



Fusion Power, Thorium & The Near Future Of Energy Capex

Emerging Thematic

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Nine days after the newspaper of record, [The New York Times](#) wrote that, “a flying machine is one million to ten million years away”, Orville and Wilbur Wright defiantly flew over Kill Devil Hills, North Carolina with their avant-garde [Kitty Hawk aeroplane on 17 December 1903](#).

Scientific history is littered with such examples – [US atomic pioneer Robert Oppenheimer](#) saying a nuclear-powered submarine was a century away, only to be proven wrong by [Admiral Hyman G. Rickover, who in the 1950's built the first operational nuclear-powered submarine and aircraft carrier in less than six years](#) – and more recently the [remarkable success of mRNA technologies solving for SARS-CoV-2 vaccines](#) in one-tenth the time previously taken to deliver newer vaccine genesis.

Cite:- [COVID-19 Vaccinations – Efficacy, Safety, Tort Litigation & Data Deficits: An Economic + Financial Markets Bet Like No Other](#), 6 December 2020

The science and human applications were impossible, until they weren't.

So, it was significant for the nascent science of man-made nuclear fusion power that in early February, the United Kingdom Atomic Energy Authority, or UKAEA, announced that the Joint European Torus's (“JET”) [Tokamak operational reactor had produced a world record total of 59 megajoules of heat energy from fusion over a five second period – the duration of the experiment](#), seen as a seismic step closer to the commerciality requirement of a “[Net-Energy Gain](#)” threshold imperative.

Progress has come from several innovations – [including modern lasers that confine reactions and advancements in computing, which has let engineers design machines to a precision previously inexcutable](#) – but also from the upsurge in [private sector funding, with Bezos, Gates](#) and institutionally heralded Private Equity giants [seeding start-ups](#) and under-funded established pathfinders.

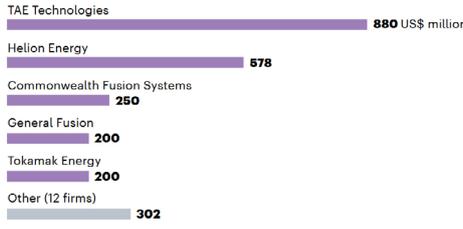
Cite:- [Quantum Supremacy: Complicated Technologies Define Realpolitik, Hegemony & Wealth](#), 22 October 2020

Long the [domain of government research and international collaborations](#), private-sector fusion companies in North America and Europe attracted US\$300 million in investment in 2020 and growing by double digits since; publicised start-up leaders include [First Light Fusion](#), [Tokamak Energy](#) & [Tae](#) but to name a few.

Nuclear Fusion energy is based on the same principle by which stars create heat and light, [whereby atoms are combined rather than split as in a nuclear reactor and special forms of hydrogen are used as fuel; harnessing the forces involved is the recurrent challenge, as at the heart of a fusion reactor is a super-hot cloud of electrically charged gas, or plasma](#),

FUSION FUNDING

Private fusion firms have disclosed more than \$2.4 billion in funding.



circa eight-fold hotter than our sun's core.

Early-stage investors are setting themselves to gain [monopolistic](#) positions in a burgeoning [science set to redefine global energy Capital Expenditure \(“Capex”\)](#).

For global energy at-large, the Russian-Ukraine conflict is a turning point for the energy sector investment cycle, similar to and potentially greater than the [2011 concurrence of the Fukushima nuclear accident](#) and Libyan Civil War.

Akin to 2011, there is already signs of an acceleration of US shale and global LNG construction, as the world revives short-cycle oil production and globally fungible gas supply.

However, [in 2011, the oil and gas sector were seven years into a cycle of exploration and mega-projects build-up that was fuelling resource expansion and a revival of non-OPEC growth](#) whereas 2022 is the exact opposite, [with seven years of hydrocarbon under-investment between 2015-2021, falling oil reserve life, which is down fifty percent since 2014 and declining non-OPEC traditional production](#), which has been requiring a steeper Capex recovery in both long-cycle and short-cycle production of facilities [embracing Africa, EMEA and even Australia](#).

Cite:- [The Levant And Law of Unintended Consequences: Emerging Markets Northwest Of The Arabian Plate](#), 25 May 2020

Cite:- [Why Africa Highlights Potential Oil Shocks](#), 24 October 2018

Cite:- [Oil Certain To Remain A Vital Signal For Global Investors](#), 5 December 2015

Cite:- [Negotiating The New Politics Of Oil](#), 6 December 2014

Cite:- [The Iron Laws & Oily Rags Of The Commodity Complex](#), 21 June 2014

Also, the ongoing focus on decarbonisation, which is driving a higher cost of capital in oil & gas developments, means this energy investment cycle will be different, characterised by a continued emphasis on renewables and previously marginalised nuclear alternatives.

Cite:- [Light Green and Dark Green Funds under the SFDR](#), 10 May 2021 (Article 8 Funds are referred to as “[Light Green Funds](#)”. Article 9 Funds are referred to as “[Dark Green Funds](#)”)

With the [Balkanization](#) of Europe in recent weeks, renewed tensions with Iran and heightened concerns over China, another safer nuclear energy science is being revisited both by state actors & private investors alike.

Cite:- [If Not China, Iran – The Next Northern Hemispheric Crisis: Assessing Its Effect On The Dollar, Energy & The ‘Recovery’ Narratives](#), 23 May 2020

As discussed within our [Hedge Fund Insight #837](#) in October of last year, Thorium-based molten salt nuclear energy is a phoenix technology resurging [as its bountiful in Australia](#), India and now it appears China, and it's safer than Uranium, cannot be as easily weaponised and does not require water or liquids to cool; it's run-off remains radioactive for around 500 years, unlike Uranium or Plutonium which perseveres for millennia.

[Thorium is a metallic element with radioactive properties](#), close to Uranium on the periodic table, which was considered as an alternative fuel source when the US was first developing nuclear energy technology in the 1940's, the U.S. Government even developed an experimental thorium-based molten salt nuclear reactor at the [Oak Ridge National Laboratory in Tennessee](#), however, it was abandoned when Uranium was favoured over thorium in the early 1970's simply because it is an easier fissile base element.

Notwithstanding, Thorium does not require enrichment, whereas the vast bulk of Uranium (around 99.3 percent) pulled from the ground is unsuitable for a nuclear reactor, so it needs to be spun in centrifuges to extract the amount of useful fissile Uranium²³⁵ material from the relatively idle Uranium²³⁸, [Thorium, on the other hand, can be used straight out of the ground, meaning it can generate around forty-times more energy per tonne mined compared to Uranium](#).

For these reasons and [the innovations with guided lasers](#), China opened a new Thorium reactor [in September 2021 and built it at Wüwei on the edge of the Gobi Desert](#), hoping to both prove and commercialise the science.

According to a paper published in the [Chinese scientific journal Nuclear Techniques by the Shanghai Institute of Applied Physics, the longer-term plan is to develop a series of small molten salt reactors each producing 100 megawatts of energy, enough for about 100,000 people](#).

Its [utility domestically within the Australian energy mix](#) has persisted since [the 1970's Lucas Heights debates](#) and resurfaced since the onset of the [Paris Accords](#).

With kinetic supply shocks and Capex compressions continuing globally throughout 2022, one possible solution gaining early momentum is controlled nuclear fusion and given fusion promises to produce ten-million times the energy of coal, [Responsible Investors](#) owe this avant-garde investment thesis energetic consideration. ■

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