# 1N Coal

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#### The global coal market is declining now. SD 9/8:

"Plans for coal power decline 14% worldwide," Shanghai Daily, <http://www.shanghaidaily.com/business/energy/Plans-for-coal-power-decline-14-worldwide/shdaily.shtml>

THE amount of coal-fired power generation under development worldwide has shrunk by 14 percent this year, driven down by China as it struggles with oversupply and tries to promote[s] cleaner energy, a study showed yesterday. India also introduced policies in the first half of 2016 curbing plans for coal-fired plants, partly due to under-utilization of existing plants, according to a Global Coal Plant Tracker run by non-government and anti-coal group CoalSwarm. Overall, the amount of coal-fired generating capacity in pre-construction planning fell 14 percent to an estimated 932 gigawatts in July from 1,090 GW at the start of the year, it said. The overall decline, of 158 GW, was almost equal to the coal generating capacity of the European Union, at 162 GW, it said. “It’s a combination of environmental concerns, including climate and health, along with the deteriorating economics of coal,” Ted Nace, director of CoalSwarm, told Reuters of the causes for the decline. China had the biggest drop in its pre-construction pipeline by far, of 114 GW to a total 406 GW proposed, followed by India with a decline of 40 GW, it estimated. The Philippines and Indonesia had also curbed coal, while Egypt and Mongolia raised their planning. China vowed in February to close 500 million tonnes of coal production in the next three to five years to reduce oversupply. Profits also shrank in the first half on sagging power demand and higher coal prices.

#### Coal switching is real – confirmed in many places BIELLO 13:

“How Nuclear Power Can Stop Global Warming” By David Biello on December 12, 2013 <http://www.scientificamerican.com/article/how-nuclear-power-can-stop-global-warming/> //LHP SG

When the Atlantic Navigator docked in Baltimore harbor earlier this month, the freighter carried the last remnants of some of the nuclear weapons that the Soviet Union had brandished in the cold war. During the past 20 years more than 19,000 Russian warheads have been dismantled and processed to make [fuel for U.S. nuclear reactors](http://www.scientificamerican.com/article.cfm?id=finding-fissile-fuel). In fact, during that period more than half the uranium fuel that powered the more than 100 reactors in the U.S. came from such reprocessed nuclear weapons. In addition to reducing the risk of nuclear war, U.S. reactors have also been staving off another global challenge: climate change. The [low-carbon electricity](http://www.scientificamerican.com/article.cfm?id=reactivating-nuclear-reactors-to-fight-climate-change) produced by such reactors provides 20 percent of the nation's power and, by the estimates of climate scientist James Hansen of Columbia University, avoided 64 billion metric tons of greenhouse gas pollution. They also avoided spewing soot and other air pollution like coal-fired power plants do and thus have [saved some 1.8 million lives](http://blogs.scientificamerican.com/the-curious-wavefunction/2013/04/02/nuclear-power-may-have-saved-1-8-million-lives-otherwise-lost-to-fossil-fuels-may-save-up-to-7-million-more/). And that's why Hansen, among others, such as former Secretary of Energy Steven Chu, thinks that nuclear power is a key energy technology to fend off catastrophic climate change. "We can't burn all these fossil fuels," Hansen told a group of reporters on December 3, noting that as long as fossil fuels are the cheapest energy source they will continue to be burned. "Coal is almost half the [global] emissions. If you replace these power plants with [modern, safe nuclear](http://www.scientificamerican.com/article.cfm?id=nuclear-power-plant-safety) reactors you could do a lot of [pollution reduction] quickly." Indeed, he has evidence: the speediest drop in greenhouse gas pollution on record occurred in France in the 1970s and ‘80s, when that country transitioned from burning fossil fuels to nuclear fission for electricity, lowering its greenhouse emissions by roughly 2 percent per year. The world needs to drop its global warming pollution by 6 percent annually to [avoid "dangerous" climate change](http://www.scientificamerican.com/article.cfm?id=dangerous-climate-change-imminent) in the estimation of Hansen and his co-authors in a [recent paper in PLoS One](http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0081648). "On a global scale, it's hard to see how we could conceivably accomplish this without nuclear," added economist and co-author Jeffrey Sachs, director of the Earth Institute at Columbia University, where Hansen works. The only problem: the world is not building so many nuclear reactors. [China leads the world](http://www.scientificamerican.com/article.cfm?id=china-goes-nuclear-to-avoid-coal-burning) in new nuclear reactors, with 29 currently under construction and another 59 proposed, according to the [World Nuclear Association](http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/China--Nuclear-Power/). And China has not confined itself solely to the typical reactors that employ water and uranium fuel rods; it has built everything from heavy-water reactors originally designed in Canada to a small test [fast-reactor](http://www.scientificamerican.com/article.cfm?id=fast-reactors-to-consume-plutonium-and-nuclear-waste). Yet, even if every planned reactor in China was to be built, the country would still rely on burning coal for more than 50 percent of its electric power—and the [Chinese nuclear reactors](http://www.scientificamerican.com/article.cfm?id=china-goes-nuclear-to-avoid-coal-burning) would provide at best roughly the same amount of energy to the developing nation as does the existing U.S. fleet. Plus, nuclear requires emissions of greenhouse gases for construction, including steel and cement as well as the [enrichment of uranium](http://www.scientificamerican.com/article.cfm?id=finding-fissile-fuel) ore required to make nuclear fuel (or the downblending of uranium from nuclear weapons as in the case of the "[Megatons to Megawatts](http://www.usec.com/russian-contracts/megatons-megawatts)" program). Over the full lifetime of a nuclear power plant, that means greenhouse gas emissions of roughly [12 grams of CO2-equivalent per kilowatt-hour](http://www.nrel.gov/analysis/sustain_lca_nuclear.html) of electricity produced, the [same as wind](http://www.nrel.gov/analysis/sustain_lca_wind.html)turbines (which [also require steel, plastics, rare earths and the like](http://blogs.scientificamerican.com/observations/2011/06/29/why-shifting-from-fossil-fuels-to-cleaner-alternatives-will-require-fossil-fuels/) in their construction) and less than photovoltaic panels, according to the U.S. Department of Energy’s National Renewable Energy Laboratory. In other parts of the world nuclear has begun to dwindle[d]. Japan may never restart its nuclear plants in the wake of the [multiple meltdowns at Fukushima Daiichi](http://www.scientificamerican.com/article.cfm?id=partial-meltdowns-hydrogen-explosions-at-fukushima-nuclear-power-plant) following the earthquake and tsunami in 2011, which also soured public opinion in many parts of the world. Germany still plans to eliminate nuclear power and even France has announced plans to reduce its reliance on reactors. In the U.S. the five [new nuclear reactors under construction](http://www.scientificamerican.com/article.cfm?id=first-new-nuclear-reactor-in-us-since-1978-approved) will replace the four aging reactors that closed in 2013, but as [older reactors](http://www.scientificamerican.com/article.cfm?id=safety-concerns-status-quo-at-us-reactors) like Oyster Creek in New Jersey and Vermont Yankee continue to shut down, the number of reactors in the U.S. may be [doomed to dwindle](http://blogs.scientificamerican.com/observations/2013/02/05/is-nuclear-power-doomed-to-dwindle/) as well. A big problem is cost. The construction of large nuclear power plants requires a lot of money to ensure safety and reliability. For example, for the U.S. to derive one quarter of its total energy supply from nuclear would require building roughly 1,000 new reactors (both to replace old ones and expand the fleet). At today's prices for the two [AP-1000 reactors being built in Georgia](http://www.scientificamerican.com/article.cfm?id=first-new-nuclear-reactor-in-us-since-1978-approved), such an investment would cost $7 trillion, although that total bill might shrink with an order of that magnitude. One other idea to cut cost is to begin [building smaller reactors](http://www.scientificamerican.com/article.cfm?id=small-reactors-bid-to-revive-nuclear-power) of so-called modular design. The Tennessee Valley Authority hopes to catalyze development of such reactors by installing one at its Clinch River site in Tennessee, former home of the U.S.’s failed attempt to build its own [commercial fast reactor](http://www.scientificamerican.com/article.cfm?id=fast-reactors-to-consume-plutonium-and-nuclear-waste). That never-completed breeder reactor is part of a legacy of failed U.S. research and development of new types of reactors, such as the Experimental Breeder Reactor that ran successfully in Idaho for nearly 30 years. "It's a shame that the U.S. essentially stopped R&D on advanced nuclear power a few decades ago," Hansen noted. "By now we should be in a position where a country like China[’s only] would have some[options other than [is] coal](http://www.scientificamerican.com/article.cfm?id=price-of-coal-in-china-climate-change)." That said, nuclear reactors are beginning to get the kind of scientific attention not seen since at least the end of the cold war. [Novel designs](http://blogs.scientificamerican.com/observations/2010/03/05/a-need-for-new-nukes-modular-reactors-for-energy-attract-interest/)with alternative cooling fluids other than water, such as Transatomic Power's molten salt–cooled reactor or the liquid lead–bismuth design from Hyperion Power, are in development. [Alternative concepts](http://www.amazon.com/Nuclear-2-0-Future-Kindle-Single-ebook/dp/B00DUV3N6E) have attracted funding from billionaires like Bill Gates. Transatomic Power even won the top prize from energy investors at the [2013 summit of the Advanced Research Projects Agency–Energy](http://www.scientificamerican.com/article.cfm?id=arpa-e-still-in-search-of-energy-unknown), or ARPA–E, in 2013. "The intellectual power of what's been done in the nuclear space should allow for radical designs that meet tough requirements," Gates told ARPA–E's 2012 summit, noting that the modeling power of today's supercomputers should allow even more innovation. "When you have fission, you have a million times more energy than when you burn hydrocarbons. That's a nice advantage to have." ARPA–E itself, however, has no program to develop alternative reactors because of the expense of proving out novel designs and the long timescales required to develop any of them. "We searched a lot in nuclear," [ARPA–E's former director Arun Majumdar](http://www.scientificamerican.com/article.cfm?id=question-and-answer-with-arpa-e-arun-majumdar), now at Google, said in a interview with [Scientific American](http://www.scientificamerican.com/) earlier this year. "We realized that in the nuclear business, investing $30 [million] to $40 million, I'm not sure it would have moved the needle. … That is something that I wish I had had the budget to try." With more money for development of novel designs and public financial support for construction—perhaps as part of a clean energy portfolio standard that lumps in all low-carbon energy sources, not just renewables or a carbon tax—nuclear could be one of the pillars of a three-pronged approach to cutting greenhouse gas emissions: using less energy to do more (or energy efficiency), low-carbon power, and [electric cars](http://www.scientificamerican.com/article.cfm?id=tesla-electric-cars-face-challenges-like-fires) (as long as they are charged with electricity from clean sources, not coal burning). "The [options for large-scale clean electricity](http://e360.yale.edu/feature/green_energys_big_challenge__the_daunting_task_of_scaling_up/2362/) are few in number," Sachs noted, including [geothermal](http://www.scientificamerican.com/article.cfm?id=fracking-for-renewable-power-geothermal), hydropower, nuclear, solar and wind. "Each part of the world will have different choices about how to get on a trajectory with most of the energy coming from that list rather than coal." As long as countries like China or the U.S. employ big grids to deliver electricity, there will be a need for generation from nuclear, coal or gas, the kinds of electricity generation that can be available at all times. A rush to phase out nuclear power privileges natural gas—as is planned under Germany's innovative effort, dubbed the [Energiewende](http://energytransition.de/)(energy transition), to increase solar, wind and other renewable power while also eliminating the country's 17 reactors. In fact, Germany hopes to develop technology to store excess electricity from renewable resources as gas to be burned later, a scheme known as “power to gas,” according to economist and former German politician Rainer Baake, now director of an energy transition think tank Agora Energiewende. Even worse, a nuclear stall can lead[s] to the construction of more coal-fired power plants, as happened in the U.S. after the end of the nuclear power plant construction era in the 1980s. Hansen, for one, argues that abundant, clean energy is necessary to [lift people out of poverty](http://blogs.scientificamerican.com/observations/2011/06/30/how-do-we-solve-energy-poverty/) and begin to reduce greenhouse gas emissions from a [swelling human population](http://www.scientificamerican.com/article.cfm?id=human-population-reaches-seven-billion). Nuclear is one of the technologies available today—and with room for significant improvement and innovation. In that sense, natural gas is a bridge fuel to disaster, even with some form of [CO2 capture and storage](http://www.scientificamerican.com/article.cfm?id=carbon-capture-and-storage-not-happening-fast-enough-to-combat-climate-change), and the world must immediately transition to renewables and nuclear.

#### Germany confirms, SILVERSTEIN 13:

AUG 3, 2013 “Less Nuclear Energy Means More Coal, Natural Gas -- And Carbon Emissions” http://www.forbes.com/sites/kensilverstein/2013/08/03/less-nuclear-energy-means-more-coal-natural-gas-and-carbon-emissions/#17dd8c617d48 //LHP SG

Seems like the whole world is wrestling with what to do about nuclear energy. And while such countries as the United States, Japan and Germany grapple with those dilemmas, they are simultaneously discovering that **using less nuclear power** may **mean[s] increasing** their use of **fossil fuels.** Resolving global energy questions in no way involves a cookie-cutter approach. Indeed, each nation has its own set of goals and constraints in which it must mix and match an optimal array of fuels to power their economies. With that, [nuclear power had risen from the ashes](http://www.energybiz.com/article/13/07/nuclear-energy-needs-revive-itself-again) at some point in the early 2000s, all as a proven, viable method of delivering mostly carbon-free electricity to the masses. Since then, though, it has taken some blows while unconventional natural gas has become the new golden boy, at least in some circles. For three-plus decades, nuclear plants had become reliable and efficient, running at 90-plus percent capacity rates — more than any other form of electric generation. To top it off, no major accidents had occurred here, or elsewhere. Then Fukushima happened. And that caused the world community to pause and to re-examine its nuclear energyoptions. The **U**nited **S**tates **is soul-searching**, again**. Three** relatively **high-profile closures have taken place: Southern California**[Edison](http://www.forbes.com/companies/edison) ’s San Onofre Generation Station in Southern California, [Duke Energy](http://www.forbes.com/companies/duke-energy) [DUK +1.15%](http://www.forbes.com/companies/duke-energy)’s **Crystal River in Florida,**[Dominion Resources](http://www.forbes.com/companies/dominion-resources) D +0.93%‘ **Kewaunee** plant **in Wisconsin**. The first two were caused by ongoing maintenance issues while the latter was **caused by low natural gas prices**. In the case of Southern California Edison, the two mothballed reactors had provided 17 percent of the region’s electricity. That **power** will largely be **replaced using fossil fuels**, namely imported natural gas. As a result, the [Breakthrough Institute](http://thebreakthrough.org/index.php/programs/energy-and-climate/san-onofre-nuclear-closure-to-boost-state-carbon-emissions-by-8-million-tons/) is pointing out that ]the **state’s carbon emissions will rise by at least 8 million metric tons a year.** Meanwhile, an analysis written by the [Institute for](http://www.bizjournals.com/prnewswire/press_releases/2013/07/17/DC48896)[Energy](http://www.forbes.com/energy/) and the Environment at Vermont [Law](http://www.forbes.com/law/) School, says that **nuclear energy is unable to compete in a low-cost natural gas environment**. And while[President Obama’s climate policies](http://www.energybiz.com/article/13/07/obama-s-climate-program-focuses-expanding-and-sharing-clean-tech) would tend to favor low-to-no-carbon fuels such as nuclear power, it will be a decade before those laws would kick in. Until then, those nuclear plants won’t be competitive. Beside the current closures or “up-rate” cancelations, of which there are nine, there remains 38 reactors in 23 states that are at risk of early retirements, with 12 of those facing the greatest risk of being shutdown, the paper adds.Up-rates are the increasing of a plant’s current output — a phenomenon that has been put on hold because of current cheap natural gas prices. That same study says that Exelon’s Clinton unit in Illinois and Entergy’s Indian Point in New York may also go. Both companies have seen their stock prices suffer as a result of the present dynamics. TVA’s Browns Ferry in Alabama, FirstEnergy’s Davis-Besse in Ohio and Constellation Energy Group’s Nine Mile Point in New York are also listed as being at risk of early retirement. “Nuclear reactors are simply not competitive,” says author Mark Cooper. “They have never been competitive at the beginning of their life cycle, when the build/cancel decision is made, and they are not competitive at the end of their life cycles, when the repair/retire decision is made.” Critics of Cooper, such as Rod Adams, publisher of [Atomic Insights](http://theenergycollective.com/rodadams/252111/cooper-s-criticism-may-awaken-nuclear-competitive-spirit), point out that Cooper holds a doctorate in sociology while billing himself as an “economic analyst.” He adds that Cooper is more interested in getting rid of nuclear energy than in limiting carbon emissions. If any nation would be timid of nuclear energy, it would Japan. In May 2012, **Japan turned off** the last of its **54 nuclear reactors.** Since then, it has re-started two units. But **it has had to rely on imported natural gas** to meet much of its electricity needs. Meanwhile, it has been able to employee energy efficiency methods resulting declines in consumption while also building solar units. Still, it’s energy costs have escalated, with consumers paying an estimate 12 percent more in electric bills. Proponents of restarting some of the nuclear facilities are emphasizing that the country cannot replace 30 percent of its electric power generation overnight. They add that all of the Japan’s nuclear reactors are going through rigorous new stress tests to try and ensure that they could survive massive natural events. To that end, France’s Areva has said that Japan would re-start six reactors by year-end. Many of the rest could get a second-life soon after, especially because [Prime Minister Shinzo Abe’s party has gained control](http://www.energybiz.com/article/13/07/independent-regulators-may-help-clear-japan-s-nuclear-energy-path)of the upper house there. Abe has said those nuclear units that exceed the nation’s new stress testing could re-start within a year of those evaluations. While such a position is contrary to how most Japanese feel, the country has now set up an independent nuclear regulator that would have powers unlike those ever granted to its predecessor — ones that could assure integrity of the regulatory system. Specifically, the so-called Nuclear Regulatory Authority has publicly stated its goals to incorporate the highest safety standards in the world, which include active measures to counter natural disasters. The aim is win the public’s trust and to create the “peaceful” development of nuclear power. By contrast, the agency that had overseen monitoring efforts was accused of being too cozy with industry, allowing senior government officials to get high-level jobs with Tokyo Electric Power Co. right after they had done their oversight stints. “We should be careful not to consort with electric utilities and other interest groups; and we will be tireless in our efforts to improve our regulatory measures so that Japan’s nuclear regulation standards will be among the world’s highest,” says Shunichi Tanaka, head of the[Nuclear Regulatory Authority](http://www.nsr.go.jp/english/). Consider also that [Japan has no oil or gas of its own](http://www.energybiz.com/article/13/06/us-could-be-dominant-lng-exporter). As such, it has spent $65 billion on LNG exports since 2012, says [Deloitte Touche Tohmatsu Limited](http://www.deloitte.com/view/en_GX/global/industries/energy-resources/oil-gas/1c99ed24eb96e310VgnVCM2000003356f70aRCRD.htm#.Ua4NPZV2Hfg). That’s 25 percent more than in 2011, which is the year the tsunami and earthquake wiped out its Fukushima nuclear plant and caused it to rethink its generation portfolio. **Germany**, finally, **remains committed to closing its 17 nuclear generating stations**, which had provided a quarter of the country’s electricity mix. Authorities have already shutdown eight such reactors, with the rest providing 18 percent of the country’s electric power. **That has enabled coal to gain a foothold there.** The [World Nuclear Association](http://www.world-nuclear.org/info/Country-Profiles/Countries-G-N/Germany/#.UfwCQWRgZxx) says that **coal has increased its market** there **from 43** percent in 2010 **to 52 percent** this year. E.ON, RWE and Vattenfall are all impacted by the closures. The result: [Bloomberg news service](http://www.bloomberg.com/news/2013-07-28/merkel-s-green-shift-backfires-as-german-pollution-jumps.html)is reporting that Germany’s Environment Ministry said that **carbon dioxide equivalents rose** from 917 million tons in 2011 **to 931 million tons** in 2012. What’s the old adage? The more things change …. Well, times have edged ahead, holding nuclear energy back, again. With that, global forces are propelling fossil fuels forward, for now. Environmental activists and next-generation of nuclear enthusiasts may ultimately converge, allowing nuclear energy to regain its legs before it would power on.

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And China has not confined itself solely to the typical reactors that employ water and uranium fuel rods; it has built everything from heavy-water reactors originally designed in Canada to a small test [fast-reactor](http://www.scientificamerican.com/article.cfm?id=fast-reactors-to-consume-plutonium-and-nuclear-waste). Yet, even if every planned reactor in China was to be built, the country would still rely on burning coal for more than 50 percent of its electric power—and the [Chinese nuclear reactors](http://www.scientificamerican.com/article.cfm?id=china-goes-nuclear-to-avoid-coal-burning) would provide at best roughly the same amount of energy to the developing nation as does the existing U.S. fleet. 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Over the full lifetime of a nuclear power plant, that means greenhouse gas emissions of roughly [12 grams of CO2-equivalent per kilowatt-hour](http://www.nrel.gov/analysis/sustain_lca_nuclear.html) of electricity produced, the [same as wind](http://www.nrel.gov/analysis/sustain_lca_wind.html)turbines (which [also require steel, plastics, rare earths and the like](http://blogs.scientificamerican.com/observations/2011/06/29/why-shifting-from-fossil-fuels-to-cleaner-alternatives-will-require-fossil-fuels/) in their construction) and less than photovoltaic panels, according to the U.S. Department of Energy’s National Renewable Energy Laboratory. In other parts of the world nuclear has begun to dwindle[d]. Japan may never restart its nuclear plants in the wake of the [multiple meltdowns at Fukushima Daiichi](http://www.scientificamerican.com/article.cfm?id=partial-meltdowns-hydrogen-explosions-at-fukushima-nuclear-power-plant) following the earthquake and tsunami in 2011, which also soured public opinion in many parts of the world. Germany still plans to eliminate nuclear power and even France has announced plans to reduce its reliance on reactors. In the U.S. the five [new nuclear reactors under construction](http://www.scientificamerican.com/article.cfm?id=first-new-nuclear-reactor-in-us-since-1978-approved) will replace the four aging reactors that closed in 2013, but as [older reactors](http://www.scientificamerican.com/article.cfm?id=safety-concerns-status-quo-at-us-reactors) like Oyster Creek in New Jersey and Vermont Yankee continue to shut down, the number of reactors in the U.S. may be [doomed to dwindle](http://blogs.scientificamerican.com/observations/2013/02/05/is-nuclear-power-doomed-to-dwindle/) as well. A big problem is cost. The construction of large nuclear power plants requires a lot of money to ensure safety and reliability. For example, for the U.S. to derive one quarter of its total energy supply from nuclear would require building roughly 1,000 new reactors (both to replace old ones and expand the fleet). At today's prices for the two [AP-1000 reactors being built in Georgia](http://www.scientificamerican.com/article.cfm?id=first-new-nuclear-reactor-in-us-since-1978-approved), such an investment would cost $7 trillion, although that total bill might shrink with an order of that magnitude. One other idea to cut cost is to begin [building smaller reactors](http://www.scientificamerican.com/article.cfm?id=small-reactors-bid-to-revive-nuclear-power) of so-called modular design. The Tennessee Valley Authority hopes to catalyze development of such reactors by installing one at its Clinch River site in Tennessee, former home of the U.S.’s failed attempt to build its own [commercial fast reactor](http://www.scientificamerican.com/article.cfm?id=fast-reactors-to-consume-plutonium-and-nuclear-waste). That never-completed breeder reactor is part of a legacy of failed U.S. research and development of new types of reactors, such as the Experimental Breeder Reactor that ran successfully in Idaho for nearly 30 years. "It's a shame that the U.S. essentially stopped R&D on advanced nuclear power a few decades ago," Hansen noted. "By now we should be in a position where a country like China[’s only] would have some[options other than [is] coal](http://www.scientificamerican.com/article.cfm?id=price-of-coal-in-china-climate-change)." That said, nuclear reactors are beginning to get the kind of scientific attention not seen since at least the end of the cold war. [Novel designs](http://blogs.scientificamerican.com/observations/2010/03/05/a-need-for-new-nukes-modular-reactors-for-energy-attract-interest/)with alternative cooling fluids other than water, such as Transatomic Power's molten salt–cooled reactor or the liquid lead–bismuth design from Hyperion Power, are in development. [Alternative concepts](http://www.amazon.com/Nuclear-2-0-Future-Kindle-Single-ebook/dp/B00DUV3N6E) have attracted funding from billionaires like Bill Gates. Transatomic Power even won the top prize from energy investors at the [2013 summit of the Advanced Research Projects Agency–Energy](http://www.scientificamerican.com/article.cfm?id=arpa-e-still-in-search-of-energy-unknown), or ARPA–E, in 2013. "The intellectual power of what's been done in the nuclear space should allow for radical designs that meet tough requirements," Gates told ARPA–E's 2012 summit, noting that the modeling power of today's supercomputers should allow even more innovation. "When you have fission, you have a million times more energy than when you burn hydrocarbons. That's a nice advantage to have." ARPA–E itself, however, has no program to develop alternative reactors because of the expense of proving out novel designs and the long timescales required to develop any of them. "We searched a lot in nuclear," [ARPA–E's former director Arun Majumdar](http://www.scientificamerican.com/article.cfm?id=question-and-answer-with-arpa-e-arun-majumdar), now at Google, said in a interview with [Scientific American](http://www.scientificamerican.com/) earlier this year. "We realized that in the nuclear business, investing $30 [million] to $40 million, I'm not sure it would have moved the needle. … That is something that I wish I had had the budget to try." With more money for development of novel designs and public financial support for construction—perhaps as part of a clean energy portfolio standard that lumps in all low-carbon energy sources, not just renewables or a carbon tax—nuclear could be one of the pillars of a three-pronged approach to cutting greenhouse gas emissions: using less energy to do more (or energy efficiency), low-carbon power, and [electric cars](http://www.scientificamerican.com/article.cfm?id=tesla-electric-cars-face-challenges-like-fires) (as long as they are charged with electricity from clean sources, not coal burning). "The [options for large-scale clean electricity](http://e360.yale.edu/feature/green_energys_big_challenge__the_daunting_task_of_scaling_up/2362/) are few in number," Sachs noted, including [geothermal](http://www.scientificamerican.com/article.cfm?id=fracking-for-renewable-power-geothermal), hydropower, nuclear, solar and wind. "Each part of the world will have different choices about how to get on a trajectory with most of the energy coming from that list rather than coal." As long as countries like China or the U.S. employ big grids to deliver electricity, there will be a need for generation from nuclear, coal or gas, the kinds of electricity generation that can be available at all times. A rush to phase out nuclear power privileges natural gas—as is planned under Germany's innovative effort, dubbed the [Energiewende](http://energytransition.de/)(energy transition), to increase solar, wind and other renewable power while also eliminating the country's 17 reactors. In fact, Germany hopes to develop technology to store excess electricity from renewable resources as gas to be burned later, a scheme known as “power to gas,” according to economist and former German politician Rainer Baake, now director of an energy transition think tank Agora Energiewende. Even worse, a nuclear stall can lead[s] to the construction of more coal-fired power plants, as happened in the U.S. after the end of the nuclear power plant construction era in the 1980s. Hansen, for one, argues that abundant, clean energy is necessary to [lift people out of poverty](http://blogs.scientificamerican.com/observations/2011/06/30/how-do-we-solve-energy-poverty/) and begin to reduce greenhouse gas emissions from a [swelling human population](http://www.scientificamerican.com/article.cfm?id=human-population-reaches-seven-billion). Nuclear is one of the technologies available today—and with room for significant improvement and innovation. In that sense, natural gas is a bridge fuel to disaster, even with some form of [CO2 capture and storage](http://www.scientificamerican.com/article.cfm?id=carbon-capture-and-storage-not-happening-fast-enough-to-combat-climate-change), and the world must immediately transition to renewables and nuclear.

#### Japan specifically, Follett 16’

Andrew Follett, 6-13-2016, "The End Of Nuclear Power In Japan Is Bringing Back Coal," Daily Caller, http://dailycaller.com/2016/06/13/the-end-of-nuclear-power-in-japan-is-bringing-back-coal/

**An analysis** published Monday by Bloomberg **states that coal power will become the largest source of electricity in Japan due to an effective ban on nuclear power.** Nuclear power **[Which] provided 29 percent of Japan’s total power** output before 2011, **but will decline to** 13.6 percent by 2023 and **1.2 percent** by 2040, **according to the report**. Japan got 24 percent of its electricity from coal in 2010 and **the country plans to get more than a third of its power from coal** by 2040. Japan previously shut down all of its nuclear reactors in the aftermath of the 2011 magnitude 9.0 earthquake, which triggered the Fukushima disaster. The country has since transitioned away from nuclear power.

## I/L

### Warming IL - Generic

#### Key to stop warming

#### Rotson 15

Eric Roston, 4-15-2015, "Why Nuclear Power Is All but Dead in the U.S.," Bloomberg, http://www.bloomberg.com/news/articles/2015-04-15/soon-it-may-be-easier-to-build-a-nuclear-plant-in-iran-than-in-the-u-s-

Natural gas has driven power prices lower than nuclear’s operating costs. If bad economic trends persist for nuclear, more and more of the U.S. fleet may retire in coming years, leaving the communities they serve at the tyranny of plants powered by fossil fuels. That’s a huge problem for climate activists who oppose nuclear power. **Nuclear plants would** likely **be replaced by natural gas** or (shudder) coal plants**, which would drive up carbon dioxide emissions.** It’s happening **in Germany,** where **the government decided to abandon nuclear power** after the March 2011 catastrophe at Fukushima. In Vermont, where a 600-megawatt plant closed in December, carbon-free nuclear power **[and it] is being replaced largely by fossil-powered electricity** from the grid. That makes **nuclear** an **energy [is a] source that** could **help[s] nations meet the goal of keeping global warming below 2 degrees Celsius.** We're already about 0.8 degree there. **“I can’t see a scenario where we can stick to the 2 degree warming commitment ... without a substantial contribution from nuclear [power],” said Michael Liebreich**, the founder of Bloomberg New Energy Finance, at its annual conference yesterday. “We have got to figure out nuclear if that envelope is to mean anything to us."

### Warming IL – Japan

#### That kills global emissions efforts, Jolly 13’

“Japan Backs Off From Emissions Targets, Citing Fukushima Disaster” By HIROKO TABUCHI and DAVID JOLLYNOV. 15, 2013. New York Times http://www.nytimes.com/2013/11/16/world/asia/japan-shelves-plan-to-slash-emissions-citing-fukushima.html

Higher-than-expected emissions from Japan would be a major setback in the fight against global warming. The announcement added to concerns in Warsaw about the difficulty in reducing the atmospheric pollution that many scientists say makes extreme weather events, possibly including the devastating typhoon that hit the Philippines last week, more severe and more frequent. Climate negotiations have been moving very slowly since a meeting in Copenhagen in 2009 that ended in acrimony after the United States and rapidly developing countries like China were unable to come to terms on how to allocate responsibility. The Warsaw conference has adopted a narrow goal of creating a road map for replacing the Kyoto Protocol, which technically expired last year, and to address the thorny issues of how poor countries should be compensated for the costs of adapting to climate change. “There is regret about the announcement from Japan,” Christiana Figueres, leader of the United Nations Framework Convention on Climate Change, the body overseeing the Warsaw talks, said at a news conference. But she added that Japan had made significant strides in energy efficiency and renewable power, and said she hoped that the new target would prove conservative. In an apparent bid to deflect criticism of its new target, Japan said it would provide about $16 billion in private and public funds through 2015 to help developing countries curb their greenhouse gas emissions. While Japan’s surprisingly modest plan was an unwelcome development to climate delegates, it was just one of many indications that negotiators would have a difficult time arranging anything beyond a cosmetic deal in Warsaw. It came just two days after Australia’s new conservative government introduced a bill in Parliament to repeal the carbon tax enacted by its Labor predecessor. Signatories to the United Nations treaty agreed in 2010 to cut greenhouse gas emissions to hold the rise in global temperatures to 3.6 degrees Fahrenheit, or 2 degrees Celsius, above preindustrial levels — the most scientists say the earth can tolerate before the effects of global warming become vastly more pernicious. Backtracking by Japan and Australia on emissions, as well as efforts by the United States and China that some criticize as too weak, would not bode well for reaching the temperature target. More broadly, Japan’s action shows the crucial role that many experts say nuclear power must play if the world has any chance of reaching its emissions goals. Just two weeks ago, four prominent climate scientists wrote an open letter calling for environmental groups to embrace nuclear power as the only hope to head off catastrophic global warming. “Energy demand is going to increase,” Stuart Neil, senior director of external relations and communications for the World Energy Council, an alliance of governments, corporations and energy activists, said Friday by telephone from Warsaw. “We need to look at that in a sustainable way. But the reality is that we’re looking at a doubling of demand by 2050,” with most growth outside the developed world. In 2011, Japan was the world’s fifth-biggest emitter of carbon dioxide, after China, the United States, India and Russia. Together, these countries and the European Union account for about 70 percent of total global carbon dioxide emissions, according to the Environmental Protection Agency in the United States. Japan had been a laggard in pursuing renewable energy, choosing instead to rely on its reactors to pare back greenhouse emissions. Before the accident, less than 3 percent of the electricity Japan generated came from renewable energy sources, excluding hydropower. The energy shortfall resulting from the closing of its nuclear plants has left Japan scrambling to fire up old coal- and gas-powered stations, and ramp up its imports of fossil fuels. In the year through March, Japan released the equivalent of 1.2 billion metric tons of carbon dioxide, more than 7 percent higher than the year preceding the nuclear accident and 14 percent higher than levels in 1990. To kick-start its renewable power program, Japan introduced incentives to diversify its energy sources last year. In the program’s first 12 months, through June, the country added renewable power equal to the output of about four nuclear reactors. Japan’s new target assumes that the country will achieve energy savings of about 20 percent by investing in renewable energy sources and energy-efficient technology, Mr. Ishihara said. Japan seeks to reduce emissions from 2005 levels by 3.8 percent, he said. Japan’s nuclear reactors around the country were shut down for regular maintenance after the disaster at Fukushima Daiichi spewed radioactive materials over northeastern Japan, but the government did not count on the antinuclear feelings that greeted its attempts to try to restart them.

## Impact Module

### Warming – extinction - Long

#### Global warming causes extinction. TORRES 16:

<http://futureoflife.org/2016/07/22/climate-change-is-the-most-urgent-existential-risk/> //LHP SG

Why? Because these ongoing catastrophes in slow-motion will frame our existential predicament on Earth not just for the rest of this century, but [for literally thousands of years](http://www.climate.unibe.ch/~stocker/papers/clark16natcc.pdf) to come. As such, they have the capacity to raise or lower the probability of other risks scenarios unfolding. Ask yourself the following: are wars more or less likely [with] in a world marked by extreme weather events, megadroughts, food supply disruptions, and sea-level rise? Are terrorist attacks more or less likely in a world beset by [the collapse of global ecosystems](http://www.nature.com/nature/journal/v486/n7401/full/nature11018.html%253Fa_aid%253D3598aabf?message-global=remove&a_aid=3598aabf%2523auth-1), agricultural failures, economic uncertainty, and political instability? Both government officials and scientists agree that the answer is “more likely.” For example, the current Director of the CIA, John Brennan, recently [identified](http://www.cnsnews.com/news/article/cnsnewscom-staff/cia-director-cites-impact-climate-change-deeper-cause-global) “the impact of climate change” as one of the “deeper causes of this rising instability” in countries like Syria, Iraq, Yemen, Libya, and Ukraine. Similarly, the former Secretary of Defense, Chuck Hagel, has [described](https://www.scribd.com/doc/242845848/Read-DoD-report-2014-Climate-Change-Adaptation-Roadmap) climate change as a “threat multiplier” with “the potential to exacerbate many of the challenges we are dealing with today — from infectious disease to terrorism.” The Department of Defense has also affirmed a connection. In [a 2015 report](http://www.defense.gov/news-article-view/article/612710), it states, “Global climate change will aggravate problems such as poverty, social tensions, environmental degradation, ineffectual leadership and weak political institutions that threaten stability in a number of countries.” Scientific studies have further shown a connection between the environmental crisis and violent conflicts. For example, [a 2015 paper](http://www.pnas.org/content/112/11/3241.abstract) in the Proceedings of the National Academy of Sciences argues that climate change was a causal factor behind the record-breaking 2007-2010 drought in Syria. This drought led to a mass migration of farmers into urban centers, which fueled the 2011 Syrian civil war. Some observers, including myself, have suggested that this struggle could be [the beginning of World War III](http://www.salon.com/2015/12/20/is_this_how_world_war_iii_begins_religion_end_times_terror_and_the_frightening_new_middle_east_tinderbox/), given the complex tangle of international involvement and overlapping interests. The study’s conclusion is also significant because the Syrian civil war was the Petri dish in which the [Islamic State consolidated its forces](http://www.huffingtonpost.com/entry/what-does-the-islamic-state-actually-believe_us_5772fadbe4b00eaa47881c1a?ki7mzko0xri5jc3di), later emerging as [the largest and most powerful terrorist organization in human history](http://media.wix.com/ugd/d9aaad_e057e808d86943e8badb0d4e1653628b.pdf). The point is that climate change and biodiversity loss could very easily push societies to the brink of collapse. This will exacerbate existing geopolitical tensions and introduce entirely new power struggles between state and nonstate actors. At the same time, advanced technologies will very likely become increasingly powerful and accessible. As [I’ve written elsewhere](http://media.wix.com/ugd/d9aaad_a2bb594c8ead4ce5bbfc8e8a54534b50.pdf), the malicious agents of the future will have bulldozers rather than shovels to dig mass graves for their enemies. The result is a perfect storm of more conflicts in the world along with unprecedentedly dangerous weapons. If the conversation were to end here, we’d have ample reason for placing climate change and biodiversity loss at the top of our priority lists. But there are other reasons they ought to be considered urgent threats. I would argue that they could make humanity more vulnerable to a catastrophe involving superintelligence and even asteroids. The basic reasoning is the same for both cases. Consider superintelligence first. Programming a superintelligence whose values align with ours is a formidable task even in stable circumstances. As Nick Bostrom argues in [his 2014 book](https://www.amazon.com/Superintelligence-Dangers-Strategies-Nick-Bostrom/dp/0198739834/ref=sr_1_1?ie=UTF8&qid=1468887102&sr=8-1&keywords=superintelligence+bostrom), we should recognize the “default outcome” of superintelligence to be “doom.” Now imagine trying to solve these problems amidst a rising tide of interstate wars, civil unrest, terrorist attacks, and other tragedies? The societal stress caused by climate change and biodiversity loss will almost certainly compromise important conditions for creating friendly AI, such as sufficient funding, academic programs to train new scientists, conferences on AI, peer-reviewed journal publications, and communication/collaboration between experts of different fields, such as computer science and ethics. It could even make an “AI arms race” more likely, thereby raising the probability of a [malevolent superintelligence being created either on purpose or by mistake](http://studylib.net/doc/13908183/taxonomy-of-pathways-to-dangerous-artificial-intelligence...). Similarly, imagine that astronomers discover a behemoth asteroid barreling toward Earth. Will designing, building, and launching a spacecraft to divert the assassin past our planet be easier or more difficult in a world preoccupied with other survival issues? In a relatively peaceful world, one could imagine an asteroid actually bringing humanity together by directing our attention toward a common threat. But if the “conflict multipliers” of climate change and biodiversity loss have already catapulted civilization into chaos and turmoil, I strongly suspect that humanity will become more, rather than less, susceptible to dangers of this sort. We can describe the dual threats of climate change and biodiversity loss as “context risks.” Neither is likely to directly cause the extinction of our species. But both will define the context in which civilization confronts all the other threats before us. In this way, they could indirectly contribute to the overall danger of annihilation — and this worrisome effect could be significant. For example, according to the [Intergovernmental Panel on Climate Change](https://www.ipcc.ch/news_and_events/docs/ar5/ar5_syr_headlines_en.pdf), the effects of climate change will be “severe,” “pervasive,” and “irreversible.” Or, as [a 2016 study](http://www.climate.unibe.ch/~stocker/papers/clark16natcc.pdf) published in Nature and authored by over twenty scientists puts it, the consequences of climate change “will extend longer than the entire history of human civilization thus far.” Furthermore, [a recent article](http://advances.sciencemag.org/content/1/5/e1400253.full?con=&dom=pscau&src=syndication) in Science Advances confirms that humanity has already escorted the biosphere into the sixth mass extinction event in life’s 3.8 billion year history on Earth. Yet [another study](http://www.nature.com/nature/journal/v486/n7401/full/nature11018.html) suggests that we could be approaching a sudden, irreversible, catastrophic collapse of the global ecosystem. If this were to occur, it could result in “widespread social unrest, economic instability and loss of human life.” Given the potential for environmental degradation to elevate the likelihood of nuclear wars, nuclear terrorism, engineered pandemics, a superintelligence takeover, and perhaps even an [impact winter](https://en.wikipedia.org/wiki/Impact_winter), it ought to take precedence over all other risk concerns — at least in the near-term. Let’s make sure we get our priorities straight.

### Warming – extinction – short

#### Extinction – the disadvantaged lose first, SNOW AND HANNAM 14’[[1]](#footnote-1)

The Earth is warming so rapidly that unless humans can arrest the trend, we risk becoming ''extinct'' as a species, a leading Australian health academic has warned. Helen Berry, associate dean in the faculty of health at the University of Canberra, said while the Earth has been warmer and colder at different points in the planet's history, the rate of change has never been as fast as it is today. ''What is remarkable, and alarming, is the speed of the change since the 1970s, when we started burning a lot of fossil fuels in a massive way,'' she said. ''We can't possibly evolve to match this rate [of warming] and, unless we get control of it, it will mean our extinction eventually.'' Professor Berry is one of three leading academics who have contributed to the health chapter of a Intergovernmental Panel on Climate Change (IPCC) report due on Monday. She and co-authors Tony McMichael, of the Australian National University, and Colin Butler, of the University of Canberra, have outlined the health risks of rapid global warming in a companion piece for The Conversation, also published on Monday. The three warn that the adverse effects on population health and social stability have been ''missing from the discussion'' on climate change. ''Human-driven climate change poses a great threat, unprecedented in type and scale, to wellbeing, health and perhaps even to human survival,'' they write. They predict that the greatest challenges will come from undernutrition and impaired child development from reduced food yields; hospitalisations and deaths due to intense heatwaves, fires and other weather-related disasters; and the spread of infectious diseases. They warn the ''largest impacts'' will be on poorer and vulnerable populations, winding back recent hard-won gains of social development programs.

### Radiation and sickness

#### That’s worse for your impacts Hvistendahl 11*[[2]](#footnote-2)*:

**Coal**, meanwhile, **is** believed **responsible for** a host of more quotidian problems, such as **mining accidents, acid rain and** [**greenhouse gas emissions**](http://www.scientificamerican.com/article/coal-friendly-climate-changes-in-kansas). But it isn't supposed to spawn three-eyed fish like Blinky. Over the past few decades, however, a series of studies has called these stereotypes into question. Among the surprising conclusions: **the waste produced by coal plants is** actually **more radioactive than that generated by their nuclear counterparts**. In fact, **the fly ash emitted by a power plant**—**[which is] a by-product from burning coal for electricity**—**carries into the surrounding environment 100 times more radiation than a nuclear power plant producing the same amount of energy**. \* [See Editor's Note at end of [page 2](http://www.scientificamerican.com/article/coal-ash-is-more-radioactive-than-nuclear-waste&page=2)] At issue is coal's content of uranium and thorium, both radioactive elements. They occur in such trace amounts in natural, or "whole," coal that they aren't a problem. But **when coal is burned into fly ash, uranium and thorium are concentrated at up to 10 times their original levels. Fly ash uranium sometimes leaches into the soil and water surrounding a coal plant**, **affect**ing **cropland** and, in turn, food. People living within a "stack shadow"—the area within a half- to one-mile (0.8- to 1.6-kilometer) radius of a coal plant's smokestacks—might then ingest small amounts of radiation. **Fly ash is** also **disposed of in landfills and abandoned mines and quarries, posing a potential risk to people living around those areas**. The result: **estimated radiation doses ingested by people living near the coal plants were equal to or higher than doses for people living around the nuclear facilities**. At one extreme, the scientists estimated fly ash radiation in individuals' bones at around 18 millirems (thousandths of a rem, a unit for measuring doses of ionizing radiation) a year. Doses for the two nuclear plants, by contrast, ranged from between three and six millirems for the same period. And **when** all **food was grown in the area, radiation doses were 50 to 200 percent higher around the coal plants.** McBride and his co-authors estimated that **individuals living near coal-fired installations are exposed to a maximum of 1.9 millirems of fly ash radiation yearly.** To put these numbers in perspective, the average person encounters 360 millirems of annual "background radiation" from natural and man-made sources, including substances in Earth's crust, cosmic rays, residue from nuclear tests and smoke detectors.

### Environmental Racism

#### Coal is a larger tool for environmental racism. A greater population of blacks are near coal than nuclear, and it renders black life as expendable. More coal plants would just increase the problem- turns aff. GEP 15:

“Environmental Racism in America: An Overview of the Environmental Justice Movement and the Role of Race in Environmental Policies.” June 24, 2015. <http://www.goldmanprize.org/blog/environmental-racism-in-america-an-overview-of-the-environmental-justice-movement-and-the-role-of-race-in-environmental-policies/> //LHP SG

The problem of racial profiling in America relates to more than just police brutality and the senseless acts of violence that have recently captured the national spotlight. Race also plays a determining role in environmental policies regarding land use, zoning and regulations. As a result, **African American, Latino, indigenous and low-income communities are more likely to live next to a coal-fired power plant**, landfill, refinery or other highly polluting facility. **These communities bear a disproportionate burden of toxic contamination** as a result of pollution in and around their neighborhoods. Moreover, these communities have historically had a diminished response capacity to fight back against such policies. A recent [report from the NAACP entitled “Coal Blooded: Putting Profits Before People,”](http://www.naacp.org/pages/coal-blooded1) found that **among the nearly six million Americans living [near] within three miles of a coal plant, 39% are people of color – a figure that is higher than the 36% proportion of people of color in the total US population.** The report also found that **78% of all African Americans live [near] within 30 miles of a coal fired power plant.** In an [interview for Yale Environment 360](http://e360.yale.edu/feature/naacp_jacqueline_patterson_coal_pollution_and_fight_for_environmental_justice/2664/), Jacqueline Patterson, the Environmental and Climate Justice Director for the NAACP commented on the disproportionate burden faced by communities of color: “**An African American child is three times more likely to go into the emergency room for an asthma attack** than a white child, **and twice as likely to die from asthma attacks as a white child.** African Americans are more likely to die from lung disease, but less likely to smoke. When we did a road tour to visit thecommunities that were impacted by coal pollution, we found **many anecdotal stories of people saying [people]**, yes, my husband, my father, my wife **died of lung cancer and never smoked a day in her life. And these are people who are living within three miles of the [near] coal**-fired power **plants we visited**.” According to Dr. Robert Bullard, a scholar and prominent environmental justice activist, in an [interview for EarthFirst! Journal](http://www.ejnet.org/ej/bullard.html), “**Race is still the potent factor** for predicting where Locally Unwanted Land Uses (LULUs) go. A lot of people say its class, but race and class are intertwined. Because the society is so racist and because racism touches every institution – employment, housing, education, facility siting, land use decisions – you really can’t extract race out of decisions that are being made by persons who are in power when the power arrangements are unequal.” The environmental justice (EJ) movement seeks to change that by giving disenfranchised communities – often communities of color – a voice and empowering them to organize and get involved in decision making processes. As defined by Dr. Bullard, “The environmental justice movement has basically redefined what environmentalism is all about. It basically says that the environment is everything: where we live, work, play, go to school, as well as the physical and natural world. And so we can’t separate the physical environment from the cultural environment. We have to talk about making sure that justice is integrated throughout all of the stuff that we do.” It should be mentioned that while the EJ movement does have solid roots in empowering minorities, its work is not limited to communities of color. “All of the issues of environmental racism and environmental justice don’t just deal with people of color. We are just as much concerned with inequities in Appalachia, for example, where white people are basically dumped on because of lack of economic and political clout and lack of having a voice to say ‘no.’ That is environmental injustice.” Environmental racism and environmental injustice are not unique concepts to the United States either.[2012 Goldman Prize winner Desmond D’Sa](http://www.goldmanprize.org/recipient/desmond-dsa/) drew connections between his own work to protect and empower marginalized communities in Durban, South Africa to the plight of the Bay Area’s Richmond communities, who live within a ring of five oil refineries, three chemical plants, eight Superfund sites, dozens of other toxic waste sites, highways, two rail yards, ports and marine terminals. We reached out to D’Sa to get his view on the global EJ movement: “Having spent the majority of my life in an area smothered by pollution, I often wondered what it’s like living on the other side. Although I was not born into the life that allows for such living, I have come to terms with the life that I’m given and try to make it a living space where others hope to live in someday. Being exposed to the ruins and health impacts caused by surrounding industries in South Durban, I was compelled to think about the injustices facing the South Durban communities, which were and continue to be linked to race and class. Since the early 1970’s, the **people living in** the South Durban **area** **have been** labelled as people whose **lives don’t matter** hence their placement in the industrialised section of Durban.

### Natives

**Coal plants are placed on reservations and kill many natives. SILVA 12:**

Cristina Silva, 7-5-2012, "Native Americans say power plants near tribal lands cause illness," MPR News, http://www.mprnews.org/story/2012/07/04/environment/tribes-utilities

MOAPA, Nev. (AP) -- Beyond the ancestral hunting fields and the rows of small, sparse homes, the cemetery at the Moapa River Indian Reservation sprawls across a barren hill with the tombstones of tribal members who died young. Their deaths haunt this small desert community outside Las Vegas. Children play indoors, afraid they might be next. Hoping to keep out the air they believe is killing their people, tribal elders keep their windows shut and avoid growing food on the land where their ancestors once found sustenance. The Moapa Paiutes need not travel far to stare down their perceived enemy: The coal-powered plant blamed for polluting the southern Nevada reservation's air and water is visible from nearly every home. "Everybody is sick," said Vicki Simmons, whose brother worked at the Reid Gardner Generating Station for 10 years before dying at age 31 with heart problems. Across the country, a disproportionate number of power plants operate near or on tribal lands. NV Energy maintains its plant near the Moapa Paiute reservation is safe and has been upgraded with the newest clean emissions technologies. Meanwhile, local, state and federal health agencies say they cannot conduct accurate health studies to verify the tribe's complaints because the sample size would be too small. In all, about 11 percent of all power plants operate within 20 miles of reservation land, according to an Associated Press analysis of data from the U.S. Environmental Protection Agency. Many of those 51 energy production centers are more than a half-century old and affect roughly 48 tribes living on 50 reservations. Fewer than 2 percent of all people in the United States identify as Native American, and only a small portion live on tribal land. In many cases, Native American leaders have long embraced energy development as an economic opportunity for communities battling widespread unemployment. But a growing backlash has some tribal leaders questioning whether the health and environmental risks associated with energy production has put their people in harm's way. While it's not conclusive that coal operations pose a direct danger to reservation residents, the Moapa Paiutes are one of several tribes demanding the closure of their neighborhood power plants. Sherry Smith, a history professor who co-edited the book "Indians and Energy: Exploitation and Opportunity in the American Southwest," said hardly anyone paid attention or were aware of potential environmental consequences when the power plants were built decades ago. "These are not simply people who have been duped by the government or the energy corporations," said Smith, director of the William P. Clements Center for Southwest Studies at Southern Methodist University in Texas. "They are simply 21st century people who are coping with the same issues the rest of us are about economic development and the environmental consequences and having to weigh these things." Among the nation's 564 diverse tribal entities, energy production is widely debated. Many support environmental protections as a natural extension of American Indian values. But tribal leaders also aspire to protect their culture by keeping members on the reservation. Jobs and economic opportunity are necessary, energy production proponents say, and power plants fill the gap. On one end of the spectrum is the Navajo Nation, the country's largest reservation, with five power plants near or on its sprawling territory in the Southwest. The tribe has embraced coal production as a central component of its economy, and Navajo officials traveled to Washington in June to oppose proposed EPA regulations to make the plants more environmentally sound. The new requirements would kill jobs, tribal leaders said. On the other side of the debate have been members of tribes like the Moapa Paiutes and the Northern Cheyenne of Montana, which for years blamed local energy companies for the health woes plaguing residents on their reservations. In Moapa, Yvette Chevalier said she became ill within weeks of moving last year to the reservation, which sits 2 miles from the decades-old coal plant that sometimes infuses nearby skies with gray fumes. Gary Lee said he recently lost 40 pounds because of health troubles. Former Tribal Chairman Vernon Lee said it's not unusual for members to be hospitalized. "There have been a lot of heart attacks," Lee said. "Many young people died." When coal is burned, carbon dioxide, sulfur dioxide, nitrogen oxides and mercury compounds are released into the air, according to the EPA. Research has shown those fine particles can be linked to serious health problems, including premature death. Children, who breathe more often, and senior citizens, who tend to have health problems agitated by pollution, are particularly vulnerable, said Colleen McKaughan, an associate director in the EPA's air division. In Montana, the Northern Cheyenne live near the state's largest coal-power plant, the Colstrip Steam Plant. The four-unit power plant operated by PPL Montana produces 2,200 megawatts of electricity and is one of the largest employers in eastern Montana with roughly 400 workers. Many in the tribe want it shut down. In northeastern Utah, the Ute Indian Tribe has threatened to sue Deseret Power over pollution from its 30-year-old plant on the reservation, which generates 500-megawatts of electricity. Ozone readings in the region can reach nearly twice the limit considered safe by the EPA, especially during winter months. "They are legitimately concerned about the impact the power plant has on the reservation," said Michael Harris, a lawyer representing the tribe. Harris said some tribal members have complained of asthma attacks and cancer clusters and the plant might be to blame. Deseret Power did not respond to a request for comment. To be sure, tribes fighting energy companies are the exceptions. The massive Four Corners Steam Plant sits on Navajo land in Fruitland, N.M., where the Arizona Public Service Co. says it generates 2,040 megawatts of electricity and serves New Mexico, Arizona, California and Texas. Tribal members who work at the power plants earn roughly triple the average Navajo family income of about $20,000 per year. The tribe expects to receive more than $7 million annually from the two power plants on its land under its latest lease proposals. "A lot of our own people who are critical of coal are not understanding the economic benefits," said Stephen Etsitty, executive director of the Navajo Nation Environmental Protection Agency. "It's easy to perceive a problem when you see a big power plant smoke stack ... but that often causes you not to look at other areas of concern." In Moapa, Simmons -- whose 31-year-old brother died after working at Reid Gardner Generating Station -- can see the Nevada power plant from her kitchen window. It reminds her of her brother's death. She also frets for her 24-year-old son, who works at the plant and comes home with ash-covered skin. His wife is pregnant with Simmons' first grandchild. "The land is poisoned," she said. "I don't even open my window because I don't like to look at it."

### Lives - Numbers

#### You cause quantifiably millions more deaths, SCHROPE 13:

Shrope, Mark. April 2, 2013. “Nuclear Power Prevents Deaths Causes.” <http://cen.acs.org/articles/91/web/2013/04/Nuclear-Power-Prevents-Deaths-Causes.html> //LHP SG

Using **nuclear power in place of** fossil-fuel energy sources, such as **coal, has prevented** some **1.8 million air pollution-related deaths globally and could**[save millions of more lives in coming decades](http://cgi.cen.acs.org/cgi-bin/cen/trustedproxy.cgi?redirect=http://pubs.acs.org/doi/abs/10.1021/es3051197?source=cen), concludes a study. The **researchers** also **find** that **nuclear energy prevents emissions of huge quantities of greenhouse gases**. These estimates help make the case that policymakers **should continue to** rely on and **expand nuclear power in place of fossil fuels to mitigate climate change**, the authors say (*Environ. Sci. Technol.,* DOI:[10.1021/es3051197](http://cgi.cen.acs.org/cgi-bin/cen/trustedproxy.cgi?redirect=http://pubs.acs.org/doi/abs/10.1021/es3051197?source=cen)). In the wake of the 2011 Fukushima nuclear disaster in Japan, critics of nuclear power have questioned how heavily the world should rely on the energy source, due to possible risks it poses to the environment and human health. “I was very disturbed by all the negative and in many cases unfounded hysteria regarding nuclear power after the Fukushima accident,” says report coauthor [Pushker A. Kharecha](http://www.giss.nasa.gov/staff/pkharecha.html), a climate scientist at [NASA’s Goddard Institute for Space Studies](http://www.giss.nasa.gov/), in New York. Working with Goddard’s James E. Hansen, Kharecha set out to explore the benefits of nuclear power. The pair specifically wanted to look at nuclear power’s advantages over fossil fuels in terms of reducing air pollution and greenhouse gas emissions. Kharecha was surprised to find no broad studies on preventable deaths that could be attributed to nuclear power’s pollution savings. But he did find data from a 2007 study on the average number of deaths per unit of energy generated with fossil fuels and nuclear power (*Lancet,* DOI:[10.1016/S0140-6736(07)61253-7](http://dx.doi.org/10.1016/S0140-6736(07)61253-7)). These estimates include deaths related to all aspects of each energy source from mining the necessary natural resources to power generation. For example, the data took into account chronic bronchitis among coal miners and air pollution-related conditions among the public, including lung cancer. The NASA researchers combined this information with historical energy generation data to estimate how many deaths would have been caused if fossil-fuel burning was used instead of nuclear power generation from 1971 to 2009. They similarly estimated that the use of nuclear power over that time caused 5,000 or so deaths, such as cancer deaths from radiation fallout and worker accidents. Comparing those two estimates, Kharecha and Hansen came up with the 1.8 million figure. They next estimated the total number of deaths that could be prevented through nuclear power over the next four decades using available estimates of future nuclear use. **Replacing all forecasted nuclear power use** until 2050 with natural gas would cause an additional 420,000 deaths, whereas swapping it **with coal, which produces significantly more pollution than gas, would mean about 7 million additional deaths. The study focused strictly on deaths, not long-term health issues** that might shorten lives, and the authors did not attempt to estimate potential **deaths tied to climate change**. Finally the pair compared carbon emissions from nuclear power to fossil fuel sources. They calculated that **if coal** or natural gas power **had replaced nuclear energy** from 1971 to 2009, **the equivalent of** an additional **64 gigatons of carbon would have reached the atmosphere.** Looking forward, **switching out nuclear for coal** or natural gas power **would lead to the release of** 80 to **240 gigatons** of additional carbon **by 2050**.

# 2N Extra/Extension:

## Link:

**Switches to coal--- empirics. ADLER:**

Ben Adler, April 5 2016, "Bernie Sanders wants to phase out nuclear power," Mother Jones, <http://www.motherjones.com/environment/2016/04/grist-bernie-sanders-wants-to-phase-out-nuclear-power-plants> //LHP SG

Is hastening nuclear power's demise a good idea? Holthaus, citing Nordhaus' frequent collaborator Michael Shellenberger of the Breakthrough Institute, [argues](http://www.slate.com/blogs/the_slatest/2015/12/07/bernie_sanders_climate_plan_calls_for_end_to_nuclear_energy.html)that if you ramp down nuclear too quickly, it will lead to an increase in the use of coal or gas. That's also the view of Devin Hartman, electricity policy manager for the R Street Institute, a center-right think tank, and a former energy market analyst at the Federal Energy Regulatory Commission. He points out that retired nuclear plants in the[Northeast](http://bigstory.ap.org/article/59b81101814946c1a1306c5af5791b30/upcoming-nuke-plant-closure-could-roil-new-england-markets) and [California](http://www.sandiegouniontribune.com/news/2015/feb/19/natural-gas-replaces-nuclear/) have been mostly replaced by increased natural gas usage. And in Japan and Germany, where the governments have been shutting down nuclear reactors since the Fukushima meltdown, coal use has spiked. "Shutting down nuclear plants would create a little more demand for energy efficiency and renewables, but the net effect of nuclear retirements will generally be increasing emissions," Hartman says. That's partly because there is excess coal- and gas-burning capacity in the current energy system. While generating an additional megawatt-hour of electricity from existing solar or wind facilities can be cheaper than burning coal, building a whole new set of wind turbines is more expensive than just feeding more gas into your existing gas-fired plant. Holthaus cites a [report](http://www.thirdway.org/report/when-nuclear-ends-how-nuclear-retirements-might-undermine-clean-power-plan-progress) from centrist think tank Third Way on US nuclear plant retirements; it projects that shuttered plants would lead to more natural gas usage and increased CO2 emissions.

Phase out links--- Germany’s twelve year phase out empirically confirms.

Germany's nuclear phase-out has come off more successfully than many expected - Rainer Baake, state secretary at Germany's Ministry for Economic Affairs and Energy, expressed his satisfaction with the first few years of the phase-out.

"We have the highest security of [energy] supply in Europe, export more electricity than ever, and have very low wholesale prices on the energy market," Baake told DW.

Electricity that was generated through nuclear fission has been replaced through a dynamic addition of wind, solar and biomass capacity.

In 2014, renewable sources accounted for a landmark 28 percent of Germany's electricity.

Continued coal use

In the meantime, due in part to a sharp drop in prices for carbon emissions trading on the European market, production of electricity from coal has remained cost-competitive. Coal thus continues to be a major source of energy in Germany.

This despite Germany's carbon dioxide emission reduction goals, which consist of 40 percent reductions from 1990 levels by 2020. Experts have pointed out that continued use of coal-fired plants could prevent this goal from being reached.

"We will have to make additional efforts in this area," Baake said. The government is thus seeking to reduce coal-based energy generation by introducing a levy on the most polluting brown-coal plants - which remains controversial.

1. Climate change could make humans extinct, warns health expert March 31, 2014 Deborah Snow, Peter Hannam [↑](#footnote-ref-1)
2. http://www.scientificamerican.com/article/coal-ash-is-more-radioactive-than-nuclear-waste/ [↑](#footnote-ref-2)