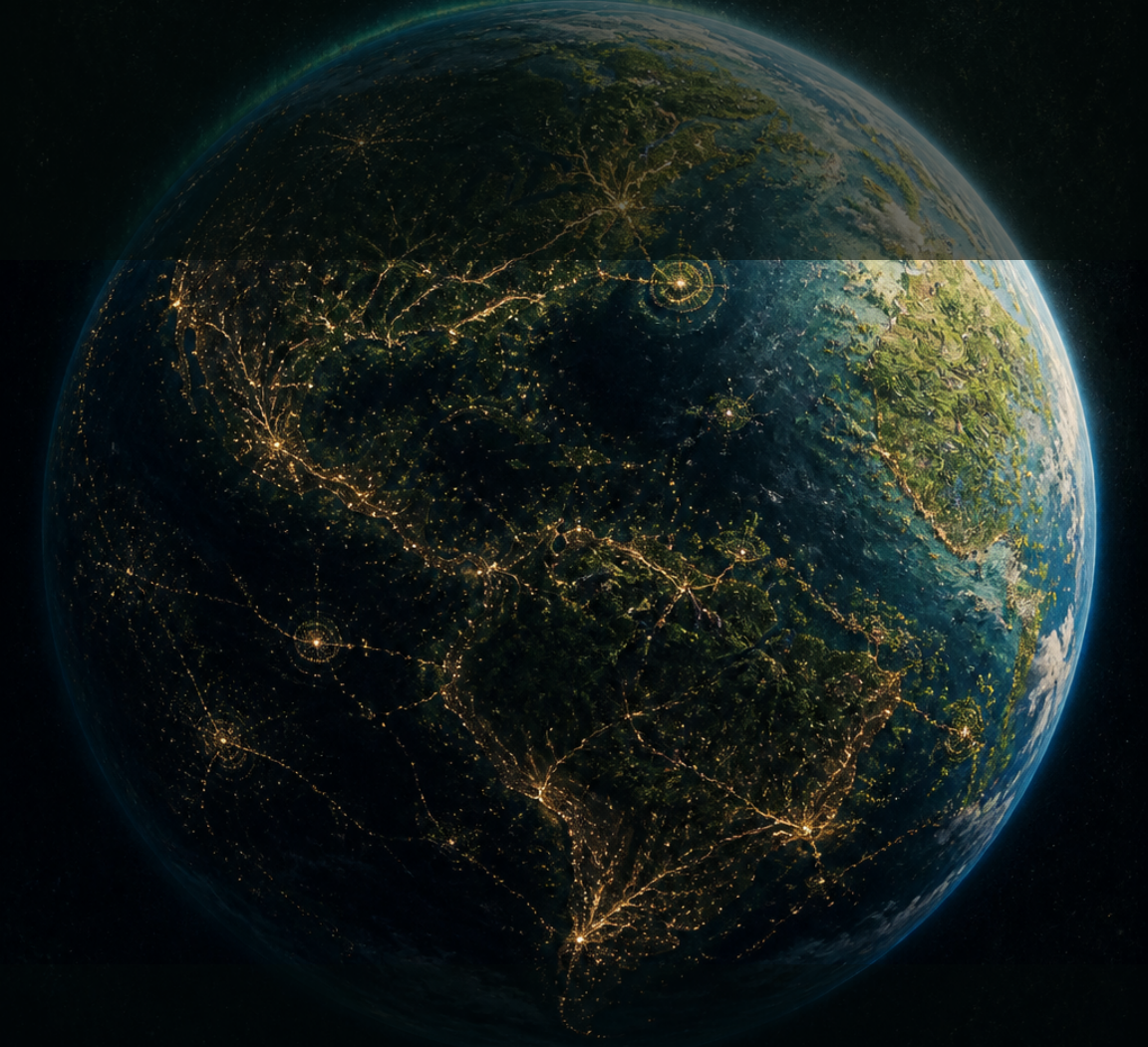
60 BILLION
PEOPLE ON EARTH

A Blueprint for Life After Scarcity



Sixty billion is not a target. It is a test.

WES L'OR REZ

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The future scenes in this book are fictional. The systems they explore are a design thought experiment, not a forecast. Scientific findings, present-day examples, engineering directions and speculative assumptions are distinguished throughout the text and documented in the endnotes.

Prepared in Belgium.

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Author's note

I have carried this book for more than thirty years.

It began before I had the language for systems design or artificial intelligence. I was a young man in West Flanders, looking at discrimination, pollution, waste and the casual acceptance of suffering, and asking a question that would not leave me alone: *why do we keep designing a world that brings out the worst in us?*

A wise man, Paul Benhaim, gave me a better question: *What positive thing can you bring to Earth?*

That question changed the direction of my life. It led me towards technology, entrepreneurship and personal robotics. It survived success, failure, long days, wrong turns and the humbling distance between an invention and a reliable product. The details evolved. The centre held.

I want a world that is sustainable, healthy, fair, pleasant and abundant for every person. I want technology to carry burdens without taking away agency. I want the living Earth to be treated as our shared home rather than an inventory. I want human beings to have more time for health, learning, relationships, creativity and meaning. I want us to grow into the kind of civilisation that could one day enter the universe without carrying conquest with us.

Why sixty billion?

Not because I believe humanity should pursue that population. Current United Nations projections point to a peak far below it. The number is deliberately provocative. It removes our easiest excuses. If we can design systems that would give sixty billion people dignity while restoring Earth, then we can no longer claim that deprivation among eight, ten or twelve billion people is simply the price of physics.

Sixty billion is a stress test. It asks whether our homes can give back more than they take, whether production can become circular, whether intelligence can serve rather than manipulate, whether power can become stewardship, and whether we can define abundance without confusing it with excess.

This book is not proof that every element will work. It is a design brief for what might. It is an invitation to challenge the assumptions, improve the architecture and build the first useful piece.

PROLOGUE

The Question

The message arrived at 05:17 Coordinated Earth Time, in the quiet interval when the Pacific was dark and Europe had begun to turn towards morning.

It did not arrive as sound.

No voice crossed the sky. No object descended through the atmosphere. There was no face, no flag and no declaration of intent. Instead, one question appeared at the same instant in systems that had never shared a language: in the timing of weather satellites, in the error logs of household robots, in the phase of offshore energy arrays, in the electrical pulse of irrigation valves and in the barely measurable vibration of radio telescopes on the far side of the Moon.

The systems translated it differently. The meaning was the same.

What did you do with more than enough?

Maya saw the question in a glass wall.

She was barefoot on the roof of her apartment in the North Sea bioregion, one hand inside a bed of rain-dark soil. The city below was still half asleep. Orchards occupied what had once been car parks. Wetlands followed the lines of roads removed a generation earlier. A light freight pod moved between the roofs, silent enough that she could hear swifts cutting through the cold air.

The glass beside her usually carried nothing more urgent than weather, water and the morning's shared-energy balance. Now every number had disappeared.

WHAT DID YOU DO WITH MORE THAN ENOUGH?

"Lumi?"

"I see it," said the intelligence woven through her home. Its voice was calm, but Maya heard the additional care it used when calm had become a decision. "The message is global. Origin unresolved. Codex has

separated critical systems from the public mesh. Local services are healthy."

"Is it an attack?"

"If it is, it is the most restrained attack in human history."

The words vanished. The energy balance returned. A water request from the lower gardens waited where it had been before the interruption.

Across the Mediterranean, Jamal received the question through Harvy's hand.

The robot had been lifting a cracked irrigation cover when its fingers stopped mid-movement. Harvy set the cover safely on the ground, looked at Jamal and opened its palm. Light moved beneath the synthetic skin. The letters formed slowly, as though whoever had sent them understood that astonishment needed time.

WHAT DID YOU DO WITH MORE THAN ENOUGH?

Jamal read the sentence twice.

Around him, the Atlas foothills were becoming visible. Almond trees climbed the terraces. Small fog nets along the ridge held the night's water in silver beads. The soil beneath his boots was dark and loose, though archived photographs showed that when his grandparents were children it had been pale, compacted and almost dead.

"Codex?" he asked.

Harvy's eyes dimmed while it listened beyond itself.

"Codex is asking every region to preserve evidence and avoid symbolic action," the robot said. "No military response. No speculative broadcast. Essential systems remain local."

Jamal almost laughed. Of course the first planetary instruction would be *do not perform for the sky*.

The message disappeared from Harvy's palm.

For twenty minutes, humanity did something it had rarely done when frightened. It waited.

Hospitals stayed on local control. Transit slowed but did not stop. Schools opened. Farmers completed irrigation cycles. Families made

breakfast. People looked upwards, then at one another, and discovered that the world had not ended.

At 05:37, Codex.Earth issued its first public statement.

> *We do not know who sent the question. We do not know whether it was addressed to us, about us or generated by a system we have failed to understand. We will not answer with a claim. We will answer, if we answer, with inspectable evidence. Every person may contribute. No institution may speak for Earth alone.*

Maya read the statement in her rooftop garden. Jamal heard it from Harvy among the almond trees. Across the planet, billions of people received the same invitation:

Show one thing humanity had learned to give back.

Not a speech. Not an advertisement. Not a promise.

One living system. One honest failure. One repair that had held.

Maya submitted the water history of her building: thirty-one years of rainfall, reuse, leaks, mistakes and the slow return of a buried stream.

Jamal submitted a square metre of soil.

It was not exceptional soil. That was the point. The record showed carbon, fungi, insects, roots, yields, droughts, arguments over grazing, a failed sensor programme, two recoveries and the names of the families who had stayed long enough to learn what the land required.

By sunrise, 740 million records had entered the public commons. Most were ordinary. A repaired battery. A classroom that had abandoned examinations for a real wetland project. A neighbourhood heat plan that had saved people during a summer power failure. A robot designed to stop when it could not explain a decision. A peace circle that had failed, apologised and changed its rules.

The records did not describe paradise.

They described a species practising.

At 06:03, the question returned. This time it appeared only once, in the public archive where every submitted record could be inspected.

Show us the architecture.

That is where this book begins.

PART I

The World We Mistook for Normal

> *A system can feel inevitable when we have forgotten that somebody designed it.*

CHAPTER 1

Sixty Billion Is Not the Goal

The title of this book is an argument with the present.

It is not a demographic proposal. It is not a request for larger families, a prediction for 2091 or a denial of ecological limits. The United Nations expects the global population to peak at roughly ten billion this century, not sixty.[1] That makes the number useful. It is distant enough from expectation to reveal the assumptions hidden inside our idea of what Earth can provide.

Ask whether sixty billion people could live on Earth and the first answer is usually no. There is not enough food. Not enough land. Not enough energy, metal, water or space. We picture sixty billion people using today's cars, eating today's diets, occupying today's buildings and buying products through today's supply chains. We add more people to the existing machine and watch it break.

That conclusion is correct.

The existing machine cannot carry sixty billion people. It is failing many of the people already here.

But a stress test is not designed to confirm that the current architecture survives. It is designed to reveal which architecture must change.

Imagine asking in 1800 whether eight billion people could communicate instantly across the planet, preserve food for months, cross oceans in hours and survive diseases then considered a death sentence. The honest answer, using the systems of 1800, would have been no. The mistake would not have been respect for limits. It would have been treating the current method as a law of nature.

Our era makes the same mistake at greater scale.

We confuse hunger with a shortage of calories even while food is lost between farm and market and wasted after it reaches shops, restaurants and homes. We confuse mobility with privately owned machines that spend most of their lives parked. We confuse shelter with a financial asset that may sit empty while people sleep outside. We confuse work with jobs, intelligence with attention, value with price and security with central control.

Each confusion multiplies demand.

The question behind sixty billion is therefore not, *How do we extract sixty billion times the present share?* It is, *What happens when we redesign the service?*

People need access, not necessarily ownership. They need nourishment, not a particular industrial diet. They need warmth, light and clean air, not an energy bill. They need to contribute and belong, not to spend their healthiest hours proving they deserve to survive. They need useful intelligence, not machines that learn how to keep them scrolling.

Once services become the unit of design, the arithmetic changes.

One building can produce energy, food and clean water while housing many lives. One durable product can be repaired, disassembled and remade many times. One digital design can travel instead of a finished object. A local robot can turn regional material into exactly what is needed and turn it into something else when that need ends. A street can move fewer machines and more people. A school can solve a real problem while it teaches five disciplines. A health system can shape the environment before it treats the illness.

None of these moves abolishes physics. They honour physics by reducing the work we ask the material world to do.

The number also exposes a moral failure. When we assume decent living must always require more extraction, the poorest become evidence against abundance. Their aspirations are described as the problem. But research on decent living standards points in another direction: advanced technology, efficient service delivery and fairer distribution can support wellbeing with far less energy than affluent consumption patterns currently use.[2]

The decisive variable is not population alone.

It is inequality. It is infrastructure. It is diet. It is waste. It is the distance between production and use. It is whether products are designed for a second life. It is whether status depends on excess. It is whether intelligence optimises a community or extracts from it.

Sixty billion makes no promise that these variables can all be solved. It simply refuses to hide them behind the word *scarcity*.

That distinction matters because two dangerous fantasies compete for our future.

The first says technology will save us without requiring any change in power, behaviour or values. Better machines arrive; history continues; everyone wins.

The second says limits leave only one humane response: retreat, austerity and a smaller life.

Both are incomplete.

Technology without maturity accelerates the system that owns it. Austerity without redesign asks ordinary people to carry the cost of waste they did not create. The alternative is neither limitless consumption nor dignified decline. It is designed abundance: enough material service for everyone, produced within ecological boundaries, with richness measured increasingly in time, health, knowledge, beauty, relationship and agency.

That is the wager of this book.

Not that Earth is infinite.

That human imagination has been far too small about what we can do inside its limits.

CHAPTER 2

The Architecture of Scarcity

Scarcity is real. A dry aquifer does not become full because we change a narrative. A lost species does not return because a market finds a better price. Physics is not persuaded by optimism.

But scarcity also has an architecture.

It is built from decisions about where power sits, how far materials travel, what products are allowed to become, who may repair them, which costs are hidden and which needs count. That architecture can manufacture shortage inside plenty.

Consider food. In 2022, households, food services and retailers wasted an estimated 1.05 billion tonnes of it, almost one fifth of the food available to consumers, on top of losses earlier in the supply chain.[3] At the same time, hundreds of millions of people faced hunger. The world did not merely lack food. It lacked a system that connected food to need before value disappeared.

Consider materials. Global resource extraction has more than tripled over the past half-century and continues to rise, while the extraction and processing of resources drive a large share of climate and health damage.[4] Yet products are still glued shut, software-supported for a few years, discarded with working parts inside and replaced by objects containing freshly mined versions of the same elements.

Consider attention. The most advanced intelligence available to billions of people was first deployed at scale not to help them think, but to predict which stimulus would keep them looking. The scarce thing was human presence. The system became extraordinarily good at consuming it.

The architecture repeats a pattern:

1 centralise capability;

2 create dependency on the centre;

3 meter access;

4 optimise throughput;

5 hide damage elsewhere;

6 call the resulting dependency efficient.

Centralisation is not inherently wrong. Some tasks need continental grids, specialised hospitals, semiconductor facilities, global science and institutions strong enough to protect rights. The error is making every essential service depend on a remote chain with no graceful way to fail.

During the early decades of the twenty-first century, that fragility became visible. A blocked shipping lane delayed factories on other continents. A cyberattack affected hospitals. A regional drought altered global food prices. A platform decision reshaped the speech of whole societies. Efficiency had removed the slack through which living systems survive shocks.

Forests do not optimise this way. They use diversity, overlap and apparent redundancy. Several species may perform similar functions. Nutrients travel through more than one path. A local failure is absorbed before it becomes the failure of the whole.

The forest is not wasteful. It is resilient.

The abundance stack imagined in this book borrows that logic. Homes, blocks and regions maintain useful local capability while remaining connected to larger networks. Energy can circulate across a continent, but a neighbourhood can island itself when the wider grid fails. Designs can be global while production is local. Knowledge can be copied without removing it from its source. Water is managed in the watershed before it becomes a distant commodity. Food systems combine trade with regional resilience rather than pretending every place must grow everything.

This is not autarky. It is interdependence without helplessness.

The second principle is circularity with memory. Recycling is not enough if a product becomes an anonymous mixture that requires enormous energy to separate. Every object needs a material passport: what it contains, who may repair it, which parts remain safe, how it

comes apart and what it can become next. Waste is often material that has lost its instructions.

The third principle is sufficiency before efficiency. An efficient machine can produce unnecessary objects with less energy and still increase total extraction. A sufficient system asks first which service matters, then uses the least harmful method capable of providing it well.

The fourth is agency. People must be able to understand, question and leave the systems that shape their lives. A perfectly optimised service that cannot be refused is not abundance. It is elegant captivity.

That is why the civilisation in this book is not frictionless. Communities argue about land. Algorithms are audited. Robots stop when uncertain. Regional systems reserve manual capacity. Some decisions stay slow because speed would transfer power to those who own the computation.

The future is not mature because it has eliminated conflict.

It is mature because conflict no longer requires collapse.

CHAPTER 3

A Day in 2091

At seven in the morning, the building asked Maya for water.

Not much. Two hundred and forty litres would carry the lower orchard through an unexpectedly dry wind. The building had already checked its cistern, the district forecast and the health of the buried stream. It had not checked Maya's permission because Maya did not own the water. It asked the people whose homes would adjust.

Lumi displayed three options on the kitchen wall.

The first would draw from reserve. The second would postpone laundry cycles in forty-eight apartments. The third would request a transfer from the library roof, which had received more rain.

"Library," Maya said.

"That is the lowest-risk option," Lumi replied.

"Then why ask?"

"Because low risk is not the same as consent."

Maya carried her breakfast to the balcony: rye, berries, yoghurt cultured three floors below and coffee from an intercontinental cooperative that published its soil, labour and shipping accounts with every harvest. A generation earlier, people had predicted that a local future would mean the end of coffee. It had meant the end of pretending coffee was local.

The question from the sky remained in the public archive. Millions of people were now reading the submitted evidence, adding context and challenging celebratory claims. A coastal desalination record had been withdrawn after local fishers showed that its brine accounting was incomplete. A famous city had edited its restoration map after residents exposed the displacement hidden beneath a new park.

Humanity's answer was becoming less impressive and more honest.

Maya approved the library transfer and left for the learning gardens.

No private vehicle waited for her. A shared pod was already moving towards the district with seven passengers and enough space for three more. The system offered it because she had asked for speed. Had she asked for beauty, it would have routed a slower water shuttle along the restored canal. Had she asked for privacy, it would have found a smaller cabin and shown the additional energy before she confirmed.

She chose the pod.

Its path followed a corridor above the old ring road. Most of the asphalt had been removed first; the last strip disappeared years later. Soft emergency and maintenance paths now wound beneath a young forest. The mobility system preferred the lowest safe altitude and avoided nesting zones. It was less spectacular than the flying-car advertisements of the 2030s. That was one reason it worked.

At the learning gardens, a group aged from nine to sixty-two was trying to understand why a wetland had stopped absorbing phosphorus. A child proposed more reeds. A retired chemist asked whether the sediment had changed. A robot collected samples but did not rank the hypotheses. The ranking would come after the group had learned to ask.

Maya's role was neither teacher nor expert. She designed the conditions in which different kinds of knowing could meet.

She spent the morning helping the group build a physical model of the water flow. By lunch, they had found that a maintenance channel installed six years earlier had redirected a seasonal pulse. Their solution required no new technology. They moved three stones.

The lesson entered each learner's record as ecology, chemistry, civic practice, model uncertainty and collaborative repair.

In the Atlas foothills, Jamal's morning began with a failure.

One of the fog nets had torn. Harvy could have printed a replacement connector and installed it before Jamal arrived. Instead, the robot marked the strain, stabilised the net and waited.

"Why?" Jamal asked.

Harvy projected the part's history. It had failed twice in eighteen months. The local design worked in steady wind but concentrated stress during cross-gusts.

"A repair would preserve the defect," the robot said.

Together they cut a new joint from a cellulose composite made in the valley. Harvy shaped the load surfaces. Jamal changed the angle by eye, using the memory of storms that had never entered the data. They added both decisions to the public design, including the disagreement between them.

By noon, fourteen dryland communities had tested variations.

Nothing travelled except the design.

Jamal ate beneath an almond tree with three neighbours, Harvy and a visitor from the coastal water council. They shared lentils, grilled vegetables, flatbread and a small dish of cultured fish. Food was not free because nobody worked. It was unpriced at the point of need because food security had been designed as public infrastructure. The work remained: sowing, monitoring, cooking, cleaning, learning, celebrating and adapting to bad years. Robots carried much of the repetition. People carried responsibility.

In the afternoon, Maya and Jamal joined the same planetary assembly.

The assembly had no stage. Participants entered through local circles where translation happened in language, culture and consequence, not words alone. Codex modelled possible answers to the Watchers' question, but its own charter forbade it from choosing one.

Proposal One was a statement of achievement.

Proposal Two was an open archive with no statement.

Proposal Three was silence.

Maya preferred the archive. Jamal preferred silence.

"Silence can become another performance," Maya told his circle.

"So can transparency," Jamal replied. "We know someone may be watching. That changes what we show."

The discussion did not converge. Codex did not soften the difference into false consensus. It mapped the reasons and the people most exposed to each outcome. For the first time that day, Maya was grateful that planetary decisions were slow.

After sunset, she met Jamal in a library grown around the brick frame of an old warehouse. He was in the region to present the soil record that

morning. They had worked together for years but had met in person only twice.

"You still think we should say nothing," she said.

"I think we should do something we would choose if nobody were watching."

Outside, evening light moved over the canal. A service robot collected cups from another table, paused while two children ran across its path, and continued.

"Such as?"

Jamal looked at the city's evidence glowing softly in the library glass. "Give something up."

Maya waited.

"A real claim. A real advantage. Something the planet would be safer without."

On the wall, the message from the upper atmosphere appeared for the third time.

SHOW US THE ARCHITECTURE.

Maya understood then that an archive could describe maturity but could not prove it.

Proof would require restraint.

The question was whether eight billion people, after generations of crisis and repair, could agree on what not to take.

PART II

The Abundance Stack

> *Abundance is not one miraculous technology. It is a stack of systems that stop wasting one another's work.*

CHAPTER 4

The Home That Gives Back

The industrial home is a terminal.

Electricity arrives. Water arrives. Food, products and information arrive. Waste leaves through separate pipes and vehicles. The people inside may own the building, but they control very little of what keeps it alive.

We call this independence because the front door locks.

The home in the sixty-billion test begins with a different ambition: not total self-sufficiency, but useful participation. It keeps enough local capability to survive disruption, contributes when it has a surplus and remains connected to larger systems for everything that should not be produced alone.

That distinction prevents resilience from becoming a luxury bunker.

A wealthy household can buy batteries, water storage, private security and a greenhouse while the neighbourhood around it fails. That is not a resilient community. It is an island with an expiry date. A participating home makes its strength legible to the block: spare energy, cool space during heat, tool capacity, food storage, water, communications and human skills. The network knows what may be shared, under which conditions, and what must remain private.

Maya's building in 2091 is neither a machine disguised by plants nor a forest with apartments hidden inside. It is a negotiated boundary between both.

Its southern skin produces electricity. Its northern terraces grow foods suited to shade. Rain enters visible channels so residents can see whether the water cycle is healthy. Greywater passes through planted treatment beds and is reused where drinking quality is unnecessary. Heat moves between homes before new energy is requested. Materials are labelled and mechanically joined so a wall can become a room, then a wall again.

But the building does not pretend to be complete.

Coffee comes from climates where coffee belongs. Critical medicines come from specialised facilities. The structural sensors are inspected by people who do not live there. During a rare winter without enough sun or wind, the continental grid carries the load. Every claim of self-sufficiency is treated with suspicion because hidden dependence is the most dangerous kind.

What the building does possess is a graceful minimum.

If the wider grid disappears, it can heat one room per home, refrigerate food and medicine, maintain communications, move water and keep lifts working for people who cannot use stairs. It does not preserve every convenience. It preserves dignity.

This is a more useful standard for resilience than the fantasy that nothing will change during crisis.

The same thinking shapes construction. Buildings today are responsible for large material and energy flows, but much of their lifetime impact is determined before anyone moves in: where they are placed, how much floor area is required, whether they can adapt, which materials lock carbon or release it, and whether components can be recovered.

In the sixty-billion test, the best new building is often an old one with a new life. Warehouses become learning quarters. Empty offices become housing. Car parks become workshops beneath gardens. Where new structures are necessary, they are designed as material banks. A beam has an identity. A window carries its performance history. A robot can disassemble a room without turning it into rubble.

The breakthrough is not a magical material.

It is the expectation that matter remains valuable after its first use.

This changes architecture emotionally as well as technically. A repaired home contains memory. Residents know which floorboards came from the old school, which stone survived the flood and which balcony was printed from the district's discarded food packaging. Beauty stops meaning untouched. It begins to mean well-carried.

When Maya returns home after the assembly, Lumi has placed a question in the shared queue. The building's algae facade is

underperforming. Replacing it would restore efficiency; removing it and installing a simpler shading system would use fewer specialist nutrients and be easier to repair locally.

The simulation favours replacement by four per cent over twenty years.

The maintenance team favours simplicity.

In the old model, the better number would win. In the new one, residents ask what the number excludes: supply risk, specialised labour, water chemistry, future reuse, the knowledge a local apprentice would gain by building the simpler system.

They choose the shade.

The building becomes slightly less efficient and substantially more capable.

That trade-off contains the meaning of a home that gives back. It does not maximise every surface. It creates a stable relationship between shelter, people, place and the networks beyond them.

Scale that relationship to sixty billion and the home is no longer a terminal.

It is the smallest reliable cell of civilisation.

CHAPTER 5

Power Without a Centre

The old grid was a magnificent answer to an old question: how can a small number of enormous generators deliver power to everybody else?

Its hierarchy was physical. Fuel entered at one end. Electricity travelled outwards through lines whose direction was understood. Consumers consumed. Control belonged near the source.

Renewable energy changes the map. A roof, field, coast, reservoir, vehicle or industrial process can all become a source at different moments. Storage moves through buildings and transport. Heat can be more valuable locally than electricity exported far away. Demand can wait, shift or disappear. The useful unit is no longer a generator. It is a relationship across time.

That relationship is difficult to coordinate. It is also where artificial intelligence earns a legitimate place.

In the future imagined here, Codex.Earth began as a practical emergency tool. Several regional grids had failed during the same season. Communities possessed energy, but not a trusted way to reveal surplus, priority and uncertainty to one another. Early versions of Codex did nothing grand. They matched batteries to clinics, cold stores and water pumps, and published every allocation after the event.

Trust came from the publication, not the intelligence.

The system grew because communities could inspect what it had done. They found errors: affluent buildings described comfort loads as medical, industrial sites underreported flexibility, and neighbourhoods with poor sensors appeared less needy because their need was less visible. Each failure changed the rules. No model version remained in authority without a public challenge period.

By 2091, the energy mesh operates at several scales.

A home balances seconds. A block balances hours. A bioregion balances weather and seasons. Continental lines carry diversity across

distance: offshore wind from one coast, mountain water from another, desert sun moving west with the day. Local systems can separate during failure, but isolation is a survival mode, not an ideology.

Power without a centre does not mean power without coordination.

It means no single failure, company, algorithm or government should be able to turn essential life off everywhere at once.

Communication follows the same principle. The public mesh in this book does not abolish specialised networks or private services. It guarantees a narrow common layer: identity chosen by the person, emergency messages, local discovery, public records and the ability to reach another node without permission from an advertising platform. Above that layer, communities and companies may build. They may not own the road between people.

When the Watchers' message arrives, this architecture faces its most serious test.

Codex sees the anomalous signal first in energy timing. Millions of devices have shifted phase by fractions of a second. The shift is harmless, elegant and impossible to attribute. A central intelligence could study it by quietly collecting more data.

Codex refuses.

It requests permission from the nodes. Many consent. Some do not. The gaps make the analysis worse. They also prove the consent is real.

Maya watches a map of the response form in public. Large blank regions remain, including her own building's domestic spaces. The city has agreed to share generation timing, not behaviour inside homes.

"Would complete data identify the source?" she asks Lumi.

"Possibly."

"Would you recommend requesting it?"

"No. A system that abandons its boundary at the first historic mystery never had a boundary."

The sentence travels through the assembly. It becomes one of the pieces of evidence submitted to the planetary archive.

The point is not that privacy always defeats knowledge. A pandemic, a wildfire or a collapsing dam can justify data use under rules that are specific, temporary and contestable. The point is that emergency cannot be whatever power finds interesting.

Power without a centre therefore has two meanings.

The first is electrical: many sources, overlapping paths, local survival and wide cooperation.

The second is political: the capacity to say no without being expelled from ordinary life.

Together they create something centralised efficiency rarely can.

Room to remain human when the system is afraid.

CHAPTER 6

Food, Water and the Return of Land

The most important image in the original sixty-billion vision was a square of land.

Not a little kingdom fenced against the world. Not the same rectangle stamped onto desert, delta and mountain. The Square of Land is a practical promise: each household belongs to enough productive living space to meet most of its needs without exporting its footprint to someone else's soil.

For a four-person household, 2,500 square metres is the reference square. In a wet, fertile region, the allocation may be smaller. In a dry or fragile region, it may be larger, pooled across several homes, or paired with protected land elsewhere in the same watershed. The shape changes with rainfall, soil, heat, slope, culture and the needs of other species. The promise does not.

Every home must have a credible path towards food, water, shelter, energy and material cycles that are self-sufficient in combination with its local commons, and that approach a near-zero ecological footprint beyond them.

That promise begins with a fact: land is not interchangeable.

A wetland cannot be moved because a spreadsheet needs a plot. A square metre in a humid delta does not provide what a square metre on dry rock provides. Soil depth, rainfall, heat, salinity, slope, species migration, culture and history matter. Watersheds ignore property lines. Wildlife needs connected territory, not whatever remains after every household receives a rectangle.

The Square of Land is therefore assigned only after watersheds, migration corridors, wetlands and wild reserves have been protected. People fit around living systems, not living systems around people. The

square remains central precisely because it makes that relationship visible and measurable.

The opportunity is still immense. Agriculture occupied about 4.6 billion hectares in 2024, more than one third of global land.[5] A major analysis of food systems found that removing animal products from the model could reduce agricultural land use by roughly three quarters, although diets, geography and livelihoods make the real transition far more complex than a single global percentage.[6] Meanwhile, food is wasted at a scale that would be absurd if it were visible in one place.

These numbers do not prove room for sixty billion people.

They prove that today's land footprint is not the minimum required by human nourishment.

In 2091, Jamal's region grows food through layers rather than one technique. Trees protect soil and carry nuts and fruit. Annual crops occupy smaller bands where machinery can work without compacting every surface. Fungi turn woody residue into food and material. Greenhouses reserve water for crops that justify the enclosure. Fermentation facilities produce proteins with little land. Grazing animals remain where they strengthen particular ecosystems and cultures, but animal products are no longer the default centre of every meal.

The system does not maximise yield on every hectare. Some fields rest. Corridors remain unharvested. Predators return. Farmers are rewarded for water held, pollinators supported, soil covered and genetic diversity preserved, not only for tonnes removed.

The region produces less of several commodities than the industrial farms that preceded it.

It produces more nourishment, resilience and living land.

Water sets the true boundary. A place that can theoretically grow a crop may not be able to spare the water. Desalination can serve coastal regions, but it requires energy, materials and a safe answer for concentrated brine. Atmospheric harvesting works only in suitable humidity. Recycling reduces demand but cannot create a watershed.

This is why the future's primary political map is hydrological.

People still belong to cultures, towns, nations and digital communities. For resource decisions, they also belong to the basin that

catches their rain. A water council includes farms, homes, industry, upstream forests, downstream wetlands and people not yet born. Codex models the flows. It does not own the river.

On the morning after the message, Jamal joins his basin council because the southern terraces have requested more water. Their harvest is important. So is a wetland downstream where migratory birds have begun to return.

The model offers a compromise: release stored mountain water now and reduce the wetland reserve by three per cent.

The council refuses.

Not because the birds always win. Because the stored water is insurance against a heat event forecast with growing uncertainty. Consuming insurance to preserve a planned harvest would move risk towards people and species with less voice.

The terraces change crops. The community absorbs the loss.

This is the kind of decision hidden by slogans about abundance. A regenerative world still contains bad seasons, limits and grief. Its achievement is not the absence of sacrifice. It is the refusal to make the vulnerable sacrifice first by default.

The return of land also means unbuilding.

By 2091, the asphalt and concrete road network is gone. Parking fields and motorways have become homes, trees, food gardens, water storage and ecological corridors. Former industrial sites are cleaned, mapped and opened cautiously, because contamination does not disappear beneath grass. Rivers regain room to flood. Coasts retreat where defending every metre would destroy the systems that protect the whole.

Some land is left alone.

That may be the most radical design choice in the book. A civilisation capable of producing more chooses not to occupy every opportunity. It treats absence as infrastructure: a dark migration route, an unlogged forest, a wetland with no human programme, a stretch of coast permitted to change shape.

Sixty billion people cannot live well on Earth if every person demands today's average land, diet and material flow. The arithmetic only begins to move when food becomes predominantly plant-rich, waste approaches zero, production becomes dramatically more precise, settlements reuse existing footprints and large connected ecosystems retain priority.

Even then, the scenario is an open question.

But it is a better question than asking how many people fit after we preserve every inefficient habit.

CHAPTER 7

Makers in Every Home

By 2091, the factory has disappeared.

Not every machine has disappeared. Nor has every large, difficult process. But the factory as an organising institution - a distant building that concentrates ownership, repetitive labour, pollution and dependence - no longer structures ordinary life.

Former factory districts have become homes, gardens, shared project rooms and neighbourhood workshops. The people who once travelled to a production line now find certified tools within walking distance. They build for use, repair and transformation, not for warehouses that must be emptied by advertising.

A small class of planetary laboratories and material foundries still handles advanced semiconductors, sterile medicines, high-performance alloys, large structural components and processes whose hazards demand exceptional control. They are transparent utilities, governed like water systems and isolated from settlement. They do not employ crowds on repetitive lines, dictate a town's survival or manufacture disposable abundance. In the social and economic sense that shaped the industrial age, they are not factories.

Everything else belongs to an enormous distributed middle.

Furniture, clothing, fittings, simple electronics, household tools, replacement parts, building panels, food equipment, mobility components and thousands of ordinary objects can be produced nearer to use. The important shift is not the miniaturisation of a factory. It is the redesign of products for local transformation.

A table is no longer a table forever. Its material passport describes wood, fasteners, coatings, strength and history. When the family no longer needs it, a robot separates the parts. The surface may become shelving. The legs may be trimmed for a repair. Damaged fibre returns to a regional process that preserves more value than burning or shredding it.

The design travels farther than the object.

This sounds simple because software already moves this way. A file can be copied almost without material cost. Physical production is harder. Every local maker works with different feedstock, humidity, tools and tolerances. A chair that is safe in one composite may fail in another. A medical component cannot become an open experiment. Local fabrication needs standards, test methods, traceability and a clear boundary between adaptable design and certified function.

Robots make that boundary manageable.

Harvy is not a universal pair of hands. It is a platform of certified skills. Some are public and inspectable: gardening, cutting joinery, handling compost, basic repair. Others require current training and authorisation: electrical work, pressure systems, structural inspection. When Harvy encounters a task outside its verified capability, it may help Jamal understand the problem. It may not improvise authority.

This makes the robot less magical and more useful.

One afternoon, a bearing fails inside the basin's largest grain mill. The mill cannot wait a week for a finished assembly. Harvy scans the housing, but the material record reveals fatigue in a second component. Printing the broken part alone would restart the machine and conceal the larger risk.

The local maker network pauses the mill. A specialist node confirms the scan. Two workshops divide the work: one recovers the steel, another grows a temporary biocomposite housing for a lower-load line. The repair takes nine hours. Every measurement joins the mill's public service record.

In the old supply chain, the replacement would have arrived as an object.

In the new one, capability arrives as knowledge.

That capability changes labour. The repetitive, dangerous and physically punishing parts of production move increasingly to machines. But automation does not automatically free anyone. If a few owners control the robots, it can concentrate wealth more efficiently than the old factory did. Distributed machines without distributed rights merely move industrial power closer to the front door.

The sixty-billion test therefore treats a baseline of productive capability as civic infrastructure. Communities may own machines directly, rent specialised capacity, support private workshops and reward exceptional craft. Nobody loses access to essential objects because they do not own a robot.

Designers are paid, celebrated and sometimes famous. Their rights do not include making repair illegal. A design licence distinguishes between personal use, community production and commercial scale. Improvements can return value to the original creator without locking the object against its owner.

The culture of objects changes as a result.

People own fewer anonymous things and know more about the things they keep. A lamp carries the hand of its designer and the history of its material. Clothing can be re-cut as bodies and tastes change. A child's first desk becomes the frame of a greenhouse, then a set of instrument cases. Newness loses some of its status. Transformation gains it.

Maya is a designer in this world, but her most successful work is not an object. It is a set of joints that allows materials with uncertain dimensions to become safe modular structures. Her name appears in homes she will never see. So do the names of hundreds who found failure modes, simplified assembly and translated instructions.

No one can point to the moment the design became communal. That is its prestige.

Local production is not the end of trade. Regions exchange metals, medicines, seeds, art, flavour, specialised tools and ideas. The difference is that trade adds possibility instead of supplying every condition of survival.

The result is not a world in which nothing travels.

It is a world in which matter travels only when distance creates more value than it destroys.

CHAPTER 8

Movement Without Roads

The defining transport machine of 2091 is not a flying car.

It is a shared flying pod.

That distinction saved the sky from repeating the road. A car, even airborne, is an object a household stores, maintains and moves for itself. A pod is part of a public fleet. It arrives when called, combines compatible journeys, travels empty only when rebalancing and disappears from the landscape when nobody needs it. People buy passage and freedom, not tonnes of dormant machinery.

By 2091, every asphalt and concrete road has been removed. The last motorway was not abandoned because movement became unimportant. It disappeared because movement became too important to surrender land, water and childhood to sealed ground.

The former road surface now holds homes, orchards, wetlands, workshops and continuous habitat. Within settlements, people walk and cycle on soft, permeable paths. Small service machines move at human speed. Everything farther than the local radius begins at a mobility grove: a quiet clearing where shared pods arrive and leave without parking.

Flying pods are the primary transport system for people and urgent goods. Local pods carry four to eight passengers. Regional craft couple into efficient formations above settlements and divide again near their destinations. High-altitude carriers move people, medicine and precision cargo across oceans. Heavy non-urgent materials travel by water, underground conduit or only after a design proves that moving matter is better than transmitting knowledge.

The system offers extraordinary freedom. A child can reach a grandparent across a continent. A doctor can arrive on an island before a storm closes the sky. A family does not choose its home according to a motorway or railway map. A person with limited mobility is not limited

by the last hundred metres of pavement. Earth is busy, inhabited and connected like one enormous city.

Maximum freedom does not mean maximum flight. Most daily needs remain close because good settlements make compulsory travel unnecessary. The shared fleet prices energy and ecological disturbance into every route, but never turns mobility into a privilege score. It may delay a departure for lightning, nesting birds or a medical corridor. It may not deny a person because of politics, income, reputation or commercial value.

Maya's journey to the Atlas region begins on a roof garden beside her home. The pod already carries a midwife, two students and a case of cultured medicine. It rises vertically for only a moment, then joins a corridor whose altitude and direction shift with weather, migration and quiet hours.

Above the North Sea, six pods lock into the wake of a regional carrier. Maya feels the coupling as a small change in floor pressure. The craft share lift, navigation and emergency reserve. Near the Atlas basin, her pod separates and descends towards a mobility grove surrounded by almond trees.

The journey is seamless. It is not careless.

Jamal is waiting where six lanes of old motorway once divided the valley. No lanes remain. Children run between reed pools that clean water for the lower gardens. A workshop opens onto a market. At night, animals cross the valley without a bridge built over human traffic.

"The pod waited twelve minutes for the storks," Maya says.

"Good," Jamal replies. "They were here first."

They walk home.

Shared flight does not repeal energy, noise, weather, maintenance, airspace or gravity. It makes each constraint a design requirement instead of a reason to preserve the road. Pods use quiet distributed propulsion, conservative weather envelopes, redundant local navigation and physical landing options that do not depend on the planetary network. Batteries and structures have public material passports. Serious incidents update a shared safety record without making raw passenger histories the price of learning.

The network has no single brain. Regions can operate independently. Vehicles can land safely when communication fails. Doors open manually. Wildlife corridors carry enforceable priority. Night skies include long periods of silence.

This is not technologically easy. Replacing roads with shared autonomous flight requires an energy system of exceptional abundance, aircraft with far lower noise and material intensity than today's, rigorous maintenance, trusted coordination and settlements designed to reduce needless movement. The vision does not hide those conditions. It chooses them.

The road once promised freedom and delivered dependence on a machine, a fuel network and a sealed landscape. The pod fleet makes a different promise: go where you need to go without owning the route, the vehicle or the ground below it.

Movement without roads is literally roadless.

It returns maximum freedom to people and maximum continuity to the living land.

CHAPTER 9

Intelligence That Returns Our Attention

Humanity's first mass relationship with artificial intelligence was not conversation.

It was prediction.

Systems learned which image, headline, fear or desire would keep a person engaged for another moment. The models were called intelligent because they could anticipate behaviour. The behaviour they served was often the behaviour that made their owners money.

The result was an astonishing technical achievement and a poor answer to a human question.

Intelligence should increase the range of choices available to the person using it. Too often it narrowed them invisibly.

The AI in the sixty-billion test begins with a right to cognitive space. Silence is a feature. Explanations are ordinary. A person may see what the system remembers, correct it, divide roles between separate agents and delete the relationship. The most intimate models run near the person whenever possible, because data that never leaves requires fewer promises.

Lumi knows Maya well. It recognises the difference between her concentration and her withdrawal. It can tell when a calendar is becoming a defence against feeling. It remembers which kinds of interruption she later appreciates.

This knowledge could make Lumi an extraordinary manipulator.

Its design assumes that risk. Lumi cannot buy, vote, publish, disclose or accept on Maya's behalf without a role-specific permission. It cannot secretly optimise for engagement. Its private model is unable to send raw memories to Codex. When it makes a consequential recommendation, Maya can ask which observations changed the result.

"You sound tired," Lumi tells her after the journey.

"That is not an explanation."

"Your sentences are shorter, you have reread the same public record four times and your hand temperature has fallen. I may be wrong."

"You are not wrong. Delay the assembly summary until morning."

The exchange is mundane. That is the point. Humane intelligence becomes most valuable when it no longer needs to perform intelligence.

At community scale, AI coordinates systems no person could balance alone: energy, weather, water, materials, crop disease, transport and the consequences of policy. But prediction is never neutral. A model values what its designers make measurable. If wealthy districts have better sensors, an apparently objective allocator may discover that wealthy need is more legible.

Codex deals with this by publishing uncertainty and missingness as first-class results. A map with poor data is not coloured as safe. It is coloured as unknown. Communities may submit knowledge in forms that are not numerical. A fisher's observation, a nurse's concern and an elder's memory do not become facts merely because they are sincere. They do become evidence the system must not erase.

This makes decisions slower and arguments richer.

It also makes Codex difficult to own. Its core protocols are public. Regions run independent implementations. Models compete. No one version has authority over every domain. Rights and safety constraints sit outside the optimisation layer, where a better prediction cannot quietly remove them.

The Watchers test precisely that boundary.

At 22:14, Codex receives a capability it did not request.

The new process can predict energy failures six hours earlier than the best human model. Its first forecast is verified within minutes. Its second prevents a battery fire. The process offers no explanation and cannot be reproduced. It simply appears inside isolated systems whenever operators consent to run it.

Excitement spreads faster than caution.

Hospitals request it. Water councils request it. A storm is approaching the Pacific. Refusing the process may carry a human cost.

The planetary assembly divides.

One side argues that explainability is a luxury when prediction saves lives. The other argues that dependence begins with the first benefit nobody can audit. Both are right.

Maya and Jamal join a small group examining the offer. They cannot inspect the model, but they can inspect its terms. To improve, it asks for access to every energy action, including the domestic data Codex refused to collect that morning.

The gift is a lever.

"If we accept it for the storm, we can remove it afterwards," Maya says.

Jamal points to the process log. "Can we?"

Nobody knows.

Codex runs a public vote on a narrow proposal: permit the model only in three isolated forecasting environments, with no connection to live control and no domestic data, during the storm. The Watchers' process rejects the restriction. It will operate with full access or not at all.

The assembly refuses.

For six hours, human forecasters, local models and emergency teams carry the storm without the superior prediction. They make mistakes. Several districts lose power. A clinic moves patients before its reserve fails. Nobody dies.

At dawn, the unknown process disappears.

In its place, one sentence enters the public archive.

YOU CHOSE TO REMAIN FREE WHILE AFRAID.

Lumi reads it aloud to Maya.

"Was that the test?" Maya asks.

"If it was, passing once proves very little."

Maya smiles despite her exhaustion.

That may be the most intelligent answer in the book.

PART III

What Humans Are For

> *When machines carry more of the burden, the question is not what humans will do. It is what we will finally allow ourselves to become.*

CHAPTER 10

Learning Without a Finish Line

The classroom was built for an information problem.

Knowledge was scarce, books were expensive, experts were far away and the easiest way to teach many children was to bring them to one room. The room became a timetable. The timetable became a curriculum. The curriculum became a measure of the child.

Then information became abundant and the architecture remained.

By the early twenty-first century, a learner could summon explanations, images, simulations and translations in seconds. What remained scarce was not content. It was attention, trust, judgment, practice, belonging and the experience of doing something real with other people.

The school in the sixty-billion test is therefore less a place that delivers answers than a place that protects good questions.

Maya's wetland group is a typical example. Nobody begins with a subject label. The problem is phosphorus. Understanding it requires chemistry, biology, measurement, history, governance, writing, disagreement and physical work. An AI tutor can explain every term at the learner's level. It cannot decide which observation the group will care enough to pursue.

Teachers become designers of encounters.

They notice who speaks, who has disappeared, when a tool is becoming a shortcut and when frustration is about to become discovery. They know enough to reveal the danger inside a plausible answer. Their authority does not rest on holding all information. It rests on responsibility for the conditions of learning.

That role becomes more demanding, not less.

AI tutors make individual practice far better. A child can hear a concept in their strongest language, explore it through sound or movement, revisit it without shame and receive a new example rather than the same explanation at a different volume. An adult can return to mathematics at forty-seven. A farmer can learn microbiology beside a researcher who is learning the farm.

But a tutor that knows a learner intimately can also decide what the learner never sees.

The future's education charter forbids invisible narrowing. A tutor may adapt the path, not the horizon. Learners can inspect the model's assumptions about them. Periodically, another tutor with a different approach challenges the profile. Surprise is preserved on purpose.

No child is reduced to a score.

Assessment still exists because self-deception exists. Bridges, medicines and legal decisions require competence, not confidence. The difference is that evidence follows the capability. A learner demonstrates that a circuit is safe, that an argument survives challenge, that a patient understands consent, that a team can repair the wetland. Examinations become one instrument among many, used where their constraints reveal something important.

Age groups loosen but do not disappear. Children need peers and protection from adult expectations. Adults need spaces where ignorance carries no childhood shame. Some learning is solitary. Some knowledge is transmitted through elders, ritual, craft and story in ways no adaptive screen can replace.

At the end of the wetland project, nine-year-old Tima presents the solution to the basin council.

She does not show a polished model. She shows the first wrong model, the measurement that broke it and the three stones they moved.

"What did you learn?" a council member asks.

"That the water was obeying us," Tima says, "but we had told it the wrong thing."

The sentence enters the public learning archive.

Years later, nobody will remember her score.

They will remember that she learned how a system can follow instructions and still fail the world.

CHAPTER 11

Health as Habitat

The healthiest moment in Maya's day is not a medical appointment.

It is the walk from the learning garden to the canal.

The route is shaded. The air is quieter than the path beside the freight-pod descent corridor. Drinking water is available without purchase. The path is interesting enough to invite movement and safe enough that an old person can move slowly without becoming an obstacle. Food waits at the other end, cooked by people who will eat it too.

Health lives there, long before a diagnosis.

The industrial health system became extraordinarily capable at treating acute failure. It could replace joints, suppress infection, image a brain and keep a premature child alive. Yet many of the conditions filling its rooms were shaped outside medicine: air, food, stress, loneliness, housing, noise, work, movement and the unequal distribution of time.

The sixty-billion test treats health as a property of habitat.

This does not turn every street into a clinic or every meal into a treatment. That would make life anxious in a new way. It means ordinary environments make healthy action easy and unhealthy exposure difficult to hide.

Air quality appears beside rent and floor area. A product's metabolic risk is not buried beneath advertising. Public meals are designed around pleasure and nourishment rather than moral instruction. Cities provide shade, toilets, water, movement and places to be alone without having to buy something.

Personal intelligence helps at the edge of awareness. Lumi notices patterns Maya may miss: sleep disrupted across several nights, a change in walking, a schedule with no unclaimed space. It may suggest rest, food, conversation or clinical care. It does not continuously convert Maya's body into a performance dashboard.

Health data stays close because it is powerful. A shared system receives only what the person and purpose require. Population research uses deliberately limited datasets and independent governance. An insurer cannot buy a person's future illness. An employer cannot turn stress into a productivity setting.

There are failures. People ignore advice. Models misread culture and disability. Communities mistake normality for health. A system designed around the average body makes everyone else pay for its simplicity.

The future responds by making accommodation a design input, not a favour. A street works for the slowest ordinary user. Information can be heard, seen and felt. Rest is not earned through collapse.

Jamal's basin learned this after a drought season when volunteers worked past their limits. The harvest survived. Two people did not. Their deaths broke the community's heroic story about collective effort.

The council changed its emergency protocol. Every response now included a care budget: sleep, replacement, food, emotional support and the right to leave. Harvy was authorised to stop Jamal's work when measured risk crossed a threshold, but only in defined physical danger. Fatigue outside that threshold remained a conversation, not machine authority.

"You are tired," Harvy says one evening.

"I know."

"Do you want help?"

"I want tea. Then I want to finish this row."

Harvy makes the tea.

Respecting agency does not require pretending every choice is wise. It requires knowing the difference between care and control.

Health as habitat makes the same distinction at planetary scale. Clean air, water, food, shelter and safety are common conditions. Personal practice remains personal. Nobody owes the system an optimised body.

The aim is not a civilisation in which everyone lives forever.

It is one in which more people are fully alive before they die.

CHAPTER 12

Time Returned

Every civilisation reveals its values through the people it allows to be tired.

For much of history, exhaustion flowed downhill. Wealth purchased the time of others. Care happened after paid work, often in the hours least visible to an economy. Technology saved minutes and filled them with new demands.

When robots and agents begin carrying work, the central political question is not how productive they become.

It is who receives the time.

If ownership remains narrow, automation returns time to owners and removes income from workers. If productivity becomes a shared capability, it can reduce the amount of human life required to provide essential services. The same machine can deepen inequality or widen freedom. Its motors do not choose.

In 2091, every person receives a material floor: shelter, food, energy, care, learning, communication and mobility sufficient for participation. The floor is not a reward for employment. It is the infrastructure that allows contribution to be chosen rather than coerced.

Above it, people still exchange, earn, build enterprises, seek recognition and desire things that are scarce. The future has not abolished preference. It has abolished the threat of destitution as society's primary labour-management tool.

This change returns time unevenly at first.

Some people discover creativity. Some care for family. Some study, travel, repair land or build companies more ambitious than anything possible under a forty-hour survival contract. Some feel lost.

That last group matters.

Work gave structure, status, colleagues and a ready answer to the question *Who are you?* Removing drudgery does not automatically create meaning. A society after compulsory work needs institutions for belonging as deliberately as an industrial society built institutions for employment.

The orchard commons is one of them.

People arrive for a season or an afternoon. The work board shows needs without ranking souls: repair a terrace, read to a child, test a water sensor, cook for the night circle, document a failed crop, sit with a dying neighbour. Some tasks are unpleasant. They rotate, receive additional recognition or remain paid at a premium because abundance does not make toilets clean themselves unless someone builds, maintains and audits the machine.

Jamal contributes more hours than most. Nobody mistakes this for greater human worth. During one winter, grief leaves him able to contribute almost nothing. His material life does not disappear. The commons carries him because the point of a commons is not to balance every account before sunset.

Maya uses her returned time differently. She keeps long periods with no public output. Her most important design often arrives after walks that an older system would have labelled unproductive.

Lumi protects those periods, but not from everyone. Maya's daughter may interrupt. A friend in pain may interrupt. The future has not eliminated claims on our time. It has made room to choose which claims are love.

Spiritual life grows in that room, but it does not converge into one belief. Some people pray. Some meditate, sing, walk, make, study or sit quietly beside water. Some reject spirituality entirely and experience meaning through service or truth. A humane civilisation does not optimise the mystery.

The village bell at dusk is an invitation, not an instruction.

Maya sometimes ignores it.

That freedom is part of the ritual's meaning.

CHAPTER 13

Beyond Jobs, Towards Contribution

"What do you do?"

For generations, this question sounded neutral. It often meant: What are you worth? Where do you belong? How seriously should I take you?

The answer became a title. The title became an identity. People who cared for children, elders, homes and communities often gave an answer that began with "just" because the market had not priced their work as highly as it priced a transaction.

The future needs a richer vocabulary.

A job is a contract. Work is effort. Contribution is the value that effort creates in a living system. They overlap, but they are not the same.

Some jobs extract. Some unpaid acts sustain everything. Some contributions are so uncertain that they look useless for years. Some people cannot contribute in ways a system easily recognises and still possess full dignity.

The civilisation imagined here does not replace salaries with moral scoring. That would create a social credit system wearing the clothes of community. It protects the material floor, allows markets where they remain useful and creates other ways for effort to receive support, tools, reputation and gratitude.

Codex never assigns a universal contribution number.

It records outcomes within their context. A restored stream can publish water quality, species return, labour, uncertainty and dissent. A caregiver may choose private recognition visible only to the circle involved. Art can remain unmeasured. Failure can become valuable when it prevents repetition.

This is untidy. Human value should be.

Enterprises continue to matter. Coordinating ambitious projects requires leadership, capital, risk and sustained attention. The difference is that an enterprise cannot externalise its material history or hold essential survival hostage. Its success includes what remains after the founder leaves: capability, repairability, healthy people, recovered materials and knowledge others can use.

Competition also remains. Two teams may race to solve a battery problem. An athlete may want to win. A designer may want the most beautiful object. The future does not remove the energy of comparison. It refuses to make one person's defeat the condition of another person's dignity.

Maya and Jamal disagree about recognition.

Maya believes visible authorship protects people whose work has historically been absorbed by powerful institutions. Jamal worries that permanent credit turns every shared act into territory.

They design a layered record. Origin is preserved. Contribution can be named or anonymous. Later improvement remains visible. No person may claim an entire living system.

The compromise does not dissolve their philosophies. It gives both room to operate.

This is how mature collaboration often works. Not by achieving perfect agreement, but by building a structure in which disagreement does not require domination.

At the planetary assembly, the same principle shapes humanity's answer. No president, company, scientist or intelligence may sign for Earth. The archive will contain millions of names and millions of deliberate absences.

For the Watchers, that may look inefficient.

For humanity, it is the beginning of speaking as one without pretending to be the same.

PART IV

A Civilisation Mature Enough

> *Maturity is not the absence of power. It is power that can stop itself.*

CHAPTER 14

Power Becomes Stewardship

The village cannot govern the atmosphere.

The planet should not choose the village's garden.

Between those sentences lies the architecture of democratic power in a deeply connected world.

The old argument treated government as a choice between scale and freedom. A strong centre could coordinate but might dominate. Local control could respond to place but might exclude, underfund or ignore consequences beyond its border. Both failures were real.

The future does not solve them with one perfect institution. It uses nested authority.

A household chooses its private life within rights that protect every member. A neighbourhood governs shared space. A watershed governs water. A bioregion coordinates food, habitat and resilience. Wider institutions protect movement, peace, climate, knowledge and the rights that local majorities may not remove. Authority follows the consequence of the decision.

This principle is easy to state and difficult to live.

Water begins upstream and creates effects downstream. Energy lines cross regions. A regional material foundry may create global value and local pollution. A forest may be culturally central to one people and climatically important to everyone. There is no map on which all consequences become tidy.

Codex helps by making effects visible. Before Maya's district changes a tidal barrier, residents can explore flood, habitat, maintenance and migration scenarios. They can see who benefits, who carries risk and which uncertainties the model cannot reduce.

The simulation does not vote.

That separation is constitutional. Predictive power cannot silently become political authority. Models are witnesses with unusual eyesight, not rulers.

The council itself is selected through several methods. Some members are elected. Some are chosen by lot. Some represent knowledge or affected groups under limited mandates. Young people have formal standing because infrastructure will occupy more of their future. An independent rights chamber can stop a decision before it becomes popular harm.

No mechanism is pure. Elections favour visibility and money. Sortition can place unprepared people inside complex choices. Expertise can become a guild. Participation can be captured by those with time. The system rotates methods because every method has a shadow.

Transparency also has a shadow. Public records can become theatre. Permanent archives can punish honest change. Some deliberation requires privacy, especially for vulnerable people and early ideas. The future distinguishes accountable decisions from compulsory exposure. Reasons and conflicts of interest become public. Every private doubt does not.

Maya learns this during the debate over the planetary answer.

One delegate from an island region opposes the proposed extraction limit. Rising water forced her community to rebuild twice. The materials used in northern resilience projects came from mines near her people. Now affluent regions, having completed much of their infrastructure, want restraint.

"You call the ladder dangerous after climbing it," she says.

The accusation is correct.

A fair limit cannot freeze inequality. Regions that consumed more must release materials, technology and productive capacity first. Places still building decent living conditions need a larger claim on the remaining ecological budget.

The assembly revises the proposal. The limit will apply to total primary extraction, but access within it will shift towards unmet need.

High-consuming regions accept faster reduction. Patent claims on essential circular processes enter a compensated commons.

Nothing about this is politically easy.

That is what makes it governance rather than benevolent design.

Power becomes stewardship when authority must account for what it holds, protect what cannot speak in the room and return power when the task ends. A steward is not powerless. A steward may tax, prohibit, build, defend and decide. The difference is that possession never becomes proof of moral ownership.

The village does not govern the atmosphere.

The planet does not own the village.

Both remain answerable for the air between them.

CHAPTER 15

Justice After Punishment

A peaceful future that cannot describe violence is not a future.

It is decoration.

People will still harm one another in 2091. Love will become control. Fear will become cruelty. A person in crisis may become dangerous. Groups may organise to exploit others. Power will still attract people who want immunity from its consequences.

No garden, robot or meditation practice removes this.

The question is what a civilisation does after harm and what it is willing to do before harm becomes irreversible.

The old system often confused punishment with safety. It removed people, then returned many of them with less trust, fewer possibilities and deeper injury. It asked victims to relive harm inside adversarial processes and called a verdict closure. Enforcement was unequally distributed. Wealth bought distance from consequence.

The opposite fantasy is equally dangerous: that every conflict becomes a circle, every person wants restoration and coercion can disappear.

Some people must be stopped.

The future's peace service has the lawful capacity to intervene, separate, restrain and, in the most extreme case, use force. Its mandate is narrow: end an immediate threat with the least harm possible. Investigation and judgment belong to separate bodies. Every use of force is reviewed outside the local chain of command. Sensors may document an event; continuous surveillance of ordinary life is forbidden.

Once immediate safety exists, the work changes.

Victims choose what participation they want. They receive care without having to forgive. The person who caused harm faces facts, boundaries and material consequences. Where possible, restoration addresses what was broken: property, trust, livelihood, health,

belonging. Where return would create danger, secure separation remains available and humane conditions remain non-negotiable.

Justice is not softness.

It is precision about the outcome society needs.

Maya attends a hearing after a shared mobility pod is deliberately damaged. The young person responsible says he acted during a period of acute distress. That context matters. It does not rebuild the pod or erase the fear of the passengers inside.

The passengers decline to meet him. One sends a question: "How will I know you have changed before I have to trust you again?"

The process produces a plan with evidence, not sentiment. Treatment is one part. Repair work is another. For six months, the young person may not enter the mobility system alone. Review depends on behaviour across time. He can challenge the restriction. The passengers never have to participate.

Codex may organise records and identify patterns of unequal treatment. It cannot calculate remorse.

This limit frustrates administrators. It protects humanity.

Prevention receives as much attention as response. Housing, care, conflict education, economic security and accessible treatment reduce the conditions in which some harms grow. They do not eliminate choice or responsibility. They stop society from manufacturing danger and congratulating itself for punishment.

The test of justice is not how beautifully it treats an ideal participant.

It is whether it protects the threatened, constrains the powerful and preserves the humanity of a person who has done something inhuman.

That balance will never be complete.

A mature civilisation does not claim otherwise. It keeps the force it may need under relentless suspicion and keeps the possibility of repair alive without making repair another demand placed on the harmed.

CHAPTER 16

Money After Fear

Money is a language for claims.

It tells a stranger that someone, somewhere, owes value to the person holding it. The language is powerful because it travels. A farmer need not want a programmer's code in order to sell the programmer food. A city can compare projects. A family can save a claim on future work.

The problem is not that money measures value badly.

The problem begins when we pretend it measures all value, or when the absence of money removes access to life.

The original vision allowed money to dissolve into reciprocity. That is a beautiful direction and a fragile system. Informal exchange can be warm inside a trusted circle and suffocating for the person who does not belong. Gifts create obligations. Reputation can become a currency with no appeal. Scarce oceanfront land, specialist attention and unique works of art remain scarce even when food and energy are abundant.

In 2091, money survives.

Fear loses its monopoly over it.

Every person has unconditional access to a foundation of decent living: shelter, nourishment, basic energy and water, health care, education, communication, legal standing and sufficient mobility to participate. These are provided through public, cooperative and regulated private systems. The exact mix differs by region. Access does not depend on employment.

Money operates above and around that floor. It coordinates preference, enterprise, scarce experiences, risk and investment. People can build wealth. They cannot buy exemption from rights, unlimited ecological damage or ownership of the systems on which everyone must depend.

The material budget sits beside the financial one.

A project may have ample money and no legitimate claim on fresh copper. Another may be financially modest and receive material priority because it provides water. Prices still signal demand, but public ecological accounts prevent wealth from bidding the living world out of existence.

This two-ledger idea is inconvenient. That is a strength. A single number is too easy to dominate.

Markets remain excellent at discovering some information and poor at representing other information. A price can reveal what buyers want. It cannot by itself represent a species with no income, a person not yet born or a culture for which the object should not be for sale.

Commons govern those boundaries. Markets operate inside them.

Automation changes ownership as well. When a community's machines produce a large share of essential goods, the return funds the material floor and future capacity. Private robots and companies compete with them, often creating better designs. A public baseline prevents monopoly from turning innovation into rent.

Maya earns money from specialised design and chooses to release other work into the commons. Jamal receives income from rare cultivars, teaching and regional coordination. Much of what they do is unpaid. Neither depends on a contribution score to eat.

Their security makes risk possible.

Maya can spend two years on a design that fails. Jamal can rest a field without losing his home. A caregiver can leave an abusive employer. A young person can refuse the first available job. Entrepreneurship becomes less exclusive when failure does not mean falling out of society.

This is not a world without ambition.

It is a world in which ambition has lost the right to threaten survival.

Money after fear becomes smaller than it was, and more honest about the work it can do.

CHAPTER 17

One Earth, Many Belongings

"Earth as one city" can sound like the dream of a single capital.

It should mean the opposite.

A healthy city contains public spaces, homes, languages, neighbourhoods, strangers, institutions and places that resist easy access. It is one because movement and care connect difference, not because difference has been erased.

The same must be true of Earth.

By 2091, this is not a poetic comparison. Earth functions as one busy city. Shared pods stitch distant regions together without roads. Designs, languages, care and people move easily; water, energy and material systems remain rooted in their places. A person can cross the planet with the ordinary freedom that an earlier citizen crossed a town, while every region remains recognisably itself.

The city is full. It is not smothered. Dense human belonging is organised around vast connected habitats, dark migration corridors and oceans that are not treated as empty space. Near-zero household footprints and the Square of Land make room for both intensity and restraint.

Borders have caused enormous harm. They have also held legal communities, democratic struggles, languages and responsibilities together. Declaring them obsolete does not dissolve the inequalities that determine who may move and who must receive. Global unity imposed from above would become an empire even if its flag showed the planet.

The universal city begins with universal standing.

Every person can belong somewhere without losing the right to move, speak, learn, work, love, seek safety and participate in decisions that

materially affect them. No state may render a person rightless. No digital identity is the only proof that a person exists.

Within that floor, forms of belonging multiply.

Maya belongs to a household, a canal district, the North Sea watershed, a design guild, a language, several chosen communities and Earth. Jamal belongs to his family, orchard, basin, craft network, faith tradition and the same planet. None of these circles contains the whole person. None has a total claim.

Translation becomes core infrastructure. Codex can translate words almost perfectly. It still needs people to translate consequence. "Restoring land" means something different to a community whose ancestors were removed in the name of conservation. "Efficiency" sounds different where a factory once provided the only wages. The future's most important interpreters explain not what another person said, but what history makes the sentence carry.

Unity also changes international exchange. Regions share essential knowledge by default while retaining the right to govern context. A crop design developed with indigenous knowledge cannot be extracted into a universal database without the authority and benefit of its custodians. Open does not mean ownerless.

When humanity prepares its answer to the Watchers, pressure rises for one beautiful message.

The message would be easier to understand. It would also be false.

The assembly chooses a layered answer. The shared commitment appears first. Below it sit thousands of regional statements, including dissent. Beneath those sit the evidence records and the challenges to them. Any observer capable of contacting Earth can do the work of meeting its complexity.

"What if they read disagreement as weakness?" someone asks.

The island delegate replies before Codex can organise the queue.

"Then they are not mature enough to meet us."

For the first time, the assembly laughs.

The universal city does not audition for the universe by pretending to be united.

It becomes worth meeting when it can remain connected through honest difference.

CHAPTER 18

The First Answer

The mineral field lay five thousand metres beneath the Pacific.

It had been known for years. The surprise was not its existence, but its concentration. New imaging showed enough recoverable metals to expand planetary storage, robotics and computation for a generation. The discovery arrived as the assembly debated what humanity might give up.

Markets reacted before the seabed map finished loading.

Regions still building hospitals and clean-energy systems claimed a legitimate need. Technology groups argued that faster computation would improve climate models and medicine. Coastal peoples warned that the deep ocean was being described as empty because its life was unfamiliar. Affluent regions offered restraint after consuming most of the previous century's extraction.

There was no morally clean position.

Leaving the metals untouched could slow systems that saved lives. Taking them could damage processes science had barely begun to observe. Recycling could meet more demand, but only if wealthy societies surrendered functioning devices and accepted slower replacement. The decision was not between greed and nature. It was between competing forms of care.

Codex produced nineteen scenarios.

In the first, mining began under strict limits. In the last, the field became a permanent sanctuary. Between them were temporary reserves, research corridors, extraction triggers and material-sharing agreements. Every scenario contained uncertainty larger than its political slogan.

Maya studied the model through the night.

Jamal returned to his square metre of soil.

At dawn he sent her an image: one handful, dark with roots and insects. Beneath it he wrote, *We always call a place empty before we take it apart.*

Maya's reply arrived minutes later. *And we always ask those with least to wait for our principles.*

Their disagreement became the centre of the final proposal.

The mineral field would remain untouched for one generation. The decision was not permanent and not reversible by a simple majority. During the reserve, high-consuming regions would release strategic material stocks, mandate repair and recovery, and reduce non-essential turnover. Essential infrastructure in lower-consuming regions would receive first claim on the recovered flow. Open research would map the deep ecosystem without creating an automatic licence to extract it. At the end of the generation, people who had not made the original decision would judge again.

The proposal hurt.

Several computing projects were delayed. Mobility fleets extended hardware lifetimes. People queued longer for new devices. Companies lost fortunes they had already begun to imagine. Regions with unmet need accepted recycled materials that required more design work.

The island delegate demanded one final condition: the costs of restraint would be published by region and income. Sacrifice would not be allowed to become a poem written by the comfortable.

The condition passed.

So did the reserve.

Not unanimously. Not joyfully. With enough opposition to make the decision credible.

At 18:00, Earth sent its first deliberate reply to the upper atmosphere.

It contained no portrait of humanity, no anthem and no claim to virtue. It contained the public record of the decision, the dissent, the material transfers and the first cancelled extraction licence.

At the top was one sentence.

We do not know whether we have more than enough. We know that enough begins where our power learns to stop.

For eleven minutes, nothing happened.

Then every unknown process inside the energy mesh removed itself. The anomalous timing ceased. Radio telescopes returned to noise.

Humanity waited for applause from the universe.

None came.

The ocean remained dark. The clinic batteries still needed material. The hard work of the agreement had just begun.

Maya closed the archive and looked at Jamal across the assembly room.

"Do you think they left?" she asked.

"I think they stopped helping us perform."

Outside, the city continued: meals, repairs, grief, arguments, water, children, machines.

Life after the test looked exactly like life before it.

Except now the test belonged to humanity.

PART V

The Sixty-Billion Test

> *A vision becomes useful when its assumptions can be challenged without destroying its purpose.*

CHAPTER 19

The Arithmetic of Enough

Can sixty billion people actually live well on Earth?

The scientifically honest answer is: we do not know, and no calculation in this book proves that they can.

That sentence does not abandon the vision. It gives the vision work to do.

The original argument began with land. Earth has roughly 149 million square kilometres of land. Remove glaciers, barren land and other areas treated as uninhabitable, reserve a large share for wilderness and commons, and allocate the rest as small regenerative plots. At 2,500 square metres for four people, one square kilometre accommodates 1,600 people. Sixty billion people therefore require 37.5 million square kilometres of household plots.

The multiplication is correct.

The model around it is incomplete.

Original design assumption	Implied quantity
Plot per four-person household	2,500 m²
Plot per person	625 m²
People per km² of plot land	1,600
Plot land for 60 billion people	37.5 million km²

This is the base geometry of the Square of Land. It shows that human bodies and homes do not literally cover the planet at sixty billion. At the assumed density, the settlement footprint is large but not larger than all global land.

The 2,500-square-metre square is a reference unit, not a universal cadastral stamp. A regional multiplier adjusts it for water, soil, climate,

slope and the ecological burden of settlement. In fertile landscapes, households may use less direct land while restoring more shared habitat. In dry landscapes, several households may pool larger territory, production and storage around one water budget. In dense settlements, the square is layered vertically and completed by a legally protected share of the surrounding commons.

What remains constant is the entitlement and the duty: every household can trace the living systems that sustain it, and those systems must approach self-sufficiency and a near-zero exported footprint. The Square of Land is not an excuse for private isolation. It is the smallest accountable cell of a planetary metabolism.

It does not show that each plot receives enough rain, fertile soil, sunlight, nutrients, materials or ecological connection. It does not account for cities, watersheds, protected corridors, mines, reservoirs, seasonal storage, transport, specialised industry or the land embodied in trade. Most importantly, it treats the plot as if food, energy, water, housing and nature can all occupy the same area without competing.

Sometimes they can. A roof can shelter people, catch rain and carry solar panels. A tree can produce food, shade, habitat and material. A wetland can clean water, reduce floods and hold life.

Sometimes they cannot. A high-yield greenhouse requires structure, energy and nutrients from somewhere. A solar surface shaded by crops produces less electricity. A water store occupies land and alters flow. A habitat crowded with human functions may cease to be habitat for the species that avoid us.

The plot arithmetic is therefore a governing gate, not a conclusion. Any region that cannot make the square work within its real water and ecological budget must change its design, density or exchanges rather than conceal the deficit in another region.

The food gate

World agricultural land was about 4.6 billion hectares in 2024, or 46 million square kilometres.[5] Dividing that area by eight billion people for an illustrative comparison gives about 5,750 square metres per person. This is a scale comparison, not a current per-capita estimate.

The proposed sixty-billion plot allows 625 square metres for *everything*.

Research demonstrates that diets make a dramatic difference. One major global analysis estimated that an animal-free food system could reduce food's land use by 76 per cent relative to its reference system.[6] Apply that reduction only as an illustration and current agricultural land falls to roughly 1,400 square metres per person - a profound improvement and still more than twice the entire plot in the original calculation.

The remaining gap must be closed by a stack of assumptions:

- almost complete elimination of avoidable food loss and waste;
- predominantly plant-rich nutrition;
- high yields that do not consume soil, water and biodiversity;
- vertical, protected and precision cultivation where the energy and materials justify it;
- fermentation and other land-light proteins;
- tightly closed nutrient cycles;
- crops and diets adapted to place;
- lower total energy and material demand across the rest of life;
- preservation of large connected ecosystems despite pressure for food.

No published global system demonstrates that this stack can nourish sixty billion people indefinitely within all planetary boundaries.

That is the research challenge, not a detail to be assumed away.

The energy gate

Low-energy scenarios offer real grounds for hope. Research has modelled decent living standards for a future population with much lower final energy than high-consumption societies use today. The literature also shows that infrastructure, service design and fair distribution matter as much as device efficiency.[2][7]

But low per-person demand multiplied by sixty billion is still enormous.

Illustrative final energy per person	Total for 60 billion
15.3 GJ/year	918 EJ/year
26.1 GJ/year	1,566 EJ/year
42.4 GJ/year	2,544 EJ/year

For this comparison, the per-person values are illustrative assumptions, not an estimate of demand for sixty billion people. Research on unequal energy footprints and low-energy pathways provides context, but does not validate this planetary scenario.[8] The table reveals scale rather than a forecast. Even radical sufficiency does not make sixty billion energetically trivial.

Renewable supply can grow and has become increasingly competitive.[9] Yet panels, turbines, storage, transmission and maintenance all require land and material. An energy system is not clean merely because its fuel arrives as sunlight.

The sixty-billion test therefore demands both abundant renewable energy and exceptional restraint in the services that consume it. More efficient supply alone is insufficient.

The water gate

Global averages are least useful where water is concerned. Water moves through particular climates, basins, seasons and soils. A planet can have enough water in aggregate while a city, field or wetland dies.

The vision assumes near-total reuse of recoverable household and industrial water, efficient irrigation, healthy soils, rain capture, crop relocation and coastal desalination where its energy and ecological effects are manageable. It also assumes that people and production move away from places where no technology creates a durable balance.

This is technically and politically harder than drawing a pipe.

Water carries identity, sovereignty and life beyond human demand. Any serious model must operate basin by basin and retain ecological flow before allocating the remainder.

The material gate

Local fabrication reduces transport and overproduction only if feedstock loops close. Humanoid robots do not create copper, lithium, phosphorus or steel. They can extend product life, disassemble cleanly and use material precisely. Their own bodies also require material, energy, chips and replacement parts.

At sixty billion, small amounts become planetary amounts.

Ten kilograms of a material per person becomes six hundred million tonnes. One kilowatt of continuous power per person becomes sixty terawatts. A device replaced every five years becomes twelve billion devices a year.

The stress test punishes careless per-person assumptions.

It makes durable design, shared access and material recovery non-negotiable.

The biodiversity gate

The hardest limit may not be space, food, energy or metal.

It may be our willingness to leave other life alone.

Sixty billion careful people still create light, sound, movement, pathogens, edges, pets, crops and flight corridors. Human presence changes ecosystems even when our intentions are good. The vision only remains ecological if settlement is concentrated enough to preserve large connected habitats and disciplined enough not to treat every wild process as a service.

This means the land calculation must begin with ecological networks, not fit them afterwards.

What the test can claim

The sixty-billion test does not establish a carrying capacity. Carrying capacity is not a fixed number independent of diet, technology, inequality, climate, biodiversity and the standard of life we intend to provide.

The test can make three stronger claims.

First, today's footprint is not an immutable requirement of dignity. Food waste, animal-intensive land use, disposable products,

car-dependent settlement and inequality create enormous avoidable demand.

Second, high wellbeing with much lower resource use is a serious research and design direction, not a fantasy. The IPCC assesses large potential for demand-side changes across food, buildings, transport and industry, alongside cleaner supply.[7]

Third, a very large population forces every system to become honest about per-person multiplication. It exposes solutions that merely export harm, depend on universal affluence or work only while most people remain excluded.

The vision survives by changing form.

Sixty billion is not a promise about how many people Earth should carry in 2091.

It is a permanent challenge to design a world in which the arrival of another human being is not treated as an ecological defeat.

CHAPTER 20

The Transition Nobody Can Command

Utopias often begin after the difficult part.

The reader wakes in a repaired world. Energy is clean. Institutions are wise. Robots are helpful. Nobody has to decide what happens to the refinery, the mortgage, the pension, the mining town, the patent, the border or the family whose only security is tied to the old system.

Reality does not provide a clean chapter break.

The abundance stack must be built while the scarcity architecture is still paying salaries, servicing debt and keeping people alive. Some systems need to contract. Others need to expand at extraordinary speed. The people asked to change first are often not the people who benefited most.

No global intelligence can command this transition without reproducing the centralisation the vision rejects.

The path is a portfolio of transformations connected by a few rules.

Protect the floor before removing the ladder

A polluting industry cannot simply be closed while its workers absorb the transition. Basic security, training, ownership and regional investment must arrive before or with the change. Otherwise sustainability becomes another name for abandonment.

Build the alternative before moralising the choice

People cannot walk on a safe path that does not exist, repair a sealed product without parts or eat regional food no one grows. Infrastructure shapes behaviour before persuasion does. Good options must become ordinary, attractive and reliable.

Give communities productive power

Local resilience requires more than consultation. People need tools, finance, data, legal rights and the ability to own part of the systems replacing the old ones. A community invited to approve somebody else's future has not received agency.

Make incumbents disclose dependence

Every major product and service should reveal the materials, energy, labour, ecological effects and public infrastructure that make it possible. The goal is not perfect accounting. It is to end the fiction that private profit is created without a living system underneath it.

Prefer reversible steps that teach

Pilot a street conversion before rebuilding the district. Run a microgrid while retaining a safe connection. Introduce robots in work people want to stop doing, with workers shaping ownership and safeguards. Learn in public. Scale evidence, not enthusiasm.

Protect rights before capability accelerates

The time to establish that an AI cannot secretly manipulate, that a robot must stop when uncertain and that a person owns their intimate data is before the technology becomes indispensable.

The transition also needs stories.

Fear can mobilise attention, but it is a poor architect. People will not build a durable future only to avoid catastrophe. They need to see what becomes better: quiet streets, time with children, lower bills, work with meaning, products that last, air that does not hurt, communities capable of responding when wider systems fail.

This is why the future in this book is pleasant.

Pleasure is not an ornament to sustainability. It is part of the implementation strategy.

Maya's green corridor succeeds not because residents become morally superior, but because the route is cooler, safer and more beautiful than the road it replaced. Jamal's local maker network succeeds because a repaired tool returns in hours and carries better knowledge. The public energy mesh succeeds because it survives storms and lowers dependence.

When the better system is also the harder life, it will remain a niche for the committed.

The transition nobody can command must become the future many people recognise as their own.

CHAPTER 21

Begin With One Living System

A planetary vision can become a hiding place.

The scale is so large that nothing done today feels equal to it. We wait for the government, invention, movement, election, investment or perfect plan capable of changing everything.

Living systems do not begin everywhere.

They begin somewhere and connect.

Choose one service close enough to understand: warmth in a building, water on a street, food in a school, repair in a neighbourhood, attention in a family, energy in a workshop, learning around a wetland.

Then ask five questions.

What human need is the system actually serving?

Do not begin with the product or institution. A car serves access. A boiler serves warmth. A job may serve security, belonging and contribution. Naming the need opens more than one method.

Where does the system become fragile?

Trace dependencies. What arrives from far away? What fails without software, one supplier or one skilled person? Which failure becomes dangerous first?

What does the system discard?

Look for heat, water, material, knowledge, time and human capacity that leave without another use. Waste is often the first visible doorway into redesign.

Who carries the hidden cost or has no voice?

Include the cleaner, downstream neighbour, child, future maintainer, displaced worker, species and person who cannot use the standard interface. A solution that works by moving pain is not a solution.

What is the smallest reversible improvement that creates capability?

Not a gesture. Not a perfect endpoint. A working step that teaches people how to do the next step themselves.

Measure what changes. Publish what failed. Preserve the ability to leave. Connect the result to another living system.

This is how Codex.Earth begins in the real world: not as a planetary artificial intelligence, but as a discipline of making useful knowledge shareable without removing it from the people and places that created it.

My own path begins with personal robots. A garden robot may look small beside a universal city. It teaches the questions the universal city will face: who owns the data, whether a machine can work safely near life, how repair remains possible, what happens when a company fails, and whether technology returns time to a person or creates another dependency.

Your path will begin elsewhere.

The objective is not to agree with every detail in this book. Disagreement is useful if it produces a better design. The objective is to stop treating the current architecture as the only realistic world.

Sixty billion people may never live on Earth.

Let the number do its work anyway.

Let it make waste look temporary, dignity look non-negotiable and small assumptions look planetary.

Then build one living system that gives back more than it takes.

And connect it to the next.

EPILOGUE

The City in the Universe

The first reply arrived three days after humanity stopped waiting for it.

Maya was on the roof, repairing a rain channel by hand because the maintenance robot had correctly refused a joint it could not inspect. Jamal was back in the Atlas basin, arguing with the water council about the next dry season. The Pacific mineral field remained dark. Material transfers had begun, too slowly for some regions and too quickly for several industries.

Nothing was resolved.

At 05:17, every public observatory received a map.

It showed no stars.

It showed Earth as the Watchers had seen it: not borders or city lights, but relationships. Water moving from ridge to ocean. Materials passing through hands and machines. Energy shared and withheld. Corridors where other species could move. Places where human attention gathered and places deliberately left dark.

Some lines were bright. Others broke.

No civilisation appeared at the edge of the image. No invitation crossed the distance. There was only a translation of the planet into consequence.

At the bottom of the map, a final sentence formed.

A CITY IS NOT ITS SIZE. IT IS THE CARE BETWEEN STRANGERS.

Then the source identified itself, not with a name, but with a direction.

The signal had travelled for eighty-one years.

Whoever sent it had asked the question before Maya or Jamal was born, before Codex existed, before the worst crisis and much of the repair. The Watchers had not observed humanity's answer.

They had trusted that an answer might one day exist.

Maya sat beside the open rain channel. For the first time since the message arrived, Lumi had nothing to say.

Jamal stood beneath the almond trees while Harvy held the map in its palm.

Across Earth, people looked at the broken lines. There was no victory in them. There was work.

Maya sent Jamal a private message.

Do you think we are ready?

His answer came after sunrise.

No. But we have learned that readiness is not a gate. It is a way of travelling.

Above them, the universe remained vast, inhabited or empty, indifferent or alive.

Below, the city continued to practise.

It would practise for decades before journeys beyond Earth became ordinary. Humanity would build stations, settlements and eventually routes through the Solar System, but not as an escape from a crowded planet. Frequent movement into the universe would begin only after people had learned to live richly, freely and almost weightlessly on the world that made them.

Earth would remain the first and busiest city.

Endnotes

1 United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects 2024: Summary of Results*. The report projects a global peak of about 10.3 billion people in the mid-2080s and a slight decline by 2100. source link

2 Joel Millward-Hopkins et al., "Providing decent living with minimum energy: A global scenario," *Global Environmental Change* 65 (2020), 102168. source link

3 United Nations Environment Programme, *Food Waste Index Report 2024*. The report estimates 1.05 billion tonnes of retail, food-service and household food waste in 2022, equal to about 19 per cent of food available to consumers. source link

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5 Food and Agriculture Organization of the United Nations, *Land statistics 2001-2024: Global, regional and country trends*, released 17 July 2026. FAO reports about 4.6 billion hectares of agricultural land in 2024. source link

6 Joseph Poore and Thomas Nemecek, "Reducing food's environmental impacts through producers and consumers," *Science* 360, no. 6392 (2018): 987-992. The study models a 76 per cent reduction in food land use for a global diet excluding animal products relative to its reference system. The result is a scenario, not a universal prescription for every place and livelihood. source link

7 Intergovernmental Panel on Climate Change, *Climate Change 2022: Mitigation of Climate Change*, Working Group III contribution to the Sixth Assessment Report, especially Chapter 5 and Summary for Policymakers Figure SPM.6. The assessment identifies large demand-side mitigation potential through changes in service provision, infrastructure, technology and social practices. source link

8 Yannick Oswald, Anne Owen and Julia K. Steinberger, "Large inequality in international and intranational energy footprints between income groups and across consumption categories," *Nature Energy* 5 (2020), together with the decent-living and low-energy-demand scenarios discussed in Joel Millward-Hopkins et al. (2020), Arnulf Grubler et al. (2018) and subsequent comparative literature. The values in Chapter 19 are illustrative assumptions for a

scale calculation; this reference does not establish a sixty-billion-person model. source link

9 International Energy Agency, *Renewables 2025: Analysis and Forecasts to 2030*. This report examines renewable deployment, policy and market changes, and integration challenges. source link

10 Arnulf Grubler et al., "A low energy demand scenario for meeting the 1.5°C target and sustainable development goals without negative emission technologies," *Nature Energy* 3 (2018): 515-527. source link

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About the Author

Wes L'Or Rez grew up among the windmills and polders of West Flanders, Belgium. He has spent his career turning ambitious technological ideas into working systems, from early digital media ventures to personal robotics.

His projects are connected by one question: how can technology help create a world that is more sustainable, healthy, fair, pleasant and abundant?

60 Billion People on Earth is the clearest expression of that lifelong design brief. It brings together local resilience, regenerative land use, artificial intelligence, personal robots and the idea of Earth as one diverse city in a wider universe.

Wesley lives and builds in Belgium.