

Alternatives for Cheap Energy

Fantasy retrospect that takes place between 2025-55

The Singapore Consortium was formed in the early 20s. The Consortium included more than 250 corporations. Most of them serviced clients in Southeast Asia and the Indian subcontinent. Also onboard were Chinese entrepreneurs who had stubbed too many toes and moved their assets offshore. As well, the Consortium forged joint ventures with startups from SOAM and Africa. It even gained a few sympathizers from the Middle East. What this menagerie lacked in deep pockets, it offset with sheer numbers.

The Consortium planned to float solar-collector sats in geosynchronous orbit. The sheer audacity had marquee flare, and the Consortium unveiled its ambitious goals step-by-step. The project was over-the-top, and the methods of achieving it were laughable. Each new disclosure inspired a fresh round of boardroom smirks and water-cooler jokes.

The key gimmick was using raw materials from near-earth asteroids to build solar-power sats. This strategy made sense, for it cut the cost of lifting loads of mass from earth's gravity well. But the consortium faced enormous problems. They needed

- reliable space vans to reach far-flung NEAs;
- robotic helpers to process the minerals and then to retrieve and
- assemble exacting components in a hostile vacuum;
- huge amounts of capital to hang in limbo before the payback kicked in.

Meanwhile the international research group at ITER realized that

commercial tokamaks would never reach commercial potential without the aid of helium3, a rare isotope of helium that was scarce on earth. They looked to the surface of the moon where copious amounts of helium3 lay strewn in the dust from constant bombardments of solar wind.

World governments had finally bought the need for cutting back on the usage of fossil fuels, but no one wanted to adopt draconian measures, such as enacting stiffer carbon taxes, adapting electric grids for more windmills and solar panels, rationing plastics, taxing throwaways, forcing citizens to wear hair shirts while they dined on bread and water. Public opinion turned to nuclear fusion as the cure-all for climate-driven mayhem.

A multinational Space-Faring Enterprise (SFE) was formed to spread the capital costs around. China and USA assumed the leadership roles: China laying out a good chunk of the cash and USA lending technical expertise. The two leaders cited their long-held rivalry and mutual distrust, which they promised to resolve with high-level closed-door negotiations. They emerged with crooked smiles and awarded the best contracts to corporations aligned with their homelands.

Other members of SFE felt snubbed and short-changed. It wasn't long before the Russians sold the Consortium two-dozen Proton boosters, then Japan offered a cohort of quasi-intelligent robots, and ESA signed on to deliver prefabricated space vans.

The media jumped all over the storyline. Two daring bids to rid the world of carbon overload. Webcasters portrayed the Consortium as a kind of NGO that dared to cross swords with the superpowers of the developed world. Network headlines for the Space Race ran as

David versus Goliath;

Intrepid Explorers versus Big Science;

Solar Collectors versus Tokamaks.

The experts assured everyone that helium3 would triple the efficiency of fusion reactors. Bookmakers in Vegas gave the Consortium 25-1 odds to produce the first gigawatt of untainted energy. ITER received 2-3 odds. Side bets were placed on which date the commercial units would come on-stream.

The jaded public became fascinated. All eyes turned to the sky. Even launches of robotic supply ships drew crowds of avid viewers. Glimmers of hope infused those who had gone through storm surges, smog alerts, urban brownouts, food shortages, decades-long droughts, toxic water wells, freak blizzards and raging tornadoes.

Cooler heads remained skeptical of the unfounded optimism. They urged climatologists to appear online and set things straight. Spokespersons reminded everyone that atmospheric carbon wouldn't disappear overnight. Decades would pass before weather patterns normalized and ocean levels quit overlapping the shorelines. Sand dunes would take longer to subside and yield marginal crops. Some fish species might never recover.

Yet sober words couldn't douse the hopeful sparks that grew like wildfires across sunbaked scrub. Folks were sick of the gloom and doom that had plagued the start of the 21st-century. They refused to accept the austere measures proposed by eco evangelists. They dreaded a future devoid of modern conveniences. They hated the thought of mist-only showers and one-toilet-flush per day. They wanted a noble cause to rally around.

When humans returned to the moon after more the fifty years, cheers echoed across hypermalls and tailgate parties. Pedestrians strolled with more spring in their steps. Vendors enjoyed record sales during the holiday season. New job offers sprang up across the globe.

Even the politicians had gotten caught up in the infectious optimism. They

were pleased with the progress at the lunar base. Robotic skimmers had collected and processed enough helium3 to warrant the 1st-shipment back to earth. Lunar settlers processed more cylinders of lox than they'd ever use themselves. Since oxygen was a versatile component for rocket fuel, SFE suggested it might be used to refuel spacecraft bound for Mars.

A Mars mission made perfect sense. SFE partners saw it as excellent PR. Exploration of the red planet would galvanize the public's attention. It would transform ITER's image from "Lead-footed Goliath" to "Jolly Green Giant" and deflect public sympathy away from the underdog Consortium.

ITER scientists appeared on newscasts where they sniffed at the drawbacks of beamersats, whose microwaves must be aimed straight down to minimize atmospheric bleed-off, forcing receptor complexes to be located at or near the equator. Critics insinuated that folks in the tropics would gain a proximity advantage over folks in the temperate climes. Scientists warned that microwaves would prove harmful if they carried enough juice to power the electric grids of urbanized regions. If passengers in jumbo jets or airships strayed too long within the beam radii, they'd fry like sausages in a microwave oven with blistered skin and scrambled brains. Air travelers would be forced to detour around the beamer hazards, even though receptors were slated to sit atop mountain ranges.

On the other hand, scientists claimed that tokamak reactors were totally safe. Nuclear fusion created no dangerous byproducts, such as plutonium or other radioactive isotopes. Tokamaks emitted only small amounts of neutrons, which were captured inside metal containment vessels. A person could stand 25 meters away from an active reactor for a month of Sundays without receiving an overdose of radiation. Tokamaks were safer than mothers' milk.

Meanwhile the Consortium was struggling to assemble its 1st-beamersat. Robotic glitches forced more human EVAs than anticipated. As well, there were delays as construction crews awaited materials being shuttled from asteroid digs to the construction platforms in L5.

SFE managers greeted these developments with ravenous grins. Their helium3 project was on schedule with regular shipments delivered to earth. The G-15 as well as transnat CEOs coveted the Consortium's assets. Their advantage was the Consortium's lack of government funding. Only Kenya and Ecuador, which stood to be primary hosts for the receptor complexes, had agreed to underwrite a portion of the Consortium's debts. As soon as commercial tokamaks came on-stream, the partners of SFE planned to cannibalize the Consortium's assets for a song.

Back at the ITER complex, scientists had split into bickering groups along national lines. They argued over the best design for commercial tokamaks and where the 1st-reactor should be built. Although the ITER prototype yielded enough energy for a good-sized grid, its fusion dynamo generated electric power in off/on fashion. Continuous operation overwhelmed the superconducting magnets with excess heat which caused frequent shutdowns and restarts. This quirk would pose dilemmas for commercial reactors, which needed to power electric grids 24/7. Serious arguments emerged over how best to extend the duty cycle.

Chinese scientists were first to abandon ITER. They formed an unlikely partnership with their Indian counterparts. Both demanded a portion of the helium3, so they could pursue their own tokamak designs on Asian soil. Then Japan, Korea and Russia formed a joint venture for the same purpose. Not to be outdone, USA collared Canada and México and made a similar call on helium3. Euroland scientists, who had been the founders and chief sponsors

of ITER, found themselves alone at the table. They squawked and threatened to sue for breach of promise, but eventually they agreed to a four-way split of the helium3 supply.

Observers were surprised by the speed with which new tokamak sites were prepared in Szechwan, Hokkaido, Arizona and Belgium. Cynics opined the four-way split had been planned all along. Whatever the case, each group promised operational startups within two years. Project officials signed letters of intent with various electrical utilities.

A few months later, a notorious webcaster claimed that a shipment of helium3 had somehow gotten lost. The rumor was never confirmed, but journalists noted a dramatic increase in activities at the GWOT Coalition.

Then the unthinkable happened. A clandestine research facility in Mogadishu triggered a thermonuclear fireball that flattened the whole city. Investigators speculated the terrorists were attempting to build suitcase bombs by adding stolen helium3 to the hydrogen cores, and the dry-run tests had gone off the rails. Whatever the intent, more than 500,000 humans were killed or maimed. News of the calamity came as a horrific shock, even for the media-jaded folk of the HyperNet Age.

Within a week, popular enthusiasm for tokamaks turned to disgust and fear. No matter how many scientists came online to dismiss the Mogadishu group as foolhardy tyros, the public continued to equate the tragedy with tokamak technology. Demonstrators took to the streets in dozens of cities. They protested the use of nuclear fusion of any kind.

"Why are commercial tokamaks sited away from the urban centers?" the protesters asked. "Why don't the builders of tokamaks come clean?"

Official press releases stated that bomb making and tokamak technology were totally different beasts. There was a huge difference between the

safeguards of scientists working under rigorous controls and the precautions of terrorists monkeying around in delusional stupors. But the public wasn't buying the soft soap. Molehills became mountains. Errant neutrons became precursors of Armageddon. Rational arguments blew away like radioactive dust on the cyclones of popular mistrust. Folks didn't want a tokamak in their backyard.

G-15 attitudes swung around 180° when the fusion projects folded, one after another.

Alone on the game board stood the Singapore Consortium which had come to the end of its tethers. It could no longer fund its operations plus service its debt load. It was in urgent negotiations with India and Indonesia. The Consortium was offering to build a 3rd-receptor complex in Sri Lanka's central highlands. Energy could then flow north and rid India of brownouts and acid rain. The Consortium was also exploring the feasibility of a 4th-receptor complex in the Sumatra's Barisan range. If a site could be found free of volcanic upheavals, the populous nation of Indonesia would become electrified for a song, not to mention the spin-off benefits for Singapore, Malaysia and Indochina.

By mid-century China was the world's largest consumer and exporter of retail goods. Its economy could expand even faster if it wasn't hobbled by the ZEST tribunal's demand to curtail CO₂ emissions. No way was China going to let India steal its thunder, which would likely happen if India gained a new source of energy that was not only cheaper but also free of ZEST quotas.

If China felt worried, Korea and Japan were terrified. They wouldn't see the benefits of the beamersats for several years, for they'd have to pay the costs of bridging the power corridors before electricity reached their grids. Industries, factories and jobs would gravitate to tropical countries while the

economies of Russia, Euroland, NOAM and Australia would stagnate under the constraints of ZEST.

If the Singapore Consortium succeeded, it would throw the world's balance of power into turmoil. If the Consortium failed, every country would have their hands tied when came to creating jobs and placating the unemployed. The old formulas for stimulating fossil-fuel economies no longer applied when production increases led to greater CO₂ emissions. The G-15 couldn't afford to let the Consortium fail. Nor could they afford to let tropical nations grab a lion's share of the nonpolluting energy.

They began negotiations and offered to guarantee the Consortium's debts for 25 years. In return, they proposed to add surtaxes on beamer-derived electricity that would go toward extending the global grid. They hoped to equalize electric costs for urbanites at all latitudes. The Consortium agreed so long as the surtax was handled by a nonpartisan agency with oversight from the UN General Assembly. The Consortium also wanted a clause that allowed full payment of debts any time during 25 years. Thereafter, the spacers would be free of obligations and in command of their own destiny.

Beuack, a huge financial conglomerate, used his pull at the World Bank to buy 95% of the Consortium's debt. It was a banker's wet dream. Beuack would earn 4%-above-inflation compound interest at no risk whatsoever. To spice the gravy, Beuack rolled the entire package into a no-coupon bond which counted toward its capital reserve. In 25 years Beuack would pocket 266% of its original outlay in prorated Euros, but the Consortium repaid their outstanding debts within 12 years, so Beuack got a mere 160% return.

What really amazed observers was that the superspowers had lost leverage on the Consortium, soon to be reorganized as SOAR.

