Almost as long as humans have existed on earth, they have utilized the unique relationship between matter and energy to their advantage. Fire first provided warmth and light and later powered great machines that facilitated peacetime prosperity and wartime horror. But converting fuel first to heat and then to mechanical or explosive energy was an inefficient process. The battleships of America's World War II Pacific Fleet required over 6,500 gallons of oil per hour to turn their 30 foot propellers at top speed. Artillery projectiles and aerial bombs packed with energetic explosives had replaced black powder propelled cannon balls but even these modern explosives had a comparatively small radius of effect. Japanese cities, mostly constructed of wood, were consumed in vast firestorms but it took hundreds of bombers, dropping tens of thousands of incendiary bombs to wreak this destruction.

Science's knowledge of the relationship between matter and energy changed radically in the early 20th Century, when physicist and mathematician Albert Einstein revolutionized the scientific world with his theories of basic physics. His Theory of Special Relativity brought insight into the immutable equivalency of mass (matter) and energy and quantified the simple observation of anyone who ever kindled a fire – that a small amount of matter can be converted a large amount of energy. Armed with this insight into the very foundation of matter, other scientists theorized that a huge quantity of energy could be released by breaking apart the atoms of certain variations (isotopes) of the elements Uranium and Plutonium. As each atom split, it released both energy and other particles which split adjacent atoms – a chain reaction. In Chicago, Enrico Fermi, built the first "nuclear pile" which demonstrated how this reaction could be controlled, promising inexpensive and nearly limitless peacetime energy. These experiments woke other physicists to the possibility that uncontrolled, the chain reaction could be used as a weapon with a destructive force tens of thousands of times greater than any conventional explosive. On 2 August 1939, scientist Leo Szilard wrote a letter to President Roosevelt, signed by Albert Einstein, informing the President that a nuclear weapon was within the realm of current science and that scientists in Nazi Germany were endeavoring to produce such a weapon for it's army.

Correspondence continued between Einstein, Szilard and Roosevelt as war broke over Europe with the invasion of Poland on 1 September 1939. Roosevelt was sufficiently concerned with Germany's investigations to authorize a program to research and develop a possible nuclear weapon by U. S. scientists. The super-secret Manhattan Project ensued, eventually bringing together the top scientific minds in America on a New Mexico hilltop to build "ours" before the Germans could build "theirs."

The theory behind "The Bomb" was already well-developed and early experiments indicated that by smashing together lumps of enriched Uranium, or by compressing a sphere of Plutonium, an uncontrolled chain-reaction would ensue that would release incredible amounts of energy in heat and shock wave, a compression of air that would cause buildings to collapse. Sadly, for years after, little would be understood about the short and long term exposure to another product of the blast – radiation. The problem facing the scientists of Los Alamos was how to effect this reaction and how to package it into a bomb that could be lifted by one of our current generation of bombers.

The Uranium bomb was the easiest to construct in terms of the current state of scientific knowledge. A cannon would be used to shoot one lump of Uranium into another. Humans had been building cannon for hundreds of years and were well versed in the process of producing a hollow cylinder, closed on one end, capable of containing the pressure of a propellant charge that accelerated a projectile. The resulting bomb was cylindrical in shape, with stabilizing fins at the rear and known as "Little Boy." The Plutonium bomb was in theory, more energetic than "Little Boy" but required an untried technique to "set it off." A sphere of Plutonium had to be violently but symmetrically compressed - imploded. This required a conventional explosive force, applied evenly across the entire surface of the sphere. None of the physicists at Los Alamos were able to create such a charge. Shape charges, focused explosives, had been used for some time in WWII demolition work. These focused their blast in a specific direction for maximum effect. (A WWII demolitions expert named Paul "Red" Adair became expert on the use of these charges and after the war became the world's foremost expert in using focused explosives to extinguish oil well fires. Adair would help fight the oil well fires in Kuwait after the 1991 Persian Gulf War.) A Ukrainian chemist, George Kistiakowsky, was called in to solve the implosion problem. Kistiakowski was an expert in designing and producing focused explosives and after many trials, produced a perfectly spherical, inward-focused conventional explosive capable of symmetrically imploding the Plutonium core.

All the necessary arming and fusing circuits needed to trigger the Uranium bomb were tested and the reaction itself was proven on a small scale. The Plutonium bomb, oblong in shape and called, "Fat Man," was new territory and required a test. On 16 July 1945, at a remote test site in Alamogordo, New Mexico known as "Trinity," Kistiakowsky's focused spherical charge imploded a core of Plutonium which in the most spectacular fashion, demonstrated to the world Einstein's most famous but least understood equation: This small sphere of Plutonium transformed itself into an amount of energy equal to its mass multiplied by the square of the speed of light. As the New Mexico night was turned to day, the military observers present knew at that moment that they had the city-killer weapon the American people invested 2 billion dollars (23 billion today) to develop. And, any hope of the scientific community that atomic energy would be used only for peaceful purposes was forever dashed.

America's atomic bomb was itself produced by the same physics that powered it – the smashing together of two bodies of matter to release vast energies - this being the Manhattan Project's leaders, Major General Leslie Groves, U. S. Army Corps of Engineers, in overall administrative charge of the project and his chief scientist, Julius Robert Oppenheimer. Groves was all Army, he had earlier overseen the construction of the Pentagon and was now focused on developing a super-weapon and using it to end the war. Oppenheimer was in every way possible, the opposite of Groves, a left-leaning intellectual, comfortable in the free-thinking academic world of scientific inquiry. Oppenheimer had to both contend with Groves and manage the passions and personalities of a large concentration of contentious geniuses working on a project with great moral implications. Oppenheimer also had some security "problems," close campus relationships with ultra-leftists and communists and an extra-marital affair with a woman who was sympathetic to the American Communist movement. Groves used these weaknesses to his full advantage, in effect blackmailing Oppenheimer to remain focused on producing a working bomb without consideration of moral issues. Oppenheimer used his intellectual prowess to manipulate the security-conscious Groves to allow his scientists to freely discuss theories and problems instead of keeping them compartmentalized as security practice dictated. Their many clashes released vast amounts of human energy that fueled the largest and most secret project of the war.

From Hanford, WA came Plutonium and from Oakridge TN, Uranium. In facilities from Berkley, CA to Rochester, NY, in laboratories and mines across Canada, 130,000 people worked in secret cabals to produce various components for a project whose ultimate product was unknown to them. General Groves managed this titanic effort. At Los Alamos, Robert Oppenheimer controlled and focused the creative energies of the scientists, keeping their naturally inquisitive minds from wandering away from their main goal of building and testing "the gadget," as they were required to call it. Oppenheimer's biggest challenge came as the "gadget" was nearing completion. The greatest scientific minds of the century were reticent to see it used and were forming a movement to pressure President Truman to demonstrate but not use this weapon. Opposition in the scientific community grew after the surrender of Germany when news broke that they were never close to producing a working nuclear weapon. But Americans were still dying in large numbers in the Pacific and whether the "gadget" would be used or not was not up to American generals, politicians or scientists. It was ultimately up to Japan.