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Until the 1939 experimental breakthroughs with nuclear fission, the basis of the atomic bomb, all indications suggested nuclear warfare was decades away. Yet by the fall of 1939, Leo Szilárd enlisted fellow physicist Albert Einstein's help in writing a letter to United States President Franklin D. Roosevelt warning of the latent threat of atomic warfare; two years later the 1941 MAUD Report sketched the plans for moving construction of the atomic bomb forward, with several scientific advances following suit. On 17 September 1942, Colonel Leslie R. Groves, promoted to Brigadier General six days later, was appointed to lead the Manhattan Engineer District, dubbed the Manhattan Project.

Events moved forward rapidly. Chief engineer J. Robert Oppenheimer hosted a conference on nuclear fission in summer 1942, and walked through the gates of the Los Alamos National Laboratories, New Mexico, USA, on 25 November 1942. Roosevelt and Winston Churchill signed the Quebec Agreement on 19 August 1943, bringing a team of British physicists on board. On 16 July 1945, the first nuclear explosion was tested, with wartime use of two of the four bombs constructed by the Project on 9 and 12 August in Japan. Officially dismantled on 1 January 1947, with the creation of the civilian Atomic Energy Commission, the Manhattan Project proved an overwhelming triumph and the paradigmatic exemplar of technological achievement for the decades that followed. Within a short period of time, one of the greatest technologies in human history went from the germs of an idea to successful fruition. The challenges of meeting carbon emissions to counter the threats of climate change demand no less an effort.

What made the Manhattan Project work? Political will was converted into financial capital: the project spent over $20 billion (in 1996 dollars), employing over 130,000 people. Great scientific leadership took charge, with many of the best scientific minds of the 20th century working together against the threat of the Axis powers developing the atomic bomb first. And a powerful coalescence of scientific and intensive administration skill facilitated the coordination of over 30 separate research facilities, across three countries and two continents. These elements—cocktailed with the appropriate caveats and exceptions—serve as powerful parallels to the possibilities of developing technology to curb carbon emissions.

The three central sites, at first maintained secretly, included the Los Alamos National Laboratory where the final assembly of the bombs took place, costing over $845 million; the Oak Ridge facilities, billed at nearly $14 billion, was the site for uranium production, at one point consuming more than 1/6th of the electrical power produced in the USA, greater than New York City at the time; and the Hanford Engineer Works, over 2,600 square kilometers, was the plutonium production center, at over $4 billion. The total cost of WWII for the United States was approximately $3.3 trillion with the majority of funding going to conventional weaponry including $31.5 billion on bombs, mines and grenades, and $64 billion on tanks.

By comparison, despite its overwhelming power to decide the outcome of the Second World War, the core funds spent on other wartime expenditures dwarf the costs of the Manhattan Project. The specifics of the costs for climate change technology need not bear any similarity to these figures. Tying budgetary strings to political and social will, however, does – it serves as the pivotal first step towards getting onto the path of technological innovation at the scale needed to fight the impending calamities of climate change.

One unique element of the Manhattan Project continues to riddle historians of science today: how could the period leading up to WWII have been such a flood shed moment for science? Niel Bohr's working out the structure of the atom and Enrico Fermi's fission experiments, to name only two of the scientific innovations towards the atomic bomb, are paramount achievements unto themselves. The political acumen of many of these great scientific minds, as exemplified in the Szilárd-Einstein letter to Roosevelt, underscores the importance of a nuanced joining of forces of the scientific and political communities. Further, the possibility of the atomic bomb being developed by the Axis powers fixed the nature of the danger to overcome.

The coordination of scientific, political and military strengths and interests is perhaps the most enduring lesson of the Manhattan Project, embodied in the figures of General Leslie Grove and J. Robert Oppenheimer. Groves's leadership, recognized in overseeing large-scale, multi-billion dollar construction projects during the 1940-1942 mobilization period, transformed the theoretical and laboratory research effort of a few universities into a fast moving, highly coordinated project including thousands of scientists, engineers, technicians, workmen, and soldiers, as well as hundreds of companies and governmental organizations. The administrative skill to undertake the Project was paramount for its success. Groves also had the vision to appoint Oppenheimer to head the key think-tank of the Project at Los Alamos.

Oppenheimer is today seen as a pivotal figure in the 20th century evolution of science and government. He was noted for his mastery of the scientific aspects of the Manhattan Project and for his management of the sensitive interaction between scientists and the military. Oppenheimer was involved in most aspects of the Project from recruiting scientists, many his former students, to helping engineers purify uranium. While today some may look backward on his contributions to the Project through the lens of his postwar political fallout, Oppenheimer remains a key figure for understanding the pivotal nexus for the Project's quick and effective conclusion: a statesmen and a scientist rolled into one. Bridging together the divides between military, political and scientific leadership as Groves and Oppenheimer achieved, is a critical element of the success of the Manhattan Project.

The parallels to the threat of climate change are striking. In many ways the challenges of building technology to manage the impending doom of climate change mirror those of the construction of the atomic bomb.

While the scales and natures of these individual threats belie detailed comparison, the organizational structure of the urgency to combat global climate catastrophe exhibits some parallels to the threat of the Axis powers acquiring the bomb before the Allied states. Most commentators agree that the threats of war and the atomic arms race were the driving forces for the indefatigable push for the Manhattan Project. Similarly, the certainty of the threats of climate change provides impetus for the exigency of carbon emissions reducing technology. It serves as a rallying point for the scientific community to join hands together with the business, non-governmental and international communities to ward off the negative impact of climate change.

While many parallels between the two projects function well enough, some aspects of the analogy merit caution. The greatest difficulty in pursuing the Manhattan Project comparison is the choosing of technology. When the Manhattan Project itself was set running in 1942, the technological pursuit—nuclear bombs—was already fixed. The project was not set up to find new technologies but to reach the more limited goal of how to make a specific technology work. Without that certainty, we may quickly get bogged down into what some skeptics on the need for a Manhattan Project for climate change suggest amounts to government interference with market mechanisms for technological innovation. However, a well-harrowed area of development economics proposes correcting inefficient technologies with “big push” technologies. The Manhattan Project rationale extends this basic principle only to a larger scale for greening economic growth.

Some ethical problems, nevertheless, abound with the comparison to the production of the most potent weapon of war known to mankind. Even in the specific case of climate change science, post-WWII government funding for climatological warfare spurred the rise of scientific knowledge on climate change, when questions such as how to unleash a devastating storm unto one’s military enemies were posed. The issue, however, of finding cleaner energy for carbon emissions reduction jettisons these ethical warfare troubles.

Other difficulties give greater cause for caution with the analogy to the Manhattan Project. One, for instance, moving beyond the potential irony, would be the immense task of cleaning up the environmental remains of such a large-scale project, as troubles proliferate till today with the mop up after the Manhattan Project and decades of nuclear weaponry production. The Hanford Site in Washington State, for example, displaced several farming communities. But the details of the search for cleaner energy technology cause the analogy to hiccup: the multiple sites requiring clean up are due to the toxic nature of atomic energy; these worries are not credible ones for the question of a Climate Change Manhattan Project. Another spot where the comparison must depart from the Manhattan Project is the secrecy with which the original was undertaken, given the security concerns over the latent power of the atomic bomb. This would need to be done away with in the efforts of new energy technology towards a broader fulfillment of rights to intellectual property consistent with the need to combat climate change. The benefits of cleaner technology belie the heart of the moral problematic of the first Manhattan Project; the dangers of nuclear war and the clean up costs, in social and economic hazardous terms, do not exist.

Some will suggest that calling for a new Climate Change Manhattan Project distracts attention from carbon emissions mitigations strategies, betraying a cornucopian view of human ability—the answer to the carbon emissions problem, they argue, does not lie in the search for new technology. For these skeptics, pursuit of a Climate Change Manhattan Project will at best only fill the fluff of castles built in the skies, and at worst raise and dash hopes at once. Yet it is clear enough that the Kyoto emissions targets cannot be led by mitigation alone, technological innovation has become essential to meet the challenge.

Recent research and political movement in the fields of innovation in and access to medical drugs provide at least one powerful anchor for how to strategize development of low-carbon technology. The current intellectual property rights (IPR) regime, as enshrined in the 1995 World Trade Organization's Trade-related Intellectual Property Rights (TRIPS) agreement, many increasingly argue, fails on both efficiency and equity grounds to incentivize drug innovation for the world's poor. Over the last several years, a flurry of analysis has unfurled a growing body of proposals to reform the TRIPS regime, crystallizing the need to develop economically and ethically grounded principles on which to stand a new global deal for advancing public health and access to essential medicines. An overlapping consensus centers on prize funds for medical innovation. One set of significant proposals includes rewarding drug and pharmaceutical researchers for innovation based on the actual impact on the global burden of disease: each increase in a year of healthy life lived receives a proportional increment in financial reward. The same concept may be fruitfully applied to incentivizing technological innovation for low-carbon economic growth and human lifestyle.

Similarly then, a prize fund can be constructed to incentivize the development of low-carbon technology, including carbon storage and sequestration, as well as technology transfer to developing countries, especially China and India. A key challenge hampering this policy in medical drug innovation is the technical difficulty in translation human lives gained into a substantive financial amount. This, however, does not riddle the proposal for a low-carbon innovation fund: the measurements for carbon and impact already exist. The carbon prices developed in carbon taxation and cap-and-trade schemes, building on – although going beyond – some of the groundwork already accomplished by the European Union's Emissions Trading Scheme, constitutes work needed in tandem with this proposal. All the market and public policy tools available must be employed at once to meet the challenge of what some call the greatest and widest-ranging market failure, ever.

The Manhattan Project accorded the world a new view of science, reaching what was perhaps its zenith in the popular imagination in the 1969 Apollo landing on the moon. President John F. Kennedy stirred the American people and the world at large with references to the successes of the Manhattan Project. The contours and content of a significant push for technology—following the conversion of political will into financial capital, scientific expertise united to combat a unified threat, and scientific and administrative leadership—are obviously desirably replicable.

The hope will be that a new Climate Change Manhattan Project will surpass the vision and achievement of the first Manhattan Project. Instead of dividing nations via technological saber rattling, it would be a force tying humanity together. Instead of the perverse effect of bringing the world to the brink of foremost anthropogenic interference—a global nuclear disaster, despite the power of atomic energy and benefits—a new Climate Change Manhattan Project could pave the way for greater prosperity and sustainable development. The new Climate Change Manhattan Project could replace the atomic project as a greater exemplar of the opportunities of human achievement. It could be the new inspiration from which future generations draw impetus to tackle the unforeseen problems of their times, and to meet the further challenges of science.

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