. Energy policies should be based on an analysis of the triple bottom line (life cycle analysis) and impacts, including for the oil and gas industry.

16.6. Federal agencies should develop sustainability metrics regarding energy crop growing systems and related energy transmission.

16.7. Federal government support (e.g. federal tax credits, federal assistance to local communities to create investment vehicles) for local energy systems is needed.

16.8. There should be federal government R&D grants and loans are needed for local small-scale energy storage.

16.9. Structure cap-and-trade revenues as incentives to support locally distributed renewable energy systems that enable sustainable landscapes.

### **Breakout Session 17: Sun, Wind, and Wildlife: Promoting Responsible Renewable Energy Development**

17.1. Congress should provide incentives for renewable energy development in areas with minimum adverse impacts, such as degraded lands and centers of energy demand.

17.2. The executive branch should identify zones for renewable energy development and ensure that any future proposed renewable energy projects are sited in identified zones

17.3. In making siting decisions, the executive branch should conduct comprehensive and consistent evaluation of all types of energy generation.

17.4. Congress should develop a leasing program for renewable energy development on federal lands equivalent to leasing programs for other types of energy.

17.5. Congress and the Administration should determine the proper mix and location of renewable energy generation.

17.6. The executive branch should plan for renewable energy development on a landscape scale.

17.7. Scientists should collect new data, expand types of data collected and enhance analysis of data to enhance siting decisions and monitoring.

17.8. In making siting decisions, the executive branch should analyze the lifecycle of, and evaluate restoration required from, renewable energy development.

17.9. The executive branch should integrate planning and evaluation for siting and transmission.

### **Breakout Session 18: Ocean Energy: The Next Green Generation**

18.1. The Council on Environmental Quality (CEQ) assisted by the Office of Science and Technology Policy (OSTP) should develop a consistent federal policy on the use of ocean space with a clarification of informational requirements for offshore renewable energies.

18.2. OSTP and CEQ should recommend substantially more collaboration and coordination across federal agencies to encourage a better exchange of information and also establish a model and execute collaboration between regional and state agencies.

18.3. The Administration should propose to Congress to develop a funding plan for research to fill critical gaps in the science, technical and regulatory sectors for offshore renewable energies.

18.4. OSTP should encourage consolidation and standardization of a range of datasets related to ocean energy in an integrated database for the public domain.

18.5. DOE should achieve the designation and accreditation of open ocean test-bed facilities that operate under streamlined regulations to recognize that the issues are different for a test facility as compared to a large commercial operation.

18.6. CEQ should develop an explicit policy encouraging agencies to use adaptive management techniques in the absence of complete data.

18.7. CEQ should promote federal and state planning for multiple-use planning.

18.8. OSTP along with DOE and NOAA should establish the implementation of a TRL (Technology Readiness Level) Protocol Standard, which allows the investors of a technology to evaluate at what stage the technology is ready to be safely deployed in commercialization.

### **Breakout Session 19: Bridging the GREEN-GAP between Environmentally-Sustainable Product Research and Commercialization**

19.1. Facilitate information exchange by creating a collaborative venue for connecting funding to ideas. For example, create a searchable national database or clearinghouse akin to a green EBay, detailing green technology ideas including those that are in the incubator stage, to help facilitate the links between funders and ideas.

19.2. The federal government and the National Academies of Sciences and Engineering should establish an academic roundtable to discuss research innovations, sustainable technology and supply chain management. This will inform federal managers, share ideas, strategies, etc.

19.3. Congress should facilitate the process of commercialization by quickly establishing federally-funded centers for innovative technology.

19.4. Government and private interests reduce the cost of risk associated with green tech development.

19.5. The government should create incentives for development and adoption of green technologies, including:

- a national green certification, with a market incentive to earn this certification (suggested: 25 years of patent protection instead of 17 in exchange for participation),
- shorten and simplify the patent process (patent office),
- simplify publication patent issues (university level),
- regulations such as building codes need faster revision to accommodate new technologies (i.e. straw bale buildings),
- and expand EPA's SmartWay program for innovative technology.

19.6. Congress should substantially increase federal funding for Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grant programs for green technology.

19.7. The Administration should reduce effort and improve the ease of access to federal funding for innovative research and development.

19.8. Congress should create environmental tax reforms that shift taxes away from desirable activities to undesirable activities.

19.9. The Department of Commerce should develop some sort of ‘one stop shopping’ that allows small green technology businesses to develop ideas, present ideas and get funding that is more streamlined than the current patchwork of “angel investor” networks and unconnected funding opportunities.

### **Breakout Session 20: Green Grid Ironies**

20.1. The Federal Energy Regulatory Commission (FERC) should consider the costs of getting power to their users as well as the costs of construction of power plants . This will help ensure that efficient technologies receive due credit.

20.2. The Federal Energy Regulatory Commission should allow private enterprises or individuals to transport power, allowing locally-produced power to be used locally, in accordance with local safety and technical standards.

20.3. The Department of Energy and the Department of Labor should create a certification program for implementing smart energy technologies and standards by the Institute of Electrical and Electronics Engineers (IEEE) to professionalize a green labor force.

20.4. The Department of Education, Department of Energy and National Science Foundation should jointly conceive and implement a program to promote a) development of curricula on energy literacy; and b) development of faculty to deliver these curricula. Emphasis should be on baccalaureate and master’s levels.

20.5. State Boards of Education should incorporate energy into science curricula.

20.6. Public Energy Commissions of each state should be accountable to their customers, telling them what the energy mix is, how efficiently the energy is produced, where it is transmitted from, and the costs of each source.

20.7. The Federal Energy Regulatory Commission should provide oversight of regional electricity transmission organizations and improve the introduction of intermittent sources of power into electricity grids.

20.8. State Public Utility Commissions should adopt “net metering” practices with consumer-friendly displays and real time pricing and rate structures.

20.9. The Department of Energy should fund research leading to more reliable forecasting of power flow levels on the grid from variable renewable sources.

20.10. State Power Utility Commissions (and their membership organization, National Association of Regulatory Utility Commissioners) and municipal and other public electric utilities should investigate, illuminate and advance local and state initiatives and best management practices concerning green grid and energy technology and approaches, and encourage rate structures to promote conservation and efficiency.

### **Breakout Session 21: The Economics of 350**

U.S. policy about carbon reduction should have a goal of reduction of atmospheric levels of CO<sub>2</sub> to 33 ppm and should be based on the following conclusions:

21.1. The costs of emissions reduction pale in comparison to the costs of inaction. This reality should drive climate policy.

21.2. Cost-benefit analysis is an insufficient framework for decision-making about climate.

21.3. Climate protection advocates should reframe the issue in terms of things people care about such as health, security and insurance.

21.4. Domestic policy must not only be effective in terms of reducing emissions, but it must sustain public support over the long-term. All policies should be held to the standard that they prevent the externalization of environmental costs.

21.5. Policy makers should not talk about a carbon price as an economic cost but rather as a transfer. Who gets this transfer is the key to sustaining support for domestic climate policy.

21.6. A cap-and-dividend approach asserts the principle of common ownership of nature's wealth can earn public buy-in.

21.7. If Congress auctions 100% of the carbon allowances, secondary-market trade in allowances is not necessary.

21.8. Rebating revenues from a 100% carbon auction protects the middle-class from higher energy costs. After a 100% auction, Congress should rebate 75% of the revenues from the 100% auction and allocate remaining 25% for investment (as in the Cantwell-Collins bill).

21.9. Major public and private investments in new technologies (e.g. carbon capture and storage, biological sequestration, renewables, etc.) may make the 350 ppm CO<sub>2</sub> target technically and politically feasible.

21.10. Modeling shows that the U.S. **does no worse** under a scenario that allocates global emissions on a per capita basis than one that does not reduce global emissions.

### **Breakout Session 22: After Copenhagen: The Economics and Physics of Implementing the COP 15 Agreements**

22.1. The President and Secretary of State should avoid mega-conferences on climate change for now and focus on small meetings with like-minded world leaders to reach real negotiations on climate change issues.

22.2. The Department of Education, Department of Energy, EPA, NASA, and NSF should support the training of students to think holistically- by taking a systems approach at all education levels.

22.3. Congress and state governments should stop subsidies of fossil fuels.

22.4. The EPA and Congress should require monitoring, measurement and verification of GHGs and an analysis of GHG emissions in every energy project in the planning process.

22.5. The National Science Foundation should launch (and Congress should fund) an interdisciplinary research effort on cultural models of stewardship, social resilience, and simplicity to inform long-term strategies for behavioral change

22.6. The Senate should include in its climate and energy bill an improved version of the House-passed Waxman-Markey Bill, with energy-related carbon dioxide reductions amounting to a factor of 20 by 2050 with regard to a 1990 baseline, and **zero energy buildings by 2030**, including deep factor of 10 energy reductions through retrofits and renovation.

22.7. State university systems, governors, EPA, NSF, USDA, and other appropriate federal agencies should establish and develop partnerships between universities and state and local governments to study and assess local environmental problems/hazards/impacts to build local capacity to understand and address emerging climate change adaptation and mitigation needs.

22.8. The EPA and the National Governors' Association (NGA) should create policy-making forums at various scales and levels and plan, based on local ecological processes, structures, and priorities (watershed planning, climate culture, etc.).

22.9. The DOE and EPA should express clear support for the evaluation of community district heating and cooling solutions within their CHP (Combined Heat and Power) programs and DOE should do this by enhancing the mission of its university-managed

Clean Energy Application Centers (also known as Regional Application Centers) to promote district heating and cooling (DHC) solutions.

22.10. The federal government should price energy so that when efficiency rises, consumption doesn't rise as a result.

### **Breakout Session 23: Carbon Equivalent Landscapes: Setting the Agenda and Implementing the Details**

23.1. The Council of Environmental Quality (CEQ) should create a green jobs initiative specifically for mining lands and for mine economies that retrains the existing workforce and reworks the land (simultaneously) for green jobs (small-scale agro-economy; carbon sequestration banking and farming; solar, wind, and biofuels (including algae) production and distribution; stormwater mitigation; stream water restoration; phytotechnologies for treating water, air, and soil; and others).

23.2. The Office of Surface Mining should recognize carbon sequestration as a post-mining land-use and **implement an advisory** of interpretation of the law stating such.

23.3. The Office of Surface Mining (permitting and inspection entities) should develop an **advisory of interpretation of the law** that would eliminate the topsoil variance and require the re-use of original topsoil.

23.4. The Office of the Surface Mining should develop an advisory of interpretation of the law to allow topsoil to be moved from one mine to another.

23.5. The EPA or Army Corps of Engineers should issue a "no net runoff" rule applicable to both during and post-mining activities.

23.6. The EPA should eliminate valley fill operations because of water quality violations and changes to the hydrologic cycle.

23.7. The National League of Cities and the American Planning Association should reduce impervious surfaces by incorporating model regulations for stormwater based on best management practices (BMPs) into local land-use codes and ordinances (pervious surfaces include: green roofs, engineered wetlands, LEED-certified housing, rain barrels, retaining the riparian zone).

### **Breakout Session 24: The Role of Young Entrepreneurs in the New Green Economy**

24.1. Universities should improve interactions between business and science, technology, engineering and math (STEM) areas designed to stimulate innovation and enable entrepreneurship or technology transfer.

24.2. Universities should improve and facilitate technology transfer to market using approaches such as those of MIT and Stanford.

24.3. Community colleges should promote vocational entrepreneurship.

24.4. Government mentorship programs for small business should retool to become more relevant to young entrepreneurs starting technology and high-growth companies.

24.5. The government should create a network of service providers for business sustainability.

24.6. The government should reduce the barriers to entry into marketplace for entrepreneurs in “green” industries.

24.7. Universities and the government should do more to facilitate individual mentoring and venture mentoring opportunities.

### **Breakout Session 25: Growing a New Vibrant “Green” Auto Industry – Who, What, When, Where and How Do We Expedite It?**

25.1. Congress should institute a gas tax surcharge to incentivize consumer adoption of fuel-efficient vehicles and automakers to build them. This can be revenue neutral if it offsets reductions in (?) the payroll tax.

25.2. The EPA should define types of vehicles (e.g. “alternative fuel”).

25.3. The EPA should provide information on stickers for new automobiles about the cost of fuel compared to electric vehicles (assume average driving cycle with individual mileage may vary). The EPA should create a website to assist drivers in calculating the likely cost of fuel for different types of vehicles based on their own driving behavior.

25.4. The Department of Housing and Urban Development (HUD) should eliminate building code restrictions and other obstacles to enable charging stations for electric vehicles to be charged..

25.5. The federal government, municipal governments, and utility companies should partner to subsidize and incentivize the installation of charging stations for electric vehicles.

25.6. Automakers and utility companies should partner to develop and implement training programs for dealers on how to sell and use electric vehicles.

25.7. The DOE should simplify the Advanced Technology Vehicles Manufacturing Loan Program (ATVM) to encourage innovation by automakers and small innovators over the long term.

25.8. The Department of Energy should develop a goal for when petroleum-based fuels we will no be longer used for personal transportation (by 2050 or sooner).

### **Breakout Session 26: Application of Green Chemistry in Decision-Making**

26.1. The federal government should establish definitions of key terms to be used by federal agencies. These terms could include green chemistry, green engineering, sustainability, etc. The terms could be used outside of the federal government and serve as national and global definitions. The definitions should rely and expand upon existing presidential executive orders and subsequent guidance.

26.2. Federal agencies should seek to continually improve the decision making process by being better informed.

Specifically:

- There should be incentives for chemical manufacturers to provide full disclosure of information to federal agencies.
- There should be improved life cycle assessment tools to be used by agencies. Ideally, the National Academy of Sciences should be funded to establish a committee to address life cycle assessment tools. The information and assessment tools could be used widely outside of government and serve as national and global standards.

26.3. The Administration and Congress should direct efforts for promoting education about green chemistry and sustainability:

- Supporting development of safer alternatives;
- Facilitating innovation as an engine for the U.S. economy;
- Introducing green chemistry and sustainability concepts in primary, secondary, and higher education;
- Development of an accepted green chemistry and sustainability curriculum.

26.4. The federal government should take necessary actions to ensure that new technologies, such as nanotechnologies, are developed and used in a sustainable manner, considering green chemistry principles and also considering unintended consequences.

26.5. Congress should establish tax credits and other incentives for the adoption of green technologies in industrial, commercial, and consumer settings.

### **Breakout Session 28: Green Economy Shifts in Science and Education**

28.1. Create a federal grant program to motivate a shift of behavior from entertainment to participating in generating what we need to know through funded projects.

28.2. HUD should change federal regulations to require that every federally funded mortgage be energy-efficient and location-efficient. Banks should provide funding to educate property buyers about these mortgages and related benefits.

28.3. Congress should create a federal grant program to fund projects to expand knowledge diffusion about economic and community benefits of new economy solutions, smart growth, etc.

28.4. The Securities and Exchange Commission (SEC) should require public companies to use semiannual financial reporting instead of quarterly reporting under Global Reporting Initiative (GRI) guidelines. SEC should also require companies to disclose social and environmental performance in accordance with GRI and require current and prospective employees know about sustainability.

28.5. The Department of Education should create a panel to develop methods and policies to change the blend of science education and to put greater emphasis on life science, and especially ecology.

28.6. Congress should reestablish and appropriate funds for a new Office of Technology Assessment whose staff would include specialists in industrial cradle-to-cradle life cycle analysis and economists with sustainability knowledge.

28.7. The Department of Education should create a federal grant program to fund demonstration projects, especially at schools, that reward, celebrate, and provide maximum visibility to benchmark solutions and working models of sustainability.

28.8. HUD should create a federally funded incentive program that provides capital funding for green technology installation at all types of residential and commercial properties.

28.9. The Department of Education should create a panel to develop guidelines for education standards to encourage learning about whole system relationships, critical thinking, and how to do science, innovate, and encourage people to see the economy and ecology as one entity.

### **Breakout Session 29: What is "Green Technology"? How Do We Define It? How Do We Achieve It?**

29.1. The federal government should establish a systems approach to develop and implement green technologies. This approach is predicated on the assumption that economic activities are embedded in and interactive with the environment at the local, regional, and global levels.

29.2. Business and investors utilize a cradle-to-grave (or cradle-to-cradle) and lifecycle assessment in evaluating green technologies. This includes conducting a full material and

energy input and output analysis that takes into account the totality of economic and ecological impacts.

29.3. The National Institute of Standards and Technology should create metrics and procedures that internalize the environmental costs of economic activities and pricing systems and thereby promote the implementation of green technologies.

29.4. The Department of Education should launch a nationwide educational program designed to familiarize students with ecological principles in the context of developing a sustainable green economy.

29.5. Congress should re-establish the congressional Office of Technology Assessment to carry out comprehensive analysis of emerging technologies that are promoted as being “green.”

29.6. Congress should devote more funds to the development of green technologies that make effective use of “biomimicry” that emulates processes of natural systems.

29.7. Federal agencies should implement requests for proposals (RFPs) and requests for applications (RFAs) that involve experts across multiple disciplines that are related to research and development of green technologies.

29.8. The federal government should implement a “Marshall-like plan” for the urgent and rapid development of green technologies that can address problems of global climate change and help create green jobs.

29.9. NCSE should consider launching an inter-disciplinary council that brings together experts and academics in the fields of economics, ecology, and engineering. This new council should be modeled after the Council of Environmental Deans and Directors (CEDD) and the Council of Energy Research and Education Leaders (CEREL).

### **Breakout Session 30: Recommendation to the U.S. Government: How to Build a Public-Private Partnership for a Green Economy**

30.1. Congress and the Administration should, as soon as possible, pass and implement a comprehensive cap-and-trade program with a steadily declining cap that achieves deep GHG emissions reductions by no later than mid-century, and that sets a price on carbon to encourage private investment in low-carbon technologies and practices. Some portion of the emissions allowance value generated by the program should be allocated to fund public-private partnerships dedicated to research, development, demonstration, and commercial deployment of advanced low-carbon technologies.

30.2. Congress should adopt a national policy for siting and cost recovery for electricity transmission lines.

30.3. The federal government should create a green jobs and careers program that includes a youth conservation corps (expanding, and modeled on, AmeriCorps, Teach for America, and other existing programs), career services, and loan forgiveness, using private sector funding or funding from cap-and-trade legislation.

30.4. Federal and state governments, in partnership with local governments, school districts, nongovernmental organizations, businesses, and industry, should use schools, educational, recreational and community centers as “living laboratories” to demonstrate green practices for sustainable development.

30.5. Using financial incentives, the federal government should encourage local governments to adopt land use regulations that promote smart and sustainable growth.

30.6. The federal government should convene a national dialogue that incorporates stakeholder and public input to create and implement a national strategy for sustainable development and a green economy, and periodically report on progress made in implementing the strategy and related international agreements.

30.7. Philanthropic foundations should fund a systematic review of local, state, and federal government laws that inhibit sustainable development and should also compile and distribute model laws that promote sustainable development.

30.8. The federal government should create a national partnership that encourages and supports renovation of residential and commercial buildings for energy efficiency and conservation, with the object of renovating half a million buildings per year.

30.9. Congress and the federal government should ensure that federal funds, including any future federal stimulus money, support the creation of green jobs, green community revitalization, particularly in distressed areas, and sustainable development.

30.10. The federal government, in partnership with state and local governments, nongovernmental organizations, and the private sector, should adopt and implement a sustainable economic opportunity program that includes green bonds guaranteed by the government and an appropriate entity to review and certify projects that are eligible for funding from the bond funds.

### **Breakout Session 31: Environmental Information Needs for a Green Economy**

The session recognized the importance of environmental information in fueling the green economy. This includes information in support of understanding climate change impacts, mitigation and adaptation, energy production and use, and sustained resource management. In addressing these topics it was recognized that environmental information includes the entire supply chain beginning with observations and ending with tangible actions.

31.1. The federal Adaptation Task Force Steering Group (Jane Lubchenco (NOAA), Shere Abbott (OSTP), Nancy Sutley (CEQ)) should determine the best approach to increase capacity and accessibility in research and observations to inform adaptation choices, and evaluate effectiveness and cost of those decisions.

31.2. The Administration and Congress should give the mandate and funding for long-term observations to NASA in partnership with private industry for the provision of global systematic, long-term, scientific quality satellite observations from 1 m to 1 km. All U.S. government resource management and regulatory agencies should provide systematic in situ observations and survey data for measuring climate impacts and adaptation.

31.3. Groups such as the Alliance for Earth Observations and other non-governmental organizations should facilitate input to leverage the open government directive and engage the environmental information community in contributing ideas and recommendations.

31.4. National governments should agree to international coordination effort beyond “best efforts” and commit to concrete approaches for sharing environmental information.

31.5. OSTP and OMB should address policy and governance of multi-agency, information technology related to climate change.

31.6. The Administration should devise a national adaptation policy that uses environmental information and incorporates climate impacts for federal actions (e.g., NEPA).

31.7. The National Science Foundation should fund systematic studies of best practices of integrated decision support solutions to build and expand capacity for adaptation.

31.8. OSTP should establish a committee to develop a strategic long-term plan for environmental information (50 to 70 years) addressing the entire supply chain of environmental information.

31.9. The Administration and Congress should support sustained funding and investment in energy and related conservation technologies.

31.10. The U.S. government should mandate cohesive standards regarding life cycle assessment and require that industry publish such data (e.g. much like nutritional data) on manufactured products.

### **Breakout Session 32: Sustainable Water Reuse for a Green Economy: Developing Policy Recommendations**

32.1. The CEQ and federal water agencies should use systems analysis and design to understand the role of water in ecosystems, in climate, in industry, job creation, etc. Options to consider include wastewater reuse by co-located industries (zoning and industrial ecology), integrated ecosystem design, evaluating full benefits of ecosystem design, and developing standard technologies in urban areas for rainwater and gray water capture

32.2. The Administration should “Just Add Water” to all government programs for all green economy issues. For example, the Administration should develop a vision for water sustainability and invest more in alternative designs, funds for research, demonstration projects, clean tech investments, tax incentives and standards for reuse.

32.3. The Administration should create one entity or agency for water.

32.4. The Administration should conduct “true cost accounting” of water to include externalities and the benefits of capturing the true value of wastewater

32.5. The Administration should develop uniform water quality indicators for multiple water uses (i.e. industrial and homes) specifically to encourage environmental use of carefully monitored waste water

32.6. The Administration should create education and outreach programs for a whole system approach to water. This should include encouraging water dialogues in communities and nationally.

32.7. The Administration should extend the Safe Drinking water Act to all drinking water (specifically bottled water).

32.8. The Administration should favor funds for innovative technologies and projects in federal funding.

32.9. The Administration should actively explore adaptation strategies for water in the face of climate change.

32.10. The Administration should analyze a “water footprint” for goods and services.

### **Breakout Session 33: The Three Pillars of Sustainability: Paradigm Shifts and Opportunities for the Public and Private Sector**

A truly sustainable future requires not only ‘greener’ thinking and ‘sustainable development’, but also a clear recognition of total planetary and regional natural resource limitations, and the need to operate our human economies within these limitations. To protect and enhance opportunities for future life on this planet, we must be very cognizant of our macro-demands on nature, and ensure that we operate in balance with

nature's capacity to provide ecosystem goods and services. The following recommendations follow from this important 'balance with nature' concept:

33.1. Make 'protecting life for future generations' central to our national agenda and facilitate a national and global paradigm shift to sustainability:

- Insert sustainability into our constitution (example - Swiss National Constitution).
- Create a National Sustainability Plan (CEQ/EPA).
- Re-instate the NEPA requirement for annual environmental quality (EQ) reports.
- Assure that EQ reports include sustainability benchmarking.
- Support research into consumer purchasing and change behavior.

33.2. Make sustainability a usable concept in guiding policy and sound decision making:

- Direct government science agencies (e.g. NSF) to support/fund development of the science of sustainability, including the development of sound metrics.
- Assure and expand open access information systems.

33.3. Clean energy, green jobs, and efficiency improvements are often the 'up-front' issues in the 'green economy' dialogue. We must also incorporate the population factor and the consumption factor in the sustainability dialogue.

- Create a 'National Population Policy' consistent with natural resource realities.
- Convert pro- natal tax policies to pro- family friendly policies.
- Make women's education and rights central to foreign policy.
- Support the international modeling of small family norms.
- Require necessary information (on labeling) for sound consumer decision making.

33.4. The relationship between sustainability and our macro-economic systems needs to be explored further:

- Establish a "National Sustainability Commission" to broadly review and publicize the economic 'prosperity without growth' concept, recommend appropriate macro-economic controls, and advance the development of self-reliant communities.
- Create a national land-use policy.
- Develop ecological tax reform and institute positive 'fee-bate' incentives.

33.5. Incorporate "sustainability" into the operations of all branches of government:

- Conduct 'sustainability' reviews within all government departments and agencies.
- Integrate sustainability into Defense Department 'national interests' guidelines. Consider redirecting defense budget money towards global stability projects.
- Review and remove obstacles to siting of solar and other alternative energy sources, consistent with the recommendations from session 17 on "promoting responsible renewable energy development".
- Review all government regulations and procedures with respect to their ability to promote sustainability.
- Implement existing policies that support sustainability.

#### **34. Public and Private Sustainability Policy: Is a Green Economy Sustainable and How Would One Know?**

This session addressed the assumption that a new green economy would be more sustainable economically, environmentally, and socially than the existing petroleum/fossil fuel economy. Participants analyzed four key myths/fallacies that surround the concept of sustainability that create barriers and missed opportunities for progress toward sustainability:

- (a) Sustainability can be achieved (or, the fallacy of a ‘tame’ problem). Sustainability is ‘wicked’ (i.e., difficult or impossible to solve) because its requirements are often incomplete, contradictory, and changing.
- (b) Sustainability is about tradeoffs (or, the fallacy of existing paradigms). Sustainability management involves more than just tradeoffs among people, prosperity, and planet.
- (c) Sustainability can be measured (or, the fallacy of stationary standards). Monitoring progress toward sustainability is highly dynamic because of multiple and potentially conflicting sustainability standards.
- (d) Sustainability arises from good science (or, the fallacy of linear science). Sustainability is not an exclusively scientific paradigm, subject only to scientific framing and inquiry.

Session participants mutually generated the following recommendations, which pertain to culturally appropriate and socially transparent systems of engagement for the explication of values underlying and motivating diverse trajectories of sustainability.

34.1. Political and business leaders at all levels should include transforming the ethics and practice of consumption as central to meeting their sustainability goals. For example, a) leaders should develop business forums to identify their sustainability goals and associated metrics, and b) the federal government should be a leader in green purchasing.

34.2. Recognizing that multiple visions and interests shape standards-setting processes, academic institutions and political and business leaders at all levels should advocate for diversity and transparency in these processes by:

- developing a greater appreciation within the environmental sciences of the role of standards in linking diverse societal values with sustainability sciences;
- making the diverse societal dimensions of standards a greater part of the ongoing public dialogue concerning sustainability;
- promoting a broader public awareness of the role and potential participatory consequences of private sustainability standards in public sustainability governance;
- moving public discussions of sustainability standards away from ‘standardization’ per se and toward a notion of heterogeneous ‘sustain-abilities’ that reflect the breadth of interests in and approaches to a more sustainable green economy.

34.3. Develop education programs that encourage and support alternative ways of understanding and pursuing sustainability, e.g. opening up dialogue with plural epistemologies. These programs should emphasize a range of discourses among different stakeholders and amongst alternative sustainability epistemologies, including but not restricted to scientific paradigms.

### **Breakout Session 36: Development of Nontraditional Educational Systems within Developing Countries to Create a New Sustainable Economy**

36.1. Universities should establish programs for new graduates within related fields to teach in developing countries about the new green economy.

36.2. The federal government should create incentives for corporations to reimburse countries from which they utilize resources.

36.3. Universities should require their faculty to teach in universities within developing countries or should provide additional resources to professors wanting to use their sabbaticals for this purpose.

36.4. The Department of Education should set up programs to connect schools within similar geographical regions, to connect students via **skip interaction** and required international experience.

36.5. Congress should invest in long-term education that would provide access to sustainable education. Congress and the Administration should provide better monitoring of education programs and funds sponsored by bilateral and international agencies. They should monitor where the money goes when it's disbursed into a developing country's educational system (accountability).

36.6. Universities should have programs to collect old computers and reuse them in developing countries.

36.7. Universities should provide standardized and comparable international and interdisciplinary education by utilizing resources from the 'haves' and providing them to the 'have-nots'.

36.8. Universities should identify key community leaders to facilitate nontraditional education surrounding the development of a new green economy.

### **Breakout Session 38: Opportunities and Barriers for Green Infrastructure and Buildings: The Case of Water Management**

38.1. Support research to determine the optimal scale for implementing green building and infrastructure performance at building, neighborhood, eco-region and political jurisdiction scales. The research outcomes must inform planning, design, construction and operation of sustainable water infrastructure. The research should include consideration of human and environmental health, affordability, equity, climate change, sea level rise, and green jobs.

**Agencies:** Department of Commerce, USGS, EPA, DOE, DOD, NSF  
**NGO's:** USGBC, WERF, AIChE, AIA, APA, NCSE

38.2. Identify data protocol and decision support tools at sufficient detail to support planning and design of sustainable water infrastructure at all scales of implementation – building, neighborhood, eco-region and political jurisdiction. Protocol must be developed in consultation with client users and stakeholders at regional levels, and be transdisciplinary. Cost, equity, and technical and other skill requirements must be considered.

**Agencies:** USGS, EPA, DOE and USDA, OSTP

**NGOs:** USGBC, WERF, AIChE

38.3. Develop educational materials and outreach to promote general adoption of sustainable water infrastructure by public and key decision makers, including architects, engineers, planners, constructors and local government officials. Conduct technology transfer and training support.

**Agencies:** Department of Education, USDA, USGS, Department of Commerce, DOE, EPA and HUD

**NGO's:** USGBC, WERF, AIChE, AIA, APA, NCSE

38.4. Develop smart grid equivalent strategies to optimize water management from a life cycle assessment (LCA) perspective, including recovery of water, materials and energy from sewerage and runoff streams.

**Agencies:** NSF, EPA, DOE, USDA

**NGO's:** WERF

38.5. Develop transformative education to link important disciplines of natural and social science, including economics, engineering and architecture. This must include components for K-12, undergraduate, graduate, and continuing education levels.

**Agencies:** NSF, EPA, DOE, USDA

**NGO's:** WERF, North American Association for Environmental Education, AIChE, WERF, AIA

38.6. Develop new images, concepts and language/lexicon for water, focusing on **resource water** treated at appropriate levels to support distinct uses. STOP using pejorative water adjectives including “**Storm**water” and “**Waste**water”. Examine options to Bronze Age assumptions of water as a waste dispersant and transport medium. Calculate actual cost and performance data for alternative water uses, via LCA, including equity, environmental justice, and international perspectives.

**Agencies:** NSF, EPA, USGS, NOAA, DOE, USDA

**NGO's:** WERF, NFPA, AIChE, Pew, NRDC

38.7. Support research on the adoption of green building and water infrastructure innovations, with a focus on existing technologies. Ensure that research includes a strategic demonstration in distinct “geo/eco” regions. Include international experiences.

**Agencies:** HUD, DOE, DOD, USDA, USAID, NSF, EPA, Department of Commerce

**NGO's:** USGBC, WERF, AIChE, NCSE

THE NATIONAL COUNCIL FOR SCIENCE AND THE ENVIRONMENT THANKS  
ALL THOSE WHO ORGANIZED AND PARTICIPATED IN THESE SESSIONS AND  
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