Prospectus for an Atmospheric Recovery Institute

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This prospectus sets forth a vision for an Atmospheric Recovery Institute to design a plan to restore Earth's atmosphere to a stable equilibrium of 350 parts per million (ppm) of carbon dioxide. As the scientific community agrees, climate change is the most extreme threat facing our planet. Dr. James Hansen, formerly this nation's chief climate scientist, expounds the danger quite clearly: "Our planet itself is in peril. Not simply the Earth, but the fate of all of its species, including humanity." At this last moment of opportunity before Earth crosses what scientists warn are irrevocable climate thresholds (tipping points), it is imperative to launch an urgent global effort to stabilize the climate system. Such effort requires an initial plan that sets forth a viable strategy for both full decarbonization across societal sectors, and drawdown of the excess carbon dioxide in the atmosphere. Due to current recalcitrance on the part of government to address the global climate crisis, an independent institute will likely serve as the best hope for designing a template of actions to restore a stable climate system. To date, no institute in the world has spearheaded a plan to return the Earth's atmosphere to a state of equilibrium. In so doing, an Atmospheric Recovery Institute would position itself as a global leader in this epic endeavor.

I. The Need for an Atmospheric Recovery Institute

Scientists warn that carbon dioxide and other greenhouse gas emissions place Earth in "imminent peril"—literally on the verge of an irreversible tipping point that would impose

catastrophic conditions on generations of humanity to come.[1] The Earth's atmospheric carbon dioxide has climbed well into the danger zone, above 400 ppm.[2] Aiming to promote efforts to stabilize the Earth's climate system, Dr. James Hansen, in his capacity as head of NASA's Goddard Institute for Space Studies, assembled an international team of scientists in 2010 to develop a climate prescription to return the atmosphere to 350 ppm of carbon dioxide, widely deemed the uppermost safe level.[3] This climate prescription calls for two measures: 1) a six percent annual reduction of carbon emissions leading to full decarbonization by mid-century; and 2) a drawdown of 100 Gigatons (GtC) of carbon dioxide from the atmosphere through natural means.[4]

To have any tangible prospect of returning Earth's atmosphere to 350 ppm, Humanity must rapidly launch a coordinated global effort on the order of Project Apollo or the Marshall Plan, to decarbonize society and draw down excess carbon dioxide from the atmosphere. This urgent effort requires a systematic plan for atmospheric recovery. The legal impetus for such a plan is taking shape through a landmark federal climate case, *Juliana v. Unites States,* now pending in the federal district court of Oregon. Brought by 21 American youth plaintiffs against the U.S. government, the case seeks to force the federal government to develop and carry out an enforceable climate recovery plan with concrete measures and benchmarks to restore the climate system.

On November 10, 2016, Hon. Ann Aiken ruled in favor of the youth plaintiffs and declared a constitutional right to a "climate system capable of sustaining human life,"[5] finding such right grounded both in the due process clause of the U.S. Constitution and in the ancient public trust principle, which forms an inalienable attribute of sovereignty and constitutional obligation. The case now proceeds to trial (already called the "The Trial of the Century")[6] to determine whether government breached its constitutional obligations to youth citizens. If successful, the case would position the court to supervise implementation of a plan to reduce emissions and achieve drawdown according to the best available science. The *Juliana* remedy would also inform courts presiding over other pending cases brought on behalf of youth as part of a global wave of atmospheric trust litigation.

In light of the stance taken by the current presidential administration to deny climate change, slash budgets for agency science, and remove climate data from accessible websites – all

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[1] Fred Pearce, With Speed and Violence: Why Scientists Fear Tipping Points in Climate Change xxiv–xxvi (2007) (describing "unstoppable planetary forces" and the end of climatic stability).

[2] Brian Kahn, *Earth's CO_2 Passes the 400 PPM Threshold – Maybe Permanently*, Scientific American, September 27, 2016 (https://www.scientificamerican.com/article/earth-s-co2-passes-the-400-ppm-threshold-maybe-permanently/).

[3] James Hansen et al., *Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generation and Nature*, PLOS ONE 8:12 (2013). Dr. Hansen has since updated the required drawdown due a lag in emissions reduction, but the original numbers are used for purposes of this prospectus.

[4] *Id.*

[5] *Juliana v. Unites States*, No. 15-1517, 2016 WL 6661146 (D. Or. Nov. 10, 2016).

[6] Chelsea Harvey, *Trump Could Face the 'Biggest Trial of the Century' – over Climate Change*, The Washington Post, December 1, 2016 (https://www.washingtonpost.com/news/energy-environment/wp/2016/12/01/trump-could-face-the-biggest-trial-of-the-century-over-climate-change/?utm_term=.ee9ba1320c07).

measures that will cripple the ability of federal agencies to undertake climate recovery planning – there is now manifest need for an independent institute to develop a climate recovery plan that can be used as a template by the court and litigants in formulating a remedy. The plan will also be advantageous for state, local, and other national governments in jumpstarting a global climate response.[7]

The Atmospheric Recovery Institute will assemble and synthesize the collective knowledge and research developed by a "brain trust" comprised of the leading scientists, economists, and strategists from around the world. Based on the work of this brain trust, the Institute will develop an "Atmospheric Recovery Plan" comprised of measures to achieve the science-based reductions in carbon emissions (starting with decarbonization in the U.S.) as well as projects designed to achieve carbon drawdown.

Following the initial phase of developing the Atmospheric Recovery Plan, the Institute could position itself to engage in a second phase of monitoring implementation of the plan, both with respect to cross-sector carbon emissions reduction and also with respect to projects contemplated in the drawdown phase. Finally, the Institute could position itself for a third phase undertaking broad carbon accounting, assessing the progress under the plan against the benchmark goals, and reporting progress to the global community of leaders, scientists, analysts and citizens.

Once established, an Atmospheric Recovery Institute has the potential to spearhead the project of the millennia. Many of the best scientists in the world are already researching approaches to decarbonization or drawdown, but these research initiatives are characteristically singular. They lack the coordination of a global climate change collaborative, and they do not have an eye towards achieving decarbonization and drawdown in a systemic way responsive to the actual magnitude of the task and the urgency of looming tipping points. Moreover, much of the research stops at the conceptual stage and does not proceed into the next phase of designing broad-scale implementation on the ground. As the global hub, the Atmospheric Recovery Institute would not generate all or even most of the research and information needed for the de-carbonization and drawdown endeavors, but rather would serve as the collective for innovation – the catalyzing, organizing entity that steers a cross-disciplinary endeavor from concept to practical design. In this manner, the Institute will position itself as the instigator of a coordinated, planned response to the global emergency posed by climate disruption.

II. The Atmospheric Recovery Plan

A. Decarbonization

The first project of the Atmospheric Recovery Plan will be a decarbonization framework designed to achieve the six percent annual carbon emissions reduction, with the ultimate goal of

[7] Other cases have been brought by youth against states and governments of other nations in a wave of "atmospheric trust litigation." See Michael Blumm & Mary Wood, *No Ordinary Case, Climate Change, Due Process, and the Public Trust Doctrine* (accepted for publication, American University Law Review, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2954661. See also Laura Parker, "*Biggest Case on the Planet*" *Pits Kids v. Climate Change*, National Geographic (March 17, 2017).

a complete transition away from fossil fuel (total decarbonization) by mid-century.[8] The global scientific community is already making strides to develop decarbonization roadmaps on various levels. Recently a team of European scientists developed "global decadal roadmap" for decarbonization based on "carbon law," the idea of reducing global anthropogenic carbon dioxide emissions by half each decade.[9] The Deep Decarbonization Pathways Project (DDPP) establishes parameters for each individual country across the globe to limit anthropogenic warming to less than two degrees Celsius.[10] On a more national level, Mark Jacobson at Stanford University led an effort to map pathways across each sector for every state to transition to 100% renewables by 2050.[11] Building on these preliminary efforts, the decarbonization framework would encompass four aspects: technical analysis, product development, financial analysis, and policy analysis. The first step, the technical analysis, will have to examine transition opportunities across broad societal sectors, including agriculture, energy, waste, and transportation.

Based on this analysis, the Institute will identify the greatest needs and possibilities for product development. In the energy sector alone, the new product possibilities for energy storage or energy efficient technologies are nearly boundless. In addition, these technologies could lead to collaboration and the development of products to be used in other sectors. Improved battery storage or solar cell technology, for example, may lead to more efficient uses of residential PV panels, and new methane capture technologies could be used at landfills or dairy farms.

The third aspect of the decarbonization plan is the financial analysis. Once the designated teams analyze sector potential and identify promising product development opportunities, other teams will determine what financial tools and incentives could bring these concepts and products to fruition. These tools might include marketplace measures promoting energy efficient appliances or tax strategies for internalizing carbon costs. Finally, after the financial analysis, a legal and policy team will examine new laws and regulations needed to make the transition towards decarbonization.

B. Drawdown

Along with decarbonization, the Institute would develop a plan to draw down 100 GtC of carbon using natural methods. The Hansen team developed the initial concept for a carbon drawdown initiative, but no single institute has embarked on the next necessary step of formulating a detailed plan comprised of projects on the ground. Based on the findings of the Intergovernmental Panel on Climate Change (IPCC) and measures identified in the United States Mid-Century Strategy (the pathway developed by the Obama administration to achieve the goals of the Paris Climate Agreement), the carbon drawdown project would focus on four natural

[8] The 6% figure is used for purposes of this prospectus, but in reality, it increases with time. The Atmospheric Recovery Plan must be based on best available updated science.
[9] Complemented by drawdown efforts, this roadmap would lead to net zero emissions by mid-century. *See* Johan Rockström et al., *A Roadmap for Rapid Decarbonization*, Science 355(6331), 1269-1271 (March 23, 2017).
[10] *Deep Carbonization Pathways Project* (2015) (available http://deepdecarbonization.org/wp-content/uploads/2015/06/DDPP_EXESUM1.pdf).
[11] Mark Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, Energy Environ. Sci., **8**, 2093 (2015)

measures for removing carbon from the Earth's atmosphere: 1) regenerative agriculture; 2) regenerative grazing, 3) reforestation; and 4) coastal wetland and mangrove restoration.

The potential for carbon sequestration in croplands is already well established.[12] Regenerative agriculture seeks to draw down carbon through projects such residue management, crop variation, crop cover, and increased perennial plantings, among other measures. Regenerative grazing also focuses on management techniques to build soil carbon and health. By mimicking the natural herding process, regenerative grazing holds potential to restore carbon to barren grasslands and pasture lands.[13] Although regenerative grazing may be lesser known than regenerative agriculture, the growing body of research and practice of regenerative grazing is showing favorable early results.

The last two measures of carbon sequestration also have enormous potential to help draw down the necessary 100 GtC of carbon. In a recent study, researchers emphasized the growing importance of carbon sequestration in coastal wetlands (mangroves, tidal marshes, and seagrass).[14] Reforestation, which may be the most widely studied measure, has great potential in not only tropical areas but in ancient forests found in the Pacific Northwest.

Although leading research now occurs throughout the world in these four areas, the research is scattered and lacks an organizing nucleus. Moreover, the research has not for the most part progressed into project design scaled toward massive carbon drawdown. The Institute would act as the hub to compile and consolidate leading science into one carbon drawdown plan setting forth project design parameters in the four sequestration categories (and other categories that may be identified).[15] To guide the project design, the Institute will create a global map overlay identifying carbon drawdown "hotspots." The Institute can also create systematic standards for monitoring reductions associated with particular project categories. Finally, it can conduct an ongoing macro, cumulative accounting of Earth's carbon drawdown as the projects begin to yield results.

An independent Sky Trust is conceived to both receive funding for drawdown projects and distribute the funds to qualified entities throughout the world. Such Sky Trust could gain funding from government sources, private sources, or liability judgments gained from Carbon Majors for natural resource damages, as described below. The Sky Trust would serve in a similar capacity as a grant-making foundation, with staff to ensure completion of funded projects in accordance with established criteria (as set forth in the Atmospheric Recovery Plan). The Atmospheric Recovery Institute, as a separate and independent entity, would be positioned to serve as a third party monitor to assess success in carbon drawdown as well as other project parameters for rehabilitating damaged ecosystems.

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[12] *See* Rattan Lal et al. *The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect* (1998).

[13] Darrell Bosch et al., *Farm Returns to Carbon Credit Creation with Intensive Rotational Grazing*, Journal of Soil and Water Conservation, 63(2), 91-98 (2008).

[14] Jenifer Howard et al., *Clarifying the Role of Coastal and Marine Systems in Climate Mitigation*, Frontiers in Ecology and Environment (2017).

[15] To this end, recent research indicates tremendous promise in establishing diverse, fruit-producing forests (multi-strata agroforestry) around the tropical areas. *See* PAUL HAWKEN, DRAWDOWN: THE MOST COMPREHENSIVE PLAN EVER PROPOSED TO ROLL BACK GLOBAL WARMING 40 (2017) (introduction by Tom Steyer).

III. Research and Educational Opportunities Created by the Atmospheric Recovery Institute

Top-flight research universities already engaged in climate research are particularly suited as candidates for housing the Atmospheric Recovery Institute. The benefits to any institution of higher education are obvious. The Institute would enjoy an enviable position at the center of the top scientific collaborative endeavor of our time, researching and advancing projects to protect the habitability of the planet and promote the well being of all humanity for generations to come. Such university would attract students from around the world who are drawn to the crucial public mission of the Institute and who wish to engage in the applied educational opportunities it offers. The Institute would create new career paths for students dealing with carbon accounting, ecosystem modeling, and energy storage development. In-house researchers, professors, and students at the university would have the opportunity, through the Institute, to interact and collaborate with top think tanks and visionary minds worldwide. The Institute would also serve as a launch pad for products designed by university researchers to promote decarbonization.

Two other locating options for the Institute are readily apparent, but less desirable. The first is the United Nation's Intergovernmental Panel on Climate Change (IPCC). That organization draws upon a collective of thousands of qualified scientists and produces climate "assessments" that diagnose the growing climate crisis. But that body operates on consensus, which demands a cumbersome and sometimes politicized process, causes significant delay, and lends itself to conclusions hovering at the lowest common denominator of agreement. These characteristics make the IPCC mismatched to the urgency required in responding to the climate emergency. A university-housed Institute could reap the benefits of the IPCC by associating with IPCC scientists without being encumbered by the IPCC process.

The other locating option is within an independent think tank such as the Stockholm Institute. While, of the three types of institutions, this model offers perhaps the greatest potential for nimble engagement, it (and the IPCC as well) lacks students and the educational component. Students are the agents through which exponential impact from the Institute can be realized on a global level. A robust educational and experiential component will train a league of professionals in carrying out the strategies and techniques conceived as part of the Atmospheric Recovery Plan. An inspired student body will create incalculable ripple effects across the world through the natural outreach that students do in their communities.

IV. Atmospheric Recovery Institute Funding

The Atmospheric Recovery Institute would have potential to attract both government and private funding. Only months ago, in December, the White House Office of Science and Technology Policy announced a soil sustainability initiative action plan that focuses on three key areas: promoting interdisciplinary research and education, advancing computational tools and

modeling, and expanding sustainable agricultural practices.[16] As part of the interdisciplinary research and education initiative, the Department of Energy's Pacific Northwest National Laboratory will devote $20 million to soil research, $10 million of which will be used to launch a "new flagship soil-plant-atmosphere integrated research program."[17]

The National Science Foundation (NSF), with an annual budget of over $7 billion, provided institutes within Oregon with over $90 million in 2016 alone.[18] Further, for the year 2017, the Natural Resource Conservation Service has a $25 million budget for Conservation Innovation Grants (CIG) for fields such as energy conservation, soil health, greenhouse gas markets, and conservation finance.[19]

On the private side, there are many foundations and private corporations seeking partners that can make a global impact. The Rockefeller Foundation, for example, has invested over half a billion dollars over the past decade to fight climate change and promote resilience.[20] Patagonia, another example, is currently working with the Land Institute to research and develop products and goods made from perennial grains,[21] and Patagonia has also partnered with Carbon Underground to restore over 4 million acres of degraded agricultural lands.

Furthermore, fossil fuel companies face potential liability for atmospheric damage. Cases could be brought by attorney generals on behalf of state sovereign trustees (such as California, Massachusetts, and New York) seeking natural resource damages against deep-pocket fossil fuel companies ("carbon majors") to hold them responsible for funding climate recovery. Similar suits have been brought to recover damages for pollution of groundwater and pollution of ocean waters from oil spills.[22] If successful, natural resource damages gained through these cases could be deposited into a Sky Trust to fund projects satisfying the parameters outlined in the Atmospheric Recovery Plan. The Sky Trust, entirely independent from the Atmospheric Recovery Institute, would be modeled after other judicially accepted environmental mitigation funding frameworks, such as wetlands mitigation banks, or the $2.7 billion Mitigation Trust created by the court in the recent Volkswagen settlement to fund projects that fully mitigate the car pollution from faulty vehicular pollution control devices.

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[16] *See* http://www.publicnow.com/view/ED81A502819F266264D478DB308C97DD1D747A11?2016-12-05-12:00:12+00:00-xxx5545.
[17] *Id.*
[18] *See* 2016 Fiscal Year Report (https://dellweb.bfa.nsf.gov/AwdLst2/default.asp).
[19] *See* https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/.
[20] *See* Rockefeller Foundation Annual Report 2015, https://www.rockefellerfoundation.org/about-us/governance-reports/annual-reports/annual-report-2015/.
[21] *See* The Land Institute, Patagonia, https://landinstitute.org/kernza-featured-beer-patagonia-provisions/.
[22] *See* Mary Christina Wood & Dan Galpern, *Atmospheric Recovery Litigation: Making the Fossil Fuel Industry Pay to Restore a Viable Climate System*, 45 ENVTL. L. 259 (2015).