# Womxn in Stem Aff

## Plan

#### Math scores from standardized tests are structurally biased against womxn, which kills gender diversity in stem, this is confirmed by an immense amount of statistical evidence.

Andrew Hacker, professor emeritus in the political-science department of Queens College in New York City, Standardized Tests Are a New Glass Ceiling, MARCH 1, 2016, <https://www.thenation.com/article/standardized-tests-are-a-new-glass-ceiling/> ///AHS PB

We’ve heard most of the reasons, not least hostility in laboratories. But a more central cause became apparent as I began researching the teaching and testing of mathematics. Standardized testing in math, where women do significantly worse than men, is setting wom[x]n back before they even begin college. Since mathematics is the first hurdle for STEM fields, women are unlikely to sign on if they’ve already been told that they don’t measure up. We know that the problem is the test. It’s not the students, because girls and women are getting better grades than boys and men in high-school and college mathematics courses. Without changing our methods for measuring ability, we stand little chance of changing the gender imbalance among our scientists and engineers. The importance we assign to standardized tests is eclipsing that of assessments by sentient teachers. Each year, more weight is given to scores disgorged by the ACT and the SAT, backstopped by the GRE, MCAT, and LSAT, not to mention standardized Common Core tests, which are given over to firms like Pearson and McGraw-Hill. Computer-awarded scores are touted as objective, whereas grades bestowed by teachers are seen as subjective, if not tainted by biases. (An ACT study intimated that the principal victims of prejudice were boys.) On last year’s SAT, boys averaged 527 in the mathematics section against 496 for girls—a far wider gulf than elsewhere in the test. The ACT’s gap is smaller, largely because its test is closer to what schools actually teach, but boys are still visibly ahead. In fact, a more reliable gauge is performance in high school before they take tests and in college courses afterward. I did some calculations to see what would happen if the SAT’s mathematics scores reflected classroom grades. If that were the case, girls would not only erase their current 31-point deficit, but would move 32 points ahead of their male classmates. With the ACT, they would gain 28 points and also pass the boys. (I’ve converted ACT scores here to the SAT range.) Since we know that girls and women are just as intelligent and adaptable as boys and men, why aren’t they faring equally well with an instrument that has been in place for over half a century? I turned to Marcia Linn at the University of California, Berkeley, who has studied grades and scores for over 20 years, especially gender differences in mathematics. “Females turn out to be better course takers,” she has concluded; “males turn out to be better test takers.” She notes that boys are more apt to take physics and computer science, which sharpen quantitative and spatial skills. And more college-aspiring girls come from lower-income homes with fewer resources for tutoring. But what ultimately separates the scores, Linn says, is the “tendency of girls to be more conscientious than boys.” Diligence pays off in complex class assignments, which results in higher grades. But pausing to ponder can spell death in multiple-choice testing, since speed is crucial for a high score. The ACT’s 60 mathematics problems must be assessed and answered in 60 minutes, although a more generous SAT, set to start this spring, allots 83 seconds. Given the ticking clock, the tests openly advise swift skimming and blind guessing. Hence this advice from Axiom Learning, a coaching company: “It’s Not What You Know, It’s How Fast You Can Show It.” I next conferred with Jonathan Chiu, who oversees Princeton Review’s tutorial services. He began by saying that he warns girls not to double-check their answers, because that wastes crucial seconds. Girls tend to “overanalyze” the options, he added, while boys cotton to the idea that there is “only one right answer.” The ACT and the SAT concede that it’s not possible to truly solve all of their problems in the allotted time. So along with speed, there’s what some coaches call “stabbing,” which can yield precious points. Suppose you know the bell is about to ring, and you have 10 items still to go. Chiu recommends that you not even read them, but simply stab a bubble for each one. He says that girls are more apt to feel it’s not honest to fill in answers if you haven’ta done the questions. A venerable College Board study found they were 12 times more likely to leave the bubbles blank because they weren’t sure. Chiu notes that too many girls enter the tests feeling their knowledge is being weighed, while boys perceive them as contests to be gamed. The keys to a successful score are an impulsive pace, brazen confidence, and a cynical view of the entire enterprise.

#### Thus the plan: Colleges and Universities ought not consider math scores from standardized tests in undergraduate admissions decisions.

#### Empirics prove testing phase-out massively increases gender diversity specifically at stem universities. Jaschik 18

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Another institution that has studied the impact of test optional is Worcester Polytechnic Institute, which attracted attention for its shift in admissions policy because WPI is an engineering and science institution. Conventional wisdom has held that standardized testing is most needed for those seeking a STEM education. As at similar institutions, WPI has been pushing not only on ethnic and racial diversity, but also to attract greater numbers of female students. The data WPI has collected point to success with the policy, but also to the need for adjustments. Here are some of the data from the university: Applications from underrepresented minority groups are up 146 percent, and enrollments are up 156 percent. Applications from women increased by 99 percent and enrollments increased by 81 percent. The incoming Class of 2021 was 43 percent women, the highest level ever at WPI. (The university attributes the gains to multiple strategies, of which test optional was one.) Students enrolling without test scores are not only matching others in academic performance, but are graduating with honors in significant numbers. WPI officials said that their biggest disappointment after launching test optional was that relatively few applicants (about 3 or 4 percent a year) used it. The original WPI plan was called "Flex Path" and required students opting not to submit test scores to instead provide a project or sample of academic work. Potential applicants indicated that this was viewed as an additional hurdle. So last year, WPI eliminated the additional requirements for those applying without test scores. Applicants responded to the new option. In 2017, 3 percent of applicants didn't submit test scores. In 2018, the first year in which applicants could skip test scores without submitting something else, 11 percent applied that way. The share was significantly higher for applicants who were women (33 percent), members of underrepresented minority groups (25 percent), and first generation college goers (20 percent). All evidence on those not submitting scores at WPI (largely before the most recent change) suggests no difference in academic performance and completion.

#### Increasing the amount of womxn in STEM is uniquely important. Disproportionately male workplaces encourage harassment and make it impossible for gender minorities to succeed.

Cary Funk, director of science and society research at Pew Research Center, where she has co-authored of a number of reports focused on [public trust in science](https://www.pewinternet.org/2017/12/08/mixed-messages-about-public-trust-in-science/), including views connected with [energy](https://www.pewinternet.org/2018/05/14/majorities-see-government-efforts-to-protect-the-environment-as-insufficient/), [climate](https://www.pewinternet.org/2016/10/04/the-politics-of-climate/), [food science](https://www.pewinternet.org/2016/12/01/the-new-food-fights/), [childhood vaccines](https://www.pewinternet.org/2017/02/02/vast-majority-of-americans-say-benefits-of-childhood-vaccines-outweigh-risks/), and [emerging science issues](https://www.pewinternet.org/2016/07/26/u-s-public-wary-of-biomedical-technologies-to-enhance-human-abilities/) such as [gene editing](https://www.pewresearch.org/fact-tank/2017/08/08/americans-divided-on-gene-editing-with-parents-of-minors-more-wary/). Recent studies include “[Science News and Information Today](https://www.journalism.org/2017/09/20/science-news-and-information-today/)” and “[Women and Men in STEM Often at Odds Over Workplace Equity](https://www.pewsocialtrends.org/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/).” She has specialized in public understanding of science topics since 2001 and has broad expertise in political and social attitudes, including American politics and elections, race and ethnicity, and religion. Prior to joining Pew Research Center, she directed the Virginia Commonwealth University Life Sciences Surveys, national surveys on science and biotechnology. She has served as an adviser for numerous projects about the science and engineering workforce and public opinion on science. She is currently on the editorial board of the Bulletin of Science, Technology & Society. Funk began her career at CBS News in New York, and in more recent years has served as an election night analyst for NBC News. She earned a doctorate and a master’s in social psychology from the University of California, Los Angeles, and Kim Parker, director of social trends research at Pew Research Center. She oversees research on emerging social and demographic trends, manages major survey projects, and writes and edits reports. Parker was previously the associate director of social and demographic trends research and the research director for the Center’s political unit. Prior to joining Pew Research Center, she worked as a research associate at the American Enterprise Institute. She holds a master’s degree in American government from Georgetown University and a bachelor’s degree from Trinity College. Parker is an author of studies on a variety of topics including [gender and work](https://www.pewsocialtrends.org/2013/12/11/on-pay-gap-millennial-women-near-parity-for-now/), the [changing American family](https://www.pewsocialtrends.org/topics/family-and-relationships/), [generational change](https://www.pewsocialtrends.org/2014/03/07/millennials-in-adulthood/), [higher education](https://www.pewsocialtrends.org/topics/education/), the [Great Recession](https://www.pewsocialtrends.org/series/the-great-recession/), the [middle class](https://www.pewsocialtrends.org/2012/08/22/the-lost-decade-of-the-middle-class/), aging, [military veterans](https://www.pewsocialtrends.org/topics/military-and-veterans/) and [Asian Americans](https://www.pewsocialtrends.org/asianamericans/). Parker frequently discusses social and demographic trends with journalists and has been interviewed by broadcast outlets such as NPR, NBC, MSNBC and C-SPAN, Women and Men in STEM Often at Odds Over Workplace Equity, January 9th 2018, <https://www.pewsocialtrends.org/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/> ///AHS PB

Pioneering work from business school professor Rosabeth Moss Kanter in the late 1970s drew attention to how the structure of organizations – particularly the balance of minority and majority groups – can influence experiences in the workplace. The majority of women in STEM positions work in majority-female workplaces (55%) or work with an even mix of both genders (25%). But the 19% of wom[x]n in STEM who work in settings with mostly men stand out from others. Fully 78% of these women say they have experienced gender discrimination in the workplace – compared with 44% of STEM women in other settings.3 About half (48%) of women in STEM jobs who work with mostly men say their gender has made it harder for them to succeed in their job, compared with just 14% of other women in STEM. One respondent explained it this way: “People automatically assume I am the secretary, or in a less technical role because I am female. This makes it difficult for me to build a technical network to get my work done. People will call on my male co-workers, but not call on me.” – White woman, technical consultant, 36 Gender balance in the workplace also tends to matter for women in non-STEM positions but those in STEM stand out especially when it comes to experiences with workplace discrimination, the feeling that they need to prove themselves in order to be respected by coworkers, and their belief that, overall, their gender has made it harder for them to succeed at work. By contrast, for male STEM workers, the gender balance in their workplace is largely unrelated to views about gender equity.4

#### More representation of womxn in stem is key to solving climate change and every other major global issue—but to due this we need to stop dropouts.

Stephenie Foster, Gender equality leader, organizational leader, and connector with deep and broad expertise in business, politics and the law. She has had decades of experience on Capitol Hill, as well as in the Executive Branch, the nonprofit sector, and the legal profession. She has guided high-profile initiatives and used her legal experience to counsel corporations, foundations, individuals, and government officials. Women in Stem: Critical to Innovation, 10 January 2019, <https://www.globalpolicyjournal.com/blog/10/01/2019/women-stem-critical-innovation> ///AHS PB

Our world faces multiple challenges: fragility of economic and political systems, cold and hot wars, cyberattacks and extremism, and disruptions caused by climate change. We need every tool to understand these threats and craft workable solutions. Science, technology, engineering and math (STEM) fields are at the forefront of creating tools and innovative solutions. At every level, we need our best thinkers and that must include wom[x]n. In December 2018, I participated in a series of meetings and speeches in Japan, focused on how to encourage women and girls to pursue STEM careers. These conversations highlighted the global and regional barriers to increasing women in STEM, as well as innovative interventions to change the status quo. Why Women? Simply put, diversity, both inherent and acquired, helps drive innovation. We know from research that diverse teams are more effective at problem solving, when different voices, viewpoints, expertise and life experiences are brought to bear. This is true both in STEM and national security fields, which are overlapping and connected, given the security challenges that cybersecurity, extremism (often propagated via social media platforms), and climate devastation pose. Understanding the impact of these challenges on women and engaging wom[x]n to address these issues -- as innovators, decision-makers and community actors -- is critical. Globally, women are underrepresented in STEM. According to UNESCO, 29 percent of those in science research and development are women, with a low of 19 percent in South and West Asia and a high of 48 percent in Central Asia. Europe and North America are at 32 percent. In the U.S., 80 percent of STEM jobs are in engineering and computer science but women comprise only 12 percent of the engineering workforce and 26 percent of the computing workforce. In the U.K., women are underrepresented in STEM at every stage of the STEM pipeline. In 2016-17, women students accounted for less than 10 percent of A Level exam entries in computing, 21 percent in physics, and 39 percent in math. Across the 34 member countries of the Organization for Economic Cooperation and Development (OECD), women represent 58 percent of university graduates, but only 20 percent of computer sciences graduates. In both academic and practical STEM environments, we need to cultivate ways of tackling science and technology problems that are inclusive, not exclusive, and that highlight the impact of STEM on real world problems. This helps interest women in STEM, which can address gaps in technology design and usability. Most artificial intelligence (AI), and the programs that utilize AI, are created by (white) men. Those programs and apps will be different than those created by a more diverse group. A recent article documented that “smart speakers” like Alexa and Home have a hard time understanding commands by those who speak American English with an accent. Challenges and Barriers Solutions to increase wom[x]n in STEM must address three major types of challenges. Redefining “what a scientist looks like” and lack of role models: STEM fields are broad and varied. Currently, within STEM, young women gravitate to healthcare, medicine, education, arts, and humanities, while young men gravitate towards engineering, computer science, math and physics. Young women need access to information about all types of STEM possibilities and the women who have succeeded in those careers. The media often does not cover these women and as a result women’s career trajectories are less visible. In the U.S., young women engineers have started a social media campaign #ilooklikeanengineer to change these stereotypes. At the same time, parents and teachers need tools to encourage young women and girls to consider STEM careers, in order to break gender norms. The “leaky” pipeline: Women drop off at every stage throughout the STEM journey, whether in elementary school, high school, university, or in the workplace. Those who remain can be isolated. An OECD study found that while 15 year-old boys and girls are fairly even in terms of science aptitude, girls have less confidence in their abilities. Girls drop out because of a confidence gap, not an ability gap. But once hired, just as in other fields, women may not be encouraged to pursue higher level jobs by their employers and the time constraints also can become pervasive as women enter child-bearing years.

#### Climate innovations are the primary key to solve warming. Moniz 15

Ernest Moniz (U.S. Secretary of Energy), Interviewed by David Biello, Accelerated Innovation Is the Ultimate Solution to Climate Change, Scientific American, 12/11/15, <https://www.scientificamerican.com/article/accelerated-innovation-is-the-ultimate-solution-to-climate-change/>.

PARIS—From "clean coal" evangelists to solar power enthusiasts, most experts at the U.N. climate talks here agree that solving climate change means transforming how the world produces and uses energy—and as quickly as possible. Such a transformation would be unprecedented. It would require enormous investments. To help make it happen, the U.S. Department of Energy, which for decades has spent billions of dollars to develop and deploy advanced energy technologies (not always clean), will play a major role in the new "Mission Innovation." The initiative is an effort announced by 20 major countries at the COP 21 negotiations here to significantly accelerate clean-energy improvements. On December 9, Secretary of Energy Ernest Moniz sat down with Scientific American to explain how innovation and transformation might be sped up to meet the climate challenge, which requires a world without carbon dioxide pollution, soon. [An edited transcript of the interview follows.] How do we get to 80 percent cuts in CO2 emissions in 35 years, the Obama administration's long-term goal? And beyond that, to meet a Paris deal that might even require "zero carbon" by then. Obviously, innovation is going to be central. We're very pleased that our French hosts put innovation on the front burner: having Innovation Day, following Energy Day. And of course, the announcement on the very first day by 20 countries, including Pres. Obama, French Pres. Hollande, India Prime Minister Modi and others, of Mission Innovation. Then the Bill Gates announcement on the parallel Breakthrough Energy Coalition initiative. There is no question that the world now understands that innovation is the core to meet the INDCs [national climate action plans, known as "intended nationally determined contributions"]. We've had a lot of cost reduction and innovation and deployment increases. That virtuous cycle has put us in a pretty good spot to meet a 10-year horizon, maybe a 15-year horizon. For sure, as we go to the longer time periods and extraordinarily low levels of greenhouse gas emissions being discussed, we're going to have to keep that going. I just came from a meeting of the Mission Innovation countries. There is a tremendous amount of enthusiasm. The resonance of the Mission Innovation agenda was so great because it largely fits with the directions that so many countries were going in. It's crystallized that—given that a very explicit framework. We are the dog that caught the car. And now we're [laughs] figuring out what to do with the car. Some people argue that we can meet the goal with the technology we already have, whether it be CO2 capture and storage for fossil fuels and nuclear power or more renewables or all of the above, to use a phrase. Others say we really need a breakthrough. You're on the breakthrough side? In some sense, the answer is yes. What we're talking about is this cycle of innovation, deployment, cost reduction. They all go hand in hand. We have seen that explicitly in the last six years. Continued cost reduction in clean technologies is going to be important. And new enabling technologies are going to be important. So, for example, with wind and solar, we still are not at the point where we can have a large scale-up of energy storage. We are still not at the stage where we really have incorporated [information technology, like computers and the Internet] extensively into the energy infrastructure in the way we're going to need. We also have qualitatively new directions to go in. One is the Makani flying wind turbines. Or now the Google X flying wind turbine; it’s so novel that we don't understand exactly how it could have a big, major transformative impact. But it sure looks like it would if it became a widespread technology.

#### Warming causes extinction – any reduction should be prioritized above any other impact Ramanathan et al. 17

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Climate change is becoming an existential threat with warming in excess of 2°C within the next three decades and 4°C to 6°C within the next several decades. Warming of such magnitudes will expose as many as 75% of the world’s population to deadly heat stress in addition to disrupting the climate and weather worldwide. Climate change is an urgent problem requiring urgent solutions. This paper lays out urgent and practical solutions that are ready for implementation now, will deliver benefits in the next few critical decades, and places the world on a path to achieving the longterm targets of the Paris Agreement and near-term sustainable development goals. The approach consists of four building blocks and 3 levers to implement ten scalable solutions described in this report by a team of climate scientists, policy makers, social and behavioral scientists, political scientists, legal experts, diplomats, and military experts from around the world. These solutions will enable society to decarbonize the global energy system by 2050 through efficiency and renewables, drastically reduce short-lived climate pollutants, and stabilize the climate well below 2°C both in the near term (before 2050) and in the long term (post 2050). It will also reduce premature mortalities by tens of millions by 2050. As an insurance against policy lapses, mitigation delays and faster than projected climate changes, the solutions include an Atmospheric Carbon Extraction lever to remove CO2 from the air. The amount of CO2 that must be removed ranges from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons if the carbon lever is not pulled and emissions of climate pollutants continue to increase until 2030. There are numerous living laboratories including 53 cities, many universities around the world, the state of California, and the nation of Sweden, who have embarked on a carbon neutral pathway. These laboratories have already created 8 million jobs in the clean energy industry; they have also shown that emissions of greenhouse gases and air pollutants can be decoupled from economic growth. Another favorable sign is that growth rates of worldwide carbon emissions have reduced from 2.9% per year during the first decade of this century to 1.3% from 2011 to 2014 and near zero growth rates during the last few years. The carbon emission curve is bending, but we have a long way to go and very little time for achieving carbon neutrality. We need institutions and enterprises that can accelerate this bending by scaling-up the solutions that are being proven in the living laboratories. We have less than a decade to put these solutions in place around the world to preserve nature and our quality of life for generations to come. The time is now. The Paris Agreement is an historic achievement. For the first time, effectively all nations have committed to limiting their greenhouse gas emissions and taking other actions to limit global temperature change. Specifically, 197 nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels,” and achieve carbon neutrality in the second half of this century. The climate has already warmed by 1°C. The problem is running ahead of us, and under current trends we will likely reach 1.5°C in the next fifteen years and surpass the 2°C guardrail by mid-century with a 50% probability of reaching 4°C by end of century. Warming in excess of 3°C is likely to be a global catastrophe for three major reasons: • Warming in the range of 3°C to 5°C is suggested as the threshold for several tipping points in the physical and geochemical systems; a warming of about 3°C has a probability of over 40% to cross over multiple tipping points, while a warming close to 5°C increases it to nearly 90%, compared with a baseline warming of less than 1.5°C, which has only just over a 10% probability of exceeding any tipping point. • Health effects of such warming are emerging as a major if not dominant source of concern. Warming of 4°C or more will expose more than 70% of the population, i.e. about 7 billion by the end of the century, to deadly heat stress and expose about 2.4 billion to vector borne diseases such as Dengue, Chikengunya, and Zika virus among others. Ecologists and paleontologists have proposed that warming in excess of 3°C, accompanied by increased acidity of the oceans by the buildup of CO2 , can become a major causal factor for exposing more than 50% of all species to extinction. 20% of species are in danger of extinction now due to population, habitat destruction, and climate change. The good news is that there may still be time to avert such catastrophic changes. The Paris Agreement and supporting climate policies must be strengthened substantially within the next five years to bend the emissions curve down faster, stabilize climate, and prevent catastrophic warming. To the extent those efforts fall short, societies and ecosystems will be forced to contend with substantial needs for adaptation—a burden that will fall disproportionately on the poorest three billion who are least responsible for causing the climate change problem. Here we propose a policy roadmap with a realistic and reasonable chance of limiting global temperature to safe levels and preventing unmanageable climate change—an outline of specific science-based policy pathways that serve as the building blocks for a three-lever strategy that could limit warming to well under 2°C. The projections and the emission pathways proposed in this summary are based on a combination of published recommendations and new model simulations conducted by the authors of this study (see Figure 2). We have framed the plan in terms of four building blocks and three levers, which are implemented through 10 solutions. The first building block would be fully implementing the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC). In addition, several sister agreements that provide targeted and efficient mitigation must be strengthened. Sister agreements include the Kigali Amendment to the Montreal Protocol to phase down HFCs, efforts to address aviation emissions through the International Civil Aviation Organization (ICAO), maritime black carbon emissions through the International Maritime Organization (IMO), and the commitment by the eight countries of the Arctic Council to reduce black carbon emissions by up to 33%. There are many other complementary processes that have drawn attention to specific actions on climate change, such as the Group of 20 (G20), which has emphasized reform of fossil fuel subsidies, and the Climate and Clean Air Coalition (CCAC). HFC measures, for example, can avoid as much as 0.5°C of warming by 2100 through the mandatory global phasedown of HFC refrigerants within the next few decades, and substantially more through parallel efforts to improve energy efficiency of air conditioners and other cooling equipment potentially doubling this climate benefit. For the second building block, numerous subnational and city scale climate action plans have to be scaled up. One prominent example is California’s Under 2 Coalition signed by over 177 jurisdictions from 37 countries in six continents covering a third of world economy. The goal of this Memorandum of Understanding is to catalyze efforts in many jurisdictions that are comparable with California’s target of 40% reductions in CO2 emissions by 2030 and 80% reductions by 2050—emission cuts that, if achieved globally, would be consistent with stopping warming at about 2°C above pre-industrial levels. Another prominent example is the climate action plans by over 52 cities and 65 businesses around the world aiming to cut emissions by 30% by 2030 and 80% to 100% by 2050. There are concerns that the carbon neutral goal will hinder economic progress; however, real world examples from California and Sweden since 2005 offer evidence that economic growth can be decoupled from carbon emissions and the data for CO2 emissions and GDP reveal that growth in fact prospers with a green economy. The third building block consists of two levers that we need to pull as hard as we can: one for drastically reducing emissions of short-lived climate pollutants (SLCPs) beginning now and completing by 2030, and the other for decarbonizing the global energy system by 2050 through efficiency and renewables. Pulling both levers simultaneously can keep global temperature rise below 2°C through the end of the century. If we bend the CO2 emissions curve through decarbonization of the energy system such that global emissions peak in 2020 and decrease steadily thereafter until reaching zero in 2050, there is less than a 20% probability of exceeding 2°C. This call for bending the CO2 curve by 2020 is one key way in which this report’s proposal differs from the Paris Agreement and it is perhaps the most difficult task of all those envisioned here. Many cities and jurisdictions are already on this pathway, thus demonstrating its scalability. Achieving carbon neutrality and reducing emissions of SLCPs would also drastically reduce air pollution globally, including all major cities, thus saving millions of lives and over 100 million tons of crops lost to air pollution each year. In addition, these steps would provide clean energy access to the world’s poorest three billion who are still forced to resort to 18th century technologies to meet basic needs such as cooking. For the fourth and the final building block, we are adding a third lever, ACE (Atmospheric Carbon Extraction, also known as Carbon Dioxide Removal, or “CDR”). This lever is added as an insurance against surprises (due to policy lapses, mitigation delays, or non-linear climate changes) and would require development of scalable measures for removing the CO2 already in the atmosphere. The amount of CO2 that must be removed will range from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons, if CO2 emissions continue to increase until 2030, and the carbon lever is not pulled until after 2030. This issue is raised because the NDCs (Nationally Determined Contributions) accompanying the Paris Agreement would allow CO2 emissions to increase until 2030. We call on economists and experts in political and administrative systems to assess the feasibility and cost-effectiveness of reducing carbon and SLCPs emissions beginning in 2020 compared with delaying it by ten years and then being forced to pull the third lever to extract one trillion tons of CO2 The fast mitigation plan of requiring emissions reductions to begin by 2020, which means that many countries need to cut now, is urgently needed to limit the warming to well under 2°C. Climate change is not a linear problem. Instead, we are facing non-linear climate tipping points that can lead to self-reinforcing and cascading climate change impacts. Tipping points and selfreinforcing feedbacks are wild cards that are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C in 15 years to 2°C by 2050, with the potential to push us well beyond the Paris Agreement goals. Where Do We Go from Here? A massive effort will be needed to stop warming at 2°C, and time is of the essence. With unchecked business-as-usual emissions, global warming has a 50% likelihood of exceeding 4ºC and a 5% probability of exceeding 6ºC in this century, raising existential questions for most, but especially the poorest three billion people. A 4ºC warming is likely to expose as many as 75% of the global population to deadly heat. Dangerous to catastrophic impacts on the health of people including generations yet to be born, on the health of ecosystems, and on species extinction have emerged as major justifications for mitigating climate change well below 2ºC, although we must recognize that the uncertainties intrinsic in climate and social systems make it hard to pin down exactly the level of warming that will trigger possibly catastrophic impacts. To avoid these consequences, we must act now, and we must act fast and effectively. This report sets out a specific plan for reducing climate change in both the near- and long-term. With aggressive urgent actions, we can protect ourselves. Acting quickly to prevent catastrophic climate change by decarbonization will save millions of lives, trillions of dollars in economic costs, and massive suffering and dislocation to people around the world. This is a global security imperative, as it can avoid the migration and destabilization of entire societies and countries and reduce the likelihood of environmentally driven civil wars and other conflicts. Staying well under 2°C will require a concerted global effort. We must address everything from our energy systems to our personal choices to reduce emissions to the greatest extent possible. We must redouble our efforts to invent, test, and perfect systems of governance so that the large measure of international cooperation needed to achieve these goals can be realized in practice. The health of people for generations to come and the health of ecosystems crucially depend on an energy revolution beginning now that will take us away from fossil fuels and toward the clean renewable energy sources of the future. It will be nearly impossible to obtain other critical social goals, including for example the UN agenda 2030 with the Sustainable Development Goals, if we do not make immediate and profound progress stabilizing climate, as we are outlining here. 1. The Building Blocks Approach The 2015 Paris Agreement, which went into effect November 2016, is a remarkable, historic achievement. For the frst time, essentially all nations have committed to limit their greenhouse gas emissions and take other actions to limit global temperature and adapt to unavoidable climate change. Nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels” and “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century” (UNFCCC, 2015). Nevertheless, the initial Paris Agreement has to be strengthened substantially within fve years if we are to prevent catastrophic warming; current pledges place the world on track for up to 3.4°C by 2100 (UNEP, 2016b). Until now, no specifc policy roadmap exists that provides a realistic and reasonable chance of limiting global temperatures to safe levels and preventing unmanageable climate change. This report is our attempt to provide such a plan— an outline of specifc solutions that serve as the building blocks for a comprehensive strategy for limiting the warming to well under 2°C and avoiding dangerous climate change (Figure 1). The frst building block is the full implementation of the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC) and strengthening global sister agreements, such as the Kigali Amendment to the Montreal Protocol to phase down HFCs, which can provide additional targeted, fast action mitigation at scale. For the second building block, numerous sub-national and city scale climate action plans have to be scaled up such as California’s Under 2 Coalition signed by 177 jurisdictions from 37 countries on six continents. The third building block is targeted measures to reduce emissions of shortlived climate pollutants (SLCPs), beginning now and fully implemented by 2030, along with major measures to fully decarbonize the global economy, causing the overall emissions growth rate to stop in 2020-2030 and reach carbon neutrality by 2050. Such a deep decarbonization would require an energy revolution similar to the Industrial Revolution that was based on fossil fuels. The fnal building block includes scalable and reversible carbon dioxide (CO2 ) removal measures, which can begin removing CO2 already emitted into the atmosphere. Such a plan is urgently needed. Climate change is not a linear problem. Instead, climate tipping points can lead to self-reinforcing, cascading climate change impacts (Lenton et al., 2008). Tipping points are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C to 2°C, with the potential to push us well beyond the Paris Agreement goals (Drijfhout et al., 2015). In order to avoid dangerous climate change, we must address these concerns. We must act now, and we must act fast. Reduction of SLCPs will result in fast, near-term reductions in warming, while present-day reductions of CO2 will result in long-term climate benefts. This two-lever approach—aggressively cutting both SLCPs and CO2 –-will slow warming in the coming decades when it is most crucial to avoid impacts from climate change as well as maintain a safe climate many decades from now. To achieve the nearterm goals, we have outlined solutions to be implemented immediately. These solutions to bend down the rising emissions curve and thus bend the warming trajectory curve follow a 2015 assessment by the University of California under its Carbon Neutrality Initiative (Ramanathan et al., 2016). The solutions are clustered into categories of social transformation, governance improvement, market- and regulation-based solutions, technological innovation and transformation, and natural and ecosystem management. Additionally, we need to intensely investigate and pursue a third lever—ACE (Atmospheric Carbon Extraction). While many potential technologies exist, we do not know the extent to which they could be scaled up to remove the requisite amount of carbon from the atmosphere in order to achieve the Paris Agreement goals, and any delay in mitigation will demand increasing reliance on these technologies. Yet, there is still hope. Humanity can come together, as we have done in the past, to collaborate towards a common goal. We have no choice but to tackle the challenge of climate change. We only have the choice of when and how: either now, through the ambitious plan outlined here, or later, through radical adaptation and societal transformations in response to an ever-deteriorating climate system that will unleash devastating impacts—some of which may be beyond our capacity to fully adapt to or reverse for thousands of years. 2. Major Climate Disruptions: How Soon and How Fast? “Without adequate mitigation and adaptation, climate change poses unacceptable risks to global public health.” (WHO, 2016) The planet has already witnessed nearly 1°C of warming, and another 0.6°C of additional warming is currently stored in the ocean to be released over the next two to four decades, if climate warming emissions are not radically reduced during that time (IPCC, 2013). The impacts of this warming on extreme weather, droughts, and foods are being felt by society worldwide to the extent that many think of this no longer as climate change but as climate disruption. Consider the business as usual scenario: 15 years from now: In 15 years, planetary warming will reach 1.5°C above pre-industrial global mean temperature (Ramanathan and Xu, 2010; Shindell et al., 2012). This exceeds the 0.5°C to 1°C of warming during the Eemian period, 115,000– 130,000 years ago, when sea-levels reached 6-9 meters (20-30 feet) higher than today (Hansen et al., 2016b). The impacts of this warming will affect us all yet will disproportionately affect the Earth’s poorest three billion people, who are primarily subsistence farmers that still rely on 18th century technologies and have the least capacity to adapt (IPCC, 2014a; Dasgupta et al., 2015). They thus may be forced to resort to mass migration into city slums and push across international borders (U.S. DOD, 2015). The existential fate of lowlying small islands and coastal communities will also need to be addressed, as they are primarily vulnerable to sea-level rise, diminishing freshwater resources, and more intense storms. In addition, many depend on fsheries for protein, and these are likely to be affected by ocean acidifcation and climate change. Climate injustice could start causing visible regional and international conficts. All of this will be exacerbated as the risk of passing tipping points increases (Lenton et al., 2008). 30 years from now: By mid-century, warming is expected to exceed 2°C, which would be unprecedented with respect to historical records of at least the last one million years (IPCC, 2014c). Such a warming through this century could result in sea-level rise of as much as 2 meters by 2100, with greater sea-level rise to follow. A group of tipping points are clustered between 1.5°C and 2°C (Figure 2) (Drijfhout et al., 2015). The melting of most mountain glaciers, including those in the Tibetan-Himalayas, combined with mega-droughts, heat waves, storms, and foods, would adversely affect nearly everyone on the planet. 80 years from now: In 80 years, warming is expected to exceed 4°C, increasing the likelihood of irreversible and catastrophic change (World Bank, 2013b). 4ºC warming is likely to expose as much as 75% of the global population to deadly heat (Mora et al., 2017). The 2°C and 4°C values quoted above and in other reports, however, are merely the central values with a 50% probability of occurrence (Ramanathan and Feng, 2008). There is a 5% probability the warming could be as high as 6°C due to uncertainties in the magnitude of amplifying feedbacks (see Section 4). This in turn could lead to major disruptions to natural and social systems, threatening food security, water security, and national security and fundamentally affecting the great majority of the projected 11.2 billion inhabitants of the planet in 2100 (UN DESA, 2015). 3. What Are the Wild Cards for Climate Disruption? Increasing the concentrations of greenhouse gases in the atmosphere increases radiative forcing (the difference between the amount of energy entering the atmosphere and leaving) and thus increases the global temperature (IPCC, 2013). However, climate wild cards exist that can alter the linear connection with warming and anthropogenic emissions by triggering abrupt changes in the climate (Lenton et al., 2008). Some of these wild cards have not been thoroughly captured by the models that policymakers rely on the most. These abrupt shifts are irreversible on a human time scale (<100 years) and will create a notable disruption to the climate system, condemning the world to warming beyond that which we have previously projected. These climate disruptions would divert resources from needed mitigation and upset mitigation strategies that we have already put in place. 1. Unmasking Aerosol Cooling: The frst such wild card is the unmasking of an estimated 0.7°C (with an uncertainty range of 0.3°C to 1.2°C) of the warming in addition to mitigating other aerosol effects such as disrupting rainfall patterns, by reducing emissions of aerosols such as sulfates and nitrates as part of air pollution regulations (Wigley, 1991; Ramanathan and Feng, 2008). Aerosol air pollution is a major health hazard with massive costs to public health and society, including contributing to about 7 million deaths (from household and ambient exposure) each year (WHO, 2014). While some aerosols, such as black carbon and brown carbon, strongly absorb sunlight and warm the climate, others refect sunlight back into space, which cools the climate (Ramanathan and Carmichael, 2008). The net impact of all manmade aerosols is negative, meaning that about 30% of the warming from greenhouse gases is being masked by co-emitted air pollution particles (Ramanathan and Carmichael, 2008). As we reduce greenhouse gas emissions and implement policies to eliminate air pollution, we are also reducing the concentration of aerosols in the air. Aerosols last in the atmosphere for about a week, so if we eliminate air pollution without reducing emissions of the greenhouse gases, the unmasking alone would lead to an estimated 0.7°C of warming within a matter of decades (Ramanathan and Feng, 2008). We must eliminate all aerosol emissions due to their health effects, but we must simultaneously mitigate emissions of CO2 , other greenhouse gases, and black carbon and co-pollutants to avoid an abrupt and very large jump in the near-term warming beyond 2°C (Brasseur and Roeckner, 2005). 2. Tipping Points: It is likely that as we cross the 1.5°C to 2°C thresholds we will trigger so called “tipping points” for abrupt and nonlinear changes in the climate system with catastrophic consequences for humanity and the environment (Lenton, 2008; Drijfhout et al., 2015). Once the tipping points are passed, the resulting impacts will range in timescales from: disruption of monsoon systems (transition in a year), loss of sea ice (approximately a decade for transition), dieback of major forests (nearly half a century for transition), reorganization of ocean circulation (approximately a century for transition), to loss of ice sheets and subsequent sea-level rise (transition over hundreds of years) (Lenton et al., 2008). Regardless of timescale, once underway many of these changes would be irreversible (Lontzek et al., 2015). There is also a likelihood of crossing over multiple tipping points simultaneously. Warming of close to 3°C would subject the system to a 46% probability of crossing multiple tipping points, while warming of close to 5°C would increase the risk to 87% (Cai et al., 2016). Recent modeling work shows a “cluster” of these tipping points could be triggered between 1.5°C and 2°C warming (Figure 2), including melting of land and sea ice and changes in highlatitude ocean circulation (deep convection) (Drijfhout et al., 2015). This is consistent with existing observations and understanding that the polar regions are particularly sensitive to global warming and have several potentially imminent tipping points. The Arctic is warming nearly twice as quickly as the global average, which makes the abrupt changes in the Arctic more likely at a lower level of global warming (IPCC, 2013). Similarly, the Himalayas are warming at roughly the same rate as the Arctic and are thus also more susceptible to incremental changes in temperature (UNEP-WMO, 2011). This gives further justifcation for limiting warming to no more than 1.5°C. While all climate tipping points have the potential to rapidly destabilize climate, social, and economic systems, some are also self-amplifying feedbacks that once set in motion increase warming in such a way that they perpetuate yet even more warming. Declining Arctic sea ice, thawing permafrost, and the poleward migration of cloud systems are all examples of self-amplifying feedback mechanisms, where initial warming feeds upon itself to cause still more warming acting as a force multiplier (Schuur et al., 2015).

## Framework

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## Extensions

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### Grade Inflation

# Rejected

<https://miscellanynews.org/2019/04/25/opinions/gender-bias-in-tests-numbers-themselves-prove-sexist/>

Despite the prevailing misconception, these tests are not accurate indicators of performance nor ability. Colleges use the SAT as a predictor of how well students will do in college; however, girls receive better grades in their first year of college (and in the following years, and in graduate school) than boys do. As Sadker and Zittleman state, “The SAT Reasoning Test (and the PSAT) consistently underpredicts female performance while over predicting male performance. In short, the PSAT and the SAT are broken” (Sadker and Zittleman, 2009). In fact, according to studies as early as 1926, the test has never accurately predicted performance in college (Silverstein, “Standardized Tests: The Continuation of Gender Bias in Higher Education,” 2000). So if the SAT fails at its one job, we need to ask: Why? One possible explanation for the gender gap is that most high-stakes tests are composed almost entirely of multiple-choice questions due to cost and time restraints. According to the Stanford Graduate School of Education, “Girls perform better on standardized tests that have more open-ended questions while boys score higher when the tests include more multiple-choice” (Stanford Graduate School of Education, “Question format may impact how boys and girls score on standardized tests, Stanford study finds,” 03.29.2018). Other reasons for the gender gap include questions that have mostly male characters, because we do better on tests when the questions reflect ourselves; questions that are centered around topics or activities that are usually more “male” in practice such as sports and politics—though we wish such topics were not gendered, we must admit that, in society, they are; time constraints, as girls do better with more time because they are more likely to fully solve problems and think through multiple possible answers; and penalties for guessing—boys are more likely to guess, which, ironically, results in higher scores, whereas girls are more likely to heed the instructions of the test and leave the question blank, which loses them more points than if they had guessed (Sadker and Zittleman, 2009). Many of these aspects of high-stakes testing actually punish girls for traits that are more valuable in school, work and life, leaving them with lower scores and, subsequently, fewer opportunities than boys. Despite the clear evidence that the gender gap on high-stakes tests like the SAT is due to flaws in the test itself rather the intellectual ability of girls, the score disparity it produces is still used as an excuse for sexist thinking and practices. Instead of questioning why these patterns may exist, or even acknowledging that SAT scores are not in line with the academic performance of girls in math not only in high school but also in college, Mark Perry in a 2016 article claims that these scores alone prove an inherent difference in mathematical ability. He states, [T]he scientific data about gender differences in math performance would seem to present a serious challenge to…frequent claims that there are no gender differences in math performance.” (American Enterprise Institute, “2016 SAT Test Results Confirm Pattern That’s Persisted for 50 Years—High School Boys are Better at Math Than Girls,” 09.27.2016). Statements like this are objectively harmful to girls as a group, but his next claim raises even more alarm: “If there are some inherent gender differences for mathematical ability, as the huge and persistent gender differences for the math SAT test suggests, closing the STEM gender degree and job gaps may be a futile attempt in socially engineering an unnatural and unachievable outcome” (American Enterprise Institute, 09.27.2016). So not only are these high-stakes tests benefiting boys and hurting girls when it comes to scholarships and college acceptances, but they are being used to bar women from access to entire fields. Perry’s claims are not only harmful, but also incorrect; the SAT consistently underpredicts women’s performance in college math and physical science courses (American Physical Society, “Fighting the Gender Gap: Standardized Tests Are Poor Indicators of Ability in Physics,” 1996). This is an excuse to ignore the real, structural issues in a sexist system that prevent women from having equal representation across the STEM field.