

Climate Change, Sustainable Development, and Ecosystems Committee Newsletter

Vol. 17, No. 3

August 2014

MESSAGE FROM THE CHAIRS

Margaret E. Peloso and Shannon S. Broome

This newsletter marks the end of the ABA year. We would like to thank all of our wonderful vice chairs for their work on behalf of the committee this year. The end of this ABA year is also the end of Maggie Peloso's term as co-Chair of the committee. We are delighted to announce that Maggie will be replaced by Emily Fisher, the Deputy General Counsel, Energy & Climate, Edison Electric Institute. Emily previously served as a vice-chair for the committee and we are thrilled that she has agreed to be a co-chair in the upcoming ABA year.

Shannon and Emily are in the process of planning the committee's activities for the upcoming ABA year. As always, we would love to hear from you with your thoughts and suggestions.

We also hope to see many of you at the Fall Conference in Miami. There are several panels that we think will be of interest to members of CCSDE, including:

1. The Supreme Court and Greenhouse Gases – What It All Means for Your Clients and Practice
2. Climate Change Impacts in the Coastal Zone: Act Now or Regret Later?
3. Train Wreck or Long Overdue Controls? Will the Electric Power Sector Find a Way to

Thrive in the Face of EPA's Multi-Media Regulatory Push?

4. Your Client Wants to Site a New Energy Project or Expand Its Manufacturing Plant: What the Environmental Lawyer Needs to Know to Spot All the Issues
5. Fracking from the Frontlines: A Review of Key Hydraulic Fracturing Issues, Including the Interaction of Local, State, and Federal Law and Crosscutting Regulatory Developments across the Basins

Finally, we wanted to be sure you all know that the ABA Presidential Task Force on Sustainable Development has been authorized to continue its work for another year. CCSDE has already provided recommendations to the Task Force and we look forward to continued collaboration in the coming year.



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Climate Change, Sustainable Development,
and Ecosystems Committee Newsletter
Vol. 17, No. 3, August 2014
Julia Latham, Bill Smalling, and Vic Baltera,
Editors

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JUDICIAL DEVELOPMENTS

L. Margaret Barry

Industry Challenges to Federal Action

Utility Air Regulatory Group v. EPA, Nos. 12–1146, 12–1248, 12–1254, 12–1268, 12–1269, and 12–1272 (U.S. June 23, 2014). See article this issue, *EPA Climate Agenda Served a Blow by the Supreme Court*, Shannon S. Broome and Chuck Knauss.

Environmental Group Lawsuits: Forcing Government to Act

WildEarth Guardians v. United States Environmental Protection Agency, No. 13-1212 (D.C. Cir. May 13, 2014). The D.C. Circuit Court of Appeals upheld EPA’s denial of a request to add coal mines to the list of regulated stationary sources under the Clean Air Act. Earthjustice, on behalf of other environmental groups, had asked EPA to create the new source category and to create standards to address methane emissions from the new category. In April 2013, EPA denied the request, citing its need to “prioritize its actions in light of limited resources and ongoing budget uncertainties.” The D.C. Circuit said that EPA’s determination “easily passes muster” under the deferential standard applied to review of agency denials of rulemaking petitions. The court distinguished this case from *Massachusetts v. EPA*, 549 U.S. 497 (2007), where EPA had responded to a rulemaking petition seeking regulation of carbon dioxide under the Clean Air Act by disclaiming authority to regulate.

Communities for a Better Environment v. Environmental Protection Agency, No. 11-1423 (D.C. Cir. Apr. 11, 2014). The D.C. Circuit upheld EPA’s determination not to establish a secondary standard for carbon monoxide, finding that petitioners did not have standing to challenge the determination because they had not presented sufficient evidence of a link between carbon monoxide at the levels permitted by EPA and a worsening of global warming. In its review of the standards for carbon monoxide, EPA had conducted an evaluation of the causal connection between carbon monoxide and climate change and

concluded that it could not determine whether a secondary standard for carbon monoxide would affect climate.

Environmental Group Lawsuits: Stopping Government Action (NEPA)

WildEarth Guardians v. Bureau of Land Management, No. 1:11-cv-01481-RJL (D.D.C. Mar. 30, 2014). The federal district court for the District of Columbia granted the U.S. Bureau of Land Management’s (BLM’s) motion for summary judgment in this challenge to BLM’s decision to authorize competitive lease sales in two coal tracts in the Wyoming Powder River Basin. As a threshold matter, the court concluded that plaintiffs had standing to bring all of their claims, including those related to climate change. After concluding that plaintiffs had standing stemming from injuries to aesthetic and recreational interests from local pollution to challenge BLM’s consideration of local pollution impacts, the court expressed relief that it “need not navigate the troubled waters of the ‘derivative’ standing issue, nor . . . decide whether plaintiffs have established a separate injury in fact caused by climate change” because the D.C. Circuit had made clear in a similar case—*WildEarth Guardians v. Jewell*, No. 12-5300—that plaintiffs had standing to challenge BLM’s consideration of climate change impacts on a procedural injury theory. On the merits, however, the court rejected plaintiffs’ claims under both the National Environmental Policy Act (NEPA) and the Federal Land Policy Management Act. The court was not persuaded that BLM had not sufficiently considered the impacts of greenhouse gas (GHG) emissions from mining operations and from the subsequent combustion of the coal. The court concluded that “the level of specificity plaintiffs would prefer in BLM’s analysis is neither possible based on current science, nor required by law.” The court said that BLM’s evaluation of GHG emissions associated with its actions as a percentage of statewide and nationwide emissions was “a permissible and adequate approach,” given that current climate science did not allow for “specific linkage between particular [greenhouse gas] emissions and particular climate change impacts.” The court also rejected plaintiffs’ contention that BLM was obligated to consider alternatives that would reduce GHG

emissions such as emissions capture and sequestration, more efficient mine hauling trucks, and carbon offsets.

Protect Our Communities Foundation v. Jewell, No. 3:13-cv-00575-JLS-JMA (S.D. Cal. Mar. 25, 2014). The federal district court for the Southern District of California rejected a challenge to BLM actions authorizing the Tule Wind Project, a utility-scale wind energy facility on public lands in San Diego County. The court was not persuaded that BLM violated NEPA (or the Migratory Bird Treaty Act or Bald and Golden Eagles Protection Act). Among other things, the court rejected plaintiffs' claims that BLM had failed to take a hard look at climate change impacts, finding that BLM did not have to indicate the number of megawatt-hours of energy the project would generate each year to support its conclusion that the project would "potentially" decrease overall emissions associated with electrical generation in California. Nor did BLM have to assess the project's "life-cycle" emissions impacts by taking into account emissions from off-site equipment manufacture and transportation—the court deemed such an assessment "largely speculative." The court also agreed with the defendants that BLM had sufficiently addressed a distributed generation alternative favored by plaintiffs that would have relied on widespread development of "rooftop solar" systems on residential and commercial structures in San Diego County, as well as development of other small-scale renewable energy sources.

Environmental Group Lawsuits: Challenging Clean Air Act Permits

In re ExxonMobil Chemical Company (Baytown Olefins Plant), PSD Appeal No. 13-11 (EAB May 14, 2014). EPA's Environmental Appeals Board (EAB) rejected a challenge by Sierra Club to EPA Region 6's issuance of a permit for a new natural gas-fired ethylene production unit at ExxonMobil Chemical Company's Baytown Olefins Plant in Harris County, Texas. Sierra Club contended that EPA had clearly erred or abused its discretion in its assessment of the viability of using carbon capture and sequestration (CCS) to reduce carbon dioxide emissions from the unit. EAB upheld Region 6's BACT analysis. EAB concluded that Region 6 had appropriately determined

that the total cost of the CCS technology, which would have increased the project's capital costs by 25 percent, made CCS economically unachievable and that implementing CCS would have secondary environmental impacts such as increased emissions of nitrogen oxides and volatile organic compounds. EAB also said that the absence of comparable facilities justified the Region's reliance on total cost information instead of on data showing the project's cost-effectiveness per ton of carbon dioxide avoided. EAB also rejected Sierra Club's arguments that Region 6 had not followed the methodology required in EPA's *Cost Control Manual* and that Region 6 should have considered emissions streams from the project's steam cracking furnaces (which produce a cleaner stream that would be less costly to capture) separately from emissions from the CCS system's utility plant.

In re La Paloma Energy Center, LLC, PSD Appeal No. 13-10 (EAB Mar. 14, 2014). EAB also rejected Sierra Club's challenge to a Prevention of Significant Deterioration permit issued by EPA Region 6 for a natural gas-fired power plant in Texas. EAB was not persuaded by Sierra Club's argument that Region 6 was required to consider each of three combined cycle natural gas-fired combustion turbine models as a separate technology in its BACT analysis. EAB deferred to Region 6's determination that the differences in the GHG emissions from each of the three proposed turbine models were "marginal" and concluded that Region 6 "did not clearly err or abuse its discretion in determining that the GHG emission limits for all three turbine models represent BACT for highly efficient combined cycle combustion turbines." EAB also ruled that Region 6 had not abused its discretion in determining that a solar thermal energy component would "redefine the source" and therefore could be excluded as a potential emissions-control alternative.

Dormant Commerce Clause Challenges to State Action

Rocky Mountain Farmers Union v. Corey, Nos. 13-1148, 13-1149, 13-1308 (U.S. cert. denied June 30, 2014). The U.S. Supreme Court denied three petitions seeking review of the Ninth Circuit decision that reversed a district court ruling that California's

Low Carbon Fuel Standard (LCFS) violated the dormant Commerce Clause. Two of the petitions had been filed by the parties who had challenged the LCFS; their petitions sought review of the Ninth Circuit’s conclusions that the LCFS did not facially discriminate against interstate commerce and did not constitute extraterritorial regulation. The third was a conditional cross-petition filed by the State of California defendants, who sought review on the issues of whether section 211(c)(4)(B) of the Clean Air Act (authorizing California to set emissions requirements) barred petitioners’ challenges and whether changes to the LCFS regulations’ treatment of 2011 California crude oil sales rendered some aspects of petitioners’ challenges moot. The cases now go back to the district court for further proceedings.

Energy and Environment Legal Institute v. Epel, No. 11-cv-00859-WJM-BNB (D. Colo. May 9, 2014, standing order May 1, 2014). The federal district court for the District of Colorado ruled on May 9 that the “Renewables Quota” of Colorado’s Renewable Energy Standard (RES) did not violate the dormant Commerce Clause. The Renewables Quota required that utilities obtain 30 percent of their energy from renewable sources by 2020. The judgment in favor of the defendants came eight days after the court ruled that the Energy and Environment Legal Institute—“a non-profit organization dedicated to the advancement of rational, free-market solutions to land, energy, and environmental challenges in the United States”—had standing to challenge the Renewables Quota, based on the lost sales and lost ability to compete of one of its members, a mining company that operated two coal mines in Wyoming. (The court concluded, however, that neither the organization nor one of its individual members had standing to challenge two ancillary provisions of the RES.) In its May 9 opinion, the court found that plaintiffs had not made any effort to show that the Renewables Quota discriminated against out-of-state interests on its face or in purpose or effect. Moreover, the court rejected plaintiffs’ contentions that the Renewables Quota improperly regulated wholly out-of-state commerce. The court noted that the RES only affected commerce when an out-of-state electricity generator “freely chooses to do business with a Colorado utility” and that the RES did not impose conditions on the

importation of electricity. The court also found that plaintiffs had failed to establish that the RES burdened interstate commerce for the purpose of the *Pike* balancing test. Plaintiffs announced they would appeal the district court’s judgment to the Tenth Circuit Court of Appeals.

North Dakota v. Heydinger, Case No. No. 11-cv-3232 (SRN/SER) (D. Minn. Apr. 18, 2014). The federal district court for the District of Minnesota enjoined the State of Minnesota from enforcing provisions of the Next Generation Energy Act that barred both importing energy from a “new large energy facility” outside Minnesota and entering into new long-term power purchase agreements, where such activities would contribute to statewide carbon dioxide emissions. The court ruled that these prohibitions were a “classic example” of extraterritorial regulation in violation of the dormant Commerce Clause. The court said that due to how the electricity industry operates—with the sources of electricity indistinguishable from each other once the electricity enters the grid—the law could require out-of-state entities to comply with Minnesota requirements and even seek regulatory approval from Minnesota before engaging in power transactions outside Minnesota.

Climate Change Protestors and Scientists

American Tradition Institute v. Rector and Visitors of the University of Virginia, Record No. 130934 (Va. Apr. 17, 2014). The Supreme Court of Virginia affirmed a lower court ruling that shielded certain documents produced or received by climate scientist Michael Mann while he was a professor at the University of Virginia (UVA) from disclosure under Virginia’s Freedom of Information Act (VFOIA). The case turned on the meaning of “proprietary” in VFOIA’s exemption for “[d]ata, records or information of a proprietary nature produced or collected by or for faculty or staff of public institutions of higher education . . . in the conduct of or as a result of study or research on medical, scientific, technical or scholarly issues.” The Virginia Supreme Court rejected the American Tradition Institute’s (ATI’s) “narrow construction” of “proprietary,” which ATI said required financial competitive advantage. The court said this interpretation was not consistent with legislative intent

to protect public educational institutions from being placed at a competitive disadvantage compared to private universities and colleges. The court concluded that the legislative concern was motivated by a “broader notion” of competitive disadvantage that extended beyond financial injury to “harm to university-wide research efforts, damage to faculty recruitment and retention, undermining of faculty expectations of privacy and confidentiality, and impairment of free thought and expression.” The court cited at length the affidavit of a UVA administrator who had also served as an administrator at Duke University, a private institution, who said that “[i]f U.S. scientists at public institutions lose the ability to protect their communications with faculty at other institutions, their ability to collaborate will be gravely harmed.”

L. Margaret Barry is the Environmental Law Writer at Arnold & Porter LLP. She maintains the Climate Case Chart (climatecasechart.com) at Arnold & Porter and writes a monthly update on U.S. climate change litigation in conjunction with Columbia Law School’s Center for Climate Change Law.

EPA CLIMATE AGENDA SERVED A BLOW BY THE SUPREME COURT

Shannon S. Broome and Chuck Knauss

On June 23, 2014, the United States Supreme Court handed down its decision in what was the final “big” environmental case of the term, *Utility Air Regulatory Group v. EPA*, No. 12-1146 (U.S.) (*UARG*). *UARG* addresses the legality of the second major element of U.S. Environmental Protection Agency’s (EPA’s) Climate Agenda—whether and to what extent greenhouse gas (GHG) emissions may be regulated under the Clean Air Act’s (the Act) Title I and V permitting programs—specifically whether EPA regulation of GHGs emitted from motor vehicle tailpipes automatically means that GHGs must also be regulated under the Act’s stationary source permitting programs. There is clearly much to take away from the Supreme Court’s decision. As it often does, the Court made sweeping pronouncements about the law, while leaving the details of implementing its decision to the lower courts and EPA.

In brief, the Court held that EPA had significantly overstepped the bounds of its legal authority in issuing the *Prevention of Significant Deterioration (PSD) and Title V Tailoring Rule*, in which the agency raised “major source” thresholds from the statutorily prescribed 250 and 100 tons per year (tpy) levels up to 100,000 tpy, with a plan to lower these thresholds progressively over time. While the Court reserved for EPA some limited authority to control GHGs when a plant is otherwise required to obtain a PSD permit, such authority will not result in a single additional PSD permit beyond those that were required before EPA decided to regulate vehicle GHG emissions. Further, the Court found no authority to impose a requirement to obtain a Title V operating permit based on a plant’s GHG emissions.

In spite of public statements to the contrary, the decision represents a significant defeat for the Obama administration on matters that will shape future agency regulations generally, not just in the Clean Air Act context. More importantly, *UARG* stands for the proposition that the separation of powers doctrine



remains alive and well, and it preserves important principles of administrative law, serving to blunt, at least for the time being, attempts by administrative agencies to expand their missions beyond congressional authorization.

The EPA and D.C. Circuit Proceedings. The decision under review was *Coalition for Responsible Regulation v. EPA*, 684 F.3d 102 (D.C. Cir. 2012) (per curiam). That decision involved challenges by industry parties to a *series* of EPA actions in which the agency (1) found that GHGs emitted from motor vehicles satisfy the criteria for an “endangerment finding” under section 202 of the Act, (2) consequently issued regulations limiting GHG emissions from tailpipes of motor vehicles, and (3) concluded that such regulation *by operation of statute automatically* triggered applicability and potential control requirements for stationary sources under Title I and Title V of the Act. Prior to regulation of GHGs from motor vehicles, EPA and states had issued altogether only a few hundred PSD permits per year (which are needed before beginning construction of subject facilities), and only about 30,000 facilities had required Title V operating permits. Because GHGs are emitted in vastly greater quantities than conventional pollutants that historically triggered permitting under PSD and Title V, EPA’s interpretation would swell PSD permits to more than 80,000 *annually*, and some 6 *million* stationary sources would become subject to the Title V permit program.

Notwithstanding these results, both EPA and the D.C. Circuit concluded that once GHGs from motor vehicles were regulated under Title II of the Act, the statute “compelled” EPA also to regulate emissions of GHGs from stationary sources under Titles I and V. In practical terms, EPA decreed that a source had to obtain a PSD or Title V permit based *solely* on its potential GHG emissions (simultaneously asserting that, even if not compelled, the interpretation was reasonable). EPA also acknowledged the absurdity of this interpretation: “applying PSD requirements literally to GHG sources at the present time . . . would result in a program that would have been unrecognizable to the Congress that designed PSD.” EPA, *Prevention of Significant Deterioration and Title V Greenhouse*

Gas Tailoring Rule; Final Rule, 75 Fed. Reg. 31,514, 31,555 (June 3, 2010).

Because astronomically higher numbers of permits would be required with this new interpretation, EPA and state permitting capabilities would be overwhelmed, thereby diverting scarce resources to permitting smaller sources and likely having negative impacts on *all of industry*, including large sources, such as utilities and refineries, already subject to these permitting programs based on emissions of conventional pollutants. To avoid what EPA itself recognized was an “absurd result,” the agency claimed authority to rewrite clear statutory thresholds, plus the sole discretion to adjust those thresholds as it saw fit.

When EPA sought comment on this problem, industry stakeholders provided potential statutory interpretations that would allow modest regulation of GHGs under the PSD program but would not dramatically expand the program. Specifically, some stakeholders pointed out the distinction in the statutory language between pollutants subject to regulation under “this chapter” (the entire Clean Air Act) and those regulated under part C of Title I (the PSD program). In particular, they asserted that EPA should interpret section 165(a)’s language limiting applicability to those areas “to which this *part* applies” in combination with the statement in section 161(a) that part C applies to “prevent significant deterioration of air quality *in each region (or portion thereof) designated pursuant to section 107 . . . as attainment or unclassifiable.*” Under this view, PSD is triggered only for pollutants for which the location in question is designated “attainment”—a designation that is made under section 107 for National Ambient Air Quality Standard (NAAQS) pollutants. Once applicability is triggered, however, then control requirements may apply more broadly in accordance with section 165(a)(4), which requires best available control technology (BACT) for any “pollutant subject to regulation under this *chapter* [the entire Clean Air Act].” Other commenters noted that EPA could interpret “PSD pollutant” as being limited to those pollutants that impact local air quality since protecting local air quality is the purpose of the PSD program. EPA’s proposed interpretation, commenters explained, ignored both the limiting

language in section 165(a)—any area to which this part *applies*—and the purposes of the PSD program.

Under any of the narrowing interpretations of the Act offered by stakeholders, EPA would not be required to rewrite the Act’s major source levels in order to avoid an onslaught of permit applications. Thus, while EPA could impose controls on a broader class of pollutants once a plant was required to obtain a permit, the proffered narrowing interpretations of initial applicability would have avoided the absurdity created by EPA’s preferred interpretation and allowed continued timely processing of PSD permit applications from larger sources. Notwithstanding these opportunities to make the program work, EPA rejected all narrowing interpretations, asserting that the only permissible choice was to bring GHGs fully within the PSD and Title V programs and then to “adjust” the thresholds for applicability as it deemed appropriate over time.

In its review of EPA’s actions, the D.C. Circuit agreed with EPA, holding that the broad, Act-wide definition of “air pollutant” must be applied across the board, even if a narrower, context-appropriate definition makes more sense in a particular operational context. Once it accepted this premise—that the PSD program applies to sources based solely on GHG emissions and that EPA was therefore facing an absurdity created by the statute—EPA’s second claim, that it could “tailor” (i.e., rewrite) perfectly clear provisions of the PSD program, did not seem to the court to be an unreasonable proposition. The court did not rule, however, on the appropriateness of invoking the absurd results, administrative necessity, and so-called “one-step-at-a-time” doctrines because it held that the petitioners did not have standing to challenge the Tailoring Rule, as it provided *relief* to sources that otherwise would have had to comply with the permitting program (since EPA’s reading of the permitting triggers was “compelled”). *See id.* at 146. The D.C. Circuit denied rehearing *en banc* over separate lengthy dissents from Judges Brown and Kavanaugh.

The Supreme Court Proceedings. Though the Supreme Court denied petitions to review the

endangerment finding and the motor vehicle rule, it granted certiorari on a single issue:

Whether EPA permissibly determined that its regulation of greenhouse gas emissions from new motor vehicles triggered permitting requirements under the Clean Air Act for stationary sources that emit greenhouse gases.

Justice Scalia’s two-part opinion commanded varying majorities of the Court:

1. The Act neither compels nor permits EPA to adopt an interpretation of the Act requiring a source to obtain a PSD or Title V permit on the sole basis of its potential GHG emissions. Slip op. at 10-24. (This part was joined by the Chief Justice and Justices Kennedy, Thomas, and Alito.)
2. EPA reasonably interpreted the Act to require sources that would need permits based on their emission of conventional pollutants to comply with BACT for GHG. Slip op. at 24-29. (This part was joined by the Chief Justice, Justice Kennedy, and the Court’s liberal wing—Justices Ginsburg, Breyer, Sotomayor, and Kagan.)

Notably, while only Chief Justice Roberts and Justice Kennedy signed onto Justice Scalia’s opinion in full, that Justice Kennedy joined in harshly rebuking the EPA action is important. Not unexpectedly, Justices Alito and Thomas joined the rebuke but would have also *entirely* forbidden EPA from any GHG regulation under Title I and Title V. Justice Breyer’s opinion, concurring in part and dissenting in part, joined by Justices Ginsburg, Sotomayor, and Kagan, would have upheld EPA altogether. Provided below are highlights of the Court’s two-part opinion.

Part 1 of the Opinion—EPA’s interpretation is neither compelled nor permissible and its action is “patently unreasonable—not to say outrageous.” The Court first rejected EPA’s argument that its interpretation of the Act was “compelled.” In rejecting EPA’s assertion that Supreme Court

precedent mandated including GHG's everywhere that the term "air pollutant" appears, the Court explained there is not just one potential definition of "air pollutant" as used in the Act. While true that there is a broad, "Act-wide" definition, this broad definition merely identifies what substances are *eligible* for regulation under the Act's operative provisions. Slip op. at 11. Justice Scalia stated that, "where the term 'air pollutant' appears in the Act's operative provisions," it is appropriate for EPA to give the phrase "a narrower, context-appropriate meaning." *Id.* Indeed, the Court noted that EPA had "routinely" done just that—given the term "air pollutant" a context-appropriate interpretation that was narrower than the Act-wide definition. Thus, there may be several interpretations of the term "air pollutant" in the Act, depending on the program for which the term is being defined.

The Court also clarified that nothing in *Massachusetts v. EPA*, 549 U.S. 497 (2007), supports EPA's contrary interpretation. As Justice Scalia quipped, "It is *plain as day* that the Act does not envision an elaborate, burdensome permitting process for major emitters of steam, oxygen, or other harmless airborne substances." Slip op. at 12 (emphasis added). Thus, the Court explained that "*Massachusetts* does not strip EPA of authority to exclude greenhouse gases from the class of regulable air pollutants under other parts of the Act where their inclusion would be inconsistent with the statutory scheme." *Id.* at 14. Having determined that EPA's proposed definition of "air pollutant" was not compelled, the Court went on to consider whether the agency's statutory interpretation was nevertheless a reasonable one. Here, Justice Scalia did not mince words, calling EPA's proposed definition "patently unreasonable—not to say outrageous." *Id.* at 20.

While the PSD program was meant to apply to a relatively small number of large industrial sources, under EPA's interpretation, the agency was claiming "newfound authority to regulate millions of small sources—including retail stores, offices, apartment buildings, shopping centers, schools, and churches—and to decide, on an ongoing basis and without regard for thresholds prescribed by Congress, how many of

those sources to regulate." Slip op. at 23. As Justice Scalia explains, our tripartite system of government does that work that way:

The power of executing the laws necessarily includes both authority and responsibility to resolve some questions left open by Congress that arise during the law's administration. But it does not include a power to revise clear statutory terms that turn out not to work in practice.

Id. With a rhetorical flourish, Justice Scalia concluded: "We are not willing to stand on the dock and wave goodbye as EPA embarks on a multiyear voyage of discovery." *Id.*

Although the Court clearly rejected EPA's proposed interpretation as neither compelled nor reasonable, it did not propose an interpretation of its own. In effect, the Court adopted the view of the industry petitioners and *amici* who argued that where the Act is susceptible to an interpretation that does not produce absurd results, EPA cannot choose one that does and then invoke the administrative necessity or absurd results doctrines to rewrite a statute. For this reason, the Court left open to EPA and the judiciary to select an interpretation that conforms with congressional intent for these programs. Here, the Court noted that several approaches had already been proposed, including that PSD permitting is only required for NAAQS pollutants in an area that has been designated attainment or unclassifiable.

Finally, the Court gave one more passing warning: "The need to rewrite clear provisions of the statute should have alerted EPA that it had taken a wrong interpretative turn." Slip op. at 24. This admonition could prove to have far-reaching impacts as EPA embarks on additional unprecedented interpretations of the Clean Air Act as applied to GHG emissions.

Part 2—Anyway sources can be required to install BACT for GHGs. The Court held that EPA may not subject sources to PSD permitting based *solely* on their emission of GHGs, but what about sources that otherwise "need [PSD] permits based on their emissions of more conventional pollutants (such as

particulate matter)?” Slip op. at 25. May EPA require that these sources comply with BACT emission standards for GHGs?

Focusing on the language difference between the *applicability* and *control* provisions of the PSD program (i.e., applicability in sections 165(a) and 161 addressing NAAQS pollutants for which an area is designated attainment and section 165(a)(4) addressing control requirements for “all pollutants subject to regulation” under the entire Act), the Court held that applying controls when a source is otherwise triggering PSD may be permissible (as had been argued by several industry petitioners). The Court held that EPA could apply BACT to GHG emissions from so-called “anyway” sources—sources that already emit sufficient quantities of conventional pollutants to be subject to the requirement to obtain a PSD permit. Slip op. at 25. All the same, the Court explained that BACT is not a blank check for any kind of GHG emissions improvements that EPA might demand. *Id.* at 26–27. Instead, there are “important limitations” on BACT that prevent EPA from exercising “unbounded” authority. *Id.* at 26. EPA must take into “account energy, environmental, and economic impacts and other costs.” *Id.* at 25.

The Court’s holding hinged on the fact that, unlike the PSD program’s triggering provisions, “the BACT provision is far less open-ended.” Slip op. at 27. “It states that BACT is required ‘for each pollutant subject to regulation under this chapter’ (i.e., the entire Act).” *Id.* The Court then explained that, even if the text did not lend itself to this position, “applying BACT to greenhouse gases is not so disastrously unworkable,

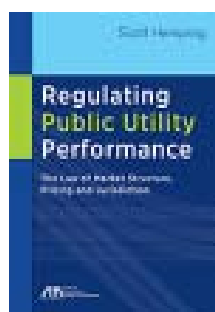
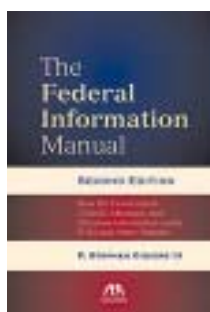
and need not result in such a dramatic expansion of agency authority, as to convince us that EPA’s interpretation is unreasonable.” *Id.* at 28. But again, the Court couched its holding:

We acknowledge the potential for greenhouse-gas BACT to lead to an unreasonable and unanticipated degree of regulation, and our decision should not be taken as an endorsement of all aspects of EPA’s current approach, nor as a free rein for any future regulatory application of BACT in this distinct context. Our narrow holding is that nothing in the statute categorically prohibits EPA from interpreting the BACT provision to apply to greenhouse gases emitted by “anyway” sources.

Id. The Court’s careful narrowing of its decision indicates that EPA does not enjoy unfettered discretion in applying GHG BACT, even at “anyway” sources.

Implications. The Obama administration publicly cast the Court’s recent decision as a victory because, as a practical matter, it may impose BACT for GHG emissions on anyway sources—thereby allowing the agency to regulate sources it says account for 83 percent of all stationary source GHG emissions that could be subjected to PSD. While on the surface this sounds like it will affect many sources, in reality, the effects are limited to no more than several hundred sources a year where construction or modification causes emissions increases of both criteria pollutants in volumes that trigger PSD and increases of GHGs that are greater than EPA-established *de minimis* levels. Moreover, the Court stated that there are important

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limits on the GHG BACT process—notably, EPA cannot order a fundamental redesign of the facility, BACT can only be used to regulate pollutants from the source itself, and EPA may not require reductions in the facility’s demand for electricity from the grid. Slip op. at 27. These BACT limitations may prove important constraints on EPA authority in the permitting for new or modified power plants.

The administration’s climate change agenda should be reviewed in light of the Court’s strong rebuke as to separation-of-powers concerns. The Court emphasized that, although the Act might be reasonably interpreted to reach some aspects of GHG emissions, EPA “has no power to ‘tailor’ legislation to bureaucratic policy goals by rewriting unambiguous statutory terms.” Slip op. at 21. The debate in the coming months will include whether EPA’s power sector GHG rules look more like the Cross State Air Pollution Rule (CSAPR), where the Supreme Court allowed EPA to fill a “gap,” *see EME Homer City v. EPA*, No. 12-1182 (U.S.), or the Tailoring Rule, where the Court vacated administrative overreach.

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INVESTING TO ADDRESS CLIMATE CHANGE ABROAD—TREAD LIGHTLY AND CARRY A BIG WALLET

Robert Foster

As momentum builds around the movement to divest from fossil fuels, it is likely that your clients will soon to be talking to you about carbon bubbles and investment strategies to come out on the right side of climate change, especially in new growth markets. Whether your client is a foundation, a newly minted billionaire, or a major financial institution, no one is too big to fail at investing to address climate change. In fact, most will fail—several times before they get their models right and find consistent successes abroad.

As the Executive Director of Accelerating Market-Driven Partnership (AMP), an international impact investing initiative launched by the United States State Department and the Rockefeller Foundation, I receive lots of questions about investing with impact. In the hopes of minimizing your clients’ failures and maximizing their successes, below I offer five answers to some of the most common questions AMP receives about investing in climate adaptation and low-carbon initiatives internationally.

- 1. If an investment involves agriculture, venture capital returns are probably a fantasy:** Simply put, when a product grows out of the earth, the barriers to entry are rarely significant. If returns of 12 to 15 times do seem realistic, odds are that the local community will not receive a fair shake. That said, impact lending—while not nearly as glamorous as venture capital—can be very effective. Witness Root Capital’s successes lending to established cooperatives. And, if an impact loan to support a carbon-conscious agricultural initiative is being evaluated, it is worth studying climate models before cutting a check. Today’s organic, fair-trade, shade fine cacao forest may be tomorrow’s savannah.
- 2. Cash is still king, but the queen—cultural awareness—runs the show:** This does not mean buying a copy of *Kiss, Bow or Shake Hands* and a *Lonely Planet* phrase book and

calling it a day. A climate-minded investor looking at deals abroad will likely experience more relevant cultural differences across socioeconomic strata within a country than between highly educated international elites. On that note, and as Esther Duflo and Abhijit Banerjee's research at the Abdul Latif Jameel Poverty Action Lab (J-PAL) teaches us, when you are poor and living in an underdeveloped nation, being an entrepreneur is usually the last occupation you want. The investment that creates the most value for the poor is one that provides reliable employment. A competitive low-carbon concrete factory in Juba is going to deliver more impact than another microfinance fund in Bangalore. Not as trendy, but the relative impact is incommensurable.

- 3. Systems thinking is important at home, but critical abroad.** Development economists and aid agencies have been investing resources to generate impact since the end of World War II. And they have made terrific mistakes that teach us about the value of systems thinking. Consider this story, as told by Amory Lovins: *“In the early 1950s, the Dayak people in Borneo had malaria. The World Health Organization had a solution: spray DDT. They did; mosquitoes died; malaria declined. . . . But there were side-effects. House roofs started falling down on people's heads, because the DDT also killed tiny parasitic wasps that had previously controlled thatch-eating caterpillars. . . . Meanwhile, the DDT-poisoned bugs were eaten by geckoes, which were eaten by cats. The DDT built up in the food chain and killed the cats. Without the cats, the rats flourished and multiplied. Soon the World Health Organization was threatened with potential outbreaks of typhus and plague, and had to call in RAF Singapore to conduct Operation Cat Drop—parachuting a great many live cats into Borneo.”* The critiques of economists Bill Easterly and Dambisa Moyo highlight that the less sensational, but perhaps more insidious, system failures are created by donor-driven market distortions. Their perspectives are important to

study because when an investor rolls up in a slightly dusted SUV saying she is there to invest in a low-carbon enterprise or a climate adaptation initiative, the locals will see her with the same eyes they have seen aid workers for decades before.

- 4. Partner with experts:** Just as Goldman Sachs found a partner in Bloomberg Philanthropies to augment their systems knowledge and mitigate risk when they invested in reducing the recidivism rate for offenders in a New York jail, it makes sense for international climate investors to find partners abroad. Whether the investor intends to invest in a low-carbon enterprise in a far-flung corner of the Amazon or a climate adaptation initiative on an isolated coastal village of Sulawesi, there is probably someone who has been studying and working in the community for at least a decade. This expert's knowledge will help predict unintended consequences and reduce the likelihood of failure, which often chalks up to be more than just a learning experience. Imagine a farmer's opportunity cost of a failed investment. That loss will not return her to square one; the failure will likely entrench her in deeper poverty than before the investor signed the term sheet.
- 5. Start with anything but housing:** While addressing inefficiencies of the built environment, which consumes three-quarters of our electricity, is tempting because of the significant impacts on energy consumption, consider starting someplace other than housing. Factors such as checkered enforcement of local regulations, community politics, correlations between interest rate shifts and election cycles in many developing countries make housing an extraordinarily challenging sector for international climate investors. Never say never—our team even coordinated financial technical assistance on a US\$2.1 billion energy-efficient urban infill deal in São Paulo that we are still waiting on—but consider Acumen, one of the smartest, most charismatic and important leaders in international impact

investing. Acumen has been working on housing for over a decade and has executed only a handful of housing deals. If they have yet to knock it out of the park, chances are the unseasoned impact investor will have better luck elsewhere.

These five ideas illustrate but a handful of the complexities of investing to address climate change. In an era of diminishing support from governments worldwide, developing sound investment approaches to achieve development outcomes is a critically important pursuit. Good luck, and remember: tread lightly and carry a (very) big wallet.

For a deeper dive into the subject check out our primer, which has received high praise from the United States Department of Commerce. Developed in partnership with Georgetown University, *The Intersection of Impact Investing and International Development*, maps the current state of impact investing overseas and provides an introduction to the ideas of development economists Esther Duflo, Bill Easterly, Dambisa Moyo and other important thought leaders. http://socialenterprise.georgetown.edu/wp-content/uploads/2014/02/Impact-Investment-Primer_AMP.pdf

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DISASTER AVERTED FOR NOW: ICAO TO DEVELOP GLOBAL APPROACH TO REGULATE AVIATION EMISSIONS

Van Hilderbrand Jr.

Awareness of climate change and concern for the environment have grown in the 21st century as individual countries and transnational groups attempt to implement reforms and incentives to reduce greenhouse gas (GHG) emissions. The latest of these attempts is in the aviation industry, whose emissions, according to the European Commissioner for Climate Change Connie Hedegaard, “are growing faster than from any other sector, and all forecasts indicate they will continue to do so under business as usual conditions.” Most aviation industry leaders believe that emissions should be curbed to reduce their effects on climate, but the manner and scale in which to achieve this goal have varied greatly (e.g., carbon tax, cap-and-trade system, alternative fuels, advanced technology, local/regional approach, global approach).

The European Union (EU) enacted measures that it believed would be a “stepping-stone” to a global approach to combat GHG emissions. Yet, other countries took a different view, believing that these measures would threaten the sovereignty of individual nations and violate international law. Eventually, the European Parliament yielded to international pressure and looked to the International Civil Aviation Organization (ICAO) to create a global mechanism to control aviation emissions. This article provides a background on the EU's measures, the international reaction, and the present status of the issue.

Legal Background—The Emissions Trading System's Application to the Global Aviation Industry

In 2008, the European Commission amended the Emissions Trading System Directive (2003/87/EC) and announced that the aviation industry would become the second-largest sector in the EU's carbon emissions trading system (ETS), after the power-generation and manufacturing sector. The Commission had previously concluded that the ETS was the most cost-efficient and

environmentally effective option to control emissions. The ETS is the largest carbon cap-and-trade program in the world. It operates through the allocation and trading of emission allowances, with one allowance equaling one ton of carbon dioxide (CO₂). Operators monitor their emissions throughout the calendar year and surrender the equivalent number of allowances by March 31 of the following year. Operators that exceed their prescribed CO₂ allowance levels are permitted to trade or purchase additional allowances from businesses that did not reach their limits, or else pay a fine. Each year, the allowance cap is reduced to further ratchet down GHG emissions. The ETS operates in the 28 EU countries and the three European Economic Area-European Free Trade Association states (Iceland, Liechtenstein, and Norway).

Beginning in 2012, emissions from non-EU operated airlines have been included in the ETS, meaning that these airlines are required to use emissions allowances to fully cover flights to or from EU airports. More than 20 countries, including the United States, China, India, Japan, and Russia, signed a declaration vowing to challenge the ETS. Despite these threats, the EU's governing bodies would not back down.

The Air Transport Association of America, American Airlines, Continental Airlines, and United Airlines filed a joint action in the High Court of Justice of England and Wales challenging their inclusion in the ETS. The matter was referred to the EU Court of Justice, which released a nonbinding opinion on October 6, 2011, finding that the EU's inclusion of the entire aviation sector in the ETS did not infringe upon state sovereignty or international agreements, including the Kyoto Protocol and the US-EU Open Skies Agreement. Consistent with the advisory opinion, the official ruling of the EU Court of Justice was handed down on December 10, 2011. This ruling essentially forced non-EU operators to comply with the ETS provisions.

The International Response Was Forceful

International aviation industry representatives believed that the EU Court of Justice set aside the principle, established in 1944 at the first Convention of

International Civil Aviation (the Chicago Convention), that because aviation is a global industry, aviation policies should be developed and implemented on a global basis; therefore, any new standards should be developed by ICAO. The organization, which was created at the Chicago Convention, serves as a United Nations specialized agency that works with signatory states, global industry, and aviation organizations to develop international uniform standards and practices. ICAO itself issued a statement, on behalf of its member states, urging the EU to exclude non-EU operated flights from the ETS.

In late February 2012, over 20 non-EU countries met in Moscow, Russia, to protest their inclusion in the ETS. This meeting resulted in a signed document that declared that each country would consider various actions, including strongly urging ICAO to adopt a multilateral approach towards international aircraft emissions, barring their country's aircraft operators from complying with the ETS, and imposing levies or charges on EU aircraft operators.

The United States had already made moves to ban compliance with the ETS. On October 20, 2011, after less than an hour of debate, the U.S. House of Representatives approved H.R. 2594 (112th), the "European Union Emissions Trading Scheme Prohibition Act of 2011," by a consent vote, a bill that would force the U.S. Department of Transportation to bar U.S. airline operators from complying with the ETS. Shortly after the December 10, 2011, opinion of the EU Court of Justice, then-Secretary of State Hillary Clinton sent a letter expressing U.S. opposition to its operators being subjected to coverage under the ETS and noting that 42 other countries had registered similar objections. On September 22, 2012, the U.S. Senate passed S.1956 (112th). The two congressional bills were reconciled and signed by President Obama on November 27, 2012.

About the time the Senate was debating S.1956 (112th), numerous aviation-related associations sent a letter to President Obama requesting that an Article 84 legal action be pursued with ICAO. An Article 84 action is a dispute resolution mechanism that all ICAO member states agreed upon at the 1944 Chicago

Convention. At that time, an Article 84 action was seen as a last resort.

Responses were not limited to non-EU countries, however. Strain began to show in the EU as well. In March 2012, several EU aviation-related companies, including Airbus, Air Berlin, Air France, British Airways, Iberia, Lufthansa, MTU Aero Engines, and Virgin Atlantic, announced that the current situation was “intolerable” and that the threatened retaliation by non-EU countries would severely impact the EU aviation industry. Airbus was especially concerned about an international trade war, particularly with China, which had suspended \$12 billion worth of aircraft orders and placed thousands of jobs in jeopardy.

Eventually, international pressure and the desire to give ICAO additional time to develop a global solution forced the EU to “stop the clock” in April 2013. This decision deferred inclusion of non-EU operated airlines in the ETS until effectively March 31, 2014, the deadline for verified emissions reports to be filed.

The EU Looks to ICAO to Create a Mechanism to Regulate Aviation Emissions on a Global Scale

In response to the international turmoil, ICAO established a working group consisting of five member states and the International Air Transport Association to study the emissions issue and propose a global framework for international aviation emissions by the end of 2012. Through the efforts of this working group and others, three potential market-based mechanisms were developed: (1) a carbon emissions offset program that requires the funding of carbon offset projects such as those that support renewable energy, promote reforestation, avoid deforestation, and boost energy efficiency; (2) a carbon emissions offset program similar to No. 1, but with the addition of a revenue mechanism, most likely a tax; and (3) a global carbon emissions cap-and-trade system. These options would serve as the starting point for discussions at the 38th Triennial ICAO Assembly in Montreal, Canada, September–October 2013.

On September 3, 2013, the ICAO Council, which is a permanent body composed of 36 member states of ICAO, met in Montreal prior to the full ICAO assembly. The council agreed to a short-term framework that would permit regional emissions trading systems to regulate the portions of flights in their airspace. This agreement was not the adoption of a global, market-based system to reduce carbon emissions, as many had hoped, but the council agreed to secure such a plan by 2020. After two weeks of negotiations at the full ICAO assembly, the member states agreed to develop a market-based approach by 2016, to be implemented in 2020. The resolution also encouraged countries to create new aircraft technology, adopt CO₂ limits, use alternatives to jet fuels, and engage in talks about the design of new carbon markets and the implementations of current programs.

With ICAO’s Proposed Plan in Position, the EU Had to Decide Whether to Restart the Clock

After the conclusion of the ICAO assembly, on October 16, 2013, the European Commission proposed amendments that would relax the ETS. The proposal would require only emissions from intra-EU flights to be reported, thus fully exempting flights to and from countries outside the EU. The European Commission urged the European Parliament to approve the proposed amendments ahead of upcoming deadlines. In the meantime, the ETS still applied in full to flights departing from or arriving in the EU.

The European Parliament’s Environment Committee considered a deal to exempt non-EU operated flights from regulation under the ETS until the end of 2016, but the measure failed on March 19, 2014. Many in the industry thought that this presaged a similar rejection of the proposed exemption by the full EU Parliament. However, the Parliament voted 458-120 to postpone until 2017 the date of application of the ETS to long-haul flights originating or arriving in the EU. The majority reasoned that, by 2017, ICAO hoped to develop a global, market-based approach to reduce GHG emissions from the aviation industry through the use of technology, the adoption of carbon standards, and the utilization of sustainable alternatives to jet fuel.

Conclusion

The debate amongst and actions taken by the EU, ICAO, and independent countries highlight the fine line between reducing emissions and respecting the sovereignty of countries. Several scenarios could play out as ICAO works to develop a worldwide solution. First, although a plan is set for 2020, there is no guarantee that it will come to fruition. Second, ICAO could develop a market-based approach that is not acceptable to all countries. If EU or non-EU operated airlines refuse to comply with the approach, it would seriously undermine ICAO's authority and could elevate tensions between countries once again if the EU reinstates the ETS's authority over emissions from non-EU operated airlines. Of course, ICAO could also develop a global approach that is agreeable to all countries and one that may replace the ETS.

For now, there is nothing to be done except to await the development of a global, market-based approach and see how the issue progresses.

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SUSTAINABILITY IN PRACTICE

John S. Kirk

Although the term “sustainability” has been popularized in recent years, the concept has been part of the culture of our firm, Manko, Gold, Katcher & Fox, LLP (MGKF), since our founding in 1989. Beginning with the use of legal pads made from recycled paper and joining in the Environmental Protection Agency's Green Lights program nearly 20 years ago, the buy-in to new sustainability initiatives has perhaps been a bit easier for us. Sustainability is part of our mantra as an environmental and energy law boutique firm: provide the highest-quality legal services to our clients while also acting as responsible stewards for the environment. When we were presented with the opportunity to renegotiate the lease for our Bala Cynwyd headquarters (just outside of Philadelphia) and move to slightly larger space in the same building, the decision to use the US Green Building Council's Leadership in Energy and Environmental Design (LEED®) Green Building Rating System as a guide for sustainable design and construction was a natural one.

Choosing the Right Team

The process began in April, 2013 with the selection of an architectural firm, Francis Cauffman (FC). We had engaged FC in previous years for two expansion projects in our old space. Their experience with law firm design and, in particular, LEED project design was important to our firm. Following a few months for the design and fit-out specifications, we issued a request for proposals and invited three construction companies to submit bids. Again, experience with LEED construction was important to the success of our project. Skanska USA was the successful bidder, the contract was awarded to it as the General Contractor (GC), and hammers started swinging in July. We also issued an RFP for the furniture and audio/visual equipment. The furniture bidder's invitation and instructions emphasized the importance of using locally sourced materials and manufacturers wherever possible.

Because we were on a tight timetable to occupy our new space, we also engaged The Sheward

Partnership, another architectural firm with extensive experience in LEED design and reporting, to provide an additional level of advisory support on various LEED procurement and reporting requirements. Furthermore, we included our landlord's building manager in every key design and construction meeting. Because of certain LEED prerequisites (e.g., designated no smoking areas, dedicated bicycle racks, HVAC system commissioning), the landlord's cooperation and buy-in to having a LEED-certified tenant was paramount to even consider building according to LEED specifications.

Managing the Construction Process

The GC held weekly meetings with all key stakeholders from the architectural and engineering firms, the landlord, and of course, MGKF representatives. Robert Miller, Skanska's Project Director, noted that while constructing to LEED standards was not more demanding on the construction trades, there were certain premiums that factored into the overall costs. For example, the GC needed to invest additional time and attention up front, when reviewing subcontractor bids and ensuring that its suppliers were adhering to LEED specifications such as locally sourced materials, amount of recycled content, and low/no volatile organic compound-emitting materials. Such premiums, however, were less than one half of one percent of the overall project costs.

The LEED rating system awards credits for achieving certain levels of demolition and construction waste management. Our project achieved a 95 percent recycling rate, but there was no added cost for diverting and recycling the waste. Further, there was the direct benefit to the environment by diverting material from the landfill and giving much of the waste a "second life" (e.g., Armstrong, a manufacturer of ceiling tiles, collects the old ceiling tiles, recycles the material into new ceiling tiles, and returns them to the consumer stream).

Another key demand on the GC's management team was scheduling delivery of certain high-efficiency lighting fixtures, many of which had long lead times. Although, the scheduling of some trades overlapped on

occasion due to these lead-time issues, this overlap had no significant impact on meeting the completion date.

LEED Benefits

The LEED guidelines gave us a blueprint to implement practical and measurable strategies and solutions aimed at achieving high performance in sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. Energy-efficient lighting, heating and cooling, and water conservation measures (e.g., low-flow plumbing fixtures) significantly reduce our office's consumption of these limited resources when compared to resource utilization in conventional office spaces. Emphasis was placed on the use of formaldehyde-free wood doors and other low-emitting construction materials to create a healthier environment. Perimeter offices that feature full-height glass walls bordering the interior hallway extend daylight and views to interior spaces and reduce lighting demand.

In addition, we re-used 68 percent of the furniture from our former space and relocated nearly all of our computer equipment. Further, 97 percent of eligible new computers and appliances purchased were Energy Star rated. Second-hand file cabinets were purchased and refurbished using an electrostatic painting process. When we did need to buy new materials, we looked for recycled content and goods that were locally harvested and manufactured. For example, our entry signs are made of reclaimed hemlock lumber, locally sourced from an old building, and our coffee table was made from beams reclaimed from old structures in central Pennsylvania. In total, the project used 41 percent regional materials and 23 percent recycled content.

The energy savings from new, more efficient lighting fixtures and heating/air conditioning units, have been particularly encouraging. In the first four months of occupying our new space, our energy consumption was 51 percent lower than what was used in our former space (comparing the same four-month period for 2013 and 2014). Of particular note, and what makes these savings even more impressive, is that we now occupy approximately 10 percent more space,

with a heating/cooling demand that was approximately 7 percent higher than the same period last year.

Green Practices

In addition to the commercial interior buildout, we also employ green practices in our daily operations. For example, over 90 percent of our paper products contain recycled content, and nearly all of our printers are set to duplex mode. For our kitchen and catering, we use traditional, nondisposable plates, glasses, and utensils and provide filtered tap water. Our landlord collects and recycles paper, bottles, cans, plastic food containers, and more. However, since most of our paper waste contains work product, designated shred bins are used, and that paper is recycled via a separate contract.

It Is Not About the Recognition

Our firm decided to pursue LEED construction because of our commitment to sustainability and to demonstrate leadership in green building design. As a side benefit to our commitment, in May, MGKF was awarded LEED Gold® certification for our buildout and became the first law firm in the Philadelphia region to achieve Gold level certification under the LEED for Commercial Interiors (LEED® CI) Rating System. Additionally, in April of this year, we received the Pennsylvania Bar Association Environmental and Energy Law Section's First Annual Law Office Sustainability Award and in May, the Lower Merion Township Environmental Advisory Council's "Go for the Green Award." The recognition is wonderful, but more importantly, we hope that by outlining the process and highlighting some of the measurable returns on our investments from financial and environmental stewardship perspectives, we may motivate others to pursue LEED certification.

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REGIONAL ENVIRONMENTAL ANALYTICS: EMERGING RESEARCH NEEDS TO SUPPORT RGGI, STATE, AND LOCAL PLANNING AND REGULATORY PROGRAMS

Edward J. Linky, Charles J. Vörösmarty, and
Bernice Rosenzweig

The Region as Global Change Focal Point

Both the international (United Nations Framework Convention on Climate Change) process and U.S. domestic policy efforts for implementing a comprehensive program to reduce greenhouse gases (GHGs) remain fractious. In the United States, prolonged litigation is likely to result as the Obama administration moves forward with administrative rules in the absence of congressional action. The current picture at the regional, state, and local levels in the Northeast United States, however, is more proactive. Municipal ordinances (e.g., New York City Local Law 84), regional networks of states (Regional Greenhouse Gas Initiative or RGGI) and an innovative voluntary municipal rating system in New Jersey (Sustainable New Jersey) exemplify emerging mechanisms that not only reduce energy consumption and attendant GHG emissions but also promote sustainable practices and technologies across multiple environmental media (air, water, and land). Each of these examples empowers stakeholders to discuss, explore, and create novel approaches to address climate change. Most of the programs at the state and local level have evolved since the late 1990s, with the main actors being the electric power sector and federal government. These evolutionary approaches aim at improving energy efficiency through the use of cleaner fuels in power plants but are supplemented by renewable sources of solar, wind, and wave energy as well as hybrid arrangements such as utility-scale natural gas and solar projects and urban microgrids.

These experiments are certainly positive; they yield lower capital costs and lower emissions of Clean Air Act criteria pollutants and GHGs. Yet, these trends are just that, long-term trends, and do not address the urgency of our most pressing sustainability challenges. Given projections of urbanization, sprawl, and irreversible impacts from climate change, more rapid

and transformational approaches to energy-sector production and consumption are needed. But energy issues are only the beginning—innovation in urban spatial design and planning in the context of increasing global and U.S. mega-urbanization remain critical challenges.

The answer may lie in environmental analytics, a broad set of assessment tools powered by new sensor systems, big data, models, and integration frameworks that enable accurate tracking of the status and change in ecosystems over multiple scales. As one example, the National Science Foundation has sponsored a Northeast Regional Earth System Modeling project (NE-RESM), whose express aim is to forecast the changing state and dynamics of ecosystems across the 12-state region from Maine to tidewater Virginia. The effort was initiated by a three-year grant from the National Science Foundation (Award # 1049181) and is led by the City University of New York, Marine Biological Laboratory at Woods Hole, Rensselaer Polytechnic Institute, University of New Hampshire, and Brookhaven National Laboratory. Its underlying mandate is to give scientific voice to the concept of ecosystem services best articulated by H. T. Odum in his seminal 1973 article “*Energy, Ecology and Economics*”:

Even in urban areas, more than half the useful work on which our society is based comes from the natural flows of sun, wind, waters, waves, etc. that act through the broad areas of seas and landscapes without money payment. An economy, to compete and survive, must maximize the use of these energies, not destroying their enormous free subsidies.

The NE-RESM employs advanced input datasets and sophisticated computer simulations to quantify—with great geographic specificity—the state of the region’s atmosphere, land ecosystems, and water resources and their interactions with human sectors, including the electric power industry. Through improved understanding of the complex interactions between ecological and human systems, this program endeavors to evaluate the role of ecosystem services in the regional economy of the Northeast.

Energy Policy and Regulatory Initiatives in the Northeast Region

The NE-RESM focuses on 12 states, Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia, and the District of Columbia. This region provides a rich clinical environment: it encompasses much of the expanding Northeast “Megaregion” defined by the America 2050 Project, it hosts advanced state environmental and energy programs, and nine of the study states comprise RGGI. New Jersey was also originally part of RGGI, but has withdrawn for the immediate future.

Despite New Jersey’s withdrawal from RGGI, it still maintains active sponsorship of advanced air-quality management programs and an aggressive support of renewable energy programs under the Clean Energy Program administered by the New Jersey Board of Public Utilities. New Jersey also supports the voluntary LEED-type municipal rating system known as Sustainable New Jersey, which provides recognition and ratings on a menu of sustainable development and management practices for municipalities. This program has approximately 380 out of 560 New Jersey municipalities at some stage of development within the program. Two regional air-quality management nongovernmental organizations, the Northeast States Coordinated Air Management (NESCAUM) and Mid Atlantic Air Management Association (MARAMA), also provide modeling and research support to state air programs in the Northeast Megaregion.

Additional ongoing studies and experiments are planned for the next three to five years, which will contribute to significant reductions in electric power sector emissions through energy efficiency and demand reduction. A reference list of these initiatives is provided:

- RGGI Request for Proposals #41-01-RRGI Inc. for US Forest Projects Offset Protocols March 2014 www.rggi.org/docs/Forestry_Offsets_Model_Docs_RFP_2014-03-10.pdf
- EPA’s EE/RE Policies and Guidance in SIPS and newly released AVERT tool (Avoided

Emissions and Generation Tool) www.epa.gov/airquality/eere/manual.html and <http://epa.gov/statelocalclimate/resources/avert/index.html>

- EPA Regional MARKAL Models and Region 2 Community Scale MARKAL Models for New York City and Long Island. *Linky, E. et al (2008) Analytical Tools Shaping the Next Generation of Carbon Regulation and Trading: The New York Metropolitan Area Case Studies, Sustainable Development Law and Policy, Vol. VIII Issue II*
- Three Case Studies That Apply and Evaluate EPA's Roadmap to Incorporate Energy Efficiency/ Renewable Energy in State Implementation Plans Final Report to USEPA by NESCAUM 2014 <http://www.nescaum.org/initiatives/ee-re-in-sips/states2019-perspectives-on-epa2019s-roadmap-to-incorporate-energy-efficiency-renewable-energy-in-state-implementation-plans-three-case-studies/>
- New York City Local Law 84 Mandatory Benchmarking of Buildings using EPA Portfolio Manager and replica efforts in Boston, Philadelphia, Pittsburgh, and Washington D.C. http://www.sallan.org/pdf-docs/FOB_year1whitepaper_082712.pdf and http://www.sallan.org/pdf-docs/FOB_year2ndwhitepaper_092013.pdf
- EPA Ecosystems Services Research Program National Atlas of Ecosystem Services <http://www2.epa.gov/eco-research>

However, the success of all these efforts depends on the availability of integrated, quantitative data concerning the status of ecosystem services and how their condition may be compromised both as a result of unmitigated climate change and the consequences of other environmental management decisions. Environmental analytics are absolutely critical in providing such support.

Framework for Environmental Analytics

As an example, the NE-RESM provides a broad array of analytical models: TEM, a terrestrial ecosystems and carbon dynamics model; FRAMES, which allows for simulations of river flow, water infrastructure, and

aquatic ecosystems; WRF an atmospheric dynamics model; MARKAL, an energy technology and impacts model; and an innovative input-output economic model to evaluate ecosystem services. The key aspect of this project is the provision of three administrative canons: *transparency* of all the models (no black boxes), *transformation* of current ecosystem policy, and *collaboration not competition* with other media-specific agencies or institutions involved in climate adaptation.

Linked to NE-RESM's biogeophysical and economic assessment is a policy dialogue engaging more than 50 partners from the regional agencies and planning organizations. This has included briefings at RGGI, power pools, and EPA headquarters. Within EPA, the Office of Research and Development has two key areas of activity that can leverage NE-RESM: the Ecosystem Atlas Project and the AIR, Climate and Energy Portfolio (ACE), which hosts, among other tools, the EPA Regional MARKAL models. These and other partners design different management scenarios of the future with NE-RESM scientists, testing the efficacy and long-term impacts of decisions made today in the context of future demographics, land-use management, technology, investment assumptions and, of course, climate change. Because multiple stakeholders have access to identical and shared technical capabilities, systems such as NE-RESM level the playing field in evaluating potentially contentious environmental and energy legislation and regulation. The regional perspective is also essential to help recognize how local management strategies may backfire when examined from a synoptic perspective (e.g., how multiple power plants along a river interfere with requirements for cooling water during heat waves).

Current Outputs and Future Scientific Directions

Among the key initial findings of the NE-RESM is that the Northeast was a net carbon source of 259 megatons of carbon (Mt C) each year, from 2001–2005. Carbon sequestration by land ecosystems (mainly forests) across the region compensated for only about six percent of the region's fossil fuel emissions. However, the region's forest store is 8300

Mt C. Thus, to combat climate change, forest protection is critical in addition to reducing fossil fuel emissions. Xiaoliang Lu et al. *A Contemporary Carbon Balance for the Northeast Region of the United States*. 47 ENVIRON. SCI. TECH. 3 at 13230–38 (2013). RGGI has already started down this path with its RFP for land use offsets, as noted above.

Additional findings for the thermoelectric sector show the expected impact of Clean Water Act thermal pollution regulations on limiting summer power production in the region. However, the model also identifies peak demand and weather circumstances when these regulations actually boost overall regional power output by reducing plant-to-plant interference and preserving a minimum supply of cooling water. Ariel Miara, et al. *Riverine Ecosystem Services and the Thermoelectric Sector: Strategic Issues Facing the Northeastern United States* 8 ENVIRON. RES. LETT. 2 at 025017 (2013). The lesson learned is that there are clear win-win strategies, but the search for these must necessarily be guided by the concerns of lawmakers and other stakeholders, working in close collaboration with researchers.

Another example of the use of environmental analytics is the capability to address the Urban Heat Island (UHI) phenomenon in a comprehensive fashion. UHIs are the energy fingerprint of built areas as they absorb, generate, and retain heat in ways that make them measurably warmer than surrounding areas. While their origin may center on the city, they are notorious for respecting no political boundaries, extending irregularly into urban heat “archipelagos” far into suburban hinterlands. For example, recent work demonstrates an evolving UHI “archipelago” in suburban and rural Somerset County, New Jersey. Jennifer Cox, *Suburban Heat Islands: The Influence of Residential Minimum Lot Size Zoning Regulation on Suburban Heat Islands in Somerset County, New Jersey* (2014) (doctoral dissertation, City University of New York). During heat waves, it is critical to understand the patterns and distributions of UHIs of extreme high temperature since they have profound consequences for human health (the 2003 heat wave killed 70,000 in Europe); ecosystems (due to enhanced stress from heat and temperature-catalyzed pollutants as well as reduced oxygen levels in streams); and power grid

reliability (brownouts and soaring energy prices). The frequency and intensity of these events are expected to increase due to climate change in coming decades, and different combinations of land use, energy efficiency, and thermal loading of the aquatic environment will either reduce or enhance regional resiliency. The array of integrated models provided by NE-RESM can be used to identify cost-effective technology and management practices for regional UHI mitigation.

Conclusion

In the late-20th Century, the launch of Earth-observing satellites ushered in a new era in earth and environmental sciences. For the first time, we had access to the full, holistic view of Earth and, as a result, began to understand the web of life-sustaining connections that allow it to function as an integrated system. The new generation of environmental analytics research projects, such as the NE-RESM, has similar potential to revolutionize our understanding of regional earth systems and support environmental management by synthesizing newly available “big” data; remote-sensing information; and state-of-the art energy, water, and land-use models to uncover patterns and relationships in an integrated and transparent quantitative manner. The challenge is whether regional, state, and local governments will utilize the results of ongoing experiments and advances in environmental data management and technology to develop a regional system that can more fully harmonize environmental and energy regulation.

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BEARTREK AND BEYOND: A VIEW TOWARD SUSTAINABLE BIODIVERSITY

John Taylor

“What is good for bears is good for people.” This maxim is a personal touchstone, but, more importantly, an alarm. Protect bear habitat, and you will protect fresh water, healthy forests, and clean air.

During my seven-year tenure as co-founder and CEO of Wildlife Media, a nonprofit film company, my team and I have used stunning and powerful images to educate and inspire people to take action for positive change and a more sustainable human presence on the planet. On the ground, Wildlife Media film footage has been used to help raise funds to construct the Bornean Sun Bear Conservation Centre in Borneo to rehabilitate orphaned and ex-captive sun bears and to establish a new national park in Peru to protect the Andean spectacled bear. To date Wildlife Media’s work has also resulted in collaborations with PBS and National Geographic to produce a TV special, as well as the PBS Nature TV series *Bears of the Last Frontier* and the National Geographic Channel’s International TV series *Bear Nomad*. Stemming from our work with *Bears of the Last Frontier*, my Wildlife Media co-founder and executive director Chris Morgan continues to work on new productions with PBS Nature, counting 13 films to date, and with the BBC Natural History Unit. We are especially excited by Wildlife Media’s first feature-length film, *BEARTREK*, which will be completed this summer. (www.wildlifemedia.org)

From the Arctic to the Andes, the eight bear species occur in some of our planet’s wildest places. As barometers of ecosystem health, they remind us that there is still room for wildness, as long as we are sensitive and smart. The iconic polar bear is our most trumpeted reminder of this fact as we consider the devastating effects of climate change. Scientists agree that there will be no summer ice by the year 2050. This will have a profound effect not just on polar bears, but on the many unique species that share polar bear habitat.

Less well known, but equally compelling, sun bears occupy the most biodiverse habitats in Asia. They are found in a few shrinking reserves that are surrounded by logging activities and oil palm plantations. If we protect the sun bear, by default, we protect countless other tropical species in the sun bear habitat. Grizzly bears present a good example of reduced habitat. At one time there were 100,000 grizzly bears in the lower 48 United States. That number has dwindled to around 1,000. Their range and numbers have been reduced by 99 percent, and they are now found only in the wildest northwest pockets of the United States.

Once released, *BEARTREK*, the movie, is expected to raise at least \$1 million—hopefully more—which will be pumped back into worldwide conservation efforts and future films about wildlife conservation. I am glad we at Wildlife Media are all doing what we can; yet I believe our work will ultimately prove futile in light of the massive and relentless havoc we as humans are inflicting on the global environment. A quantum shift in mindset and a coordinated global effort will be needed to avert the looming catastrophe.

In essence, we are destroying the very planet we call home. We do so in several ways. We impact the Earth through our direct consumption and use of Earth’s resources. Here are a few out of hundreds of examples:

- We have converted over 50 percent of the land surface of Earth to our own uses and intruded upon most of the rest.
- We have overfished and depleted the stocks of many fish species to the brink of extinction, including orange roughy, hammerhead sharks, Bluefin tuna, Chilean sea bass, and Atlantic cod. It is estimated that industrial fishing has reduced the number of large ocean fish to approximately 10 percent of pre-human levels.
- We use over half of the world’s readily accessible fresh water per year.
- We have destroyed over 50 percent of the Earth’s tropical forests and continue to do so at a rate that will leave approximately 10 percent remaining by 2030, with the loss of hundreds of thousands of species.

- Our annual demand for ecological resources now exceeds what Earth produces and is equivalent to approximately 1.5 to 2 Earths.

With increased human mobility and later the advent of boats and planes, we have transported species from one part of the world to another, across the natural barriers that separated local ecosystems. Those ecosystems evolved over millions of years to each have a unique balance of species that exist and interact with one another in an intricate and cohesive manner. Many of the transplanted species are benign in their new environments, but many others have caused local catastrophe, as they explosively spread without natural predators and exploit new prey species that have not evolved adequate defenses. Again, a few examples out of thousands:

- Burmese pythons, introduced to the Everglades as escaped pets about 30 years ago, now number about 150,000, and have eaten almost all of the small animals in the Everglades, such as bobcats, possums, rabbits, and foxes.
- The brown tree snake wiped out 14 bird species on the island of Guam during and after the Second World War, likely arriving on a military cargo ship.
- Chestnut blight, imported to the United States around 1900, killed most of the four billion chestnut trees in the United States by mid-century.

Through such actions and others both deliberate and inadvertent, humans have caused the extinction of a large but unknown number of species. A few extinctions by our hand include the passenger pigeon, which numbered in the billions and of which a single flock was known to take several hours to pass overhead, the West African Black Rhino, Javan Tiger, Golden Toad of Costa Rica, and Atlantic Gray Whale. There are likely thousands of others that we do not know about, even of species we have not yet discovered. Currently 1,895 of Earth's 6,285 known species of amphibians are threatened with extinction due to human causes.

The rate at which humans are causing species extinctions far exceeds the "background" rate of extinction on Earth before the emergence of humans. The rate of extinction seems to vary with the class of animal or plants involved, but in general is estimated to be from one to five species a year across the spectrum of species. The current rate of extinctions is estimated at over a thousand times the background rate, with every day seeing dozens of species winking out. To quote the website for the Center of Biological Diversity, "Because the rate of change in our biosphere is increasing, and because every species' extinction potentially leads to the extinction of others bound to that species in a complex ecological web, numbers of extinctions are likely to snowball in the coming decades as ecosystems unravel." http://www.biologicaldiversity.org/programs/biodiversity/elements_of_biodiversity/extinction_crisis/

Paleontologists have determined that there have been five events in the history of life on Earth that resulted in significant mass extinctions of species. The most recent occurred about 65 million years ago at the end of the Cretaceous and is best known for the loss of the dinosaurs. Based on the geological record, scientists have estimated the level of species extinction in the five events, varying from 17 percent to approximately 54 percent for the Permian extinction of 200 million years ago.

According to the Center for Biological Diversity, Earth is currently experiencing the worst spate of extinctions since the Cretaceous mass extinction, and this will likely result in another mass extinction of life on Earth. Scientists are now referring to the current extinction crisis as the "Sixth Extinction."

While the evidence seems clear that the most recent mass extinction was caused by the impact of a large asteroid crashing to Earth, the causes of the earlier events are not as evident. Interestingly for the situation humans face today, the geological record suggests that global warming may have played a factor in several of the past mass extinctions.

Global warming is real and increasing. Human activities currently pour carbon dioxide into the atmosphere at

the rate of 9 billion tons a year, through deforestation and the burning of fossil fuels.

Global warming is measured in parts per million (ppm) of carbon dioxide (CO₂) in the atmosphere. At the start of the industrial revolution about 200 years ago, the level of CO₂ was 280ppm. On May 10, 2013, the Mauna Loa Observatory in Hawaii reported the average level of CO₂ for a full day at over 400ppm, the highest level in possibly as much as 4 million years. The level is rising at the rate of 2ppm/year and accelerating.

The geological record shows that there have been periods of global warming in the past, but they have usually developed over tens of thousands of years, allowing time for species to migrate or evolve to survive the climate change. Our current warming trend is occurring too fast for many species to successfully migrate or evolve. A study published in *Nature* in 2005 estimated that climate changes brought about by global warming will lead to the extinction of more than a million species by 2050.

No one knows what will happen as global warming continues and the level of CO₂ rises. To quote climatologist Wally Broecker, “The climate is like a wild beast, and we’re poking it with sticks.” We are already seeing the disruption of normal weather patterns and an increase in the severity of storms. Scientists estimate that significant damage to life on Earth as we know it will begin as CO₂ in the atmosphere reaches a level between 450ppm and 550ppm. We do know that on a human timescale the warming has been gradual and so will be any cooling. If the climate becomes hostile to life on Earth due to global warming, humans will be powerless to reverse the process in any useful length of time.

As an aside, the impact that humans now have on Earth is so significant, that scientists have coined the name “Anthropocene” for the current geological epoch. This is in recognition that the changes wrought by humans will leave a permanent record in the geological history of Earth, visible for the millions of years of Earth’s remaining existence.

All of these various impacts are exacerbated by the explosion in human population. From a population of approximately 1.7 billion 100 years ago, the current human population is approximately 7.2 billion, a four-fold increase, and growing. The population is expected to hit 9.6 billion by 2050. At the current growth rate, 2014 will see another 82 million humans on Earth. To express that number on a more understandable scale, our population is increasing by 224,000 daily. That’s equivalent to a new city the size of Seattle every three days. To feed another 224,000 humans each day requires approximately 6,000 acres of new arable land per day.

A focus of the CCSDE committee is on “Sustainable Development.” When sustainability is applied at a local level, we see some success as it relates to specific projects, such as a new building designed and operated as a self-sufficient structure. Applied on a global level, sustainability means the ability of humans to live on Earth in a sustainable way within the limit of the resources available on Earth. This relates to the biological concept of “carrying capacity.”

The carrying capacity of a species is the maximum population size that the environment can sustain indefinitely, given the resources available in the environment. Biologists have estimated the carrying capacity of Earth for the human species, to live “within its means” so to speak, using the resources of the Earth without diminishing or degrading other species. There are many variables in the analysis, but the general consensus is that the carrying capacity for humans on Earth is a population size between two and four billion. The stark truth is that the current human population level is not sustainable on Earth, much less the 9.6 billion population level projected in 35 years.

Now imagine the Earth with a human population level within the estimated range of the carrying capacity for humans on Earth. Any actual planned goal for a sustainable human population level would be hotly negotiated if a summit conference were held to address the issue, but let’s assume, for example, a human population level of three billion. That was our population in 1960, a scant 54 years ago, and well within the memories of many people alive today. At that level, there would be enough food for all to eat,

enough fresh water for all to drink and live in sanitary conditions, enough housing, schools, teachers, and medical care. Fish and other prey species could rebound. There would be less need for deforestation, and hopefully proportionately less CO₂ contributed to the atmosphere, slowing or even reversing global warming. With a stable population and less need for new lands for expansion, perhaps we would even see a reduction in territorial conflicts and border clashes.

It has been suggested that technological advances will allow more efficient use of Earth's resources. While this may be possible, technological advances to date, particularly in agriculture, have facilitated the rapid rise in the human population. So long as technological advances are focused on increasing human wellness and the human population level, which is where the development incentives lie, then they contribute to rather than alleviate the pressure on Earth's remaining resources.

Ultimately, the sustainability of life on Earth as we know it will require a drop in the population of humans. To achieve such a reduction in population will require a coordinated global plan among the various countries and religious groups of the world, steadily implemented over several generations. While the details of such a global approach are beyond the scope of this article, humans have the intelligence to understand the issues and craft possible solutions, although they have not yet shown adequate inclination to do so. Nor do I think they will. I am not confident that humans have the capacity and willingness to act in concert with the discipline and long-term commitment it will take. One has only to look at the article headings of any weekly publication reporting on international news to see the selfish and short-sightedness of human behavior.

Meanwhile, the reasoned conclusions of hard-working scientists in many fields go unheeded, as we continue to go about business as usual, overfishing the seas, stripping the rainforest, denuding Central Africa for bush meat, pursuing our appetites for unbridled consumption, and heedlessly growing in numbers. Every few years there is a summit on climate change, with no significant result. No world "leaders" have chosen to address these issues. All the while, we blithely and complacently drive the Earth at high speed

toward a brick wall. We don't know exactly what will happen, but it will be spectacular and likely lead to the next mass extinction of life on Earth, at the end of the Anthropocene.

Humans have struggled and competed as a species on Earth for 300,000 years. Now that they have become the dominant species on Earth, with the technological advances to harness the resources of the Earth for a healthy and sustainable lifestyle at a reasonable population level, it is ironic and tragic that they continue to devastate the very home that provides their nourishment, and will likely lead to their own extinction. It brings to mind the old proverb: "If you don't change direction, you will end up where you are headed."

Hundreds of thousands, perhaps millions of years from now, there may be some future species on Earth that has evolved adequate intelligence and curiosity to look at the geological record of these times, showing the sudden extinction of many species in a short span of geological time, and wonder what happened.

I will continue to do my small part in an attempt to avoid the looming catastrophe but do not really believe it will have any meaningful effect. Yet my sadness at the eventual outcome is assuaged by the knowledge that Earth will continue to spin on its axis as it circles the Sun, and life on Earth will evolve anew as it has in the past, with a new variety of species, which will surely be different yet equally beautiful and fascinating as those we are blessed to experience on Earth today.

John Taylor is CEO and co-founder of Wildlife Media, and a real estate attorney licensed in Washington State. In earlier years, John served as an Army officer in Vietnam, a saloon keeper in Seattle, and occasional adventure motorcycle rider. A conservationist, John has provided financial and pro bono support to several conservation organizations. John currently devotes significant time and effort as unpaid CEO & Director to pursue and implement the vision of Wildlife Media. He believes that visual media is the most effective way to bring greater awareness to the richness, complexity and interconnectedness of the natural world. Only through broad public awareness will come the support that is required for effective efforts to preserve Earth as we know it, and with it our own species.



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