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September 9, 2013

Charles P. Nicholson
NEPA Compliance
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VIA E-MAIL AND TVA PUBLIC COMMENTS FORM

RE: PAF Draft EA Comments

Dear Mr. Nicholson,

The attached comments on the Tennessee Valley Authority's "Paradise Fossil Plant Units 1 and 2 Mercury Air Toxics Standards Compliance Project" are respectfully submitted on behalf of Earthjustice, Environmental Integrity Project, Kentucky Environmental Foundation, Sierra Club, Southern Alliance for Clean Energy and Southern Environmental Law Center. These comments have also been uploaded directly to TVA using the online TVA Public Comments Form.

Because of the size and amount of documents associated with our Climate Change comments (Section VI), we have made these available via a universally accessible hyperlink. Please access these documents using the following hyperlink - https://app.box.com/s/qpdfqps7ryjlow8fm1i4.

Please let me know if you are unable to access these documents.

Please confirm your receipt of these comments and please do not hesitate to contact me should you need any additional information.

Sincerely,

Angela Garrone
Southeast Energy Research Attorney

COMMENTS ON PARADISE FOSSIL PLANT UNITS 1 AND 2 MERCURY AIR TOXICS STANDARDS COMPLIANCE PROJECT

The following organizations (collectively referred to as Commenters) respectfully submit these comments on the Tennessee Valley Authority's (TVA) Draft Environmental Assessment (DEA) for the "Paradise Fossil Plant Units 1 and 2 Mercury Air Toxics Standards Compliance Project." For the reasons detailed below, Commenters believe that the DEA fails to satisfy the requirements of the National Environmental Policy Act ("NEPA") and does not ensure that TVA is making a decision regarding Paradise Units 1 and 2 that is consistent with the goal of satisfying energy needs in a low-cost, reliable, and environmentally sound manner. We urge TVA to more fully evaluate, in the context of an Environmental Impact Statement, the significant environmental impacts of retrofitting and continuing to operate Paradise Units 1 and 2, and the comparative impacts and benefits of pursuing a more diverse combination of energy resources for replacing those two aging coal-fired electric generating units. The thorough evaluation required by law will almost certainly lead to the conclusion that retiring and replacing Paradise Units 1 and 2 with cleaner energy resources is the most reasonable decision from an economic and environmental perspective.

These comments are submitted on behalf of the following organizations:

1. Earthjustice

Earthjustice is a non-profit public interest law organization dedicated to protecting the magnificent places, natural resources, and wildlife of this earth, and to defending the right of all people to a healthy environment.

2. Environmental Integrity Project

The Environmental Integrity Project is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for more effective enforcement of environmental laws. The Environmental Integrity Project has three objectives: to provide objective analysis of how the failure to enforce or implement environmental laws increases pollution and affects the public's health; to hold federal and state agencies, and individual corporations, accountable for failing to enforce or comply with environmental laws; and to help local communities in key states obtain the protection of environmental laws.

3. Kentucky Environmental Foundation

The Kentucky Environmental Foundation is a non-profit organization focused on reducing harmful energy and chemical-related pollution and securing clean, safe solutions to improve the health, environment and economy of Kentucky communities.

4. Sierra Club

Sierra Club is the nation's oldest grass-roots environmental non-profit organization with approximately 600,000 members nationwide. Since its founding in 1892, Sierra Club has pursued its mission to enjoy, explore, and protect the planet. Sierra Club's Kentucky Chapter has approximately 4,145 members throughout the state, including members who are directly affected by the Paradise plant's pollution and who will see bill impacts caused by TVA's proposed Paradise project.

5. Southern Alliance for Clean Energy

Southern Alliance for Clean Energy is a nonprofit organization that promotes responsible energy choices that create global warming solutions and ensure clean, safe, and healthy communities throughout the Southeast.

6. Southern Environmental Law Center

The Southern Environmental Law Center (SELC) is a non-profit, public-interest environmental organization that uses law and policy expertise to protect the South's natural resources—its land, air, water, coast and wetlands, and forests—and to preserve our rural countryside and community character. SELC works collaboratively with over 100 national, state, and local groups to enhance their efficacy and achieve common conservation goals, striking a balance with economic prosperity; a beautiful and healthy environment; and attractive, vibrant, and livable communities in the South.

I. Summary of Comments

We welcome the opportunity to comment on this important decision facing TVA and appreciate the Agency's engagement in the NEPA process, allowing for public input, before a firm decision is made with respect to the future of operations at the Paradise Fossil Plant ("PAF"). The Draft EA presents a question of significant environmental importance, namely whether to retrofit and continue operating, or retire and replace, PAF Units 1 and 2. In the Draft EA, TVA proposes three alternative actions to be taken at PAF: the No Action Alternative (Alternative A), Install and Operate Pulse Jet Fabric Filter Systems for PAF Units 1 and 2 (Alternative B), and Construct and Operate Combined Cycle/Combustion Turbine Plant (Alternative C).[1] Alternative A does not represent a viable option going forward as a no-action alternative would allow Units 1 and 2 to emit pollutants in levels that exceed federal air standards.[2] Between Alternatives B and C, TVA has indicated no preferred alternative. Both Alternatives B and C represent a "major federal action significantly affecting the human environment" and as such require TVA to complete a full Environmental Impact Statement (EIS) in order to comply with NEPA regulations.

The Draft EA itself is flawed in several important respects, and cannot be offered as a substitute for an EIS. The Draft EA fails to consider other reasonable alternatives, such as retiring Units 1 and 2 and replacing lost generation capacity with any combination of energy efficiency measures, demand side management policies, purchased power, renewable energy resources and/or transmission upgrades. Instead, the Draft EA looks at each one of these generation resources individually and finds each one infeasible.

The Draft EA also fails to consider whether or not constructing a smaller combined cycle/combustion turbine natural gas plant could also meet generation resource needs in the region. Furthermore, the Draft EA does not inform the public on the amount of power needed to replace lost generation capacity in the event that PAF Units 1 and 2 are retired.

The Draft EA reveals that TVA must prepare an Environmental Impact Statement (EIS) to determine whether to install retrofits on Units 1 and 2 at PAF or retire these units and replace them

[1] Draft EA at 9-11.
[2] Draft EA at 9.

with a natural gas plant because the impacts of either alternative would be significant, and the EA fails to adequately consider other reasonable alternatives in accordance with NEPA regulations.

II. Legal Background

The National Environmental Policy Act (NEPA, or Act) is "our basic national charter for protection of the environment."[3] Other environmental statutes focus on particular media (like air, water, or land), specific natural resources (such as wilderness areas, or endangered plants and animals), or discrete activities (such as mining, introducing new chemicals, or generating, handling, or disposing of hazardous substances). In contrast, NEPA applies broadly "to promote efforts which will prevent or eliminate damage to the environment."[4]

To accomplish this expansive goal, NEPA requires that government agency decision-makers consider and weigh the environmental consequences of proposed actions "at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays late in the process, and to head off potential conflicts."[5] "[B]y focusing the agency's attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast."[6]

Whereas the substantive environmental protection goals of the Act provide some flexibility and responsible exercise of agency discretion, "the Act also contains very important 'procedural' provisions—provisions which are designed to see that all federal agencies do in fact exercise substantive discretion given to them."[7] NEPA's procedural protections "are not highly flexible. Indeed, they establish a strict standard of compliance."[8]

The Environmental Impact Statement (EIS) is the centerpiece of the NEPA process, and it is the principal tool for insuring that agencies meet NEPA's substantive and procedural goals. NEPA

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[3] 40 C.F.R. § 1500.1(a).
[4] NEPA § 2, 42 U.S.C. § 4321.
[5] 40 C.F.R. 1501.2; s*ee* NEPA § 102, 42 U.S.C. § 4332; *see also* 40 C.F.R. § 1501.1(a).
[6] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989); *see also Jones v. District of Columbia Redev. Land Agency*, 499 F.2d 502, 512 (D.C. Cir. 1974), *cert. denied*, 423 U.S. 937 (1975) ("NEPA was intended to ensure that decisions about federal actions would be made only after responsible decision-makers had fully adverted to the environmental consequences of the actions, and had decided that the public benefits flowing from the actions outweighed their environmental costs.").
[7] *Calvert Cliffs Coord. Comm., Inc. v. Atomic Energy Comm'n*, 449 F.2d 1109, 1112 (D.C. Cir. 1971), *cert. denied*, 404 U.S. 942 (1972).
[8] *Id*.

directs agencies to provide a coordinated public process and to prepare a detailed EIS for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the human environment."[9] The requirement to prepare an EIS fulfills two of NEPA's essential mandates. First, it "ensures that the agency, in reaching its decision, will have available and will carefully consider detailed information concerning significant environmental impacts" before committing resources to a course of action.[10] Second, "[p]ublication of an EIS, both in draft and final form, also serves a larger informational role. It gives the public the assurance that the agency 'has indeed considered environmental concerns in its decisionmaking process,' and, perhaps more significantly, it provides a springboard for public comment."[11] Where an agency is uncertain whether an EIS is required for a proposed action, it may first develop a concise public document known as an Environmental Assessment (EA) to help resolve the question and as an aid in preparing an EIS. But the decision whether to prepare an EIS "is not committed to the agency's discretion."[12]

As explained in the comments that follow, TVA's proposed installation of emission controls and associated equipment at PAF and/or the retirement of PAF Units 1 and 2 and construction of a new natural gas generating facility is a major federal action significantly affecting the human environment. Based on NEPA's statutory directives, Council of Environmental Quality (CEQ) regulations, and TVA's own NEPA guidelines, TVA must prepare an EIS following a full public process before deciding what action to take at PAF. And TVA must complete this process and issue a final EIS and record of decision (ROD) before committing resources to the proposed action.

III. TVA Must Provide a Full Public Process and Prepare an Environmental Impact Statement for the Proposed PAF Project.

TVA must prepare an EIS for the following reasons, as set forth below. Each of these reasons provides a separate and sufficient basis for the preparation of an EIS.

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[9] NEPA § 102(2)(C); 42 U.S.C. § 4332(2)(C).
[10] *Robertson*, 490 U.S. at 349.
[11] *Id.*; *see also Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1056 (9th Cir. 1982) (the "form, content and preparation [of the EIS] foster both informed decision-making and informed public participation"); 40 C.F.R. § 1502.1 (purpose of EIS is to "provide full and fair discussion of significant environmental impacts and . . . [to] inform the decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts . . .").
[12] *Foundation for N. Am. Wild Sheep v. Dept. of Agric.*, 681 F.2d 1172, 1177, n. 24 (9th Cir. 1982).

A. TVA's Proposed Action Requires Preparation of an EIS because It Is a "Major Federal Action Significantly Affecting the Human Environment."

TVA faces a stark choice between retiring and replacing Paradise Unit 1 and/or Unit 2, or investing in expensive pollution controls that would not only allow TVA to continue operating Units 1 and 2 as coal-fired units but would actually impel TVA to do so for another decade or more in order to recoup its investment from ratepayers. Unlike retiring Units 1 and 2, continued operation of these units would produce significant amounts of air and water pollution and coal combustion waste, even after installation of the proposed pollution controls.

If TVA installs pollution controls on Units 1 and 2, every year for the remainder of its operational life the plant would continue to emit millions of tons of regulated air pollutants, including carbon dioxide, sulfur dioxide, nitrogen oxides, coarse and fine particle pollution and dozens of toxins, such as acid gases, dioxins, mercury, arsenic, lead, copper, selenium, hexavalent chromium, and other heavy metals. Units 1 and 2 would also continue to discharge more than a dozen toxic metal pollutants into the Green River.[13] And the Paradise plant would continue to generate more than 350,000 cubic yards of bottom ash, and 900,000 cubic yards of gypsum slurry and 270,000 cubic yards of fly ash annually[14]. Coal ash contains numerous toxins, including arsenic, beryllium, boron, cadmium, chromium, hexavalent chromium, cobalt, lead, manganese, mercury, molybdenum, selenium, strontium and thallium.[15] Conversely, retiring PAF Units 1 and 2 would entirely eliminate emissions of air pollutants, discharges of water pollution, and land disposal of coal combustion wastes generated by those units. By any relevant measure, either Alternative B or Alternative C qualifies as a major federal action for which NEPA requires an EIS.

1. TVA's Proposed Action is a Major Federal Action.

NEPA requires an EIS for all "proposals for . . . major Federal actions significantly affecting the quality of the human environment."[16] A major federal action, for NEPA purposes, includes actions with effects that may be major and that are potentially subject to federal control and

[13] *See* Draft EA 57-61.
[14] *See* Draft EA AT 77-78.
[15] *See http://www.epa.gov/wastes/nonhaz/industrial/special/fossil/coalashletter.htm.*
[16] 42 U.S.C. § 4332(2)(C); *see* 40 C.F.R. § 1502.3, TVA NEPA Procedures § 5.4.1.

responsibility.[17] The term "major" has no meaning independent of "significantly," as defined in the CEQ regulations, and merely reinforces the meaning of significantly.[18] An "action" includes new and continuing activities, including projects financed, assisted, conducted, regulated or approved by federal agencies.[19]

The proposed action in this case, installing pollution controls and associated facilities at the Paradise Units 1 and 2 at the plant and/or retiring those units and replacing them with a new natural gas combined cycle/combustion turbine plant, satisfies all of these components of the definition of a major federal action. Not only is the decision to install pollution controls or to construct a new combined cycle/combustion turbine natural gas plant being proposed, financed, conducted, regulated, and subject to approval by TVA, it is also an action that will clearly have major effects on people and the environment.

2. TVA's Proposed Action Significantly Affects the Human Environment.

Based on their corresponding regulatory definitions, actions are deemed "major" if they "significantly" affect the human environment.[20] Under the CEQ regulations, in order to determine if an action significantly affects the environment, an agency must consider both the context of the action and the intensity of the action.[21] Evaluating the significance of an action necessarily requires analyzing its impacts in several contexts, including: the action in relation to society as a whole; in relation to the affected region in which the action is taking place; in relation to the interests affected by the action; and in relation to the locality affected by the proposed action.[22] Both short-term and long-term effects are relevant for this analysis.[23] As discussed below, the PAF proposal implicates all of these contexts and would cause or contribute to significant short-term and long-term impacts locally, regionally, and nationally.

It is equally important that the agency proposing the action correctly analyzes the intensity of the action, in order to determine whether the action is significant for NEPA purposes. Intensity refers

[17] 40 C.F.R. § 1508.18.
[18] Id.
[19] 40 C.F.R. § 1508.18(a).
[20] 40 C.F.R. § 1508.27
[21] Id. See Humane Society of the United States v. Johanns, 520 F.Supp.2d 8 (D.C. Cir. 2007)
[22] 40 C.F.R. § 1508.27(a).
[23] 40 C.F.R. § 1508.27(a).

to the severity of the impact and includes a wide range of considerations of the impact of the proposed action, including:

> [t]he degree to which the proposed action affects public health or safety, [t]he degree to which the effects on the quality of the human environment are likely to be highly controversial, [t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks, [t]he degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration, [w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts, and [t]he degree to which the action may adversely affect an endangered or threatened species or its habitat.[24]

An action may be "significant" if any one of these factors is met.[25] Even if the determination of whether a significant environmental impact will or will not result from the proposed action is a close call, then an EIS ***still must*** be prepared pursuant to NEPA.[26] Nonetheless, as shown below, the PAF proposal is not even a close call. The proposed project, individually and in combination with other related and similar activities, would significantly affect the human environment locally, regionally, and nationally; it clearly requires an EIS.

"Human environment" must be interpreted comprehensively to include both the natural and physical environment as well as the relationship of people with that environment.[27] The agency must evaluate the project's economic effects to the extent they are interrelated with natural or physical effects.[28] NEPA requires "a narrowly focused, indirect review of the economic assumptions underlying a federal project described in an impact statement."[29] NEPA analysis of the human

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[24] 40 C.F.R. § 1508.27(b)(2), (4), (5), (6), (7), (9).
[25] Ocean Advocates v. U.S. Army Corps of Eng'rs, 361 F.3d 1108, 1125 (9th Cir. 2004).
[26] Center for Biological Diversity v. National Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008) (emphasis added).
[27] 40 C.F.R § 1508.14.
[28] *Id.*
[29] *City of Shoreacres v. Waterworth*, 332 F.Supp.2d 992, 1009 (S.D. Texas 2004), quoting *Welch v. U.S. Air Force,* 249 F.Supp.2d 797, 806 (N.D. Texas 2003).

environment encompasses social or economic impacts that are interrelated with or caused by natural or physical impacts, which flow from the proposed major federal action.[30]

Specifically, the proposed actions would have significant impacts on areas including, but not limited to, the following:

a. Water Quality/Quantity Impacts

Both Alternative B and Alternative C would have significant impacts on water quality and quantity in the area around the PAF facility. Extending the operating lives of Units 1 and 2 under Alternative B would mean a continuation of the significant water withdrawals and pollution discharges into surrounding surface water and into groundwater caused by Units 1 and 2. Conversely, retiring PAF Units 1 and 2 would greatly diminish future water withdrawals and discharges, thus mitigating any long-term future effects to local surface waters. The significant difference in amount and kind of impacts on water from either Alternative A or Alternative B is further proof that a full EIS is needed to adequately assess impacts of TVA's actions regarding future operations of PAF.

Currently, PAF withdraws water from the Green River for operational use as a non-contact cooling water, boiler feed water, CCR sluice water, and equipment cleaning.[31] On average, 337.26 MGD is withdrawn for cooling and operational purposes.[32] On average, 367 MGD is discharged into the Green River from the PAF operation.[33] Continuing operation of Units 1 and 2 and/or building a new natural gas plant would have a significant impact on water quality and quantity in the Green River.

b. Surface Water Impacts

The Paradise plant ranks as the 3rd most polluting coal plant in the United States in terms of the quantity of discharges of pollutants to surface waters of the U.S.[34] Currently, the Paradise plant discharges more than 367 million gallons of polluted stormwater and process water every day into the

[30] *Morris v. Myers*, 845 F.Supp. 750, 754 (D. Oregon 1993).
[31] *See* Draft EA at 55.
[32] *Id.*
[33] *Id.*
[34] *See* TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), top 100 facilities (of 618) for facilities in NAICS 2211 - Electric Utilities, for All chemicals, U.S., 2011.

Green River.[35] The Toxics Release Inventory data for PAF show 2011 surface water discharges of 15,320 pounds of barium, 11,260 pounds of copper, 6,100 pounds of vanadium, and 2,600 pounds of selenium.[36]

Further, these wastewaters receive only the most rudimentary treatment in an unlined settling pond that is not effective at removing dissolved heavy metals and other toxics. Whereas retirement of Units 1 and 2 would greatly reduce the discharge of these pollutants, significant toxic discharges will persist and increase with continued operation of these units. The Draft EA does not analyze the impacts associated with the continued discharge of inadequately-treated wastewater in the Green River.

Alternative B could substantially alter the Paradise wastewater streams by adding new contaminants and increasing pollutant discharges. TVA acknowledges that the physical structures, reagents and raw materials, operations, and waste products associated with the proposed pollution controls would add and increase water pollution discharges.[37] But the Draft EA does little to quantify, let alone fully characterize the flow, constituents, or concentrations of additional water pollution the proposed action would produce.

c. Air Quality and Climate Change Impacts

In addition to the significant impacts on water, TVA must complete a full EIS for this action because of the significant effects it will have on air quality and climate change mitigation efforts. There is no question that elevated levels of carbon dioxide (CO_2) in the atmosphere endanger public health and welfare.[38] The harms posed by CO_2-induced climate change are pervasive and severe.[39] Based on the vast weight of scientific evidence, EPA has found that "climate change associated with elevated atmospheric concentrations of carbon dioxide and the other well-mixed greenhouse gases have the potential to affect essentially every aspect of human health, society and the natural

[35] *See* Draft EA at 55.
[36] TRI data taken from http://www.tva.com/environment/air/paradise.htm#tri
[37] *See* Draft EA at 59.
[38] See Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009); Of the six greenhouse gases identified in EPA's Endangerment Finding, CO_2, along with methane, ranks as the most important directly emitted pollutant. Id. at 66,517.
[39] *See* 74 Fed. Reg. at 66,523 (linking "human emissions and resulting elevated atmospheric concentrations of . . . greenhouse gases to observed global and regional temperature increases and other climate changes").

environment."[40] Alternative B will do nothing to eliminate CO_2 emissions from the plant, and would, instead, prolong these emissions for decades to come.

The adverse effects of human-induced climate change cut across multiple sectors and geographic areas, adversely affecting "human health, air quality, food production and agriculture, forestry, water resources, sea level rise and coastal areas, the energy sector, infrastructure and settlements, and ecosystems and wildlife."[41] The current and projected future consequences of climate change are dire. Rising global temperatures already are producing more frequent and more intense weather events, such as hurricanes and storms, causing enormous damage to people, the environment, and the economy (*e.g.*, Hurricane Sandy).

Heavy precipitation induces more floods, causing deaths, injuries, water-borne diseases, and mental health problems, such as post-traumatic stress disorders.[42] Higher average temperatures increase the likelihood of extreme heat waves, causing greater numbers of deaths and illnesses.[43] Increased temperatures also will adversely affect air quality, raising ground-level ozone concentrations and associated premature deaths, acute cases of bronchitis, heart attacks, asthma attacks, and other respiratory illnesses.[44] In addition, "[l]arge areas of the country are at serious risk of reduced water supplies, increased water pollution, and increased occurrence of extreme events such as floods and droughts."[45] Coastal areas face rising sea levels and more intense and damaging coastal storms and storm surges.[46] In short, "[o]ver the 21st century, climate change will fundamentally rearrange U.S. ecosystems."[47] As with most environmental risks, these harms will disproportionately burden children, the elderly, and the poor.[48]

Carbon dioxide emissions constitute the largest fraction of total greenhouse gas emissions in the U.S.[49] Fossil-fuel fired power plants are the largest sources of these CO_2 emissions.[50] Thus,

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[40] 74 Fed. Reg. at 66,523.
[41] *Id*.
[42] Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,393, 22,402 (Apr. 13, 2012).
[43] *Id*.
[44] *Id*.
[45] *Id*.
[46] *Id.*
[47] *Id*.
[48] 74 Fed. Reg. 66,526.
[49] 77 Fed. Reg. at 22,403.
[50] *Id*.

fossil-fuel fired power plants, like PAF, "are by far the largest emitters of GHGs, primarily in the form of CO_2, among stationary sources in the U.S."[51] From 1995-2012, the Paradise plant has emitted more than 303 million tons of CO_2.[52]

Retiring PAF Units 1 and 2 would correspondingly reduce or eliminate the plant's future CO_2 emissions; a fact TVA recognizes in its Draft EA.[53] Should TVA move forward with Alternative B, TVA's would continue to add to the global CO_2 burden, with severe consequences for the human environment, precisely at the time TVA should take steps to reduce its climate change footprint. Continuing operation of Units 1 and 2 as coal-fired units would also expose TVA to further emission reduction investment risk when upcoming GHG emissions regulations come into effect.[54]

The World Meteorological Organization recently determined that "the amount of greenhouse gases in the atmosphere reached a new record high in 2011."[55] A recent report by the World Bank concludes that, unless current greenhouse gas emission trends are sharply reversed, we will experience "unprecedented heat waves, severe drought, and major floods in many regions, with serious impacts on human systems, ecosystems, and associated services."[56]

Whereas swift and decisive action to slash CO_2 emissions is imperative to avert or, increasingly more likely, mitigate severe ecological, sociological, and economic impacts from climate change, TVA's proposed action would do just the opposite by adding millions of tons more CO_2 into the air. And because CO_2 is one of the longest lived greenhouse gases, persisting in the atmosphere for decades or centuries, the additional CO_2 emissions from Gallatin will continue to contribute to adverse climate change effects for decades or centuries to come.[57]

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[51] *Id*.
[52] Taken from TVA emissions data for the Paradise Fossil Plant, available at http://www.tva.com/environment/air/paradise.htm (last visited 9/4/13).
[53] Draft EA at 24, Table 2-1, Comparison of TVA's Selected Alternatives, Air Quality and Climate Change, Alternative C, "significant decreases in both total PAF greenhouse gas (GHG) emissions and GHG emission rate."
[54] Effect of GHG regulations on future operation of Units 1 and 2 as coal-fired units is discussed in more detail in Section VIII below.
[55] *See* World Metereorological Organization, Press Release No. 965 (Nov. 20, 2012), available at http://www.wmo.int/pages/mediacentre/press_releases/pr_965_en.html.
[56] World Bank Report, *Turn Down the Heat: Why a 4°C Warmer World Must Be Avoided*, at xiii-xiv (Nov. 2012), available at http://climatechange.worldbank.org/content/climate-change-report-warns-dramatically-warmer-world-century.
[57] 74 Fed. Reg. at 66,517.

As the Supreme Court has recognized, because climate change is necessarily a global problem, it can only be addressed by reducing or eliminating emissions from many individually relatively small sources. We must "whittle away" at the problem, meaning that each marginal source of emissions – and any decision to prolong the life of any one of those sources – is itself significant.[58] And Paradise is hardly "marginal." CEQ's Draft Guidance on climate change in NEPA analysis advises agencies that any decision that allows more than 25,000 tons of greenhouse gases to be emitted should be considered as likely significant.[59] From 2002 to 2011, annual direct CO2 emissions from PAF ranged from 13.63 – 16.35 million tons, with an average of 14.83 million tons per year during this period.[60] In 2012, PAF almost surpassed its own previous 16-year emissions record high, in 1996, by emitting a total of 16,369,417 million tons of CO_2.[61]

TVA acknowledges that retiring PAF Units 1 and 2 would reduce local and regional air emissions.[62] In fact, retiring these units would eliminate emissions of dozens of harmful air pollutants. Some of these air pollutants—such as fine particle pollution,[63] sulfur dioxide,[64] nitrogen oxides,[65] and mercury[66]—cause significant adverse health effects and environmental damage locally and regionally. Others—like acid rain[67] and carbon dioxide[68]—tend to disperse widely across the country and globally, contributing to widespread harm to people and the planet.

These air pollutants wreak both short-term and long-term damage. Pollutants like SO_2, fine particles, and nitrogen oxides (a critical precursor to ground-level ozone pollution) produce acute, localized health and environmental harms. Others, like highly toxic mercury and carbon dioxide,

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[58] *Massachusetts v. EPA*, 549 U.S.497, 524 (2007).
[59] CEQ, Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions at 3 (Feb. 18, 2010).
[60] Draft EA at 32.
[61] EPA Air Markets Program Data, CO_2 emission for PAF, 2012, available at http://ampd.epa.gov/ampd/.
[62] Draft EA at 24, Table 2-1. Comparison of TVA's Selected Alternatives, Air Quality and Climate Change, Alternative C, "Significant reduction in emissions of criteria pollutants compared to Alt A and B with benefits to regional air quality."
[63] *See, e.g.,* National Ambient Air Quality Standards for Particulate Matter, 77 Fed. Reg. 38,890, 38,906-38,911 (June 29, 2012).
[64] *See, e.g.*, Primary National Ambient Air Quality Standard for Sulfur Dioxide, 75 Fed. Reg. 35,551 (June 22, 2010).
[65] *See, e.g.,* National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436, 16, 439-16,449 (March 27, 2008).
[66] *See, e.g.,* Mercury and Air Toxics Standards, 77 Fed. Reg. 9,304 (Feb. 16, 2012); *see also* Gerald J. Keeler et al., *Sources of Mercury Wet Deposition in Eastern Ohio, USA*, 40 Envtl. Sci. & Tech. 5874, 5874 (Sept. 2006) (Steubenville Study). This study of mercury-deposition and source-apportionment from coal combustion in the Steubenville, Ohio area demonstrated that "[t]he dominant contributor to the mercury wet deposition was found . . . to be coal combustion (~70%)." *Id.*
[67] *See* CAA § 401, 42 U.S.C. § 7651.
[68] *See, e.g.,* EPA's Denial of the Petitions to Reconsider the Endangerment and Cause or Contribute Findings for Greenhouse Gases, 75 Fed. Reg. 49,556 (Aug. 13, 2010).

persist in the environment and cause harm to people and the environment for hundreds of years or more. Ground-level ozone, or smog pollution, from coal-fired power plants harms people's lungs and causes respiratory problems, including asthma.[69] Ozone is formed when nitrogen oxides react with volatile organic compounds in the presence of sunlight.[70] Coal-fired power plants emit both ozone precursor pollutants;[71] they are among the largest industrial sources of nitrogen oxides in the United States.[72] Across the nation, smog pollution contributes to hundreds of thousands of hospital admissions and lost days from work and school every year.[73] Young children, the elderly, and people who are active outdoors are especially vulnerable.[74]

In light of these significant impacts on air quality, climate change mitigation and public health, along with other reasons outlined both above and below, TVA must complete a full EIS in accordance with NEPA regulations.

B. TVA Must Prepare an EIS for the Proposed Action because Paradise is a "Major Power Generating Facility."

In addition to the CEQ regulations prescribing when an EIS is required, TVA's NEPA Procedures also provide that an EIS is normally required for a "major power generating facility."[75] There is no question that the proposed PAF project qualifies.

Pursuant to applicable Clean Air Act terms and definitions, the Paradise plant is a "major power generating facility" based on its physical design, operating parameters, and emissions profiles. The Paradise plant is comprised of three coal-fired units that generate electricity for sale.[76] Units 1 and 2 have a nameplate capacity of 704 MW each and Unit 3 has a nameplate capacity of 1150.2 MW.[77] In 2012, the Paradise plant emitted more than 16 million tons of CO_2,[78] 10,000 tons of NOx[79] and more than 28,000 tons of SO_2.[80]

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[69] *See, e.g.,* National Ambient Air Quality Standards for Ozone, 73 Fed. Reg. 16,436 (March 27, 2008).
[70] *Id*.
[71] *Id*.
[72] *Id*.
[73] *Id*.
[74] *Id*.
[75] TVA NEPA Procedures § 5.4.1(2).
[76] *Id*. at 3.
[77] *See* Draft EA at 2.
[78] *See* http://www.tva.com/environment/air/paradise.htm.

The Clean Air Act defines "the terms 'major stationary source' and 'major emitting facility' [to] mean any stationary facility or source of air pollutants which directly emits, or has the potential to emit, one hundred tons per year or more of any air pollutant."[81] The Paradise plant clearly meets this definition.

The prevention of significant deterioration and new source review provisions of the Act define "major emitting facility" to include "fossil-fuel fired steam electric plants of more than two hundred fifty million British thermal units per hour heat input" "which emit, or have the potential to emit, one hundred tons per year or more of any air pollutant."[82] PAF exceeds these thresholds many times over.

The hazardous air pollutant provisions of Clean Air Act §112 define an electric utility steam generating unit as "any fossil fuel fired combustion unit greater than 25 megawatts that serves a generator that produces electricity for sale."[83] And a "major source" of hazardous air pollutants is defined as any stationary source that "emits or has the potential to emit, considering controls, in the aggregate, 10 tons per year of any hazardous air pollutant or 25 tons per year of any combination of hazardous air pollutants."[84] There is no question that the Paradise plant is a major source of hazardous air pollutants, as the subject of the Draft EA is to evaluate whether to install pollution controls to bring Paradise Units 1 and 2 into compliance with the MATS rule that applies to such major sources.

It is equally clear that Paradise is a major air pollution source that is subject to the operating permit requirements of Title V of the Clean Air Act.[85] Based on its size, operations, and emissions of regulated air pollutants, the Paradise power plant is a major source under multiple Clean Air Act programs and definitions. TVA's proposal to install pollution controls necessary to continue operating the plant, thus, is a decision to operate a major power generating facility. Under TVA's NEPA Procedures, this decision requires preparation of an EIS.

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[79] *Id.*
[80] *Id.*
[81] CAA § 302(j), 42 U.S.C. § 7602(j).
[82] CAA § 169(1), 42 U.S.C. § 7479(1).
[83] CAA § 112(a)(8), 42 U.S.C. § 7412(a)(8).
[84] CAA § 112(a)(1), 42 U.S.C. § 7412(a)(1).
[85] *See* CAA § 501(2), 42 U.S.C. 7661(2) (defining "major source" to include all major sources under CAA § 112, as defined in CAA § 302, and as defined in Part D of subchapter I (addressing nonattainment areas)).

IV. The Draft EA fails to meet TVA's NEPA obligations to rigorously explore and objectively evaluate a reasonable range of alternatives to the proposed action.

TVA is faced with an important question – whether to retrofit and extend the life of Paradise Units 1 and/or 2, or to retire and replace one or both of those units. The draft EA, unfortunately, presents this as a binary choice between either retrofitting both units or replacing both units with a newly-constructed 1,000MW natural gas plant. In doing so, the Draft EA fails to consider, or cursorily dismisses, numerous reasonable alternatives that could reduce environmental impacts and could save ratepayers money. Such alternatives include, without limitation, purchasing existing energy resources, market purchases, energy efficiency, renewable energy resources, and/or transmission grid additions and updates, either alone or in combination. In addition to failing to adequately evaluate these alternatives as means for fully replacing both Paradise Units 1 and 2, the Draft EA fails to consider whether these alternatives could enable Paradise Units 1 and 2 to be replaced with a natural gas plant that is significantly smaller than 1,000MW. Finally, even if TVA were able to demonstrate that retiring both Paradise Units 1 and 2 were unreasonable, the Draft EA should evaluate whether one, rather than both, of Paradise Units 1 and 2, should be retired. The law and reasonable and prudent utility planning standards require a rigorous and objective evaluation of such a range of alternatives for reducing or avoiding the significant environmental impacts that would result from retrofitting and extending the life of Paradise Units 1 and 2, and presentation of that evaluation for public review and comment.

A. NEPA Requires TVA to Rigorously Explore and Objectively Evaluate All Reasonable Alternatives to the Retrofitting of Paradise Units 1 and 2.

The purpose of the NEPA process is "to provide full and fair discussion of significant environmental impacts and to inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[86] As such, the core duty under NEPA is for an agency to "[r]igorously explore and objectively evaluate all reasonable alternatives" to a proposed action.[87] This required alternatives analysis "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply

[86] *Natural Res. Def. Council, Inc. v. Fed. Aviation Admin.*, 564 F.3d 549, 556 (2d Cir. 2009) (internal quotation marks and alteration omitted)
[87] 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1502.14(a).

defining the issues and providing a clear basis for choice among the options by the decisionmaker and the public."[88] Such analysis constitutes the "heart" or "linchpin" of the NEPA analysis,[89] and helps to:

> ensure[s] that each agency decision maker has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit analysis. Only in that fashion is it likely that the most intelligent, optimally beneficial decision will ultimately be made.[90]

Courts have recognized that "[n]o decision is more important than delimiting what these 'reasonable alternatives' are,"[91] and have made clear that a wide net should be cast in identifying and exploring such alternatives. For example, the alternatives analysis must include a consideration not only of individual actions, but also of a combination of actions that could satisfy the purpose and need of the project.[92] In addition, "reasonable alternatives" should include feasible options even if they are "not within the jurisdiction of the lead agency."[93] And in order to ensure that the alternatives analysis is not hampered by a rigid concept of what is needed at the outset of the NEPA process, agencies must consider alternatives that meet only part of the stated purpose of the proposed action.[94] When an agency suggests that an otherwise achievable alternative is not "feasible" or "prudent," the agency must back up that assertion with specifics such as "cost studies, cost/benefit analyses, or other barriers that warrant a conclusion that [the proposed] alternatives are unreasonable, standing alone or in conjunction with other alternatives."[95]

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[88] 40 C.F.R. § 1502.14.
[89] 40 C.F.R. § 1502.14; *Monroe Cty. Conservation Council*, 472 F.2d 693, 697-98 (2d. Cir 1972).
[90] *Calvert Cliffs' Coordinating Comm., Inc. v. Atomic Energy Comm'n*, 449 F.2d 1109, 1114 (D.C. Cir. 1971).
[91] *Simmons v. U.S. Army Corps of Engineers,* 120 F.3d 664, 666 (7th Cir. 1997).
[92] *Davis v. Mineta*, 302 F.3d 1104, 1121-22 (10th Cir. 2002) (finding that agency's failure to evaluate a combination of alternatives "represents one of the most egregious shortfalls in the EA")
[93] 40 C.F.R. § 1502.14(c); *see also* 46 Fed. Reg. 18,026, 18,027 (March 23, 1981) ("An alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable.").
[94] *North Buckhead Civic Ass'n v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990) ("A discussion of alternatives that would only partly meet the goals of the project may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact."); *Natural Resources Defense Council v. Morton*, 458 F.2d 827, 836 (D.C. Cir. 1972) ("[It is not] appropriate . . . to disregard alternatives merely because they do not offer a complete solution to the problem.").
[95] *Davis*, 302 F.3d at 1122.

B. The Purpose and Need Identified in the Draft EA Skews the Analysis Against Alternatives that Involve Retiring and Replacing Paradise Units 1 and 2

The range of "reasonable alternatives" that an agency must consider depends largely on the purpose of the project. "The broader the purpose, the wider the range of alternatives; and vice versa."[96] As such, it is essential that an agency does not define the purpose and need of a project so narrowly as to preclude consideration of viable alternatives. Courts have repeatedly made clear that they will guard vigilantly against agency attempts to "contrive" purposes in such a way as "to define competing 'reasonable alternatives' out of consideration (and even out of existence)."[97] Courts will not tolerate agency efforts to constrict the definition of the project's purpose, and thereby exclude what truly are reasonable alternatives, which frustrates Congressional will and violates NEPA.[98]

The stated purpose set forth in the Draft EA is "to comply with MATS while maintaining reliable generating capacity in the PAF service territory" in order to maintain "an adequate and reliable power supply to the north-central portion of TVA's service area."[99] Read broadly, this purpose allows for a wide range of alternatives, including pursuit of energy efficiency, demand response, renewable resources, transmission grid upgrades, and purchase of existing resources. Unfortunately, the Draft EA sets forth additional project goals that could improperly skew the analysis in favor of retrofitting, rather than retiring, Paradise Units 1 and 2.

For example, the Draft EA identifies "maximizing the use of existing TVA facilities" as an "additional goal of TVA's proposed action."[100] Such a stated goal, however, could plainly bias the analysis in favor of retrofitting and extending the life of Paradise Units 1 and 2 rather than pursuing newer, cleaner energy resources. And in an energy reality where coal-fired power generation is increasingly uneconomic compared to newer and cleaner energy resources, maximizing the use of existing TVA facilities, which are primarily aging coal units, is often not reasonable or in the best interests of TVA or its ratepayers. In fact, utilities throughout the country are finding that it is more reasonable to retire or reduce the use of many of their existing coal units. To date, more than 50,000MW of coal units have been retired or announced for retirement, and coal generation as a

[96] *Simmons,* 120 F.3d at 666.
[97] *Id.*
[98] *Id.*
[99] TVA, Draft EA, "Chapter 1.2 – Purpose and Need."
[100] Draft EA at p. 1.

proportion of total electric generation in the US has fallen significantly over the past few years. It is simply unreasonable for TVA to set a goal that runs directly against this increasing economic trend and that could thwart the objective evaluation of a full range of alternatives required under the law.

The Draft EA also potentially skews the analysis in favor of retrofitting Paradise Units 1 and 2 by setting forth as a goal "minimizing construction of new transmission system components and upgrades of existing transmission system components."[101] Such a goal is improper because transmission system additions or upgrades could enable TVA to retire Paradise Units 1 and/or 2 and continue providing reliable service even without building new generation to replace those units. For example, the U.S. Energy Information Administration ("EIA") recently noted that 1,400MWs of existing capacity in the American Transmission System Inc. ("ATSI") zone in northern Ohio was retired in 2012 without the need for replacement generation due to upgrades to the transmission system.[102] As the EIA explained, "electric systems can ensure a reliable supply of electricity by building new power plants, but . . . it may be more cost-effective to upgrade the transmission system to improve the flow of power between regions."[103] TVA should not foreclose an evaluation of a similar transmission approach here by setting forth an unreasonable project goal that excludes such an approach.

C. The Draft EA Fails to Evaluate What Level of Additional Energy and Capacity Would be Needed If Paradise Units 1 and/or 2 Were to Retire

A significant shortcoming of TVA's discussion of alternatives in the Draft EA is the agency's failure to identify what level of energy and capacity would be needed if Paradise Units 1 and/or 2 were to be retired. Those two units have a combined capacity of approximately 1,400MW, which the Draft EA proposes replacing with the construction of 1,000MW of new natural gas combined cycle and combustion turbine capacity. TVA, however, has not explained how it selected 1,000MW, as opposed to some other figure, as the size of the natural gas plant in Alternative C, or whether an alternative involving a smaller amount of new energy generation could be adequate to replace Paradise Units 1 and 2. The evaluation of the level of energy and capacity needed if Paradise Units 1 and 2 were to be retired is critical, however, as it can help determine the environmental impacts,

[101] Draft EA at p. 1.
[102] U.S. EIA, Transmission upgrades compensate for coal-fired retirements in Ohio electric region (Sept. 3, 2013), *available at* http://www.eia.gov/todayinenergy/detail.cfm?id=12791.
[103] *Id*.

feasibility, and cost of various alternative energy options for replacing those units.

This omission is especially problematic given that TVA has been experiencing far lower energy demand than it expected. For example, in the agency's 2011 IRP, TVA projected that total energy demand would be approximately 180,000MWhs in 2013 and more than 190,000MWhs by 2020.[104] Yet in a recent board meeting, TVA reported that its fiscal year 2013 energy demand was expected to be around 165,000MWhs and that such demand is projected to remain below 180,000MWhs through at least fiscal year 2024.[105] Similarly, the 2011 IRP projected peak energy demand of approximately 32,500MW in 2013 increasing to nearly 40,000MW by 2024.[106] But at the most recent board meeting, TVA reported that peak demand was expected to be around 30,000MW in fiscal year 2013 and to increase to 32,500MW by fiscal year 2024.[107] Just a few weeks ago, TVA announced that it was increasing customers' rates to make up for declining energy sales.[108] And TVA recently lost its largest customer when the USEC facility in Paducah, Kentucky closed its operations,[109] resulting in a loss of 8,200 GWhs of energy demand per year and a 4.6% decline in projected energy sales in fiscal year 2014 compared to fiscal year 2013.[110] Such a decline in peak demand and energy sales suggests that TVA may not need to replace all of the capacity and energy produced by Paradise Units 1 and 2 even if both those units were retired. At a minimum, TVA must evaluate, especially in light of the USEC closure, the level of energy and capacity needed if Paradise Units 1 and 2 were to be retired, and present such evaluation for public review and comment.

With regards to the level of energy and capacity needed if TVA were to not retrofit Paradise Units 1 and 2, the Draft EA is also deficient because it fails to evaluate the alternative of retrofitting one of those units while retiring the other. Such an approach would, presumably, enable TVA to pursue a significantly smaller amount of replacement energy and capacity. In addition, while TVA contends that significant transmission grid additions and upgrades would be needed if both Paradise

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[104] TVA 2011 IRP at p. 69.
[105] TVA Board Meeting – Fiscal Year 2014 Financial Plan – Finance, Rates, and Portfolio Committee (Aug. 22, 2013), at p. 46, *available at http://www.tva.gov/abouttva/board/pdf/aug-22-2013_public_board.pdf* (hereinafter "TVA Board Meeting").
[106] 2011 TVA IRP at p. 68.
[107] TVA Board Meeting at p. 45.
[108] Dave Flessner, TVA Rates Rise As Power Sales Decline in the Tennessee Valley, Chattanooga Times Free Press (Aug. 23, 2012), *available at http://timesfreepress.com/news/2013/aug/23/tva-rates-rise-power-sales-decline/.*
[109] Dave Flessner, TVA Suffers Blow, Loses Biggest Customer, Chattanooga Times Free Press (May 31, 2013), *available at http://www.timesfreepress.com/news/2013/may/31/tva-suffers-blow-loses-biggest-customer/*
[110] TVA Board Meeting at p. 50.

Units 1 and 2 were retired,[111] no analysis is provided as to whether one of those units could be retired with no or substantially less transmission grid additions and upgrades, especially with the closure of the USEC facility in Kentucky. TVA must provide an evaluation of the alternative of retiring only one Paradise Units 1 or 2, and subject such evaluation to public review and comment.

D. The Draft EA's Summary Dismissal of Other Energy Alternatives is Unreasonable and Unsupported.

Another major inadequacy in the Draft EA is TVA's failure to rigorously explore and objectively evaluate a full range of alternatives to retrofitting Paradise Units 1 and/or 2. Such alternatives that should have been evaluated, both individually and in combination, as options for replacing both or one of those units include purchasing existing under-utilized generation, market purchases, demand side management, increased renewable energy, and transmission grid additions or upgrades. While it is TVA's duty to fully explore alternatives to a proposed action, Commenters offer the following information regarding such options.

1. The Draft EA fails to evaluate obtaining energy from existing sources.

One obvious potential alternative to the retrofitting of Paradise Units 1 and 2 is for TVA to purchase one or more existing generating units and/or the energy and capacity from such units. For example, Big Rivers Electric Corporation is looking to sell its Wilson and Coleman power plants, or the energy generated by those plants.[112] Those plants are located within 15 and 60 miles, respectively, from Paradise Units 1 and 2, and each is seeking to install only activated carbon injection and dry sorbent injection, rather than the more capital-intensive pulse-jet fabric filters that are needed to bring Paradise Units 1 and 2 into compliance with the MATS rule. In addition to evaluating the purchase of the Wilson and/or Coleman plants in order to retire Paradise Units 1 and 2, TVA should also assess whether there are existing under-utilized natural gas plants to replace those units and consider the option of market purchases for replacing some or all of the energy and capacity provided by those units. By failing to evaluate any such existing energy resources as alternatives allowing for the retirement of Paradise Units 1 and 2, the Draft EA is deficient.

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[111] Draft EA at p. 23.
[112] Bob Matyi, Big Rivers Looking to Sell Two Kentucky Coal Plants, Platts (June 25, 2013), *available at* *http://www.platts.com/latest-news/coal/LouisvilleKentucky/Big-Rivers-looking-to-sell-two-Kentucky-coal-21206797*.

2. The Draft EA Fails to Justify Excluding Transmission Upgrade Alternatives

The Draft EA contends that TVA evaluated transmission grid upgrades as an alternative to retrofitting Paradise Units 1 and 2, but dismissed them because of the "time required for siting and construction."[113] The Draft EA contends that the retirement of Paradise Units 1 and 2 would cause "voltage and equipment overloading problems" that would require a new, lengthy 500-kV transmission, upgrades to other 161-kV lines, and construction of a new 500-kV substation that, combined, would take six to eight years to complete.[114] These claims, however, provide an inadequate basis for rejecting transmission upgrade alternatives for at least three reasons.

First, TVA has not provided any study or report supporting the claims regarding the transmission reliability impacts that would purportedly occur if Paradise Units 1 or 2 were retired, or documenting the transmission additions or upgrades identified as necessary in the Draft EA. Without such study or report, however, there is no way for the public to evaluate or verify the accuracy of these claims. Second, the Draft EA provides no evidence that TVA considered other options for addressing reliability impacts, such as implementing demand response programs and/or converting one or both of Paradise Units 1 or 2 into synchronous condensers. Third, TVA should evaluate whether one of the two units could be retired with significantly lower transmission reliability impacts and upgrade needs.

3. The Draft EA Unreasonably Dismissed Energy Efficiency as Part of an Alternative to Retrofitting Paradise Unit 1 and/or 2.

The Draft EA dismisses energy efficiency as an alternative to retrofitting Paradise Units 1 and 2 by referencing TVA's 2011 IRP TVA and then contending that it cannot "be assured that the energy savings from these programs in the southwestern Kentucky area would be sufficient and reliable to meet regional generation needs" and that "the results of such programs are not a resource equivalent to the energy that would be generated under Alternative B or C."[115] But this cursory dismissal of energy efficiency fails for at least two reasons. First, the argument that energy efficiency alone cannot replace the energy that would be produced by Paradise Units 1 and 2 or by the natural gas plant included in Alternative C ignores the fact that alternatives should be considered in

[113] Draft EA at p. 23.
[114] *Id*.
[115] *Id*.

combination.[116] Even if TVA could not achieve significant enough savings from energy efficiency programs to fully replace Paradise Units 1 and 2, additional energy efficiency efforts could reduce the amount of energy and capacity that TVA would need to obtain from other sources to replace those units.

The second flaw in TVA's cursory dismissal of energy efficiency is that the Draft EA relies on TVA's 2011 IRP, which significantly underestimates the amount of energy savings that is cost effectively achievable through energy efficiency programs. In particular, the General Accountability Office ("GAO") has determined that TVA has systematically failed to analyze energy efficiency as an alternative in its planning processes, and has undervalued the role of energy efficiency as such an alternative.[117] The GAO explained that "TVA cannot be sure that its current resource plans reflect the full scope and possible extent of energy efficiency programs or that the plans are realistic."[118] One consequence of this flawed process, the GAO concluded, was that TVA has tended to unduly favor capital assets in its planning process, to the inappropriate exclusion of demand side resources.[119] The IRP and associated EIS were issued without important data regarding TVA's energy efficiency potential. The GAO identified this data gap as a problem with the IRP process, and recommended that TVA build the results of a third-party energy efficiency study into its future decision making.[120]

On December 21, 2011, Global Energy Partners (GEP) released a study, commissioned by TVA, of TVA's energy efficiency potential. The GEP Study revealed that TVA's potential energy efficiency savings could be as high as 5 percent by 2015, and 19.8 percent by 2030 – much higher than TVA's goal in the IRP of 3.5 percent by 2015.[121] The GEP Study also described recommended methods for achieving these energy efficiency targets.[122] TVA must fully and objectively these higher levels of energy efficiency potential as part of an alternative to retrofitting Paradise Units 1 and 2, and subject such evaluation to public review and comment.

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[116] *Davis*, 302 F.3d at 1121-22 (agency's failure to evaluate a combination of alternatives "represents one of the most egregious shortfalls in the EA").
[117] U.S. Government Accountability Office, Tennessee Valley Authority: Full Consideration of Energy Efficiency and Better Capital Expenditures Planning Are Needed (Oct. 2011), *available at* http://www.gao.gov/assets/590/586006.pdf (hereinafter "GAO Report").
[118] Id. at 2.
[119] Id. at 27-32.
[120] GAO Report at 2, 29 (concluding that "TVA cannot be sure that its current resource plans reflect the full scope and possible extent of energy efficiency programs or that the plans are realistic . . . [u]ntil this study is completed . . .").
[121] Global Energy Partners, Tennessee Valley Authority Potential Study (Dec. 21, 2011), at 20, *available at http://www.tva.gov/news/releases/energy_efficiency/Executive.pdf.*
[122] GEP Study at 24-25.

4. The Draft EA fails to evaluate renewable resources as part of an alternative to retrofitting Paradise Units 1 and/or 2

The Draft EA dismisses renewable resources as an alternative on the grounds that they would be too costly, are "non-dispatchable," and would be unable to replace the generation and capacity of Paradise Units 1 and 2. Such cursory dismissal, however, is flawed for at least two reasons. First, as with energy efficiency, the argument that renewable resources alone cannot replace the energy that would be produced by Paradise Units 1 and 2 or by the natural gas plant included in Alternative C ignores the fact that alternatives should be considered in combination.[123] Even if TVA could not install or obtain sufficient wind and solar energy to fully replace Paradise Units 1 and 2, such renewable resources could reduce the amount and the environmental impacts of the energy and capacity that TVA would need to obtain from other sources to replace those units.

Second, the Draft EA's treatment of renewable resources as too costly and incapable of producing significant amounts of energy ignores the significant advancements in wind energy technology and usage that has occurred over the past few years. These advancements are well-documented in a recent report from the U.S. Department of Energy ("DOE"), which provided an overview of wind energy technology and costs as of 2012. Specific findings of the DOE Report include that:

- 13.1GW of new wind energy capacity was installed in the US in 2012
- 43% of all new energy capacity in the US in 2012 was wind capacity
- Wind power produced more than 12% of energy generation in nine states in 2012
- Average wind power capacity factors in the Southeast were 23% in 2012
- Average levelized prices for long term wind energy power purchase agreements have falled to $40 per kWh in 2011-2012[124]

These facts all demonstrate that wind energy has advanced technologically and economically over the past few years. TVA must take into account such significant developments for the feasibility and price of wind power throughout the U.S. and submit a new analysis for public review and comment.

[123] *Davis*, 302 F.3d at 1121-22 (agency's failure to evaluate a combination of alternatives "represents one of the most egregious shortfalls in the EA").
[124] U.S. Dept. of Energy, 2012 Wind Technologies Market Report (Aug 2013), at iv to ix, *available at* http://www1.eere.energy.gov/wind/pdfs/2012_wind_technologies_market_report.pdf.

IV. TVA Must Provide the Public with Essential Information That Is Missing from the Draft EA.

A critical element of any NEPA process is providing opportunities for meaningful public participation, through which the public is able to assist the agency, through the process of public review and comment, in making better and more well-informed decisions.[125] In order for such meaningful public participation to be able to occur, however, critical analyses and information upon which a draft NEPA analysis is based must be available for public review and comment. Unfortunately, the Draft EA cites to a number of studies, analyses, or assumptions for which no supporting documentation has been provided. TVA must ensure that all relevant information, including but not limited to the following, is made available to the public for review and comment at the outset of the EIS process or before TVA prepares a revised Draft EA:

- The costs associated with retrofitting and extending the life of each of Paradise Units 1 and 2, and of the natural gas plant proposed in Alternative C. Such costs should include capital costs, ongoing operating, maintenance and fuel costs, and a net present value for retrofitting versus retiring each of Units 1 and 2.

- Design documents and other reports showing how TVA's proposed ash and scrubber waste landfills will be built, whether they will maintain structural integrity, the adequacy of the leak detection and prevention systems for those landfills, and related waste management questions (including, for instance, the current level and type of groundwater contamination associated with the ash ponds that the project will allow to continue to operate).

- The transmission system studies referenced in Section 2.3.3 of the Draft EA and any other studies evaluating the transmission grid reliability impacts of retiring Paradise Units 1 and/or 2 or of the transmission grid additions or upgrades purportedly needed to allow for such unit retirements.

[125] *DuBois v. U.S. Dep't of Agriculture*, 102 F.3d 1273, 1285-86 (1st Cir. 1996).

- Any studies or reports regarding the feasibility, availability, and/or cost of energy efficiency or renewable resources as part of an alternative to retrofitting and extending the life of Paradise Units 1 and/or 2.

VI. The Environmental Assessment Fails to Adequately Consider Direct, Indirect, and Cumulative Impacts.

A. The Environmental Assessment Fails to Adequately Analyze Climate Change Impacts

1. NEPA Requires a Thorough Evaluation of the Climate Change Impacts of Proposed Federal Actions.

Federal law requires a thorough evaluation of the comparative climate change impacts of the proposed retrofit of Paradise Units 1 and 2 versus the impacts of a reasonable range of lower-carbon alternatives. In particular, NEPA calls for a quantification of the "incremental impact[s] that [the proposed project's] emissions will have on climate change … in light of other past, present, and reasonably foreseeable actions."[126] This is true "regardless of what agency or person undertakes such other actions."[127] Even if a proposed project has an "individually minor" effect on the environment, this and other such actions are "collectively significant actions taking place over a period of time."[128]

As the Supreme Court has recognized, because climate change is necessarily a global problem, it can only be addressed by reducing or eliminating emissions from many individually relatively small sources. We must "whittle away" at the problem, meaning that each marginal source of emissions – and any decision to prolong the life of any one of those sources – is itself significant.[129] NEPA requires analysis of the "actual environmental effects resulting from those

[126] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1216 (9th Cir. 2008).
[127] *Id.*
[128] 40 C.F.R. § 1508.7; *see also Native Ecosystems Council,* 304 F.3d at 897 (holding that the Forest Service's road density standard amendments must be subject to cumulative impacts analysis because otherwise, "the Forest Service will be free to amend road density standards throughout the forest piecemeal, without ever having to evaluate the amendments' cumulative environmental impacts."); *City of Los Angeles v. NHTSA,* 912 F.2d 478, 501 (D.C.Cir.1990) (Wald, C.J., dissenting) ("[W]e cannot afford to ignore even modest contributions to global warming. If global warming is the result of the cumulative contributions of myriad sources, any one modest in itself, is there not a danger of losing the forest by closing our eyes to the felling of the individual trees?"), *overruled on other grounds by Fla. Audubon Soc. v. Bentsen,* 94 F.3d 658 (D.C.Cir.1996).
[129] *Massachusetts v. EPA*, 549 U.S.497, 524 (2007).

emissions,"[130] as "climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct."[131]

Accordingly, the Environmental Assessment must quantify and evaluate the cumulative and incremental effects of climate change resulting from the proposed project and connected actions in comparison to and in conjunction with the effects of emissions of other reasonable alternatives or actions – past, present and reasonably foreseeable. Following is a discussion of some of those impacts, which helps demonstrate why TVA should select an alternative that reduces or eliminates the approximately 9.5 million tons of CO that Paradise Units 1 and 2 would continue emitting every year if they were retrofit rather than retired.

2. Climate Science Overview

Climate change from the anthropogenic emissions of climate pollutants poses a number of significant threats to Earth's inhabitants, which include: losses to the cryosphere (areas of the Earth's surface that are frozen or covered with snow or ice); rapid sea level rise; more extreme weather events; imperiled biodiversity; harms to the oceans; injury to human health and reduced food security. Current atmospheric concentrations of greenhouse gases are already resulting in severe and significant climate change impacts that are projected to worsen as emissions rise.[132] The U.S. Environmental Protection Agency has found that climate change endangers the health and welfare of this and future generations.[133] We are fast approaching a global "state-shift" that could result in unanticipated and rapid changes to Earth's biological systems.[134]

The most direct impact of accumulated climate pollutants is global warming – an increase in global atmospheric temperatures. The atmospheric concentration of CO_2 reached ~392 parts per

[130] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1216 (9th Cir. 2008)
[131] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 508 F.3d 508, 550 (9th Cir. 2007)); *Mid States Coalition for Progress v. Surface Transportation Board*, 345 F.3d 508 (9th Cir. 2008); *Border Power Plant Working Group v. DOE*, 260 F.Supp 2d 997 (S.D. Cal. 2003).
[132] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).
[133] U.S. Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule, 74 Federal Register 66496 (2009).
[134] A.D. Barnosky et al., *Approaching a state shift in Earth's biosphere*, 486 NATURE 52 (2012).

million (ppm) in 2011[135] compared to the pre-industrial concentration of ~280 ppm. The current CO_2 concentration has not been exceeded during the past 800,000 years and likely not during the past 15 to 20 million years.[136] The growth rate of carbon dioxide emissions has largely tracked or exceeded the most fossil-fuel intensive emissions scenario projected by the IPCC (A1FI).[137] The result is that the decade from 2000 to 2010 was the warmest on record,[138] and 2005 and 2010 tied for the hottest years on record.[139] By the end of this century, the average temperature in the United States is expected to increase by 2.2 to 3.6°C (4 to 6.5°F) under a lower emissions scenario and by 3.9 to 6.1°C (7 to 11°F) under a higher emissions scenario.[140]

Such extensive global warming is decimating the cyrosphere. Arctic summer sea ice extent and thickness have decreased to about half of what they were several decades ago,[141] with an accompanying drastic reduction in volume,[142] which is severely jeopardizing ice-dependent animals.[143] In fact, the Arctic is now predicted to be ice free in the summer as early as 2020 based on extrapolation of trends in sea ice extent.[144] Ice sheets in Greenland and the Antarctic are also vulnerable to significant melting in a warmer world. Greenland has been experiencing accelerated ice

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[135] *See* National Oceanic and Atmospheric Administration, *Trends in Atmospheric Carbon Dioxide*, *www.esrl.noaa.gov/gmd/ccgg/trends/global.html.*

[136] Kenneth L. Denman et al., *Couplings Between Changes in the Climate System and Biogeochemistry, in* Climate Change 2007: The Physical Science Basis - Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 500 (Susan Solomon et al., eds. 2007); Aradhna K. Tripati et al., *Coupling of CO2 and ice sheet stability over major climate transitions of the last 20 million years*, 326 SCIENCE 1394 (2009).

[137] Michael R. Raupach et al., *Global and Regional Drivers of Accelerating CO_2 Emissions*, 104 PROC. OF THE NATL. ACAD. OF SCIENCES OF THE U.S. 10288 (2007). McMullen & J. Jabbour, UNEP, CLIMATE CHANGE SCIENCE COMPENDIUM 2009 (2009); Katherine Richardson et al., SYNTHESIS REPORT FROM CLIMATE CHANGE: GLOBAL RISKS, CHALLENGES AND DECISIONS (Copenhagen March 10-12, 2009), *available at climatecongresss.ku.dk*; Global Carbon Project, Carbon Budget 2009 (2010); Global Carbon Project, Carbon Budget 2010 (2011).

[138] Press Release, National Aeronautic Space Association, *NASA Research Finds Last Decade was Warmest on Record, 2009 One of the Warmest Years* (Jan. 21, 2010), *www.nasa.gov/home/hqnews/2010/jan/HQ_10-017_Warmest_temps.html.*

[139] National Oceanic and Atmospheric Administration, *NOAA: 2010 Tied for Warmest Year on Record, www.noaanews.noaa.gov/stories2011/20110112_globalstats.html.*

[140] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).

[141] J. Stroeve et al., *Arctic Sea Ice Extent Plummets in 2007*, 89 EOS 2 (January 8, 2008); R. Kwok and D.A. Rothrock, *Decline in Arctic sea ice thickness from submarine and ICESat records: 1958-2008*, 36 GEOPHYS. RES. LETT. L15501 (2009).

[142] Polar Science Center, *Arctic Sea Ice Volume Anomaly, version 2*, *http://psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/.*

[143] Center for Biological Diversity and Care for the Wild International, EXTINCTION: IT'S NOT JUST FOR POLAR BEARS (2010).

[144] J.E. Overland and M. Wang, *When will the summer Arctic be nearly sea ice free*?, GEOPHYS. RES. LETT. Pre-Publication copy doi: 10.1002/grl.50316 (Feb. 21, 2013).

loss, with recent studies finding that minimal temperature increases could result in complete loss[145] and that northern portions of Greenland's ice sheet may be more vulnerable than previously believed.[146] Like ice, the consensus is that, as a whole, the Earth's glaciers are exhibiting rapid recession.[147] For example, the number of glaciers at Glacier National Park has dropped from 150 to 26 since 1850, with some projections suggesting that if current trends in the rate of melting continue, the remaining glaciers will be gone in the next 25 to 30 years.[148] Glaciers and seasonal snowpack are important freshwater reservoirs; early and increased rates of melting jeopardize water availability in many regions.[149]

These losses to the cryosphere have already resulted in a rise in sea level, and are projected to result in further, substantial increases in sea level. Global average sea level rose by roughly eight inches (20 centimeters) over the past century, and sea level rise is accelerating in pace.[150] Recent studies documenting the accelerating ice discharge from ice sheets indicate that the IPCC projections are a substantial underestimate.[151] Studies that have improved upon the IPCC estimates have found that a mean global sea-level rise of at least 1 to 2 meters is highly likely within this century,[152] and larger rates of 2.4 to 4 meters per century are possible.[153] More than half (52%) of U.S. residents live

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[145] A. Robinson, et al., *Multistability and critical thresholds of the Greenland ice sheet,* 2 NATURE CLIMATE CHANGE 429 (2012).
[146] A. Born and K.H. Nisancioglu, *Melting of Northern Greenland during the last interglaciation*, 6 THE CRYOSPHERE,1239 doi:10.5194/tc-6-1239-2012 (2012).
[147] P. Lemke et al., *Chapter 4, Observations: Changes in Snow, Ice and Frozen Ground in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 356 (S. Solomon et al. eds., Cambridge Univ. Press 2007).
[148] GOVERNMENT ACCOUNTABILITY OFFICE, CLIMATE CHANGE: AGENCIES SHOULD DEVELOP GUIDANCE FOR ADDRESSING THE EFFECTS ON FEDERAL LAND AND WATER RESOURCES 18 (Aug. 2007), *available at*: *http://www.gao.gov/news.items/d07863.pdf.*
[149] See, e.g., C. Bonfils et al., *Detection and Attribution of Temperature Changes in the Mountainous Western United States*, 21 JOURNAL OF CLIMATE 6404 (2008); J.C. Adam et al*., Implications of global climate change for snowmelt hydrology in the twenty-first century*, 23 HYDROL. PROCESS. 962 (2009).
[150] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).
[151] James Hansen et al., *Target atmospheric CO_2: Where should humanity aim*? 2 OPEN ATMOSPHERIC SCIENCE JOURNAL 217 (2008); Harnish D Pritchard et al., *Extensive Dynamic Thinning on the margins of the Greenland and Antarctic ice sheets*, 461 NATURE 971 (2009); E. Rignot et al., *Acceleration of the contribution of the Greenland and Antarctic ice sheets to sea level rise*, 38 GEOPHYS. RES. LETT. L05503 (2011).
[152] S. Rahmstorf et al., *Recent climate observations compared to projections*, 316 SCIENCE 709 (2007); W.T. Pfeffer et al., *Kinematic Constraints on glacier contributions to 21st century sea-level rise*, 321 SCIENCE 1340 (2008); Martin Vermeer & Stefan Rahmstorf, *Global sea level linked to global temperature*, 106 PROC. NATL. ACAD. OF SCIENCES 21527 (2009); Aslak Grinsted et al., *Reconstructing sea level from paleo and projected temperatures 200 to 2100 AD*, 34 CLIMATE DYNAMICS 461 (2010). Jevrejeva et al., *How will sea level respond to changes in natural and anthropogenic forcings by 2100?,* 37 GEOPHYS. RES. LETT. L07703 (2010),
[153] Glenn A. Milne et al., *Identifying the causes of sea-level change,* 2 NATURE GEOSCIENCE 471 (2009).

in coastal counties,[154] while an estimated 40% of U.S. endangered species inhabit coastal ecosystems,[155] highlighting the threats of sea-level rise to coastal communities. A nation-wide study estimated that approximately 3.7 million Americans live within one meter of high tide and are at extreme risk of flooding from sea-level rise in the next few decades.[156]

Extreme weather events are striking with increasing frequency, most notably heat waves and rainfall extremes such as droughts and floods,[157] with deadly consequences for people and wildlife. In the United States in 2011 alone, a record 14 weather and climate disasters occurred, including droughts, heat waves, and floods that cost at least US $1 billion each in damages and loss of human lives.[158] There were 11 such events in 2012, with the total cost exceeding that in 2011 due primarily to tropical storm Sandy and the year-long drought.[159] Several studies predict that climate change will increase the frequency of high-severity hurricanes in the Atlantic,[160] which would increase the economic damages by $25 billion by 2100 in the United States.[161] Furthermore, Arctic amplification – enhanced global warming at high latitudes – has been associated with increased incidence of drought, flooding, heat waves and cold spells at mid-latitudes.[162]

The oceans have already suffered as a result of greenhouse gas emissions and face a bleak future under "business as usual" emissions scenarios. Ocean warming and acidification are two major

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[154] Natl Ocean and Atmospheric Admin, *State of the Coast,* http://stateofthecoast.noaa.gov/population/ welcome.html.
[155] O.E. LeDee et al., *The challenge of threatened and endangered species management in coastal areas*, 38 COASTAL MANAGEMENT 337 (2010).
[156] B.H. Strauss et al., *Tidally Adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States*, 7 ENVIRON. RES. LETT. 014033 (2012).
[157] Intergovernmental Panel on Climate Change (IPCC), Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) (2012*), http://ipcc-wg2.gov/SREX/*; U.S. Global Change Research Program, Global Climate Change Impacts in the US: Global Climate Change (2009); Dim Coumou & Stefan Rahmstorf, *A Decade of Weather Extremes,* 2 NATURE CLIMATE CHANGE 491 (2012).
[158] National Oceanic and Atmospheric Administration, *Extreme Weather 2011, http://www.noaa.gov/extreme2011/*; World Meteorological Organization*, Press Release - 2011: World's 10th Warmest Year, Warmest Year with La Niňa on Record, Second-lowest Arctic Sea Ice Extent* (2012), *www.wmo.int/pages/mediacentre/press_releases/gcs_2011_en.html.*
[159] National Oceanic and Atmospheric Administration, *Preliminary Info on 2012 U.S. Billion-Dollar Extreme Weather/Climate Events*, *http://www.ncdc.noaa.gov/news/preliminary-info-2012-us-billion-dollar-extreme-weatherclimate-events.*
[160] James B. Elsner et al., *The Increasing Intensity of the Strongest Tropical Cyclones*, 455 NATURE 92 (2008); Morris A. Bender et al., *Modeled Impact of Anthropogenic Warming on the Frequency of Intense Atlantic Hurricanes*, 327 SCIENCE 454 (2010); C.M. Kishtawal et al., *Tropical Cyclone Intensification Trends During Satellite Era (1986–2010),* 39 GEOPHYS. RES. LETT. L10810 (2012).
[161] Robert K. Mendelsohn et al., *The Impact of Climate Change on Global Tropical Cyclone Damage*, 2 NATURE CLIMATE CHANGE 205 (2012).
[162] J.A. Francis and S.J. Vavrus, *Evidence linking Arctic amplification to extreme weather in mid-latitudes*, 39 GEOPHYS. RES. LETT. L06801, doi:10.1029/2012GL051000 (2012).

climate threats. Through thermal exchange, atmospheric heating affects ocean temperatures, which have been on a continual rise in recent decades. Aside from increasing the severity of storms, this rise in temperature harms ocean ecosystems with effects such as more frequent and extreme coral bleaching events.[163] Oceans have also become over 30% more acidic due to the absorption of carbon dioxide from the atmosphere, with ocean pH predicted to plummet further.[164] Ocean acidification impairs the ability of corals, crabs, abalone, oysters, sea urchins, and other animals to make shells and skeletons.[165] Many species of phytoplankton and zooplankton, which form the basis of the marine food web, also build thick shells that are vulnerable to ocean acidification. Ocean acidification increases the toxicity of harmful algal blooms, or red tides, which are known to kill fish, marine mammals, and even cause paralytic shellfish poisoning in humans. Many of these effects are already occurring, with predictions that under current emissions trajectories coral and coral-dependent species will be unable to survive by the end of the century, if not before.[166]

Climate change is already having significant impacts on species and ecosystems in all regions of the world, including changes in distribution, phenology, physiology, demographic rates, genetics and ecosystem services, as animals and plants lose their habitats and food sources, struggle to move poleward and upward to keep pace with climate change, and shift their timing of breeding and migration.[167] Climate-vulnerable animals and plants including Arctic sea-ice dependent species (e.g. polar bears, ringed seal), high-elevation species, amphibians, and corals are already experiencing

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[163] See, e.g., O. Hoegh-Guldberg et al., *Coral reefs under rapid climate change and ocean acidification*, 318 SCIENCE 1737 (2007).

[164] K. Caldeira and M.E. Wickett*, Ocean model predictions of chemistry changes from carbon dioxide emissions to the atmosphere and ocean*, 110 J. GEOPHYS. RES. C09S04, doi:10.1029/2004JC002671 (2005).

[165] National Research Council, OCEAN ACIDIFICATION: A NATIONAL STRATEGY TO MEET THE CHALLENGES OF A CHANGING OCEAN (2010); Royal Society, OCEAN ACIDIFICATION DUE TO INCREASING ATMOSPHERIC CARBON DIOXIDE (2005); K.J. Kroeker et al*., Impacts of ocean acidification on marine organisms: quantifying sensitivities and interaction with warming*, GLOBAL CHANGE BIOLOGY pre-publication copy doi:10.1111/gcb.12179 (2013).

[166] See, e.g., T. Abbasi and S.A. Abbasi, *Ocean Acidification: The Newest Threat to the Global Environment*, 41 CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY 1601 (2011).

[167] Camille Parmesan & Gary Yohe, *A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems*, 421 NATURE 37 (2003); Terry L. Root et al., *Fingerprints of Global Warming on Wild Animals and Plants*, 421 NATURE 57 (2003); Camille Parmesan, *Ecological and Evolutionary Responses to Recent Climate Change*, 37 ANNUAL REV. OF ECOLOGY EVOLUTION AND SYSTEMATICS 637 (2006); I-Ching Chen et al., *Rapid Range Shifts of Species Associated with High Levels of Climate Warming*, 333 SCIENCE 1024 (2011); Ilya M. D. Maclean & Robert J. Wilson, *Recent Ecological Responses to Climate Change Support Predictions of High Extinction Risk*, 108 PROC.OF THE NATL. ACAD. OF SCIENCES OF THE U.S. 12337 (2011); Rachel Warren et al., *Increasing Impacts of Climate Change upon Ecosystems with Increasing Global Mean Temperature rise*, 141 CLIMATIC CHANGE 106 (2011).

climate-change-related population declines and extirpations.[168] It is predicted that 15%-37% of species will be committed to extinction by 2050 under a mid-level emissions scenario,[169] which the world has been exceeding,[170] and that one in 10 species could face extinction by the year 2100 if current climate change continues unabated.[171]

A comprehensive literature review found that significant species range losses and extinctions are predicted to occur globally for coral reef ecosystems and in several biodiversity hotspots at a global mean temperature rise below 2°; at 2°C temperature rise, projected impacts increase in magnitude, numbers, and geographic spread; and beyond a 2°C temperature rise, entire ecosystems may collapse and extinction risk accelerates and becomes widespread.[172]
Climate change also imperils human health through increases in heat waves and other extreme weather events, aliments caused or exacerbated by air pollution and airborne allergens, and the increased occurrence of climate-sensitive infectious diseases.[173] Certain groups such as children, the elderly, the poor, and minorities are particularly vulnerable to climate-related health effects.[174] Heat is already the leading cause of weather-related deaths in the United States, and a recent study estimated that more than 150,000 Americans may die by the end of the century due to excessive heat caused by climate change.[175]

Extreme precipitation, which has increased in the Midwest, South and other regions by 50% mostly over the last few decades,[176] poses significant human health risks including contaminated drinking water leading to disease outbreaks, drowning, and mold-related illnesses.[177] Air pollution

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[168] *See*, Simon D. Donner et al., *Model-based Assessment of the Role of Human-induced Climate Change in the 2005 Caribbean Coral Bleaching Event*, 104 PROC. OF THE NAT'L ACAD. OF SCIENCES OF THE U.S. 5483 (2007); Eric Regehr et al., *Effects of Earlier Sea Ice Breakup on Survival and Population Size of Polar Bears in Western Hudson Bay*, 71 J. OF WILDLIFE MGMT. 2673 (2007); Erik A. Beever et al., *Testing Alternative Models of Climate-Mediated Extirpations*, 20 ECOLOGICAL APPLICATIONS 164 (2010).
[169] Chris Thomas et al., *Extinction Risk from Climate Change,* 427 NATURE 145 (2004)..
[170] *See*, Exhibit Global Carbon Project, Carbon Budget 2009 (2010).
[171] *See*, Exhibit *Recent Ecological Responses to Climate Change.*
[172] *See*, Exhibit Rachel Warren et al., *Increasing Impacts of Climate Change*.
[173] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).
[174] *Id.*
[175] Natural Resources Defense Council, KILLER SUMMER HEAT: TOLL FROM RISING TEMPERATURES IN AMERICA DUE TO CLIMATE CHANGE (2012), *available at http://www.nrdc.org/globalwarming/killer-heat/files/killer-summer-heat-report.pdf.*
[176] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).
[177] Union of Concerned Scientists, AFTER THE STORM: THE HIDDEN HEALTH RISKS OF FLOODING IN A WARMING WORLD (2012), *available* at *www.ucsusa.org/global_warming/science_and_impacts/impacts/global-warming-and-flooding.html.*

components that trigger asthma attacks, specifically air particulates and ozone, are expected to increase with climate change.[178] Infectious diseases also pose an increased threat in a changing climate. There are an estimated 38 million cases of food and water-borne illness in the U.S. each year, caused in part by an increasing number of pathogens in the wake of extreme weather events such as droughts, flooding, and hurricanes.[179]

Climate change affects food security through a number of complex pathways, both direct and indirect, including the reduced ability of crops to thrive, increased threats to livestock, climate-related contamination of food supplies, and an alteration in land use patterns and availability. Higher levels of warming and extreme weather events such as droughts and flooding are expected to negatively affect the growth and yields of many crops.[180] Warming will benefit weeds, diseases, and insect pests, increasing stress on crop plants and requiring more pest and weed control.[181] Increasing CO_2 concentrations are expected to lead to declines in forage quality in pastures and rangelands for livestock, while increased heat, disease, and weather extremes will increase livestock mortality.[182] Temperature increases, changes in rainfall, and extreme weather events are also expected to increase the incidence and intensity of food-borne diseases and food contamination, jeopardizing food security. [183]

We are already experiencing dangerous climate change, but catastrophe may still be avoidable with rapid and immediate reductions in carbon dioxide and other climate pollutants.[184] The consensus is that we must aim to return carbon dioxide concentrations to no more than 350 ppm to avoid the

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[178] A. Bernstein & S.S. Myers, *Climate Change and Children's Health,* 23 CURRENT OPINION IN PEDIATRICS 221 (2011), *available at http://journals.lww.com/co-pediatrics/Fulltext/2011/04000/ Climate_change_and_children_s_health.16.aspx#.*

[179] E. Maibach et al., Center for Climate Change Communication, CONVEYING THE HUMAN IMPLICATIONS OF CLIMATE CHANGE, 10-11 (2011), *available at http://www.climatehealthconnect.org/resource/conveying-human-implications-climate-change-climate-change-communication-primer-public-heal.*

[180] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009).

[181] *Id.*

[182] *Id.*

[183] M.C. Tirado et al., *Climate Change and Food Safety: A Review*, 43 ELSEVIER 1745 (2010), *available at www.elsevier.com/locat/foodres*.

[184] *See*, e.g., S.J. Davis et al., *Rethinking Wedges*, 8 ENVIRON. RES. LETT. 011001 (2013); H.D. Matthews and S. Solomon, *Irreversible Does Not Mean Unavoidable*, SCIENCEEXPRESS doi: 10.1126/science.1236372 (April 1, 2013); D. Shindell et al., *Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security*, 335 SCIENCE 183 (2012).

worst consequences.[185] Every action we take must be evaluated with a full understanding of the necessity of immediate emissions reductions and the dire consequences of failing to make those reductions.

3. The Environmental Assessment Fails to Adequately Analyze Climate Change Impacts.

The Draft Environmental Assessment fails to adequately analyze the impacts of the proposed project's greenhouse gas emissions on climate change as required by NEPA. After providing a very cursory overview of the causes and impacts of climate change, the draft Environmental Assessment simply compares the quantities of greenhouse gas emissions resulting from construction and operation of the three alternatives.[186] What the document does not do is evaluate the actual climate change effects of the proposed project and its alternatives on the environment, including climate health, wildlife, water resources and other natural resources, and human health.

By failing to properly conduct climate change impacts analyses the Draft Environmental Assessment falters in the same way that NHTSA did in evaluating proposed Corporate Average Fuel Economy Standards (CAFE), that the Surface Transportation Board did in evaluating the construction and upgrade of a railroad track carrying low sulfur coal to the Midwest, and that the BLM did in evaluating impacts of harvest on a watershed. All of these agency analyses were invalidated by the courts for failing to assess the cumulative effects of the alternatives on various resources, such as wildlife, water quantity, and soils.[187] Similarly, TVA simply projects the relative emissions of two alternatives and fails to evaluate the climate change effects of the alternative energy sources. As such, the analysis is arbitrary and capricious.

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[185] *See*, e.g., Exhibit James Hansen et al., *Target atmospheric* CO_2.
[186] Draft EA at 32-33.
[187] *Center for Biological Diversity v. NHTSA*, 508 F.3d 508; *Klamath Siskiyou Wildlands Center v. Bureau of Land Management*, 387 F.3d 989, 994 (9th Cir. 2004); *Mid States Coalition for Progress v. Surface Transportation Board*, 345 F.3d 520, 550 (8th Cir. 2003).

4. The Environmental Assessment Fails to Consider Climate Impacts in the Context of Avoiding a Climate Disaster.

In a world constrained by climate change, the proper measure of the project's climate impact – of any project's impact – should not be based on assumptions inherent in a business as usual scenario that guarantees climate disaster. With respect to climate pollution, the national interest cannot be determined by considering only the incremental increase in emissions relative to an already-disastrous scenario.

With climate impacts growing worse every day, decisions regarding energy must be taken with climate change in mind. As such, TVA's decision about which alternative to select should be judged based on how it impairs our ability to adequately address climate change. The International Energy Agency (IEC) has recently warned that we must keep some 66 percent of proven fossil fuel reserves in the ground in order even to have a chance of stabilizing our climate below two degrees Celsius of warming,[188] the globally-recognized safe limit of warming. Other financial and climate analysts such as the Carbon tracker initiative have suggested that 80 percent of proven fossil fuel reserves must remain in the ground to have a serious chance of staying within this limit.[189]

These estimates are in the context of a large body of science showing that global greenhouse gas emissions must be reduced swiftly by 80 percent globally over the next 40 years in order to stabilize the climate at sustainable levels, with U.S. emissions being reduced to near zero in that time frame in order to achieve this goal. President Obama, in the Copenhagen accord and other international agreements and statements, has committed the United States to achieving this goal of stabilizing global warming as far below 2℃ as possible.[190]

When looking at the climate cost of retrofitting PAF or pursuing another cleaner alternatives, it is vital to consider the project not in the context of where we find ourselves today, but in the

[188] "World Energy Outlook 2012: Executive Summary." OECD/IEA. 2012. pg. 3, available at *http://www.iea.org/publications/freepublications/publication/English.pdf.*
[189] Leaton, James. "Unburnable Carbon - Are the World's Financial markets Carrying a Carbon Bubble?" Carbon Tracker Initiative. 2012. pg. 2, available at *http://www. carbontracker.org/wp-content/uploads/downloads/2011/07/Unburnable-Carbon-Full-rev2.pdf.*
[190] Obama, Barack. "Remarks by the President During Press availability in Copenhagen." The White House. December 18, 2009, available at *http://www.whitehouse. gov/the-press-office/remarks-president-during-press-availability-copenhagen.*

context of where we need to be during the lifetime of this project in order to have a stable climate. Carbon dioxide emissions constitute the largest fraction of total greenhouse gas emissions in the U.S.[191] Fossil-fuel fired power plants are the largest sources of these carbon dioxide emissions.[192] Thus, fossil-fuel fired power plants, like PAF, "are by far the largest emitters of GHGs, primarily in the form of carbon dioxide, among stationary sources in the U.S."[193]

From 2002 to 2011, annual direct carbon dioxide emissions from PAF averaged 14.83 million tons per year.[194] In 2012, PAF almost surpassed its own previous 16-year emissions record high, in 1996, by emitting a total of 16,369,417 million tons of carbon dioxide $_2$.[195] The Paradise plant has emitted more than 303 million tons of carbon dioxide from 1995 to 2012.[196] These emissions are hardly "marginal" as CEQ's Draft Guidance on climate change in NEPA analysis advises agencies that any decision that allows more than 25,000 tons of greenhouse gases to be emitted should be considered as likely significant.[197] Alternatives A and B will do nothing to eliminate carbon dioxide emissions from the plant, and would, instead, prolong these emissions for decades to come. Retiring PAF Units 1 and 2 would correspondingly reduce or eliminate the plant's future carbon dioxide emissions; a fact TVA recognizes in its Draft EA.[198]

Should TVA move forward with Alternative B, TVA's would continue to add to the global carbon dioxide burden, with severe consequences for the human environment. Instead, TVA should make its decision in the context of what needs to be done to address global warming. Viewed through such a lens, TVA should determine that the appropriate decision is to retire Units 1 and 2 of PAF and pursue a cleaner energy option. Such a decision will benefit TVA and its ratepayers when the upcoming GHG emissions regulations come into effect.[199]

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[191] 77 Fed. Reg. at 22,403.
[192] *Id*.
[193] *Id*.
[194] Draft EA at 32.
[195] Taken from TVA emissions data for the Paradise Fossil Plant, available at *http://www.tva.com/environment/air/paradise.htm* (last visited 9/4/13).
[196] *Id.*
[197] CEQ, Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions at 3 (Feb. 18, 2010).
[198] Draft EA at 24, Table 2-1, Comparison of TVA's Selected Alternatives, Air Quality and Climate Change, Alternative C, "significant decreases in both total PAF greenhouse gas (GHG) emissions and GHG emission rate."
[199] Effect of GHG regulations on future operation of Units 1 and 2 as coal-fired units is discussed in more detail in Section VIII below.

5. President Obama's Leadership and Ambitious Federal Policy Dictate a More Searching Climate Change Assessment.

The draft Environmental Assessment's greenhouse gas assessment and analysis of climate change effects must take into account the President's leadership and the federal government's efforts to mitigate the effects of climate change and to reduce our nation's consumption of fossil fuels, and consider how the project fits in with those goals. A commitment to climate leadership requires rigorous scrutiny of every federal action that will result in climate change impacts and taking every possible step to decrease the consumption of fossil fuels and especially carbon heavy fuels, and to promote and incentivize meaningful investments in clean, alternative energy.

In 2010, President Obama issued Executive Order 13514, calling for federal agencies and departments to lead by example in increasing sustainability and energy-efficiency across the federal government. These efforts include greenhouse gas reporting, 28% reductions in direct greenhouse gas emissions, and 13% reductions in indirect greenhouse gas emissions by 2020. Cumulatively, the President's reduction targets for federal government activities by 2020 are equivalent to reducing CO_2 emissions by 101 million metric tons.[200]

President Obama, in his 2013 State of the Union address, made a strong public commitment to combatting climate change: "[I]f Congress won't act soon to protect future generations, I will. I will direct my Cabinet to come up with executive actions we can take, now and in the future, to reduce pollution, prepare our communities for the consequences of climate change, and speed the transition to more sustainable sources of energy." Indeed, the President already has made commitments to reduce national carbon dioxide emissions by 17% from 2005 levels by 2020. And to avoid catastrophic climate disruption, the U.S. must do its parts to ensure that atmospheric CO2 concentrations do not exceed 450 ppm. This means that the U.S. must take additional ambitious measures of reducing emissions by at least 80% by 2050.[201]

[200] *http://www.whitehouse.gov/administration/eop/ceq/sustainability/fed-ghg.*
[201] See *http://climatecommunication.org/wp-content/uploads/2011/08/presidentialaction.pdf* at 4.

On June 25, 2013, President Obama issued a memorandum on Power Sector Pollution Standards, where he noted "with every passing day, the urgency of addressing climate change intensifies" and that his "Administration is committed to reducing carbon pollution that causes climate change, preparing our communities for the consequences of climate change, and speeding the transition to more sustain- able sources of energy."[202] He directed that decisive action be taken by the federal government to address "carbon pollution from the power sector."[203] To ensure a reduction in harmful carbon pollutants he directed the U.S. EPA to issue regulations that address carbon pollution from modified, reconstructed, or existing power plants.[204]

Given this ambitious federal agenda, a NEPA analyses of a major source of CO2 emissions needs to consider whether continued operate of the source makes sense in a world that is actually seeking to minimize the dangers of climate change. Unfortunately, the draft Environmental Assessment fails to adequately do so. While acknowledging that a natural gas CC/CT alternative "would result in a significant reduction in CO2 emissions relative to the operation of the coal-fired Units 1 and 2" TVA's failure to fully consider a clean energy alternative, and the draft Environmental Assessment's failure to analyze the incremental and cumulative effects of the various alternatives on climate change, and the failure to clarify the catastrophic climate context against which incremental emissions are considered cannot form the basis of a meaningful decision. Far more is needed to comply with NEPA and demonstrate that TVA is acting consistent with the President's critical efforts to protect the American people from the catastrophic effects of climate change.

VII. TVA FAILED TO FULLY CONSIDER IMPACTS TO GROUNDWATER AND PAF WASTEWATER STREAM IN THE DRAFT EA

TVA has failed to meaningfully assess the different groundwater quality impacts posed by the three EA alternatives. TVA is currently sluicing 580,000 cubic yards of bottom ash and fly ash to on-site ash ponds every year, in addition to roughly 5 million gallons of scrubber sludge sluice each day.[205] The various waste streams are mixed among the ponds.[206] These ponds are contaminating

[202] 78 Fed. Reg. 39,535, 39,535 (June, 25, 2013).
[203] *Id.*
[204] *Id.*
[216] Data were obtained by the Environmental Integrity Project from TVA through Freedom of Information Act requests.

local groundwater, as described in more detail below. Alternative A would have little or no impact on the magnitude of this waste stream and its associated impacts. Alternative B would alter the flow and chemical composition of the waste stream, but would leave the overall loadings of coal ash and gypsum to the ash ponds largely unchanged.[207] Alternative C would essentially eliminate this waste stream and all future impacts. Alternative C therefore provides a substantial groundwater quality benefit relative to Alternatives A and B. The same can be said about several of the Alternatives that were considered but not analyzed (e.g., generation replacement and unit retirement).

PAF's Fly Ash Pond (FAP) is approximately 127 acres in size and provides passive physical settling of suspended solids, ammonia removal, and limited metals precipitation before the treated water overflows into a stilling pond.[208] Fly ash sluice, bottom as sluice and FGD sluice comprise almost 95% of the total in-flow into the FAP.[209] About 33 MGD of effluent from the FAP stilling pond is discharged into Jacobs Creek.[210] As laid out below, current operation of PAF and its on-site ash storage facilities are negatively impacting both surrounding surface water as well as groundwater.

Figure A shows the network of groundwater wells that TVA has installed and/or monitored in recent years. Table A-1 summarizes results of onsite groundwater monitoring since 2010, focusing on those pollutants that TVA has identified as coal ash indicators,[211] and cobalt, which the U.S. EPA has identified as one of the two "constituents with the highest estimated risks for surface impoundments."[212]

Wells 10-1 and 10-2, at the eastern edge of the Scrubber Sludge Complex, show clear evidence of coal ash contamination, with elevated concentrations of boron, manganese, and sulfate. Boron concentrations are particularly notable, exceeding background concentrations by 20-50 times and easily exceeding the U.S. EPA Child Health Advisory of 3 mg/L.[213] Wells around the Jacob's Creek and Peabody Ash Ponds have only been sampled once, but all four showed unsafe

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[216] Data were obtained by the Environmental Integrity Project from TVA through Freedom of Information Act requests.
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concentrations of one or more pollutants, including manganese in all four wells and cobalt in three of the four wells. Well 10-6 stands out as having much higher concentrations of cobalt and manganese than the other three wells: Cobalt in well 10-6 was measured at 130 ug/l, while wells 10-3 through 10-5 had concentrations of 1.4 – 27 ug/L. Similarly, manganese in well 10-6 was measured at 28 mg/L, roughly 100 times higher than EPA's health advisory of 0.3 mg/L.[214] Manganese in wells 10-3 through 10-5 was measured at 1.4 – 3.8 mg/L. Well 10-6 also stands out as having much higher boron concentrations than the other three wells, providing further evidence of ash contamination.

Wells along the Bottom Ash Ponds, measured once in 2011, also show evidence of contamination. Well 10-8 had unsafe concentrations of arsenic, cobalt, and manganese, although the cobalt and manganese concentrations were less than those seen in upgradient well 10-7. Well 10-9, however, had higher concentrations of cobalt and manganese than the upgradient well (both were orders of magnitude higher than health-based thresholds) and also had an extremely high concentration of boron, five times higher than the Child Health Advisory; boron was not detected in the upgradient well.

The EA ignores most of the contamination discussed above. In fact, the sum total of the discussion of ongoing groundwater impacts from coal ash disposal at Paradise is as follows:

> Groundwater monitoring of the site occurs semiannually and results are reported to the Kentucky Division of Waste Management in the Semi-Annual Groundwater Report for the Residual Landfill and the FGD Pond Voluntary Monitoring Report. As of June 2013, the residual landfill had no maximum containment level (MCL) exceedances from the groundwater. Statistical exceedances of sodium, conductance, chloride, and total dissolved solids were reported and have been observed in the past. In June 2013, a statistical exceedance for boron Draft Environmental Assessment was reported. Analytical results for the 2012 FGD Pond Voluntary Monitoring Report indicated that all constituent contaminants were below MCLs (TVA 2013a).[215]

[216] Data were obtained by the Environmental Integrity Project from TVA through Freedom of Information Act requests.
[216] Data were obtained by the Environmental Integrity Project from TVA through Freedom of Information Act requests.

TVA has failed to make a fair assessment of its own groundwater quality data, which clearly demonstrates that the PAF site already has groundwater contamination issues, reinforcing the need for full EIS analysis. Moreover, TVA has failed to analyze or even discuss the groundwater quality benefits that would accompany the retirement of some or all of the coal units at Paradise.

Figure A: Groundwater wells at Paradise Fossil Plant (approximate locations)

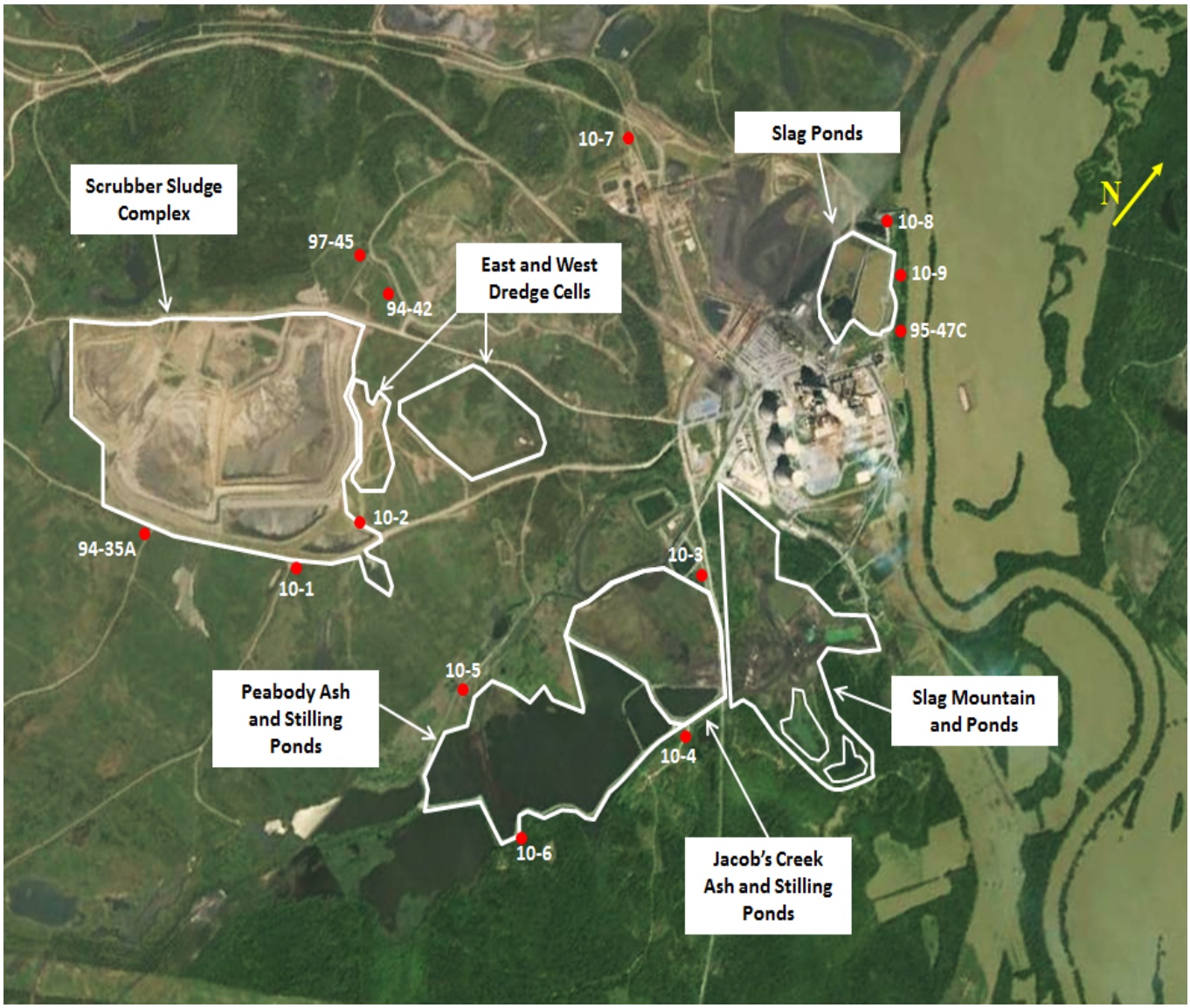

Table A-1: Groundwater quality at Paradise Fossil Plant. Each value represents the mean of groundwater quality measurements between June 2010 and June 2013, in units of mg/L.[216]

Ash Disposal Area / Well	Arsenic	Boron	Cobalt	Manganese	Sulfate
Upgradient wells					
94-35A	0.006	*No data*	*No data*	*No data*	1,800
94-42	0.003	*No data*	*No data*	*No data*	*No data*
97-45	<0.001	*No data*	*No data*	*No data*	1,600
10-5	<0.001	0.5	0.013	3.0	1,900
10-7	0.003	<0.2	0.135	48.5	190
Bottom Ash Ponds					
95-47C	<0.001	*No data*	*No data*	*No data*	460
10-8	0.018	<0.2	0.026	19.0	210
10-9	0.001	15.0	0.370	61.0	280
Fly Ash Ponds					
10-3	<0.001	0.4	0.027	3.8	1,400
10-4	0.008	0.3	0.001	1.4	98
10-6	<0.005	3.2	0.130	28.0	590
Scrubber Sludge Complex					
10-1	0.003	10.5	0.008	2.7	1,900
10-2	0.004	24.0	0.006	2.6	1,800

Alternative B, installation and operation of the proposed PJFF system, would change the characteristics of PAF's wastewater stream, including retention time, general chemistry, absorption and alkalinity.[217] TVA's own analysis shows that installation of the PJFF system will potentially increase concentrations of selenium and cadmium in violation of water quality criteria established by the Kentucky Department of Environmental Protection (KDEP).[218] Currently, PAF's KPDES permit does not contain discharge limits for cadmium or selenium.

[216] Data were obtained by the Environmental Integrity Project from TVA through Freedom of Information Act requests.
[217] Draft EA at 59.
[218] *Id.*

Installation and operation of the PJFF system on PAF Units 1 and 2 would increase raw water demand by 3 MGD and would increase wastewater output of the ash pond by 8.7 percent.[219] In contrast, Alternative C would dramatically reduce water consumption from PAF operations. Maximum water consumption for the PAF CC/CT plant operations would be 95% less than the 168.63 MGD currently used to operate PAF Units 1 and 2.[220] Alternative C would also result in significant less heat loading discharged to the Green River.[221] Due to the lower intake flow rates for the CC plant there would likely be a significant reduction in the amount of aquatic organisms entrained.[222]

VIII. THE DRAFT EA FAILS TO ADEQUATE CONSIDER THE IMPACTS OF FUTURE ENVIRONMENTAL REGULATIONS ON CONTINUED OPERATION OF PAF UNITS 1 AND 2

A. NEPA Requires an Analysis of All Connected Actions in a Single Environmental Assessment or Environmental Impact Statement.

NEPA requires connected actions "to be considered together in a single EIS."[223] Connected actions include "interdependent parts of a larger action and depend on the larger action for their justification."[224] "NEPA instructs that significant cumulative impacts are not to be made to appear insignificant by breaking a project down into small component parts."[225] Most circuits apply an independent utility test "to determine whether multiple actions are so connected as to mandate consideration in a single EIS."[226]

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[219] *Id.*
[220] Draft EA at 63.
[221] Draft EA at 64.
[222] Draft EA at 68.
[223] 40 CFR 1508.25(a)(1); *Thomas v. Peterson*, 753 F.2d 754 (9th Cir. 1985).
[224] 40 C.F.R. § 1508.25(a)(1)(iii).
[225] *Utahns for Better Transp.*, 305 F.3d at 1182, *as modified on reh'g*, 319 F.3d 1207 (10th Cir. 2003) (citing 40 C.F.R. §1508.27(b)(7)); *Pres. Endangered Areas of Cobb's History, Inc. v. U.S. Army Corps of Engineers*, 87 F.3d 1242, 1247 (11th Cir. 1996)(the Corps cannot avoid NEPA by artificially dividing a major federal action into smaller components, each without a 'significant' impact.")(citing Coalition on Sensible Transportation, Inc. v. Dole, 826 F.2d 60, 68 (D.C.Cir. 1987)).
[226] *See*, *e.g.*, *Wilderness Workshop v. U.S. Bureau of Land Management*, 531 F.3d 1220, 1228-31 (10th Cir. 2008).

Furthermore, improper segmentation occurs where the "completion of the first project may cause the benefit/cost ratio on the second to rise sharply."[227]

The completion of a modification project to make PAF compliant with MATS would cause the benefit/cost ratio whether to retrofit this facility to comply with other proposed and emerging regulations to rise sharply. Therefore, modification projects that would be needed to comply with these other federal requirements are connected actions that must be considered in a single environmental assessment or environmental impact statement.

B. The Draft Environmental Assessment Fails to Analyze Modification Projects that May be Needed for PAF to Comply with a Reinstated Cross State Air Pollution Rule

The Cross State Air Pollution Rule (CSAPR) was finalized in July 2011 and required states to significantly improve air quality by reducing power plant emissions that contribute to ozone and/or fine particle pollution in other states.[228] Enacted under the Clean Air Act's "good neighbor" provision, CSAPR was designed as an interstate air pollution transport rule that would address the negative effect of upwind air pollution on downwind states' ability to attain and maintain National Ambient Air Quality Standards (NAAQS). Kentucky is one of the twenty states that are must place strict controls on emissions of both fine particles (annual SO2 and NOx) and ozone (ozone season NOx).

While the exact fate of CSAPR is uncertain, it is highly likely that the rule will return in a form at least as stringent as was finalized in July 2011. The U.S. Court of Appeals for the District of Columbia Circuit held that EPA had exceeded its authority and invalidated CSAPR.[229] Given that CSAPR was designed to implement National Ambient Air Quality Standards that are still in place and are expected to become more stringent, however, it is not surprising that the D.C. Circuit specifically called on U.S. EPA to "proceed expeditiously" to replace the vacated CSAPR program.[230] In addition, the U.S. Supreme Court recently granted certiorari in EPA's challenge to the D.C. Circuit

[227] *Coalition on Sensible Transportation, Inc. v. Dole*, 826 F.2d 60, 70 (D.C. Cir. 1987).

[228] *http://www.epa.gov/crossstaterule/basic.html*

[229] *EME Homer City Generation, L.P. v. EPA*, 696 F.3d 7 (D.C. Cir. 2012).

[230] *Id.* at 38 n. 35.

decision with a Supreme Court decision expected either in the Fall 2013 term or the Spring 2014 term. As such, interstate air pollution regulation is imminent and could even return in the form of the previously invalidated CSAPR. This regulation is likely to require TVA to install further air pollution controls on Units 1 and 2, and possibly even Unit 3, in order to comply with interstate air regulation. Prolonging the life of Units 1 and 2 would accordingly expose TVA to further costs in the form of investment in future air pollution control technologies. Instead of continuing the life of these coal-fired units, we urge TVA to retire these two units and to stop investing significant amount of ratepayer money into outdated coal fired generation.

C. The Draft Environmental Assessment Fails to Analyze Modification Projects the would be Needed for PAF to Comply with Greenhouse Gas Regulations

In June 2013, President Barack Obama announced an aggressive plan to begin to reduce national carbon dioxide emissions.[231] President Obama set out clear directives in a June 25, 2013 memo[232] to the Administrator of the Environmental Protection Agency, which included exercising authority under sections 111(b) and 111(d)[233] of the Clean Air Act to issue standards, regulations, or guidelines, as appropriate, that address carbon pollution from modified, reconstructed, and existing power plants

> (i) issue proposed carbon pollution standards, regulations, or guidelines, as appropriate, for modified, reconstructed, and existing power plants by no later than June 1, 2014;
>
> (ii) issue final standards, regulations, or guidelines, as appropriate, for modified, reconstructed, and existing power plants by no later than June 1, 2015; and
>
> (iii) include in the guidelines addressing existing power plants a requirement that States submit to EPA the implementation plans required under section 111(d) of the Clean Air Act and its implementing regulations by no later than June 30, 2016.

[231] *See* The President's Climate Action Plan (Attachment A)
[232] *See* June 25, 2013 Presidential Memo to EPA (Attachment B).
[233] 42 USC § 7411(b) and (d).

The President's announcement only confirmed and publicized a regulatory process that has been underway for years. In 2007, the Supreme Court held that carbon dioxide and other greenhouse gases are covered by the Clean Air Act's broad definition of "air pollutant" and that the EPA must decide whether greenhouse gases endanger public health.[234] After analyzing the available climate science, the EPA issued a formal finding that current and projected emissions of six greenhouse gases, including CO_2, threaten the public health and welfare of current and future generations.[235]

This finding has since been upheld by the U.S. Court of Appeals for the District of Columbia Circuit.[236] That court also confirmed that the Clean Air Act requires the EPA to address greenhouse gas emissions under its stationary source permitting programs.[237] As confirmed by these decisions, Section 111 of the Clean Air Act requires the EPA to issue performance standards for air pollutants from both new and existing electric generating units.[238] While the precise details of these rules are still uncertain, it is clear that utilities will need to meet new regulatory requirements (and their associated costs) in the near future.

In light of these upcoming regulations, TVA should be wary of investing significant amounts of money to prolong the life of its coal units that contribute more than 9.5 million tons of carbon dioxide into the atmosphere annually and, at a minimum, must factor such likely future regulations into the decision of whether to retrofit or retire and replace Paradise Units 1 and 2.

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[234] *Massachusetts v. Envtl. Prot. Agency*, 127 S. Ct. 1438, 1462–63 (2007).

[235] U.S. EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66,496 (Dec. 15, 2009).

[236] *See Coal. for Responsible Regulation v. Envtl. Prot. Agency*, 684 F.3d 102, 120–22 (D.C. Cir. 2012).

[237] *Id.* at 134–36.

[238] *See* 42 U.S.C. § 7411(b) & (d); 42 U.S.C. § 7411(d) provides that the EPA Administrator "shall prescribe regulations which shall establish a procedure" for states to submit proposed "standards of performance for any existing source for any air pollutant," such as CO_2, "for which air quality criteria have not been issued" but for which new source performance standards have been established. Then-Acting EPA Administrator Robert Perciasepe recently stated that he expects that the Agency will develop these standards of performance for carbon dioxide emissions from existing power plants during fiscal year 2014. Jean Chemnick, "EPA official: Carbon rules for existing power plants 'on the table' in 2014," *Environment & Energy Daily* (Apr. 12, 2013), *available at http://www.midwestenergynews.com/2013/04/12/epa-official-carbon-rules-for-existing-power-plants-on-the-table-in-2014/.*

D. The Draft Environmental Assessment Fails to Analyze Modification Projects the would be Needed for PAF to Comply with Coal Ash Regulation

In 2010, EPA proposed the first-ever national rules to ensure the safe disposal and management of coal ash from coal-fired power plants under the Resource Conversation and Recovery Act (RCRA).[239] In its proposed rule, EPA laid out two options for regulating coal ash under RCRA: as a "special waste" under Subtitle C or as a non-hazardous waste under Subtitle D.[240] Should EPA choose to regulate coal ash as a special waste, all currently existing coal ash storage facilities, like those at PAF, will have to be phased out. Should EPA regulate coal ash as a non-hazardous waste, all unlined coal ash impoundments will have to be lined.

PAF has at least 9 unlined impoundments currently located on site. At the very least, TVA will have to invest significant amounts of money to remove ash from and line these unlined landfills or move ash in unlined landfills to newly constructed lined landfills. If TVA decides to extend the lives of Units 1 and 2 by installing pollution controls on these units, it will continue to produce massive amounts of bottom and fly ash (approximately 580,000 cubic yards of ash is wet-sluiced to unlined bottom or fly ash ponds). [241] Units 1 and 2 contribute about 156,000 cubic yards of fly ash per year to the unlined Scrubber Sludge Complex.[242]

Alternative B would result in the continued production of massive amounts of fly and bottom ash from Units 1 and 2, which would continue to be stored in unlined impoundments. Allowing for the continuation of this untenable practice would once again put TVA in a position where it would have to spend a significant amount of additional money, after the PJFF investment, in order to properly manage PAF's wastestreams in accordance with upcoming EPA regulations. Alternative C would completely eliminate coal ash waste streams from Unit 1 and 2, significantly reducing the ash burden on TVA when it will have to convert PAF ash ponds from wet to dry, lined storage facilities (a fact TVA acknowledges in the Draft EA)[243]. To date, PAF's

[239] 40 CFR Parts 257, 261, 264, 265, 268, 271, 302.
[240] *Id.*
[241] Draft EA at 55.
[242] *Id.*
[243] Draft EA at 25; Table 2-1. Comparison of Alternative by Resource Area. Solid Waste. Alternative C. "Significant long term decrease in production of CCR."

fly ash ponds only have about 5 million cubic yards of available volume for coal combustion waste management.[244]

At a minimum, TVA must factor likely future regulation of coal ash disposal, and the substantially reduced burden from such regulations if Paradise Units 1 and 2 are retired and replaced instead of retrofitted, into the decision regarding the future of those coal units.

IX. CONCLUSION

We once again thank TVA for providing the opportunity to submit these comments before a firm decision is made with respect to the future of operations at PAF. In light of the arguments and reasons set forth above, the Draft EA is flawed in several important respects, and cannot be offered as a substitute for an EIS. The Draft EA fails to include other reasonable alternatives, such as retiring Units 1 and 2 and replacing lost them with any combination of energy efficiency measures, demand side management policies, purchased power, renewable energy resources and/or transmission upgrades as well as whether or not constructing a smaller combined cycle/combustion turbine natural gas plant could also meet generation resource needs in the region.

The Draft EA reveals that TVA must prepare an Environmental Impact Statement (EIS) to determine whether to install retrofits on Units 1 and 2 at PAF or retire these units and replace them with a natural gas plant because the impacts of either alternative would be significant, and the EA fails to adequately consider other reasonable alternatives in accordance with NEPA regulations.

[244] Draft EA at 2.

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ATTACHMENTS

THE PRESIDENT'S CLIMATE ACTION PLAN

Executive Office of the President

June 2013

THE WHITE HOUSE
WASHINGTON

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PRESIDENT OBAMA'S CLIMATE ACTION PLAN

"We, the people, still believe that our obligations as Americans are not just to ourselves, but to all posterity. We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires and crippling drought and more powerful storms.

The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition, we must lead it. We cannot cede to other nations the technology that will power new jobs and new industries, we must claim its promise. That's how we will maintain our economic vitality and our national treasure -- our forests and waterways, our croplands and snow-capped peaks. That is how we will preserve our planet, commended to our care by God. That's what will lend meaning to the creed our fathers once declared."

-- President Obama, Second Inaugural Address, January 2013

THE CASE FOR ACTION

While no single step can reverse the effects of climate change, we have a moral obligation to future generations to leave them a planet that is not polluted and damaged. Through steady, responsible action to cut carbon pollution, we can protect our children's health and begin to slow the effects of climate change so that we leave behind a cleaner, more stable environment.

In 2009, President Obama made a pledge that by 2020, America would reduce its greenhouse gas emissions in the range of 17 percent below 2005 levels if all other major economies agreed to limit their emissions as well. Today, the President remains firmly committed to that goal and to building on the progress of his first term to help put us and the world on a sustainable long-term trajectory. Thanks in part to the Administration's success in doubling America's use of wind, solar, and geothermal energy and in establishing the toughest fuel economy standards in our history, we are creating new jobs, building new industries, and reducing dangerous carbon pollution which contributes to climate change. In fact, last year, carbon emissions from the energy sector fell to the lowest level in two decades. At the same time, while there is more work to do, we are more energy secure than at any time in recent history. In 2012, America's net oil imports fell to the lowest level in 20 years and we have become the world's leading producer of natural gas – the cleanest-burning fossil fuel.

While this progress is encouraging, climate change is no longer a distant threat – we are already feeling its impacts across the country and the world. Last year was the warmest year ever in the contiguous United States and about one-third of all Americans experienced 10 days or more of 100-degree heat. The 12 hottest years on record have all come in the last 15 years. Asthma rates have doubled in the past 30 years and our children will suffer more asthma attacks as air pollution gets worse. And increasing floods, heat waves, and droughts have put farmers out of business, which is already raising food prices dramatically.

These changes come with far-reaching consequences and real economic costs. Last year alone, there were 11 different weather and climate disaster events with estimated losses exceeding $1 billion each across the United States. Taken together, these 11 events resulted in over $110 billion in estimated damages, which would make it the second-costliest year on record.

In short, America stands at a critical juncture. Today, President Obama is putting forward a broad-based plan to cut the carbon pollution that causes climate change and affects public health. Cutting carbon pollution will help spark business innovation to modernize our power plants, resulting in cleaner forms of American-made energy that will create good jobs and cut our dependence on foreign oil. Combined with the Administration's other actions to increase the efficiency of our cars and household appliances, the President's plan will reduce the amount of energy consumed by American families, cutting down on their gas and utility bills. The plan, which consists of a wide variety of executive actions, has three key pillars:

1) **Cut Carbon Pollution in America:** In 2012, U.S. carbon emissions fell to the lowest level in two decades even as the economy continued to grow. To build on this progress, the Obama Administration is putting in place tough new rules to cut carbon pollution – just like we have for other toxins like mercury and arsenic – so we protect the health of our children and move our economy toward American-made clean energy sources that will create good jobs and lower home energy bills.

2) **Prepare the United States for the Impacts of Climate Change:** Even as we take new steps to reduce carbon pollution, we must also prepare for the impacts of a changing climate that are already being felt across the country. Moving forward, the Obama Administration will help state and local governments strengthen our roads, bridges, and shorelines so we can better protect people's homes, businesses and way of life from severe weather.

3) **Lead International Efforts to Combat Global Climate Change and Prepare for its Impacts:** Just as no country is immune from the impacts of climate change, no country can meet this challenge alone. That is why it is imperative for the United States to couple action at home with leadership internationally. America must help forge a truly global solution to this global challenge by galvanizing international action to significantly reduce emissions (particularly among the major emitting countries), prepare for climate impacts, and drive progress through the international negotiations.

Climate change represents one of our greatest challenges of our time, but it is a challenge uniquely suited to America's strengths. Our scientists will design new fuels, and our farmers will grow them. Our engineers to devise new sources of energy, our workers will build them, and our businesses will sell them. All of us will need to do our part. If we embrace this challenge, we will not just create new jobs and new industries and keep America on the cutting edge; we will save lives, protect and preserve our treasured natural resources, cities, and coastlines for future generations.

What follows is a blueprint for steady, responsible national and international action to slow the effects of climate change so we leave a cleaner, more stable environment for future generations. It highlights progress already set in motion by the Obama Administration to advance these goals and sets forth new steps to achieve them.

CUT CARBON POLLUTION IN AMERICA

In 2009, President Obama made a commitment to reduce U.S. greenhouse gas emissions in the range of 17 percent below 2005 levels by 2020. The President remains firmly committed to achieving that goal. While there is more work to do, the Obama Administration has already made significant progress by doubling generation of electricity from wind, solar, and geothermal, and by establishing historic new fuel economy standards. Building on these achievements, this document outlines additional steps the Administration will take – in partnership with states, local communities, and the private sector – to continue on a path to meeting the President's 2020 goal.

I. Deploying Clean Energy

Cutting Carbon Pollution from Power Plants: Power plants are the largest concentrated source of emissions in the United States, together accounting for roughly one-third of all domestic greenhouse gas emissions. We have already set limits for arsenic, mercury, and lead, but there is no federal rule to prevent power plants from releasing as much carbon pollution as they want. Many states, local governments, and companies have taken steps to move to cleaner electricity sources. More than 35 states have renewable energy targets in place, and more than 25 have set energy efficiency targets.

Despite this progress at the state level, there are no federal standards in place to reduce carbon pollution from power plants. In April 2012, as part of a continued effort to modernize our electric power sector, the Obama Administration proposed a carbon pollution standard for new power plants. The Environmental Protection Agency's proposal reflects and reinforces the ongoing trend towards cleaner technologies, with natural gas increasing its share of electricity generation in recent years, principally through market forces and renewables deployment growing rapidly to account for roughly half of new generation capacity installed in 2012.

With abundant clean energy solutions available, and building on the leadership of states and local governments, we can make continued progress in reducing power plant pollution to improve public health and the environment while supplying the reliable, affordable power needed for economic growth. By doing so, we will continue to drive American leadership in clean energy technologies, such as efficient natural gas, nuclear, renewables, and clean coal technology.

To accomplish these goals, President Obama is issuing a Presidential Memorandum directing the Environmental Protection Agency to work expeditiously to complete carbon pollution standards for both new and existing power plants. This work will build on the successful first-term effort to develop greenhouse gas and fuel economy standards for cars and trucks. In developing the standards, the President has asked the Environmental Protection Agency to build on state leadership, provide flexibility, and take advantage of a wide range of energy sources and technologies including many actions in this plan.

Promoting American Leadership in Renewable Energy: During the President's first term, the United States more than doubled generation of electricity from wind, solar, and geothermal sources. To ensure America's continued leadership position in clean energy, President Obama has set a goal to double renewable electricity generation once again by 2020. In order to meet

this ambitious target, the Administration is announcing a number of new efforts in the following key areas:

- **Accelerating Clean Energy Permitting:** In 2012 the President set a goal to issue permits for 10 gigawatts of renewables on public lands by the end of the year. The Department of the Interior achieved this goal ahead of schedule and the President has directed it to permit an additional 10 gigawatts by 2020. Since 2009, the Department of Interior has approved 25 utility-scale solar facilities, nine wind farms, and 11 geothermal plants, which will provide enough electricity to power 4.4 million homes and support an estimated 17,000 jobs. The Administration is also taking steps to encourage the development of hydroelectric power at existing dams. To develop and demonstrate improved permitting procedures for such projects, the Administration will designate the Red Rock Hydroelectric Plant on the Des Moines River in Iowa to participate in its Infrastructure Permitting Dashboard for high-priority projects. Also, the Department of Defense – the single largest consumer of energy in the United States – is committed to deploying 3 gigawatts of renewable energy on military installations, including solar, wind, biomass, and geothermal, by 2025. In addition, federal agencies are setting a new goal of reaching 100 megawatts of installed renewable capacity across the federally subsidized housing stock by 2020. This effort will include conducting a survey of current projects in order to track progress and facilitate the sharing of best practices.

- **Expanding and Modernizing the Electric Grid:** Upgrading the country's electric grid is critical to our efforts to make electricity more reliable, save consumers money on their energy bills, and promote clean energy sources. To advance these important goals, President Obama signed a Presidential Memorandum this month that directs federal agencies to streamline the siting, permitting and review process for transmission projects across federal, state, and tribal governments.

Unlocking Long-Term Investment in Clean Energy Innovation: The Fiscal Year 2014 Budget continues the President's commitment to keeping the United States at the forefront of clean energy research, development, and deployment by increasing funding for clean energy technology across all agencies by 30 percent, to approximately $7.9 billion. This includes investment in a range of energy technologies, from advanced biofuels and emerging nuclear technologies – including small modular reactors – to clean coal. To continue America's leadership in clean energy innovation, the Administration will also take the following steps:

- **Spurring Investment in Advanced Fossil Energy Projects:** In the coming weeks, the Department of Energy will issue a Federal Register Notice announcing a draft of a solicitation that would make up to $8 billion in (self-pay) loan guarantee authority available for a wide array of advanced fossil energy projects under its Section 1703 loan guarantee program. This solicitation is designed to support investments in innovative technologies that can cost-effectively meet financial and policy goals, including the avoidance, reduction, or sequestration of anthropogenic emissions of greenhouse gases. The proposed solicitation will cover a broad range of advanced fossil energy projects. Reflecting the Department's commitment to continuous improvement in program management, it will take comment on the draft solicitation, with a plan to issue a final solicitation by the fall of 2013.

- **Instituting a Federal Quadrennial Energy Review:** Innovation and new sources of domestic energy supply are transforming the nation's energy marketplace, creating economic

opportunities at the same time they raise environmental challenges. To ensure that federal energy policy meets our economic, environmental, and security goals in this changing landscape, the Administration will conduct a Quadrennial Energy Review which will be led by the White House Domestic Policy Council and Office of Science and Technology Policy, supported by a Secretariat established at the Department of Energy, and involving the robust engagement of federal agencies and outside stakeholders. This first-ever review will focus on infrastructure challenges, and will identify the threats, risks, and opportunities for U.S. energy and climate security, enabling the federal government to translate policy goals into a set of analytically based, clearly articulated, sequenced and integrated actions, and proposed investments over a four-year planning horizon.

II. Building a 21st-Century Transportation Sector

Increasing Fuel Economy Standards: Heavy-duty vehicles are currently the second largest source of greenhouse gas emissions within the transportation sector. In 2011, the Obama Administration finalized the first-ever fuel economy standards for Model Year 2014-2018 for heavy-duty trucks, buses, and vans. These standards will reduce greenhouse gas emissions by approximately 270 million metric tons and save 530 million barrels of oil. During the President's second term, the Administration will once again partner with industry leaders and other key stakeholders to develop post-2018 fuel economy standards for heavy-duty vehicles to further reduce fuel consumption through the application of advanced cost-effective technologies and continue efforts to improve the efficiency of moving goods across the United States.

The Obama Administration has already established the toughest fuel economy standards for passenger vehicles in U.S. history. These standards require an average performance equivalent of 54.5 miles per gallon by 2025, which will save the average driver more than $8,000 in fuel costs over the lifetime of the vehicle and eliminate six billion metric tons of carbon pollution – more than the United States emits in an entire year.

Developing and Deploying Advanced Transportation Technologies: Biofuels have an important role to play in increasing our energy security, fostering rural economic development, and reducing greenhouse gas emissions from the transportation sector. That is why the Administration supports the Renewable Fuels Standard, and is investing in research and development to help bring next-generation biofuels on line. For example, the United States Navy and Departments of Energy and Agriculture are working with the private sector to accelerate the development of cost-competitive advanced biofuels for use by the military and commercial sectors. More broadly, the Administration will continue to leverage partnerships between the private and public sectors to deploy cleaner fuels, including advanced batteries and fuel cell technologies, in every transportation mode. The Department of Energy's eGallon informs drivers about electric car operating costs in their state – the national average is only $1.14 per gallon of gasoline equivalent, showing the promise for consumer pocketbooks of electric-powered vehicles. In addition, in the coming months, the Department of Transportation will work with other agencies to further explore strategies for integrating alternative fuel vessels into the U.S. flag fleet. Further, the Administration will continue to work with states, cities and towns through the Department of Transportation, the Department of Housing and Urban Development, and the Environmental Protection Agency to improve transportation options, and lower transportation costs while protecting the environment in communities nationwide.

III. Cutting Energy Waste in Homes, Businesses, and Factories

Reducing Energy Bills for American Families and Businesses: Energy efficiency is one of the clearest and most cost-effective opportunities to save families money, make our businesses more competitive, and reduce greenhouse gas emissions. In the President's first term, the Department of Energy and the Department of Housing and Urban Development completed efficiency upgrades in more than one million homes, saving many families more than $400 on their heating and cooling bills in the first year alone. The Administration will take a range of new steps geared towards achieving President Obama's goal of doubling energy productivity by 2030 relative to 2010 levels:

- **Establishing a New Goal for Energy Efficiency Standards:** In President Obama's first term, the Department of Energy established new minimum efficiency standards for dishwashers, refrigerators, and many other products. Through 2030, these standards will cut consumers' electricity bills by hundreds of billions of dollars and save enough electricity to power more than 85 million homes for two years. To build on this success, the Administration is setting a new goal: Efficiency standards for appliances and federal buildings set in the first and second terms combined will reduce carbon pollution by at least 3 billion metric tons cumulatively by 2030 – equivalent to nearly one-half of the carbon pollution from the entire U.S. energy sector for one year – while continuing to cut families' energy bills.

- **Reducing Barriers to Investment in Energy Efficiency:** Energy efficiency upgrades bring significant cost savings, but upfront costs act as a barrier to more widespread investment. In response, the Administration is committing to a number of new executive actions. As soon as this fall, the Department of Agriculture's Rural Utilities Service will finalize a proposed update to its Energy Efficiency and Conservation Loan Program to provide up to $250 million for rural utilities to finance efficiency investments by businesses and homeowners across rural America. The Department is also streamlining its Rural Energy for America program to provide grants and loan guarantees directly to agricultural producers and rural small businesses for energy efficiency and renewable energy systems.

  In addition, the Department of Housing and Urban Development's efforts include a $23 million Multifamily Energy Innovation Fund designed to enable affordable housing providers, technology firms, academic institutions, and philanthropic organizations to test new approaches to deliver cost-effective residential energy. In order to advance ongoing efforts and bring stakeholders together, the Federal Housing Administration will convene representatives of the lending community and other key stakeholders for a mortgage roundtable in July to identify options for factoring energy efficiency into the mortgage underwriting and appraisal process upon sale or refinancing of new or existing homes.

- **Expanding the President's Better Buildings Challenge:** The Better Buildings Challenge, focused on helping American commercial and industrial buildings become at least 20 percent more energy efficient by 2020, is already showing results. More than 120 diverse organizations, representing over 2 billion square feet are on track to meet the 2020 goal: cutting energy use by an average 2.5 percent annually, equivalent to about $58 million in energy savings per year. To continue this success, the Administration will expand the program to multifamily housing – partnering both with private and affordable

building owners and public housing agencies to cut energy waste. In addition, the Administration is launching the Better Buildings Accelerators, a new track that will support and encourage adoption of State and local policies to cut energy waste, building on the momentum of ongoing efforts at that level.

IV. Reducing Other Greenhouse Gas Emissions

Curbing Emissions of Hydrofluorocarbons: Hydrofluorocarbons (HFCs), which are primarily used for refrigeration and air conditioning, are potent greenhouse gases. In the United States, emissions of HFCs are expected to nearly triple by 2030, and double from current levels of 1.5 percent of greenhouse gas emissions to 3 percent by 2020.

To reduce emissions of HFCs, the United States can and will lead both through international diplomacy as well as domestic actions. In fact, the Administration has already acted by including a flexible and powerful incentive in the fuel economy and carbon pollution standards for cars and trucks to encourage automakers to reduce HFC leakage and transition away from the most potent HFCs in vehicle air conditioning systems. Moving forward, the Environmental Protection Agency will use its authority through the Significant New Alternatives Policy Program to encourage private sector investment in low-emissions technology by identifying and approving climate-friendly chemicals while prohibiting certain uses of the most harmful chemical alternatives. In addition, the President has directed his Administration to purchase cleaner alternatives to HFCs whenever feasible and transition over time to equipment that uses safer and more sustainable alternatives.

Reducing Methane Emissions: Curbing emissions of methane is critical to our overall effort to address global climate change. Methane currently accounts for roughly 9 percent of domestic greenhouse gas emissions and has a global warming potential that is more than 20 times greater than carbon dioxide. Notably, since 1990, methane emissions in the United States have decreased by 8 percent. This has occurred in part through partnerships with industry, both at home and abroad, in which we have demonstrated that we have the technology to deliver emissions reductions that benefit both our economy and the environment. To achieve additional progress, the Administration will:

- **Developing an Interagency Methane Strategy:** The Environmental Protection Agency and the Departments of Agriculture, Energy, Interior, Labor, and Transportation will develop a comprehensive, interagency methane strategy. The group will focus on assessing current emissions data, addressing data gaps, identifying technologies and best practices for reducing emissions, and identifying existing authorities and incentive-based opportunities to reduce methane emissions.

- **Pursuing a Collaborative Approach to Reducing Emissions:** Across the economy, there are multiple sectors in which methane emissions can be reduced, from coal mines and landfills to agriculture and oil and gas development. For example, in the agricultural sector, over the last three years, the Environmental Protection Agency and the Department of Agriculture have worked with the dairy industry to increase the adoption of methane digesters through loans, incentives, and other assistance. In addition, when it comes to the oil and gas sector, investments to build and upgrade gas pipelines will not only put more Americans to work, but also reduce emissions and enhance economic productivity. For example, as part of the Administration's effort to improve federal

permitting for infrastructure projects, the interagency Bakken Federal Executive Group is working with industry, as well as state and tribal agencies, to advance the production of oil and gas in the Bakken while helping to reduce venting and flaring. Moving forward, as part of the effort to develop an interagency methane strategy, the Obama Administration will work collaboratively with state governments, as well as the private sector, to reduce emissions across multiple sectors, improve air quality, and achieve public health and economic benefits.

Preserving the Role of Forests in Mitigating Climate Change: America's forests play a critical role in addressing carbon pollution, removing nearly 12 percent of total U.S. greenhouse gas emissions each year. In the face of a changing climate and increased risk of wildfire, drought, and pests, the capacity of our forests to absorb carbon is diminishing. Pressures to develop forest lands for urban or agricultural uses also contribute to the decline of forest carbon sequestration. Conservation and sustainable management can help to ensure our forests continue to remove carbon from the atmosphere while also improving soil and water quality, reducing wildfire risk, and otherwise managing forests to be more resilient in the fact of climate change. The Administration is working to identify new approaches to protect and restore our forests, as well as other critical landscapes including grasslands and wetlands, in the face of a changing climate.

V. Leading at the Federal Level

Leading in Clean Energy: President Obama believes that the federal government must be a leader in clean energy and energy efficiency. Under the Obama Administration, federal agencies have reduced greenhouse gas emissions by more than 15 percent – the equivalent of permanently taking 1.5 million cars off the road. To build on this record, the Administration is establishing a new goal: The federal government will consume 20 percent of its electricity from renewable sources by 2020 – more than double the current goal of 7.5 percent. In addition, the federal government will continue to pursue greater energy efficiency that reduces greenhouse gas emissions and saves taxpayer dollars.

Federal Government Leadership in Energy Efficiency: On December 2, 2011, President Obama signed a memorandum entitled "Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings," challenging federal agencies, in support of the Better Buildings Challenge, to enter into $2 billion worth of performance-based contracts within two years. Performance contracts drive economic development, utilize private sector innovation, and increase efficiency at minimum costs to the taxpayer, while also providing long-term savings in energy costs. Federal agencies have committed to a pipeline of nearly $2.3 billion from over 300 reported projects. In coming months, the Administration will take a number of actions to strengthen efforts to promote energy efficiency, including through performance contracting. For example, in order to increase access to capital markets for investments in energy efficiency, the Administration will initiate a partnership with the private sector to work towards a standardized contract to finance federal investments in energy efficiency. Going forward, agencies will also work together to synchronize building codes – leveraging those policies to improve the efficiency of federally owned and supported building stock. Finally, the Administration will leverage the "Green Button" standard – which aggregates energy data in a secure, easy to use format – within federal facilities to increase their ability to manage energy consumption, reduce greenhouse gas emissions, and meet sustainability goals.

PREPARE THE UNITED STATES FOR THE IMPACTS OF CLIMATE CHANGE

As we act to curb the greenhouse gas pollution that is driving climate change, we must also prepare for the impacts that are too late to avoid. Across America, states, cities, and communities are taking steps to protect themselves by updating building codes, adjusting the way they manage natural resources, investing in more resilient infrastructure, and planning for rapid recovery from damages that nonetheless occur. The federal government has an important role to play in supporting community-based preparedness and resilience efforts, establishing policies that promote preparedness, protecting critical infrastructure and public resources, supporting science and research germane to preparedness and resilience, and ensuring that federal operations and facilities continue to protect and serve citizens in a changing climate.

The Obama Administration has been working to strengthen America's climate resilience since its earliest days. Shortly after coming into office, President Obama established an Interagency Climate Change Adaptation Task Force and, in October 2009, the President signed an Executive Order directing it to recommend ways federal policies and programs can better prepare the Nation for change. In May 2010, the Task Force hosted the first National Climate Adaptation Summit, convening local and regional stakeholders and decision-makers to identify challenges and opportunities for collaborative action.

In February 2013, federal agencies released Climate Change Adaptation Plans for the first time, outlining strategies to protect their operations, missions, and programs from the effects of climate change. The Department of Transportation, for example, is developing guidance for incorporating climate change and extreme weather event considerations into coastal highway projects, and the Department of Homeland Security is evaluating the challenges of changing conditions in the Arctic and along our Nation's borders. Agencies have also partnered with communities through targeted grant and technical-assistance programs—for example, the Environmental Protection Agency is working with low-lying communities in North Carolina to assess the vulnerability of infrastructure investments to sea level rise and identify solutions to reduce risks. And the Administration has continued, through the U.S. Global Change Research Program, to support science and monitoring to expand our understanding of climate change and its impacts.

Going forward, the Administration will expand these efforts into three major, interrelated initiatives to better prepare America for the impacts of climate change:

I. Building Stronger and Safer Communities and Infrastructure

By necessity, many states, cities, and communities are already planning and preparing for the impacts of climate change. Hospitals must build capacity to serve patients during more frequent heat waves, and urban planners must plan for the severe storms that infrastructure will need to withstand. Promoting on-the-ground planning and resilient infrastructure will be at the core of our work to strengthen America's communities. Specific actions will include:

Directing Agencies to Support Climate-Resilient Investment: The President will direct federal agencies to identify and remove barriers to making climate-resilient investments; identify and remove counterproductive policies that increase vulnerabilities; and encourage and support smarter, more resilient investments, including through agency grants, technical assistance, and other programs, in sectors from transportation and water management to conservation and

disaster relief. Agencies will also be directed to ensure that climate risk-management considerations are fully integrated into federal infrastructure and natural resource management planning. To begin meeting this challenge, the Environmental Protection Agency is committing to integrate considerations of climate change impacts and adaptive measures into major programs, including its Clean Water and Drinking Water State Revolving Funds and grants for brownfields cleanup, and the Department of Housing and Urban Development is already requiring grant recipients in the Hurricane Sandy–affected region to take sea-level rise into account.

Establishing a State, Local, and Tribal Leaders Task Force on Climate Preparedness: To help agencies meet the above directive and to enhance local efforts to protect communities, the President will establish a short-term task force of state, local, and tribal officials to advise on key actions the federal government can take to better support local preparedness and resilience-building efforts. The task force will provide recommendations on removing barriers to resilient investments, modernizing grant and loan programs to better support local efforts, and developing information and tools to better serve communities.

Supporting Communities as they Prepare for Climate Impacts: Federal agencies will continue to provide targeted support and assistance to help communities prepare for climate-change impacts. For example, throughout 2013, the Department of Transportation's Federal Highway Administration is working with 19 state and regional partners and other federal agencies to test approaches for assessing local transportation infrastructure vulnerability to climate change and extreme weather and for improving resilience. The Administration will continue to assist tribal communities on preparedness through the Bureau of Indian Affairs, including through pilot projects and by supporting participation in federal initiatives that assess climate change vulnerabilities and develop regional solutions. Through annual federal agency "Environmental Justice Progress Reports," the Administration will continue to identify innovative ways to help our most vulnerable communities prepare for and recover from the impacts of climate change. The importance of critical infrastructure independence was brought home in the Sandy response. The Federal Emergency Management Agency and the Department of Energy are working with the private sector to address simultaneous restoration of electricity and fuels supply.

Boosting the Resilience of Buildings and Infrastructure: The National Institute of Standards and Technology will convene a panel on disaster-resilience standards to develop a comprehensive, community-based resilience framework and provide guidelines for consistently safe buildings and infrastructure – products that can inform the development of private-sector standards and codes. In addition, building on federal agencies' "Climate Change Adaptation Plans," the Administration will continue efforts to increase the resilience of federal facilities and infrastructure. The Department of Defense, for example, is assessing the relative vulnerability of its coastal facilities to climate change. In addition, the President's FY 2014 Budget proposes $200 million through the Transportation Leadership Awards program for Climate Ready Infrastructure in communities that build enhanced preparedness into their planning efforts, and that have proposed or are ready to break ground on infrastructure projects, including transit and rail, to improve resilience.

Rebuilding and Learning from Hurricane Sandy: In August 2013, President Obama's Hurricane Sandy Rebuilding Task Force will deliver to the President a rebuilding strategy to be implemented in Sandy-affected regions and establishing precedents that can be followed

elsewhere. The Task Force and federal agencies are also piloting new ways to support resilience in the Sandy-affected region; the Task Force, for example, is hosting a regional "Rebuilding by Design" competition to generate innovative solutions to enhance resilience. In the transportation sector, the Department of Transportation's Federal Transit Administration (FTA) is dedicating $5.7 billion to four of the area's most impacted transit agencies, of which $1.3 billion will be allocated to locally prioritized projects to make transit systems more resilient to future disasters. FTA will also develop a competitive process for additional funding to identify and support larger, stand-alone resilience projects in the impacted region. To build coastal resilience, the Department of the Interior will launch a $100 million competitive grant program to foster partnerships and promote resilient natural systems while enhancing green spaces and wildlife habitat near urban populations. An additional $250 million will be allocated to support projects for coastal restoration and resilience across the region. Finally, with partners, the U.S. Army Corps of Engineers is conducting a $20 million study to identify strategies to reduce the vulnerability of Sandy-affected coastal communities to future large-scale flood and storm events, and the National Oceanic and Atmospheric Administration will strengthen long-term coastal observations and provide technical assistance to coastal communities.

II. Protecting our Economy and Natural Resources

Climate change is affecting nearly every aspect of our society, from agriculture and tourism to the health and safety of our citizens and natural resources. To help protect critical sectors, while also targeting hazards that cut across sectors and regions, the Administration will mount a set of sector- and hazard-specific efforts to protect our country's vital assets, to include:

Identifying Vulnerabilities of Key Sectors to Climate Change: The Department of Energy will soon release an assessment of climate-change impacts on the energy sector, including power-plant disruptions due to drought and the disruption of fuel supplies during severe storms, as well as potential opportunities to make our energy infrastructure more resilient to these risks. In 2013, the Department of Agriculture and Department of the Interior released several studies outlining the challenges a changing climate poses for America's agricultural enterprise, forests, water supply, wildlife, and public lands. This year and next, federal agencies will report on the impacts of climate change on other key sectors and strategies to address them, with priority efforts focusing on health, transportation, food supplies, oceans, and coastal communities.

Promoting Resilience in the Health Sector: The Department of Health and Human Services will launch an effort to create sustainable and resilient hospitals in the face of climate change. Through a public-private partnership with the healthcare industry, it will identify best practices and provide guidance on affordable measures to ensure that our medical system is resilient to climate impacts. It will also collaborate with partner agencies to share best practices among federal health facilities. And, building on lessons from pilot projects underway in 16 states, it will help train public-health professionals and community leaders to prepare their communities for the health consequences of climate change, including through effective communication of health risks and resilience measures.

Promoting Insurance Leadership for Climate Safety: Recognizing the critical role that the private sector plays in insuring assets and enabling rapid recovery after disasters, the Administration will convene representatives from the insurance industry and other stakeholders to explore best practices for private and public insurers to manage their own processes and

investments to account for climate change risks and incentivize policy holders to take steps to reduce their exposure to these risks.

Conserving Land and Water Resources: America's ecosystems are critical to our nation's economy and the lives and health of our citizens. These natural resources can also help ameliorate the impacts of climate change, if they are properly protected. The Administration has invested significantly in conserving relevant ecosystems, including working with Gulf State partners after the Deepwater Horizon spill to enhance barrier islands and marshes that protect communities from severe storms. The Administration is also implementing climate-adaptation strategies that promote resilience in fish and wildlife populations, forests and other plant communities, freshwater resources, and the ocean. Building on these efforts, the President is also directing federal agencies to identify and evaluate additional approaches to improve our natural defenses against extreme weather, protect biodiversity and conserve natural resources in the face of a changing climate, and manage our public lands and natural systems to store more carbon.

Maintaining Agricultural Sustainability: Building on the existing network of federal climate-science research and action centers, the Department of Agriculture is creating seven new Regional Climate Hubs to deliver tailored, science-based knowledge to farmers, ranchers, and forest landowners. These hubs will work with universities and other partners, including the Department of the Interior and the National Oceanic and Atmospheric Administration, to support climate resilience. Its Natural Resources Conservation Service and the Department of the Interior's Bureau of Reclamation are also providing grants and technical support to agricultural water users for more water-efficient practices in the face of drought and long-term climate change.

Managing Drought: Leveraging the work of the National Disaster Recovery Framework for drought, the Administration will launch a cross-agency National Drought Resilience Partnership as a "front door" for communities seeking help to prepare for future droughts and reduce drought impacts. By linking information (monitoring, forecasts, outlooks, and early warnings) with drought preparedness and longer-term resilience strategies in critical sectors, this effort will help communities manage drought-related risks.

Reducing Wildfire Risks: With tribes, states, and local governments as partners, the Administration has worked to make landscapes more resistant to wildfires, which are exacerbated by heat and drought conditions resulting from climate change. Federal agencies will expand and prioritize forest and rangeland restoration efforts in order to make natural areas and communities less vulnerable to catastrophic fire. The Department of the Interior and Department of Agriculture, for example, are launching a Western Watershed Enhancement Partnership – a pilot effort in five western states to reduce wildfire risk by removing extra brush and other flammable vegetation around critical areas such as water reservoirs.

Preparing for Future Floods: To ensure that projects funded with taxpayer dollars last as long as intended, federal agencies will update their flood-risk reduction standards for federally funded projects to reflect a consistent approach that accounts for sea-level rise and other factors affecting flood risks. This effort will incorporate the most recent science on expected rates of sea-level rise (which vary by region) and build on work done by the Hurricane Sandy Rebuilding Task Force, which announced in April 2013 that all federally funded Sandy-related rebuilding projects must meet a consistent flood risk reduction standard that takes into account increased risk from extreme weather events, sea-level rise, and other impacts of climate change.

III. Using Sound Science to Manage Climate Impacts

Scientific data and insights are essential to help government officials, communities, and businesses better understand and manage the risks associated with climate change. The Administration will continue to lead in advancing the science of climate measurement and adaptation and the development of tools for climate-relevant decision-making by focusing on increasing the availability, accessibility, and utility of relevant scientific tools and information. Specific actions will include:

Developing Actionable Climate Science: The President's Fiscal Year 2014 Budget provides more than $2.7 billion, largely through the 13-agency U.S. Global Change Research Program, to increase understanding of climate-change impacts, establish a public-private partnership to explore risk and catastrophe modeling, and develop the information and tools needed by decision-makers to respond to both long-term climate change impacts and near-term effects of extreme weather.

Assessing Climate-Change Impacts in the United States: In the spring of 2014, the Obama Administration will release the third U.S. National Climate Assessment, highlighting new advances in our understanding of climate-change impacts across all regions of the United States and on critical sectors of the economy, including transportation, energy, agriculture, and ecosystems and biodiversity. For the first time, the National Climate Assessment will focus not only on dissemination of scientific information but also on translating scientific insights into practical, useable knowledge that can help decision-makers anticipate and prepare for specific climate-change impacts.

Launching a Climate Data Initiative: Consistent with the President's May 2013 Executive Order on Open Data – and recognizing that freely available open government data can fuel entrepreneurship, innovation, scientific discovery, and public benefits – the Administration is launching a Climate Data Initiative to leverage extensive federal climate-relevant data to stimulate innovation and private-sector entrepreneurship in support of national climate-change preparedness.

Providing a Toolkit for Climate Resilience: Federal agencies will create a virtual climate-resilience toolkit that centralizes access to data-driven resilience tools, services, and best practices, including those developed through the Climate Data Initiative. The toolkit will provide easy access to existing resources as well as new tools, including: interactive sea-level rise maps and a sea-level-rise calculator to aid post-Sandy rebuilding in New York and New Jersey, new NOAA storm surge models and interactive maps from the National Oceanic and Atmospheric Administration that provide risk information by combining tidal data, projected sea levels and storm wave heights, a web-based tool that will allow developers to integrate NASA climate imagery into websites and mobile apps, access to the U.S. Geological Survey's "visualization tool" to assess the amount of carbon absorbed by landscapes, and a Stormwater Calculator and Climate Assessment Tool developed to help local governments assess stormwater-control measures under different precipitation and temperature scenarios.

LEAD INTERNATIONAL EFFORTS TO ADDRESS GLOBAL CLIMATE CHANGE

The Obama Administration is working to build on the actions that it is taking domestically to achieve significant global greenhouse gas emission reductions and enhance climate preparedness through major international initiatives focused on spurring concrete action, including bilateral initiatives with China, India, and other major emitting countries. These initiatives not only serve to support the efforts of the United States and others to achieve our goals for 2020, but also will help us move beyond those and bend the post-2020 global emissions trajectory further. As a key part of this effort, we are also working intensively to forge global responses to climate change through a number of important international negotiations, including the United Nations Framework Convention on Climate Change.

I. Working with Other Countries to Take Action to Address Climate Change

Enhancing Multilateral Engagement with Major Economies: In 2009, President Obama launched the Major Economies Forum on Energy and Climate, a high-level forum that brings together 17 countries that account for approximately 75 percent of global greenhouse gas emissions, in order to support the international climate negotiations and spur cooperative action to combat climate change. The Forum has been successful on both fronts – having contributed significantly to progress in the broader negotiations while also launching the Clean Energy Ministerial to catalyze the development and deployment of clean energy and efficiency solutions. We are proposing that the Forum build on these efforts by launching a major initiative this year focused on further accelerating efficiency gains in the buildings sector, which accounts for approximately one-third of global carbon pollutions from the energy sector.

Expanding Bilateral Cooperation with Major Emerging Economies:
From the outset, the Obama Administration has sought to intensify bilateral climate cooperation with key major emerging economies, through initiatives like the U.S.-China Clean Energy Research Center, the U.S.-India Partnership to Advance Clean Energy, and the Strategic Energy Dialogue with Brazil.

We will be building on these successes and finding new areas for cooperation in the second term, and we are already making progress: Just this month, President Obama and President Xi Jinping of China reached an historic agreement at their first summit to work to use the expertise and institutions of the Montreal Protocol to phase down the consumption and production of HFCs, a highly potent greenhouse gas. The impact of phasing out HFCs by 2050 would be equivalent to the elimination of two years' worth of greenhouse gas emissions from all sources.

Combatting Short-Lived Climate Pollutants: Pollutants such as methane, black carbon, and many HFCs are relatively short-lived in the atmosphere, but have more potent greenhouse effects than carbon dioxide. In February 2012, the United States launched the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollution, which has grown to include more than 30 country partners and other key partners such as the World Bank and the U.N. Environment Programme. Major efforts include reducing methane and black carbon from waste and landfills. We are also leading through the Global Methane Initiative, which works with 42 partner countries and an extensive network of over 1,100 private sector participants to reduce methane emissions.

Reducing Emissions from Deforestation and Forest Degradation: Greenhouse gas emissions from deforestation, agriculture, and other land use constitute approximately one-third of global emissions. In some developing countries, as much as 80 percent of these emissions come from the land sector. To meet this challenge, the Obama Administration is working with partner countries to put in place the systems and institutions necessary to significantly reduce global land-use-related emissions, creating new models for rural development that generate climate benefits, while conserving biodiversity, protecting watersheds, and improving livelihoods.

In 2012 alone, the U.S. Agency for International Development's bilateral and regional forestry programs contributed to reducing more than 140 million tons of carbon dioxide emissions, including through support for multilateral initiatives such as the Forest Investment Program and the Forest Carbon Partnership Facility. In Indonesia, the Millennium Challenge Corporation is funding a five-year "Green Prosperity" program that supports environmentally sustainable, low carbon economic development in select districts.

The Obama Administration is also working to address agriculture-driven deforestation through initiatives such as the Tropical Forest Alliance 2020, which brings together governments, the private sector, and civil society to reduce tropical deforestation related to key agricultural commodities, which we will build upon.

Expanding Clean Energy Use and Cut Energy Waste: Roughly 84 percent of current carbon dioxide emissions are energy-related and about 65 percent of all greenhouse gas emissions can be attributed to energy supply and energy use. The Obama Administration has promoted the expansion of renewable, clean, and efficient energy sources and technologies worldwide through:

- Financing and regulatory support for renewable and clean energy projects
- Actions to promote fuel switching from oil and coal to natural gas or renewables
- Support for the safe and secure use of nuclear power
- Cooperation on clean coal technologies
- Programs to improve and disseminate energy efficient technologies

In the past three years we have reached agreements with more than 20 countries around the world, including Mexico, South Africa, and Indonesia, to support low emission development strategies that help countries to identify the best ways to reduce greenhouse gas emissions while growing their economies. Among the many initiatives that we have launched are:

- The U.S. Africa Clean Energy Finance Initiative, which aligns grant-based assistance with project planning expertise from the U.S. Trade and Development Agency and financing and risk mitigation tools from the U.S. Overseas Private Investment Corporation to unlock up to $1 billion in clean energy financing.

- The U.S.-Asia Pacific Comprehensive Energy Partnership, which has identified $6 billion in U.S. export credit and government financing to promote clean energy development in the Asia-Pacific region.

Looking ahead, we will target these and other resources towards greater penetration of renewables in the global energy mix on both a small and large scale, including through our

participation in the Sustainable Energy for All Initiative and accelerating the commercialization of renewable mini-grids. These efforts include:

- **Natural Gas.** Burning natural gas is about one-half as carbon-intensive as coal, which can make it a critical "bridge fuel" for many countries as the world transitions to even cleaner sources of energy. Toward that end, the Obama Administration is partnering with states and private companies to exchange lessons learned with our international partners on responsible development of natural gas resources. We have launched the Unconventional Gas Technical Engagement Program to share best practices on issues such as water management, methane emissions, air quality, permitting, contracting, and pricing to help increase global gas supplies and facilitate development of the associated infrastructure that brings them to market. Going forward, we will promote fuel-switching from coal to gas for electricity production and encourage the development of a global market for gas. Since heavy-duty vehicles are expected to account for 40 percent of increased oil use through 2030, we will encourage the adoption of heavy duty natural gas vehicles as well.

- **Nuclear Power.** The United States will continue to promote the safe and secure use of nuclear power worldwide through a variety of bilateral and multilateral engagements. For example, the U.S. Nuclear Regulatory Commission advises international partners on safety and regulatory best practices, and the Department of Energy works with international partners on research and development, nuclear waste and storage, training, regulations, quality control, and comprehensive fuel leasing options. Going forward, we will expand these efforts to promote nuclear energy generation consistent with maximizing safety and nonproliferation goals.

- **Clean Coal.** The United States works with China, India, and other countries that currently rely heavily on coal for power generation to advance the development and deployment of clean coal technologies. In addition, the U.S. leads the Carbon Sequestration Leadership Forum, which engages 23 other countries and economies on carbon capture and sequestration technologies. Going forward, we will continue to use these bilateral and multilateral efforts to promote clean coal technologies.

- **Energy Efficiency.** The Obama Administration has aggressively promoted energy efficiency through the Clean Energy Ministerial and key bilateral programs. The cost-effective opportunities are enormous: The Ministerial' s Super-Efficient Equipment and Appliance Deployment Initiative and its Global Superior Energy Performance Partnership are helping to accelerate the global adoption of standards and practices that would cut energy waste equivalent to more than 650 mid-size power plants by 2030. We will work to expand these efforts focusing on several critical areas, including: improving building efficiency, reducing energy consumption at water and wastewater treatment facilities, and expanding global appliance standards.

Negotiating Global Free Trade in Environmental Goods and Services: The U.S. will work with trading partners to launch negotiations at the World Trade Organization towards global free trade in environmental goods, including clean energy technologies such as solar, wind, hydro and geothermal. The U.S. will build on the consensus it recently forged among the 21 Asia-Pacific Economic Cooperation (APEC) economies in this area. In 2011, APEC economies agreed to reduce tariffs to 5 percent or less by 2015 on a negotiated list of 54 environmental goods. The

APEC list will serve as a foundation for a global agreement in the WTO, with participating countries expanding the scope by adding products of interest. Over the next year, we will work towards securing participation of countries which account for 90 percent of global trade in environmental goods, representing roughly $481 billion in annual environmental goods trade. We will also work in the Trade in Services Agreement negotiations towards achieving free trade in environmental services.

Phasing Out Subsidies that Encourage Wasteful Consumption of Fossil Fuels: The International Energy Agency estimates that the phase-out of fossil fuel subsidies – which amount to more than $500 billion annually – would lead to a 10 percent reduction in greenhouse gas emissions below business as usual by 2050. At the 2009 G-20 meeting in Pittsburgh, the United States successfully advocated for a commitment to phase out these subsidies, and we have since won similar commitments in other fora such as APEC. President Obama is calling for the elimination of U.S. fossil fuel tax subsidies in his Fiscal Year (FY) 2014 budget, and we will continue to collaborate with partners around the world toward this goal.

Leading Global Sector Public Financing Towards Cleaner Energy: Under this Administration, the United States has successfully mobilized billions of dollars for clean energy investments in developing countries, helping to accelerate their transition to a green, low-carbon economy. Building on these successes, the President calls for an end to U.S. government support for public financing of new coal plants overseas, except for (a) the most efficient coal technology available in the world's poorest countries in cases where no other economically feasible alternative exists, or (b) facilities deploying carbon capture and sequestration technologies. As part of this new commitment, we will work actively to secure the agreement of other countries and the multilateral development banks to adopt similar policies as soon as possible.

Strengthening Global Resilience to Climate Change: Failing to prepare adequately for the impacts of climate change that can no longer be avoided will put millions of people at risk, jeopardizing important development gains, and increasing the security risks that stem from climate change. That is why the Obama Administration has made historic investments in bolstering the capacity of countries to respond to climate-change risks. Going forward, we will continue to:

- Strengthen government and local community planning and response capacities, such as by increasing water storage and water use efficiency to cope with the increased variability in water supply

- Develop innovative financial risk management tools such as index insurance to help smallholder farmers and pastoralists manage risk associated with changing rainfall patterns and drought

- Distribute drought-resistant seeds and promote management practices that increase farmers' ability to cope with climate impacts.

Mobilizing Climate Finance: International climate finance is an important tool in our efforts to promote low-emissions, climate-resilient development. We have fulfilled our joint developed country commitment from the Copenhagen Accord to provide approximately $30 billion of climate assistance to developing countries over FY 2010-FY 2012. The United States contributed approximately $7.5 billion to this effort over the three year period. Going forward, we will seek

to build on this progress as well as focus our efforts on combining our public resources with smart policies to mobilize much larger flows of private investment in low-emissions and climate resilient infrastructure.

II. Leading Efforts to Address Climate Change through International Negotiations

The United States has made historic progress in the international climate negotiations during the past four years. At the Copenhagen Conference of the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, President Obama and other world leaders agreed for the first time that all major countries, whether developed or developing, would implement targets or actions to limit greenhouse emissions, and do so under a new regime of international transparency. And in 2011, at the year-end climate meeting in Durban, we achieved another breakthrough: Countries agreed to negotiate a new agreement by the end of 2015 that would have equal legal force and be applicable to all countries in the period after 2020. This was an important step beyond the previous legal agreement, the Kyoto Protocol, whose core obligations applied to developed countries, not to China, India, Brazil or other emerging countries.
The 2015 climate conference is slated to play a critical role in defining a post-2020 trajectory. We will be seeking an agreement that is ambitious, inclusive and flexible. It needs to be ambitious to meet the scale of the challenge facing us. It needs to be inclusive because there is no way to meet that challenge unless all countries step up and play their part. And it needs to be flexible because there are many differently situated parties with their own needs and imperatives, and those differences will have to be accommodated in smart, practical ways.

At the same time as we work toward this outcome in the UNFCCC context, we are making progress in a variety of other important negotiations as well. At the Montreal Protocol, we are leading efforts in support of an amendment that would phase down HFCs; at the International Maritime Organization, we have agreed to and are now implementing the first-ever sector-wide, internationally applicable energy efficiency standards; and at the International Civil Aviation Organization, we have ambitious aspirational emissions and energy efficiency targets and are working towards agreement to develop a comprehensive global approach.

The White House

Office of the Press Secretary

For Immediate Release June 25, 2013

Presidential Memorandum -- Power Sector Carbon Pollution Standards

ENVIRONMENTAL PROTECTION AGENCY

SUBJECT: Power Sector Carbon Pollution Standards

With every passing day, the urgency of addressing climate change intensifies. I made clear in my State of the Union address that my Administration is committed to reducing carbon pollution that causes climate change, preparing our communities for the consequences of climate change, and speeding the transition to more sustainable sources of energy.

The Environmental Protection Agency (EPA) has already undertaken such action with regard to carbon pollution from the transportation sector, issuing Clean Air Act standards limiting the greenhouse gas emissions of new cars and light trucks through 2025 and heavy duty trucks through 2018. The EPA standards were promulgated in conjunction with the Department of Transportation, which, at the same time, established fuel efficiency standards for cars and trucks as part of a harmonized national program. Both agencies engaged constructively with auto manufacturers, labor unions, States, and other stakeholders, and the resulting standards have received broad support. These standards will reduce the Nation's carbon pollution and dependence on oil, and also lead to greater innovation, economic growth, and cost savings for American families.

The United States now has the opportunity to address carbon pollution from the power sector, which produces nearly 40 percent of such pollution. As a country, we can continue our progress in reducing power plant pollution, thereby improving public health and protecting the environment, while supplying the reliable, affordable power needed for economic growth and advancing cleaner energy technologies, such as efficient natural gas, nuclear power, renewables such as wind and solar energy, and clean coal technology.

Investments in these technologies will also strengthen our economy, as the clean and efficient production and use of electricity will ensure that it remains reliable and affordable for American businesses and families.

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to reduce power plant carbon pollution, building on actions already underway in States and the power sector, I hereby direct the following:

Section 1. Flexible Carbon Pollution Standards for Power Plants. (a) Carbon Pollution Standards for Future Power Plants. On April 13, 2012, the EPA published a Notice of Proposed Rulemaking entitled "Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units," 77 Fed. Reg. 22392. In light of the information conveyed in more than two million comments on that proposal and ongoing developments in the industry, you have indicated EPA's intention to issue a new proposal. I therefore direct you to issue a new proposal by no later than September 20, 2013. I further direct you to issue a final rule in a timely fashion after considering all public comments, as appropriate.

(b) Carbon Pollution Regulation for Modified, Reconstructed, and Existing Power Plants. To ensure continued progress in reducing harmful carbon pollution, I direct you to use your authority under sections 111(b) and 111(d) of the Clean Air Act to issue standards, regulations, or guidelines, as appropriate, that address carbon pollution from modified, reconstructed, and

existing power plants and build on State efforts to move toward a cleaner power sector. In addition, I request that you:

(i) issue proposed carbon pollution standards, regulations, or guidelines, as appropriate, for modified, reconstructed, and existing power plants by no later than June 1, 2014;

(ii) issue final standards, regulations, or guidelines, as appropriate, for modified, reconstructed, and existing power plants by no later than June 1, 2015; and

(iii) include in the guidelines addressing existing power plants a requirement that States submit to EPA the implementation plans required under section 111(d) of the Clean Air Act and its implementing regulations by no later than June 30, 2016.

(c) Development of Standards, Regulations, or Guidelines for Power Plants. In developing standards, regulations, or guidelines pursuant to subsection (b) of this section, and consistent with Executive Orders 12866 of September 30, 1993, as amended, and 13563 of January 18, 2011, you shall ensure, to the greatest extent possible, that you:

(i) launch this effort through direct engagement with States, as they will play a central role in establishing and implementing standards for existing power plants, and, at the same time, with leaders in the power sector, labor leaders, non-governmental organizations, other experts, tribal officials, other stakeholders, and members of the public, on issues informing the design of the program;

(ii) consistent with achieving regulatory objectives and taking into account other relevant environmental regulations and policies that affect the power sector, tailor regulations and guidelines to reduce costs;

(iii) develop approaches that allow the use of market-based instruments, performance standards, and other regulatory flexibilities;

(iv) ensure that the standards enable continued reliance on a range of energy sources and technologies;

(v) ensure that the standards are developed and implemented in a manner consistent with the continued provision of reliable and affordable electric power for consumers and businesses; and

(vi) work with the Department of Energy and other Federal and State agencies to promote the reliable and affordable provision of electric power through the continued development and deployment of cleaner technologies and by increasing energy efficiency, including through stronger appliance efficiency standards and other measures.

Sec. 2. General Provisions. (a) This memorandum shall be implemented consistent with applicable law, including international trade obligations, and subject to the availability of appropriations.

(b) Nothing in this memorandum shall be construed to impair or otherwise affect:

(i) the authority granted by law to a department, agency, or the head thereof; or

(ii) the functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(c) This memorandum is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

(d) You are hereby authorized and directed to publish this memorandum in the *Federal Register.*

BARACK OBAMA