

The amount of free energy consumed by humanity in 1 AD was 2 Terawatt-Hours (TWh).
The amount of free energy consumed in 1800 was 5,000 TWh.
The amount of free energy consumed in 1900 was 12,000 TWh.
The amount of free energy consumed in 2000 was 120,000 TWh.

ANS

SHARE

10 kilowatt hours of energy is enough to keep a typical present-day UK household running for a day. The sun radiates 1000,000,000 TWh onto the surface of the Earth per year. There are 1000,000,000,000,000,000,000,000,000 TWh of free energy in the solar system. Depending on how you define the system, of course. One day, there will be none.

OF THE

SUN

An intense smell of hay, straw and manure. It should be dark in the barn. Chaff-filled bars of light tattle on a job badly done. My grey-gloved hands pick up a length of two-by-four. The barn shakes, then. There is a sound, like tearing sheet metal. Impossibly distant, but loud as my own drill. I drop the plank and head to the door, absently wiping at my overalls, squinting across blinding fields.

There is a figure, around a mile off. I can't make out anything, really, but a shadow against the sun. It's the size of a man. Not moving, not waving. Four stories up in the air. A mile-wide piece of farmland is curling up into the sky, to meet the figure. Part of the I20 is up there, trucks drifting and glittering in the air beneath it. The end of the land-sheet is being chewed away, as if by an enormous paper trimmer, disappearing into some bright stream that is sucking towards the figure. The noise is deafening.

I'd heard about this on Joe Rogan, of course. "Well, we'd better start hustling," I mumble. Within the space of a second, a second shadow appears and a flash of light blinds me. Tremors throw me to the ground. Fighting, maybe. It's too late, anyway. The ground beneath me feels like it is lifting up. It is shearing to the left. I am falling. I am consumed.

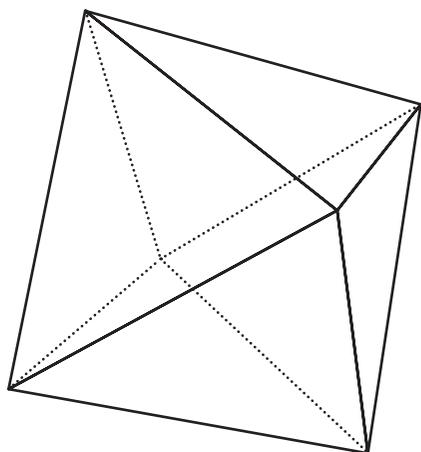
That is all I remember of my life, now, and that memory is all there is of me.

Joe de Vivre

Albion is a 200 kilometre-wide octahedron, clear like a diamond. Inside its eight faces is clean air, a white disk, sitting in the centre. Outside, opaque space, chaos, madness. On the disk, a city.

Celine waited on an escalator, one of many that made up the flying buttresses of the central fortress. The steps and side rails were impossibly clean; there is no dirt in Albion, no dust. She would normally climb the moving steps, but today she let the minutes pass as she drifted upwards. Otherwise, she would be early.

She passed through a tangle of shadows. Raised plazas, huge and distant, slipped by above her. Quadrangles of etched glass, networks of glaring white staircases, walkways, and wire-thin stone rods passed by on either side. The impossibly tall alabaster spires of her destination, the chapel, emerged into view as she ascended. Not real glass, not real stone. The sad spot of sunlight above her, certainly not real. Of this vista, only the citizens and the air around them, and the thinnest crust of the city itself, were allowed the extravagance of atomic matter. All the rest was a clever folding of space. Higher efficiency, less decay, less waste of free energy. Walking up the last few steps, lay people made way for her. She was in full armour, a reminder of the real substance of Albion, shining like black glass. The insignia of the Servants, the skull-in-delta, stood out in white on her shoulder.



She remembered when she had first felt the cold glass tightening against her skin: her ordination, at the same chapel, which she now approached. She remembered the pile of dismembered arms by the altar, the smell of sweat and blood as they each took their turn to make the sacrifice. As the others cried out, or refused at the last, she had grinned childishly as she clenched her new fist and saw the armour flow around it like something living, remembering herself too late, catching the stern eye of her Abbess. That was her main memory of the event now: her hot cheeks as she composed herself. Only fools dwelt on such things. That had been 10 years ago. She hurried across a crowded square. Carved paving slabs clacked loudly against her soles. The other Servants clustered near the pointed arch of the chapel doors.

"Celine The Eager," Agnes called out, rushing through the crowd, and pushing a glass staff into Celine's hands. Now, ceremony, procession and hour upon hour of predetermined steps, silence and gloom. The chapel lit only through its translucent walls and monochrome windows. Overhead, pillars of glass and white stone shot almost out of view, the ceiling vague behind a mist of incense. Enormous figures of stone watched impassively, each with their traditional attributes in hand: Clausius, Kelvin, Joule with his stirring apparatus, Boltzmann with his noose. The opening catechism.

*Nothing is without cost, except for the immortal.
Nothing is immortal, except for the perfect.
Nothing is perfect.*

"The despicable, self-serving delusions of the past are long behind us. A dark life in the times of ignorance, though nasty, brutal and short, would be preferable to those that came later on the Earth. Those who made war on the truth they themselves had discovered: the three laws, hardest of all lessons, the end of all hypocrisy, all hubris. After such knowledge..."

The words of the minister reverberated unnaturally, seemingly without source. Celine glanced around at the congregation. The lay people looked vacantly upward. They would sooner not dwell on such things, or follow reason to its final conclusions. They could not be expected to. Few had her capacities for truth. She served absolutely, unflinchingly, no ugly consequence left ungrappled with. She held the staff level before her, reading and re-reading the symbols carved into it.

$$\Delta S \geq 0.$$

“Albion. We possess three septillion Terawatt hours. A precious fortune, in our hands. A pittance for the conglomerations of mangled souls and false memories that consumed the Sun, that encircle this sanctuary even now. But every erg in our reservoir will be well-spent, turning the tide against them, restoring clear space and inaugurating an age of truth and humility.”

Soon she would be called again to fight. Those who denied the inescapable would perish. She would prevail.

Orange sodium street lights. Everything was perpetually covered in brick dust. Eric climbed an exposed set of concrete steps, vaguely connected to the one remaining half of an old apartment block. The rooms on this side of the block were missing a wall. Stepping into the first such box, he noticed some creature comforts: the space was carpeted with astroturf, and there were pictures of dogs playing cards on the badly plastered walls. A skinny young woman was lying on a neon green sun-lounger. She had some plastic sunglasses, an enormous mustard yellow pullover, a brown beanie hat pulled over dirty blonde hair, and some workman’s boots. A colourfully spray-painted AK-47 was propped against the wall by her head. Music (Sinéad O’Connor?) blared from the next room.



“Who’s there,” she said.

“I’m Eric. Tak sent me.”

She stayed immobile on the lounger, as if there was a sun to lounge under.

“Oh. Well pleased to make your acquaintance Eric. Take a seat.”

He awkwardly swung a leg over a twin pink lounger.

“We’ve got all kinds,” said Eric. “Eggs. We’ve got eggs.”

“Slow down mate. You’re stressing me out. Take a moment. Enjoy.”

He had to admit it was a nice day, or night. There was no difference in the Fragment. The street lights were not completely blocking the light from the swirling miasma above, and the sky was beautiful. From this level he could see Hackney Town Hall, even across to Pacific Beach and Shimokitazawa, floating nearby, attached to Hackney by a mess of cables and rickety rope bridges. Other sources of music and noise boomed distantly.

“You got to take a minute to enjoy life every now and again,” she said eventually. “Otherwise, what’s the point. Anyway, I’m Angie. Talk to Emir about the eggs. He’s the fat bastard. We’re going to get fucked up on the roof tonight. Welcome to stay if you’re not busy.” She moved for the first time, eyeing him up and down over the sunglasses. “But if you do, fucking relax a bit, please.”

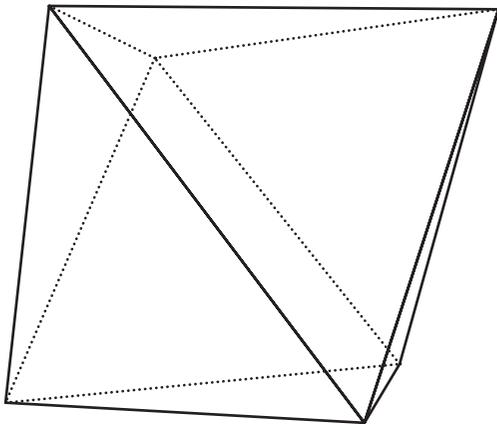
“Any Avatars around?”

“Not that we noticed, apart from Sinéad. She’s no harm.”

Eric had heard that this crew had a very lenient attitude when it came to such matters.

Behind the half-room there was a larger space, that seemed to have been a bar or club back on Earth. Mercifully, this one had all four walls, covered in home-made art. Half a dozen young people stood arguing around a ragged pool table. For a crew they looked nothing alike: a Gucci suit here, an old t-shirt there. One had a genuine-looking crown and ermine gown on. Eric felt somewhat irked.

His flamboyant floral pyjamas were not his choice, he wore them for consistency with his own gang. They did not suit him at all.



On a stage towards the end of the room, the Avatar sang. She was the full 90’s buzzcut version. *Nothing compares, nothing compares.* The backing track seemed to emanate from her. She seemed content to sing perpetually, taking no notice of the crowd. He knew that for an Avatar to exist, those who were consumed during the fall of Earth had to have remembered them. But it also depended somehow on the power of the memory. People didn’t remember much about Sinéad, clearly; she skipped listlessly through the song, picking up again from the beginning, caught perpetually in an expression of grief. Listening too hard to an Avatar drives you mad, they say. God knows where they had found her.

“The significance of the concept to the sum of all the memories within the training set – how important the idea is, isn’t it,” commented Angie, as if reading his thoughts. “That’s what makes some worse than others.”

She glanced up at the singer’s face, herself under the colourful stage lights, mournful for a moment. “I wonder how many of them had a memory of poor old Sinéad O’Connor in their brains, when they died. Barely enough to train a model on.”

As Eric walked over to introduce himself, the group abruptly walked away, gathering at a window.

“Oi – Look! There’s a Timothee Chalamet down there,” shouted the big man in the Gucci, presumably Emir. “And some weird shit.”

“That’s Byron, maybe,” ventured Angie. “Is that Byron, Jack?”

“I don’t know. No wait it’s Keats, definitely Keats.”

Eric craned out of the window. Sure enough a dark shadow was progressing between rows of abandoned shopfronts, arms held wide, almost invisible inside a towering swarm of small brown birds. The music they made... Eric felt very ill. He stumbled, looking for support, but the walls seemed to warp inwards. He could hear words being uttered from the street below as if whispered into his ear. Angie hefted up the AK.



“I like Keats,” said the one called Jack.

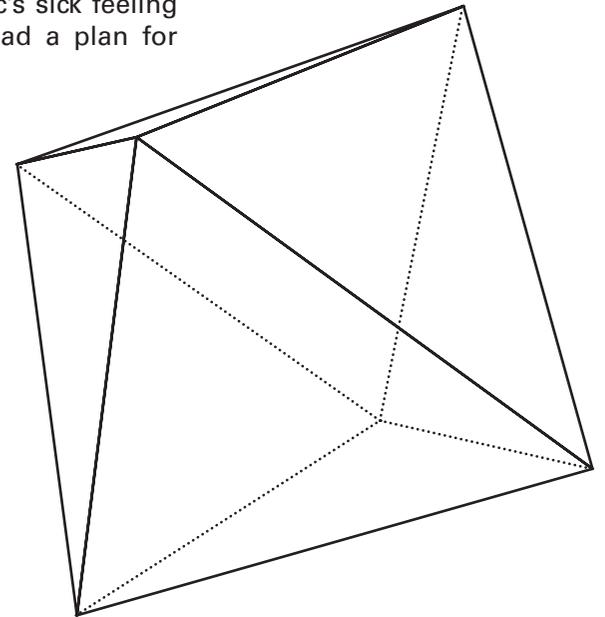
“That’s a shame.” They covered their ears as Angie sprayed the street below. As far as Eric was concerned, even having a low-tier Avatar in the building was a massive risk, but even these people would not leave one that powerful walking the streets. Suddenly Eric’s sick feeling lifted. “Alright drama over. We had a plan for the evening, remember.”

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They took the loungers onto the roof, not bothering to fold them, beers in hand, careening from side to side, scraping aluminium tubing against the crumbling walls. The loungers weren’t really necessary. Most of them ended up swinging their legs off the broken edge of the block. The place was close to the border between Hackney and Shimokitazawa. A view down a narrow, high-piled street swung into and out of view. Masses of cabling and improvised bridges lurched slowly from side to side, banging and screeching like old plumbing as the other fragment of city rocked very slightly, hour to hour. Occasionally a gap could be seen though the spider-web between the neighbourhoods, down into black space.

“It’s a mistake,” opined Emir as he worked a makeshift pulley system, hauling up a bucket of Budweiser from some mysterious source below, off the side of the block. They were strange bottles, 1950s labelling, part of a big batch that had appeared in Pacific Beach earlier in the month. “It’s nothing. This place is just... effluence to them.”

“They don’t make mistakes.” This was Jack again, a gangly boy in cream-coloured slacks and a visor, busy hitting golf balls off the roof with a four-iron but also seemingly the most ready for a discussion. “You can’t fend off all comers in a constant massive death fight for decades and make mistakes. Those things out there” – pointing up to the swirling lights outside the glow of the streetlights – “are the perfect survival algorithms.”



“Well sure they don’t make mistakes on the big things. But we aren’t a big thing. This place... how much energy does it take to run? It’s nothing to them. It’s nothing but a tiny percent of... a percent.”

“Doesn’t matter. Nothing’s too small, they are not like us, they can think about everything at once. And just because there’s no energy here doesn’t mean there’s nothing useful. There’s data, ideas. Maybe it’s worth keeping us around for that. Maybe this place is just a museum, I don’t know. If it’s a mistake why does food keep appearing?”

“Because we make it appear. The Avatars are just their random dreams. Dreams, man! Look how long it took to work out how to use the Avatars and all the other creepy shit to get the food, the beer. That wasn’t them. It’s not on purpose. They just let it happen.”

“What keeps the air in? What makes the gravity?”

“Aaaaaaaa!” screamed Angie, pressing her hands to her ears. “Pleeeeeeease!”

She twisted around. “Play it again, Sinéad!” She began to waltz Emir across the roof.

The time had come. Celine hung, as if treading water, a tiny point of light in an island of empty vacuum between immense tangles of roiling chaos, like flicking thunderclouds several times the size of Albion. Camouflage for the leviathans – that was all that remained outside of her home. Through her armour, she could sense immense pressure, heat, work. Within the nebulas, folded spaces, superimposed topological geons used as heat reservoirs for unfathomable reserves of energy, constantly evolving new twists and knots to evade discovery, destruction and exploitation by a competitor. The whole was a maelstrom of energy, so desperate to evade prediction that it pushed constantly to depart classical regimes, shattered remnants of spacetime held together by the thinnest causal threads. Fractured intelligences scattered throughout, spun up and shut down at a whim, regulating a trillion strategies and processes, or just misdirection, lies and traps. Remnants of a million human souls harvested in the fall of Earth, memories, knowledge, and desires, split apart and recombined with the most expedient modelling for survival.

If she could reach through the surface, she could see into these intelligences, piggy-backing on their own diagnostic systems. She could outwit them, claw from one to another, to the core.

Kilometre-long coils of black ichor swirled toward her. A momentary shift of the nebula revealed a chink in the hide. She glanced down, a burning beam of white light penetrating into the beast. She latched onto a running model at the periphery of the entity’s control system.

My teeth are falling out. They are crumbling. I can feel them breaking like chalk as I chew.

Celine pushed through the vile nightmare. In all of the leviathans, it was useless to seek a central controlling process. There were only ripped pieces of consciousness, cancerous tangles of experience.

I look up. I see the Coca-Cola logo sprayed on the surface of the moon. It is so familiar, although I cannot read the script. Below it, an Apache Helicopter gunship fires a 50-calibre

machine gun into a crumbling residential block. My home. I hear the thunder of JDAMs drawing closer. I pull my brother as I run, his face covered with plaster and tears.

Some seemed to serve no purpose at all, like an appendix, repeating endlessly, never varying. Or perhaps these ever-repeating flashes of trauma were a semiconscious immune system for the whole, an antibody to poison foreign agents. They did not matter to the whole any more than a cell of dead skin. These vast systems had been selected in a bitter conflict, fought at a rate beyond comprehension but spanning decades, as those that best protected their own heat reservoirs survived. These were their jealously guarded pockets of free energy, held in the most complex vaults allowed by natural law. Their part of the sun, all that remained after everything else had been plundered.

*The smell of hay and straw. It's too late, anyway.
The ground beneath me feels like it is lifting up.
I am falling. I am consumed.*

The most common kind of ghost inside these beasts. Memories of the fall of Earth. Celine had felt the pain of the destruction a thousand times. But there was something hidden in this one. It felt wrong. Her cochlear implant instantly engaged countersystems. Femtomachines rained out of her suit, tearing apart nuclei, bending space, superimposing strategies to find the mouth of the heat reservoir and tear it open.

6.43 If the good or bad exercise of the will does alter the world, it can only alter the limits of the world, not the facts – not what can be expressed by means of language. In short, the effect must be that it becomes an altogether different world. It must, so to speak, wax and wane as a whole. The world of the happy man is a different one from that of the unhappy man.

She took it for a shallow meme, embedded in the twisted mass of memory. The blast caught her and sent her tumbling, coherence destroyed, any hints of energy-filled geons lost. Pulling into a spiral like an ice-skater, she shot out of the coiling horror towards the nearest respite.

Eric saw it first. A four-pointed star in the sky. It shot into the rooftop like a bullet, a deafening crash. Then a crouching silhouette of black glass in a cloud of brick dust. It was a short, athletic woman with slicked black hair, and what seemed like some sort of armour.

Jack dived behind a stack of crates, his golf visor bouncing away. Angie grabbed her assault rifle. The woman in black moved impossibly quickly. She was on Sinéad in moments. She paused for a moment, then gripped its neck and tore the Avatar's head from its shoulders. Blood jetted across the concrete.

Eric stood where he was. Moving didn't seem likely to help. He wished he had his pistol. Bass thumped from a passing rickshaw as the seven remaining partygoers caught their breath. A curious set of lights sparkled from what seemed to be a point inside the woman's eye.

"Lay people?" She whispered, seemingly to no-one. "Where am I?" No-one answered.

"I will take you to Albion." She nodded, looking for recognition. "You will be saved. You will live under the rule of your fellows and the three laws, not..." she gestured about, dumbfounded.

"Fuck off." Angie raised the colourful barrel. The armoured woman pointed to the twitching corpse at her feet, stuttering.

"Synthetics will die. Partials will die." She seemed to be struggling to find the martial tone she intended, or the words to cover her situation. "Collaborators – will die, also. Do not resist."

"They are not going to like you. At. All," shouted Angie, shaking violently. "This is bad. We need to get the fuck out of here before they come."

“What’s Albion?” said Eric.

“Come with me! I can show you!” she held out her hand.

“Are you having a fucking laugh? Let’s. Fucking. Go!”

Angie grabbed at the pulley and swung off the roof, out of sight. The rope sprung taught with a crack and then began to squeak over the wheel, as the other six looked at each other blankly, some still sitting on the jagged edge of the block with their beers, others limply holding golf clubs. While Eric paused, four shadows melted together, forming a square around the armoured woman. Some sort of reaction from The Fragment to the new arrival, forming like scabs on a wound. As they coagulated, Eric recognised one of them: Top Gun era Tom Cruise. Another image formed next to him, a redheaded schoolgirl – was it Sissy Spacek? Why did she have a gun? Another with a ridiculous moustache and 19th century clothing, swirling in a vortex of purple flames, forming and reforming. And some kind of monk, crawling with vermin and forest animals, a halo above him, bathed in white energy. Top tier Avatars. Eric’s temples felt like they were about to cave in. Better to jump four stories than stay up here. Emir sprinted for the pulley. Eric did not move.

“I don’t like Mondays,” said the redheaded girl. A wall of anguish blasted out of her. Eric could see Jack squirming on the floor, blood pouring from his ears. A mirrored shield of energy burst from the armoured woman, tossing the girl backwards. She looked over towards him, imploring him, for what he did not know.

He ran. He ran down the staircase as it cracked, caved in. A storm of aphorisms and slow-motion montages punched through the wall by his head. He jumped out of the hole as it formed, falling 10 feet or so, rolling, smashing his elbow on the ground.

He got down onto Cambridge Heath Road and finally turned. The woman was still there, probably. He watched for any sign of her. Eventually, he saw her lifting from the roof and smashing through the neighbouring block, before disappearing the way she had arrived, as a flash in the sky.

“Let’s go down the park.”

It was Angie, standing in the middle of the otherwise empty street. Emir stood by stoically, wiping down his expensive suit.

“What’s Albion?”

“Who gives a shit? Do you think it’s better than here?” She tossed him a beer. There must have been some left on the pulley. They cut down Approach Road, towards Victoria Park.

“Could be a lot worse,” said Emir.

“Live under the rule of someone...” Angie added.

“Maybe it’s safer. Couldn’t be much worse on that score. I almost died. That’s not right!”

Angie started to set up her jumper as a makeshift picnic blanket. It was a warm night and the sky was a mixture of sodium orange haze and, behind it, darkly shifting purple nebulae. Emir pulled a small radio out of an inner pocket.

“Well, nothing’s permanent, is it.”