H HEURISTICS

Navigating a Changing World

Clean Development as a Strategy for Global Risk Reduction

How Sustainable Infrastructure Can Address Multiple Systemic Threats Simultaneously

One Asset Class, Many Risks Reduced at Once: The Under-Counted Case for Multisolving Infrastructure

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Abstract

Governments confront their systemic dangers one at a time — a climate ministry and a climate budget, a health ministry and a health budget, separate strategies for energy, debt, water, and disaster — and this report argues that the division of labour systematically undervalues the one class of investment that cuts across all of it. The early twenty-first century has produced a portfolio of coupled systemic threats: climate disruption; the air-pollution death toll, now the second-leading risk factor for death worldwide at 8.1 million lives a year; energy insecurity; macro-financial fragility; water and food stress; the loss of nature; and the geopolitics of scarce energy and minerals. Treated separately, each looks nearly unaffordable, because the drivers overlap: the combustion of fossil fuels is at once the largest source of greenhouse gases, of lethal particulate pollution, of destabilising import bills, and of coercive energy dependence.

The central thesis is that this overlap is an opportunity, not merely a complication. Because the threats are coupled through shared physical drivers, an investment made at a node of coupling reduces several of them at once. Sustainable infrastructure — clean power, energy efficiency and green buildings, clean cooking and heat, electrified and public transport, resilient water and sanitation, nature-based systems, and the digital backbone that ties them together — sits at exactly those nodes. A single act of clean development therefore delivers a risk-reduction multiplier: on the reading developed here, each asset class materially reduces three to five distinct systemic threats simultaneously. The report's analytical core is a co-benefit matrix mapping eight infrastructure asset classes against seven systemic threats, from which the multiplier can be read directly.

The report's diagnosis of why so much of this value goes uncaptured is an accounting failure rather than a technological one. Across much of the world the core technologies are already the cheapest available, yet appraisal, budgeting, and finance are organised threat by threat, so an investment that reduces four threats is credited with reducing one and its measured return is a fraction of its true return. The same regime that hides clean development's co-benefits hides fossil fuels' co-harms: the IMF estimates fossil-fuel subsidies at about US$7 trillion in 2024, close to 7 percent of world GDP, of which some US$6.7 trillion is the implicit value of unpriced pollution and climate damage. Under-counting the benefits of the challenger and the harms of the incumbent are two faces of one mispricing.

The implication is a reframing: sustainable infrastructure should be appraised, budgeted, and financed as portfolio risk reduction rather than as sectoral climate policy competing for an environmental budget. Concretely, that means counting the full portfolio of co-benefits in every major public investment decision, ending the implicit subsidy that unpriced harm confers on fossil fuels, hard-wiring good outcomes through standards where appraisal is absent, clearing the debt and cost-of-capital barriers that keep high-return investments unfinanced, and designing each investment against the whole portfolio so that co-benefits are secured and co-harms avoided. Grounded in the experience of China, India, Morocco, Europe, and East Africa — where clean investment undertaken for clean air, secure energy, or basic access delivered climate and fiscal benefits as a bonus — the report's central finding is that clean development is not a cost borne for the planet's sake but the rare investment that pays many times over, in many currencies of risk at once, for those with the accounting to see it and the finance to build it.

Keywords: clean development; sustainable infrastructure; global risk reduction; systemic risk; co-benefits; multisolving; risk-reduction multiplier; air pollution; energy security; fossil-fuel subsidies; externalities; integrated appraisal; climate mitigation; energy transition; nature-based solutions; cost of capital; sovereign debt; development finance; carbon pricing; health co-benefits

JEL classification: Q56, Q48, H54, I18, O13; environment and development, sustainability; energy and the environment; infrastructure and public investment; government policy and health; agriculture, natural resources and environment in economic development

Data and method: This report synthesises institutional and peer-reviewed research on systemic risk, sustainable infrastructure, health, and development finance, including the *IPCC Sixth Assessment Report* (WGII and WGIII); the Health Effects Institute *State of Global Air 2024*; the WMO *Atlas of Mortality and Economic Losses (1970–2021)*; the *IEA World Energy Investment 2025*, *Global Critical Minerals Outlook 2025*, and *Tracking SDG7 (2025)*; the IMF's *Fossil Fuel Subsidies 2025 Update*; UNCTAD's *A World of Debt (2025)*; the WHO/UNICEF Joint Monitoring Programme and FAO *SOFI*; the *New Climate Economy* report; and primary reporting on country programmes in China, India, Morocco, the European Union, Kenya, and Ethiopia. Every quantitative claim is attributed inline to a primary or authoritative secondary source. Figures 1 and 3 are conceptual schematics; Figure 3's intensities and Figure 4's counts are a qualitative expert reading; Figure 2's bars are an illustrative severity ranking; Figure 7's components are stylised; Figures 5, 6, and 8 report values from the cited primary sources. The report is analytical rather than predictive.

Contents

1. Introduction: Solving Many Problems With One Investment

> *Governments confront their dangers one at a time. There is a climate ministry and a climate budget; a health ministry and a health budget; an energy strategy, a debt-management office, a disaster agency, each with its own mandate, its own metrics, and its own claim on scarce public money. The argument of this report is that this division of labour, sensible as it looks, systematically undervalues the one class of investment that cuts across all of it — and that recognising the overlap is the most under-used lever in global risk reduction.*

The early twenty-first century has produced a long list of systemic threats. Climate change is destabilising the physical basis of economies. Air pollution has become the second-leading risk factor for death worldwide. Energy insecurity, exposed brutally by the price shock of 2022, can hollow out a government's finances in a single year. A record overhang of hard-currency debt has left much of the developing world one shock away from crisis. Water and food systems are straining against population, heat, and depletion. Ecosystems that quietly regulate the climate and the water cycle are being dismantled. Each of these is studied by its own experts, financed from its own pot, and negotiated in its own forum. Treated separately, each looks nearly intractable, because the sums required to address any one of them in isolation are enormous.

This report starts from a different observation: that these threats share drivers, and therefore share solutions. The combustion of fossil fuels is at once the largest source of greenhouse gases, the largest source of the fine-particulate pollution that kills millions, a principal source of the import bills and price shocks that destabilise budgets, and a driver of the geopolitical dependencies that turn energy into a weapon. Degraded watersheds worsen floods, droughts, and food insecurity at the same time. Because the drivers overlap, an investment aimed at one threat frequently reduces several others as a matter of physics and economics, whether or not anyone intended it to. A solar array displaces carbon, but it also displaces the particulate pollution that would have shortened lives, the fuel imports that would have drained reserves, and the exposure to a fuel-price spike that would have widened the deficit. It does all of this at once, from a single act of construction.

The name this report gives to that class of investment is clean development: the build-out of sustainable infrastructure — clean power, efficient buildings and industry, clean cooking and heat, electrified and public transport, resilient water and sanitation, nature-based systems, and the digital backbone that ties them together — as the physical substrate of a modern economy. The term deliberately echoes the Clean Development Mechanism of the Kyoto era, which treated clean investment in developing countries as a way to buy down a single problem, carbon. The claim here is broader and, in a sense, more optimistic: the same investment buys down many problems, and its case does not stand or fall on the carbon price alone.

The framing that follows is sometimes called multisolving — the deliberate design of a single intervention to deliver benefits across multiple problems and budgets at once. Figure 1 states the idea in its simplest form. At the centre is one asset class; radiating outward are the distinct systemic threats it reduces. The rest of the report is, in effect, an attempt to make each of those arrows precise: to say through what channel sustainable infrastructure lowers each threat, how large the effect is, why it is so often left out of the accounts, and what it would take to capture the full return.

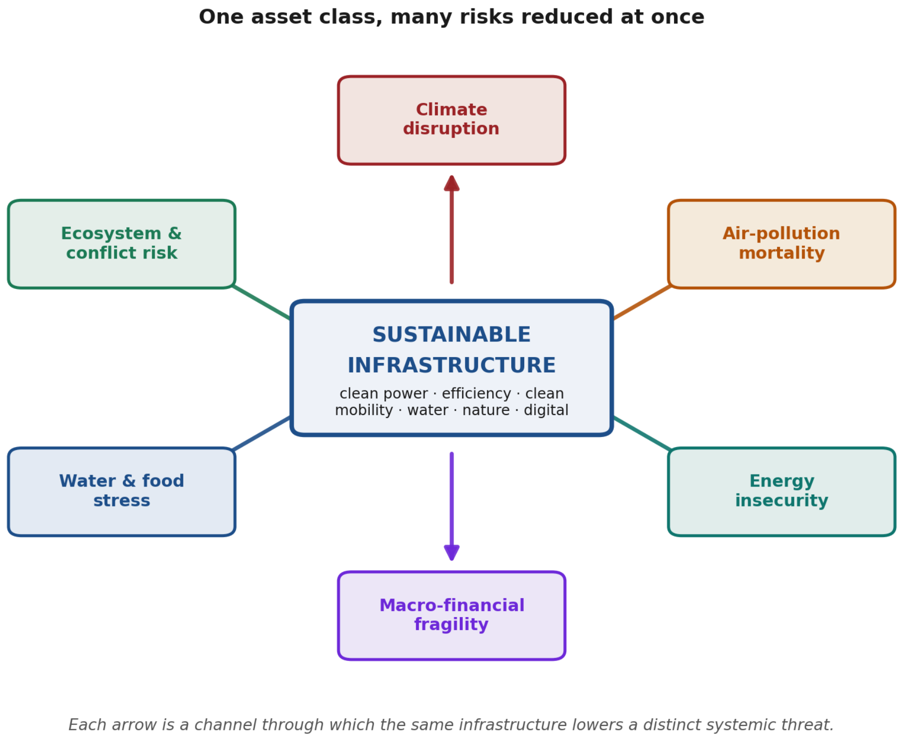

Figure 1. *Clean development as a shared upstream lever: one asset class reduces many systemic threats at once.*
Schematic by the author, after the "multisolving" framing (Multisolving Institute) and the IPCC treatment of mitigation–development co-benefits.

The central thesis has three parts. First, that the true return on sustainable infrastructure is the sum of its risk-reduction effects across the whole portfolio of threats, not its performance against any single objective. Second, that because appraisal, budgeting, and finance are organised threat by threat, most of that return is never counted — the investment is judged against one objective and charged the full cost, so it looks marginal when it is in fact exceptional. Third, that correcting this accounting — valuing infrastructure as portfolio risk reduction rather than as sectoral climate policy — is the change most likely to unlock the investment that a single-objective world leaves on the table. The problem, in short, is less that we lack the technologies than that we mis-measure their worth.

The report proceeds as follows. Section 2 sets out the portfolio of systemic threats and shows why they are coupled rather than independent. Section 3 defines clean development and its component asset classes. Section 4 introduces the risk-reduction multiplier — the co-benefit matrix at the analytical heart of the report. Sections 5 through 8 take the principal threats in turn: climate, the air-pollution health burden, energy insecurity and macro-financial fragility, and the water–food–nature nexus. Section 9 explains why the multiplier is chronically under-counted, using the mirror image of unpriced fossil-fuel subsidies. Section 10 addresses the financing constraint; Section 11 confronts the trade-offs and the conditions under which co-benefits fail to appear; Section 12 grounds the argument in country experience; and Section 13 concludes.

2. The Threat Portfolio: Seven Coupled Systemic Risks

> *To argue that one investment addresses many threats, one must first be clear about the threats. This section sets out seven systemic risks — chosen because each is large, each is systemic in the sense of propagating across sectors, and each is materially affected by the composition of a country's infrastructure.*

The seven are: climate disruption; the health burden of air pollution; energy insecurity; macro-financial fragility; water and food stress; the loss of nature and biodiversity; and the geopolitical and conflict risk that flows from competition over energy and resources. The list is not exhaustive — pandemics and rapid technological disruption are systemic threats too — but it is chosen to capture the risks most tightly bound to the physical infrastructure of energy, water, land, and mobility. Figure 2 arrays them by rough scale, with the headline metric for each printed alongside.

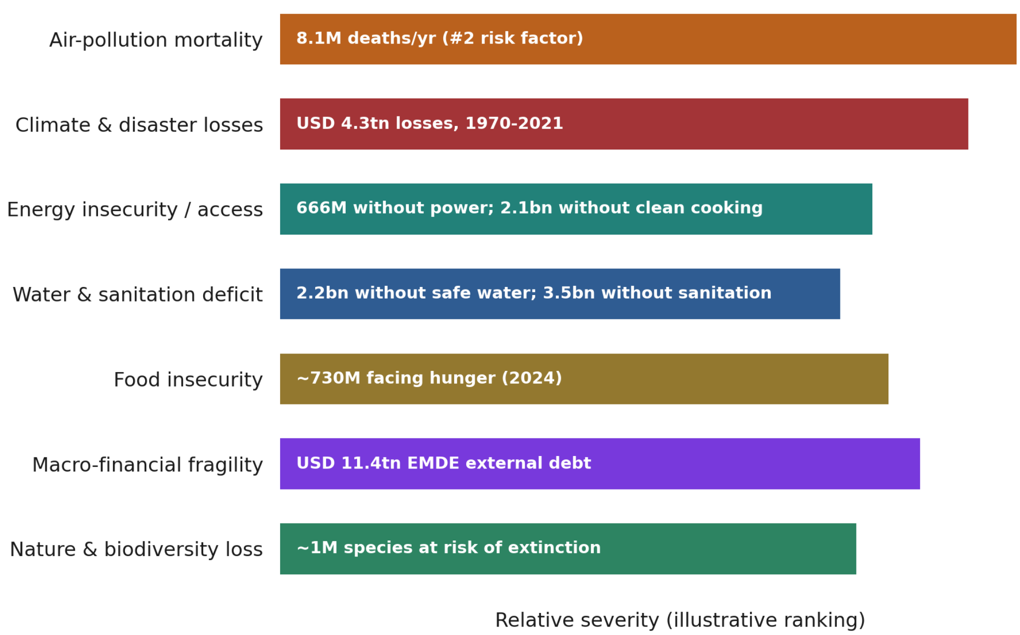

Figure 2. *The threat portfolio: seven coupled systemic risks and their approximate scale.*

Compiled by the author from sources cited in the text (State of Global Air 2024; WMO; IEA/ESMAP; WHO/UNICEF JMP; FAO; UNCTAD; IPBES). Bar lengths are an illustrative severity ranking, not a common unit.

Consider each briefly. Climate disruption is the slow-moving amplifier behind much of the rest: the World Meteorological Organization, reviewing 1970–2021, found that reported weather, climate, and water disasters rose roughly fivefold and reported economic losses roughly sevenfold, to a cumulative US$4.3 trillion. Air pollution is the most under-appreciated killer in the set: the State of Global Air 2024, produced by the Health Effects Institute, attributes 8.1 million deaths in 2021 to air pollution — about one death in eight worldwide — making it the second-leading risk factor for death after high blood pressure, and the second-leading risk factor for death in children under five.

Energy insecurity is both a development deficit and a macro-financial exposure. The 2025 edition of Tracking SDG7 records roughly 666 million people still without access to electricity and about 2.1 billion without clean cooking fuels — the latter responsible for millions of deaths a year from household air pollution — while, for energy importers, a fuel-price spike lands directly on the trade balance and the budget. Macro-financial fragility has tightened alarmingly: UNCTAD reports developing-country external debt at a record US$11.4 trillion, net interest payments of US$921 billion in 2024, and 3.4 billion people living in countries that spend more on debt-service interest than on health or education.

Water and food stress round out the material risks. The WHO and UNICEF's Joint Monitoring Programme estimates that about 2.2 billion people lack safely managed drinking water and roughly 3.5 billion lack safely managed sanitation; the FAO's State of Food Security and Nutrition in the World counts on the order of seven hundred million people facing hunger. The loss of nature is systemic in a subtler way: the IPBES global assessment warned that around one million species are at risk of extinction, and the decline of forests, wetlands, and reefs erodes the natural infrastructure that regulates water, buffers storms, and stores carbon. And competition over fossil energy and, increasingly, over the critical minerals that a clean transition requires, remains a live source of geopolitical and conflict risk.

2.1 Why the threats are coupled, not independent

The organising claim of this report is not merely that these seven threats coexist, but that they are coupled — linked so that a movement in one propagates into others. Fossil combustion is the clearest node of coupling: burning coal, oil, and gas simultaneously drives the climate hazard, the particulate-pollution health burden, and the import-bill exposure, so that anything which reduces combustion reduces all three together. Degraded ecosystems couple nature loss to water stress, food insecurity, and climate vulnerability at once. Debt couples to everything, because a country whose budget is pre-committed to creditors cannot fund the health system, the flood defence, or the clean-power programme that would contain the other threats.

Coupling is what makes the portfolio dangerous, and it is also what makes the portfolio solvable. If the seven threats were independent, reducing them would require seven separate campaigns with seven separate budgets, and the arithmetic would be hopeless. Because they are coupled through shared physical drivers, a well-chosen investment at a node of coupling — most of all, at the fossil-combustion node — relieves several threats simultaneously. The coupling that transmits harm in the business-as-usual world becomes, once the driver is replaced, a transmission of benefit. This is the structural fact on which the rest of the report builds.

2.2 The cost of treating them one at a time

The prevailing approach treats the threats as a list to be worked through sequentially, each by its own institution. That approach carries two hidden costs. The first is duplication: three ministries may each spend to address a problem that a single upstream investment would have relieved for all of them, and none credits the others' budgets in its own appraisal. The second, and larger, is omission: an investment that would have paid handsomely across the portfolio is rejected because, measured against the one objective of the ministry that would fund it, its benefit–cost ratio looks unremarkable. The clean-power project that a carbon budget finds marginal might be overwhelmingly justified once its health, energy-security, and fiscal benefits are counted — but no institution is charged with counting them together. Correcting that omission is the work of Sections 4 and 9.

Table 1. The seven systemic threats: scale, principal metric, and source.

Systemic threat	Headline metric	Primary source
Climate disruption	Disasters up ~5x and losses up ~7x since the 1970s; US$4.3tn cumulative losses, 1970–2021	WMO Atlas (2021)
Air-pollution mortality	8.1 million deaths in 2021; 2nd-leading risk factor for death worldwide (~1 in 8 deaths)	State of Global Air 2024 (HEI)
Energy insecurity	~666 million without electricity; ~2.1 billion without clean cooking; import-price exposure	Tracking SDG7 (2025)
Macro-financial fragility	US$11.4tn developing-country external debt; US$921bn net interest (2024); 3.4bn people	UNCTAD, A World of Debt (2025)
Water & food stress	~2.2bn without safe drinking water; ~3.5bn without sanitation; ~700m facing hunger	WHO/UNICEF JMP; FAO SOFI
Nature & biodiversity loss	~1 million species at risk of extinction; loss of natural climate and water regulation	IPBES Global Assessment
Geopolitical / conflict risk	Competition over fossil energy and critical minerals; energy used as coercion	IEA; author synthesis

3. What Clean Development Means: Sustainable Infrastructure as an Asset Class

> *"Sustainable infrastructure" can sound either grandly abstract or narrowly technical. This section pins it down as a concrete asset class — a set of buildable systems — because the argument that follows depends on treating clean development as investable, appraisable, and financeable, not as a slogan.*

By sustainable infrastructure this report means the physical and digital systems that provide the services of a modern economy — power, mobility, shelter, water, food, connectivity — in a form that is low-carbon, resource-efficient, resilient, and distributed. Eight asset classes carry most of the weight. Clean power generation (solar, wind, hydropower, geothermal, and, where appropriate, nuclear) replaces the combustion at the root of several threats. Grids, storage, and interconnection turn variable clean generation into firm, reliable supply and let systems share power across a wider area. Energy efficiency and green buildings cut the demand that must be met at all, the cheapest and cleanest unit of energy being the one never used.

Clean cooking and heat — from liquefied petroleum gas as a transitional fuel to electric induction and clean biomass — attack the household air pollution that kills millions, most of them women and children. Electrified, public, and active transport reduces both tailpipe emissions and the urban particulate pollution that shortens urban lives. Water, sanitation, and efficient irrigation infrastructure secures the resource on which health and food depend. Nature-based infrastructure — restored watersheds, mangroves, wetlands, and urban green space — provides regulating services that engineered systems cannot easily replicate. And the digital and data backbone — metering, sensing, forecasting, and control — is the connective tissue that lets the others be operated intelligently and lets early-warning and payment systems reach people.

3.1 What makes it "development", not just "green"

It is essential to the argument that these are development assets first. They are not environmental add-ons paid for out of whatever is left after the growth budget is spent; they are the growth budget, redirected. A country electrifying for the first time must build generation and grid regardless; the only question is whether it builds clean or fossil. A city that must house a growing population will build; the only question is whether it builds efficient or wasteful, on the floodplain or off it. Because much of the infrastructure the developing world will use at mid-century has not yet been built, the marginal cost of choosing the sustainable option is often the difference between two new builds, not the full cost of tearing out and replacing an old one. That is why clean development need not be a slower path to prosperity, and frequently is a faster one.

This framing also clarifies why the falling cost of the core technologies matters so much. Over the decade to the mid-2020s the levelised cost of electricity from solar photovoltaics fell by roughly 90 percent and that of onshore wind by well over half, so that, as the International Renewable Energy Agency documents, the large majority of newly commissioned renewable capacity now undercuts the cheapest fossil alternative on cost alone. The clean option is no longer a premium product bought for its virtue; across much of the world it is simply the cheapest new capacity, and the co-benefits described below come attached to it for free. The economic case has quietly inverted, and much of the policy architecture has not caught up.

3.2 A common misconception: mitigation versus everything else

A persistent misconception treats sustainable infrastructure as synonymous with climate mitigation, and therefore as a cost imposed for a distant, global, collective benefit that any individual country has an incentive to avoid paying. This report's central point is that the framing is wrong on its own terms. The climate benefit is real, but it is only one of several, and often not the largest from the point of view of the country making the investment. The air-quality, energy-security, and fiscal benefits are local, immediate, and captured by the investing country itself — which means clean development can be strongly in a country's narrow self-interest even setting the global climate benefit entirely aside. Recognising this reframes the politics: clean development is not a sacrifice a country makes for the world, but an investment it makes chiefly for itself, whose global benefit is a bonus.

4. The Risk-Reduction Multiplier: A Co-Benefit Framework

> *This section sets out the analytical core of the report: a simple framework for the fact that a single infrastructure investment reduces several distinct threats at once, and a way of reading its combined return that the sectoral accounts systematically miss.*

Begin with a definition. A co-benefit is a reduction in one threat that comes attached, at no extra cost, to an investment made against another. Insulating a building to cut energy bills also cuts the emissions and the pollution from the power it no longer draws; the emissions and pollution reductions are co-benefits of the efficiency investment. The concept is not new — the IPCC has long catalogued the co-benefits of mitigation, and health researchers have shown that the air-quality benefits of meeting climate targets can, on their own, exceed the cost of meeting them. What is under-used is the systematic application of the idea across the whole threat portfolio, treating co-benefits not as a footnote to climate policy but as the main event.

Figure 3 does this. It is a matrix: each row is one of the eight sustainable-infrastructure asset classes; each column is one of the seven systemic threats; each cell records how strongly that asset reduces that threat, from none through modest, strong, and very strong. Read across a row, the matrix shows the multiplier — the number of distinct threats a single asset class relieves. Read down a column, it shows which investments a government worried about a particular threat should reach for. The matrix is the report's central object, and most of the argument can be read off it.

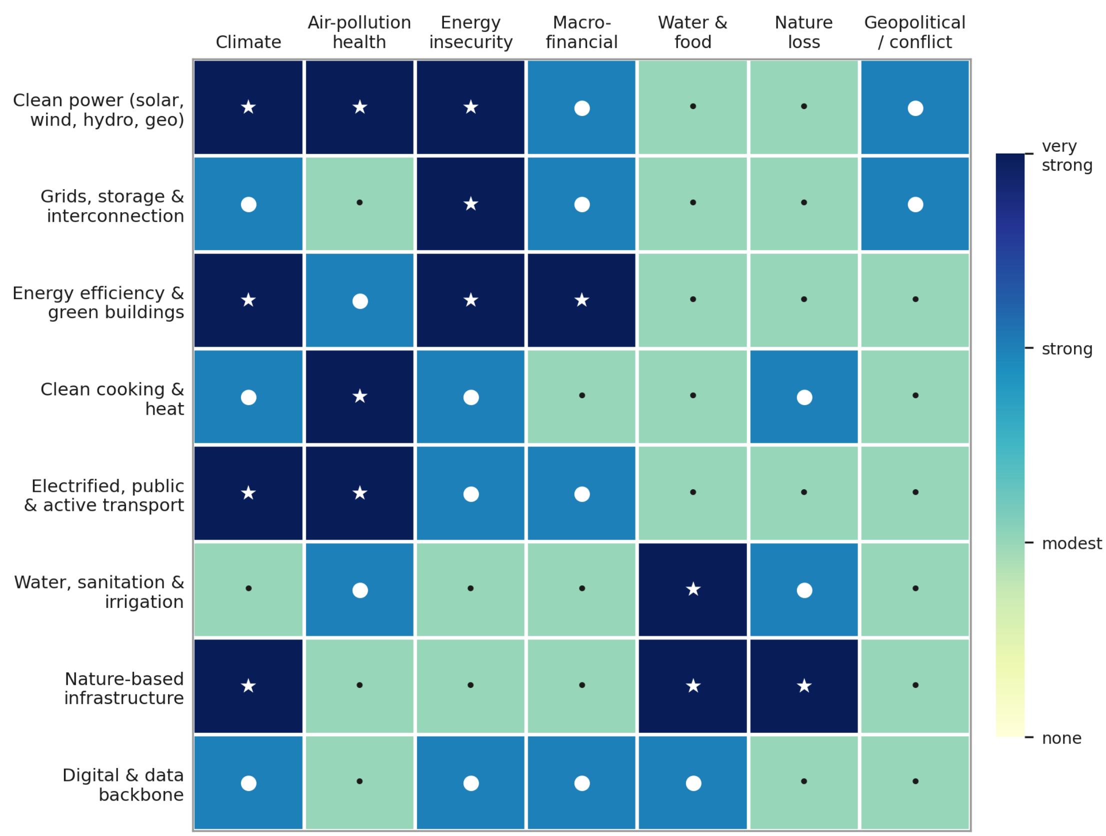

Figure 3. *The co-benefit matrix: how strongly each sustainable-infrastructure asset class reduces each systemic threat.*

Author's synthesis of the mechanisms documented in Sections 5–8 and their cited sources. Intensities are a qualitative expert reading, intended to be indicative rather than precise.

Three features of the matrix carry the argument. First, it is dense: very few cells are empty, meaning almost every asset class touches almost every threat to some degree. Second, the diagonal is not where the action is — clean power's largest single effect may be on climate, but its rows extend strongly across pollution, energy security, and fiscal fragility, so that its total row-sum dwarfs its diagonal entry. Third, the columns are served by many rows: a government worried about, say, energy insecurity has not one but several infrastructure levers, and the one it chooses will bring different bundles of co-benefits with it. The matrix is, in effect, a map of where multisolving is possible — which is nearly everywhere.

4.1 The multiplier, counted

The practical payoff of the matrix is a single number for each asset class: the count of threats it materially reduces. Figure 4 extracts that count — the number of the seven systemic threats each asset class reduces strongly or very strongly. Clean power, efficient buildings, and electrified transport each reach across most of the portfolio; even the more specialised assets, such as water infrastructure or nature-based systems, reach three or four threats apiece. No asset in the set is a single-purpose tool. This is the quantitative statement of the report's title: sustainable infrastructure addresses multiple systemic threats simultaneously, and the multiplier is typically in the range of three to five, not one.

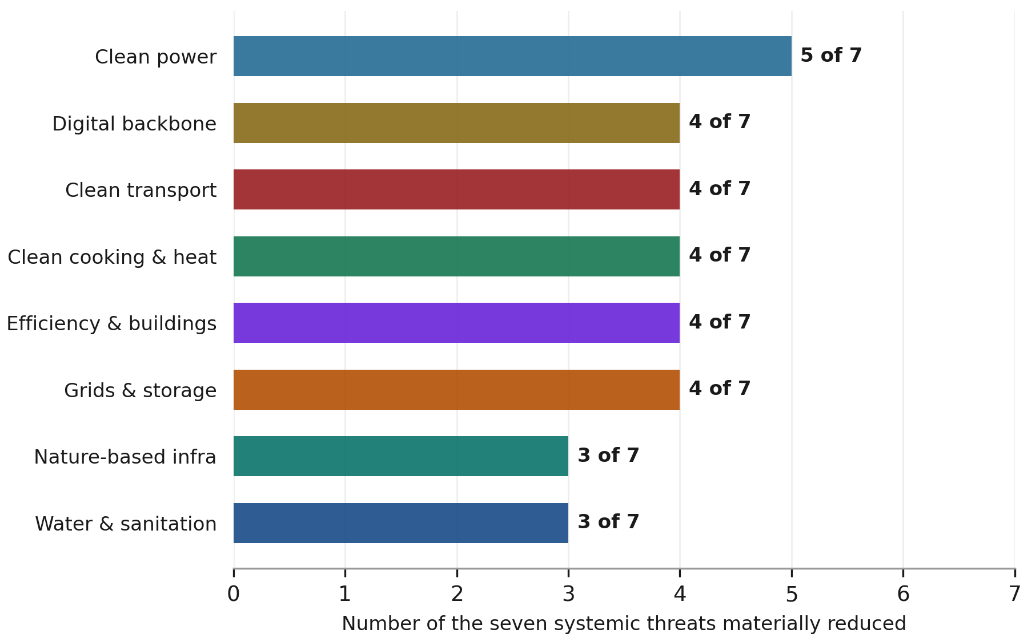

Figure 4. *The multiplier by asset class: how many of the seven systemic threats each materially reduces.*

Derived from Figure 3 (count of "strong" or "very strong" reductions per row). Indicative.

A multiplier of three to five has a striking implication for appraisal. If an investment reduces four threats to a comparable degree but is credited, in the budget that funds it, with reducing only one, then its measured benefit is roughly a quarter of its true benefit. An investment whose true benefit–cost ratio is, say, four to one will present to that budget as one to one — barely worth doing. The gap between the true and the measured return is not a rounding error; it is the difference between an investment that is obviously worthwhile and one that looks like a toss-up. Section 9 shows that this is exactly the gap that keeps sustainable infrastructure under-provided.

4.2 A ledger of mechanisms

The matrix compresses a great deal of mechanism into single cells; Table 2 unpacks the most important of them, naming for each asset class the specific channels through which it reduces threats beyond its headline purpose. The point of the ledger is to insist that co-benefits are concrete and causal, not a hopeful aura around green investment. Each entry corresponds to a measurable physical or financial channel, developed further in the threat-specific sections that follow.

Table 2. A co-benefit ledger: the principal channels through which each asset class reduces threats beyond its headline purpose.

Asset class	Headline purpose	Principal co-benefit channels
Clean power	Low-carbon electricity	Cuts PM2.5 and health burden; replaces fuel imports (energy security + fiscal); insulates budget from price shocks; reduces resource-conflict exposure
Grids & storage	Reliable supply	Enables variable renewables (climate); firms up supply against shocks; shares power across regions (security); supports digital early-warning
Efficiency & buildings	Lower energy demand	Cuts emissions and pollution from avoided generation; lowers bills and import needs; reduces heat stress; eases fiscal pressure
Clean cooking & heat	Modern cooking energy	Removes household air pollution (large health gain); reduces deforestation (nature); frees time, chiefly for women; cuts fuelwood pressure
Clean transport	Mobility	Removes urban tailpipe pollution (health); cuts oil imports (security + fiscal); reduces congestion; improves access and productivity
Water & sanitation	Safe water	Prevents water-borne disease (health); secures food via irrigation; buffers drought and flood (resilience); protects ecosystems
Nature-based infra	Ecosystem services	Sequesters carbon; buffers floods and storms; recharges water; sustains fisheries and food; supports biodiversity
Digital backbone	Data & control	Optimises grids and water; powers early warning (resilience); enables targeted payments; improves service delivery and governance

5. The Climate Channel: The Threat That Amplifies the Rest

> *Climate is placed first among the threat-specific sections not because it is the largest co-benefit — often it is not, from a single country's vantage — but because it is the amplifier that makes the others worse, so that reducing it protects the whole portfolio.*

The mechanism by which sustainable infrastructure reduces the climate threat is direct: it avoids the greenhouse-gas emissions that would otherwise have been released. Energy accounts for roughly three-quarters of global emissions, so a clean energy system is most of the climate solution by construction. But the climate benefit of clean development is not only that it lowers the global hazard for everyone; it is that a lower hazard reduces the intensity and frequency of the very shocks — floods, droughts, heatwaves, storms — that transmit stress into every other system a country runs. Climate mitigation is, in this sense, upstream risk reduction for the entire threat portfolio.

This is why the standard objection to mitigation — that it is a global public good, so no single country has an incentive to provide it — matters less than it appears. The objection is correct about the climate benefit narrowly defined: one country's emissions cuts do little to change the hazard it faces. But it is wrong about the investment as a whole, because the same infrastructure that cuts emissions delivers local, appropriable benefits — clean air, secure energy, fiscal space — that a country captures regardless of what others do. The free-rider problem that paralyses climate diplomacy dissolves once the investment is valued for its full portfolio of returns rather than for its climate return alone. A country that builds clean because it wants clean air and secure energy also, incidentally, mitigates; the global good is produced as a by-product of rational self-interest.

5.1 The scale of the prize, and the economic case

The economic case for treating climate action as growth rather than sacrifice has been made repeatedly by mainstream institutions. The Global Commission on the Economy and Climate estimated in its New Climate Economy work that a decisive shift to a low-carbon growth model could deliver on the order of US$26 trillion in cumulative economic benefits through 2030 relative to business as usual, while generating tens of millions of jobs and avoiding hundreds of thousands of premature deaths from air pollution. Whatever the precision of any single such estimate, the direction is robust across studies: the low-carbon path is not systematically more expensive than the high-carbon one once the avoided damages and co-benefits are counted, and is frequently cheaper.

The climate channel also interacts with adaptation. Every tonne of emissions avoided lowers the future hazard against which a country must defend, which means mitigation and adaptation are complements, not rivals for the same budget. A country that builds clean lowers the flood and drought risk it will later have to adapt to; a country that builds resilient reduces the damage from the hazards that arrive regardless. Sustainable infrastructure that does both — a hardened, distributed clean-power system, a restored watershed that stores carbon and buffers floods — is doubly valuable, and it is precisely this doubling that the co-benefit matrix is designed to make visible.

6. The Health Dividend: Air Pollution as the Largest Hidden Return

> *If there is a single co-benefit large enough to justify clean development on its own, it is the reduction of air pollution. It is also the co-benefit most reliably left out of the accounts, because it accrues to health budgets and grieving families rather than to the energy ministry that makes the investment.*

The scale is easy to under-state and hard to overstate. The State of Global Air 2024 attributes 8.1 million deaths in 2021 to air pollution, making it the second-leading risk factor for death worldwide, behind only high blood pressure and ahead of tobacco. Around 90 percent of that burden is non-communicable disease — heart disease, stroke, chronic lung disease, diabetes, lung cancer — the slow, expensive illnesses that overwhelm health systems. More than 700,000 of the deaths are children under five, for whom air pollution is now the second-leading risk factor for death after malnutrition. Figure 5 shows the totals, and the household share within them.

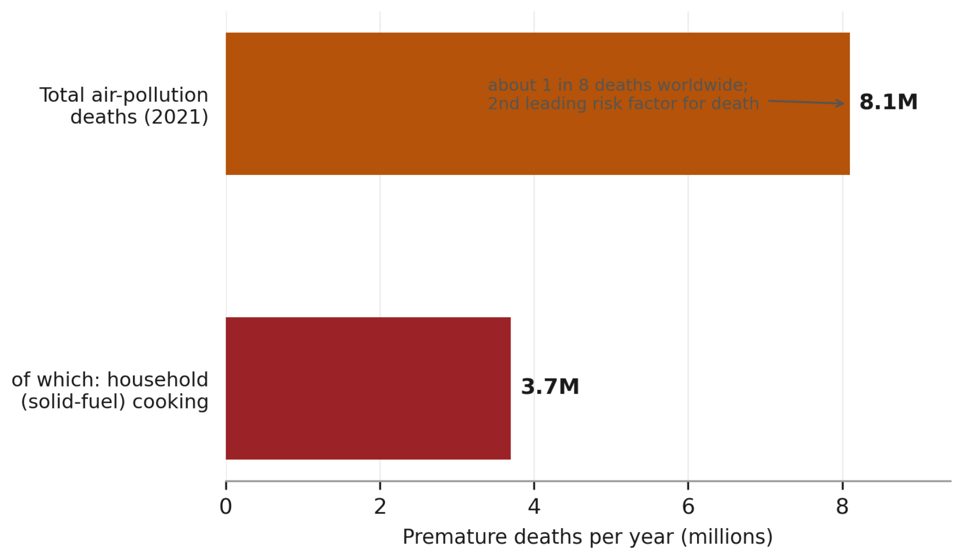

Figure 5. *The air-pollution health burden, and the household share within it.*

State of Global Air 2024 (Health Effects Institute / IHME). Household figure denotes deaths linked to solid-fuel cooking; total is overlap-adjusted.

The dominant controllable source of this burden is combustion — of fossil fuels in power plants, engines, and industry, and of solid fuels (wood, charcoal, dung, coal) in the household stoves on which some 2.1 billion people still depend. This is what makes air pollution a co-benefit of clean development rather than a separate problem: the same clean power that displaces coal generation, the same electric or induction stove that displaces the wood fire, the same electrified bus that displaces the diesel one, removes the source of the particulates as a matter of chemistry. There is no trade-off to manage and no separate programme to fund; the health gain is a physical consequence of the energy transition, delivered wherever combustion is displaced.

6.1 Why the health dividend is systematically omitted

The health co-benefit is large, local, immediate, and — in a well-functioning appraisal — decisive. Studies of major emitters have repeatedly found that the domestic health savings from cleaner air can equal or exceed the entire cost of the emissions reductions that produce them, so that the climate benefit comes, in effect, for less than nothing. And yet the dividend is routinely omitted, for a structural reason: the investment is made and paid for by an energy ministry or a private developer, while the benefit lands on a health ministry's budget and in the lifespans of citizens years later. No accounting line connects the two. The energy project is charged its full cost and credited only its energy revenue and, sometimes, its carbon value; the avoided heart attacks and hospital admissions appear in nobody's appraisal of it. Section 9 argues that closing this gap — literally counting the health return in the energy decision — is among the highest-value reforms available in public finance.

6.2 The clean-cooking case in miniature

Clean cooking is the health dividend in its purest form. For the roughly 2.1 billion people cooking over open fires and rudimentary stoves, household air pollution is a leading cause of death, killing on the order of three million people a year, overwhelmingly women and young children who spend the most time near the smoke. A transition to clean cooking — LPG as a bridge, electric and induction as the destination — removes that exposure almost entirely. It also reduces the pressure on forests from fuelwood gathering, cutting a driver of nature loss; returns hours each day, chiefly to women and girls, that were spent gathering fuel and tending fires, with knock-on gains for education and income; and, where the fuel had been imported, trims the import bill. One modest investment reaches health, gender, education, forests, and the trade balance at once — a multiplier of five from a single stove, and a vivid illustration of why the sectoral accounts, each seeing only its own column, so badly undervalue the whole.

7. Energy Security and Macro-Financial Resilience

> *The events of 2022 taught, at brutal cost, a lesson this section formalises: that a country's energy system is also its exposure to two of the most dangerous systemic threats — the price shock and the fiscal crisis — and that clean development is, among other things, a hedge against both.*

When Russia's invasion of Ukraine sent gas and oil prices to multi-year highs, the countries hurt most were not only those closest to the conflict but those most dependent on imported fossil fuels priced in dollars. For a fuel importer, an energy price spike is a triple blow: it raises the household cost of living, widens the trade deficit as the same volume of fuel costs more, and forces the government either to subsidise consumption — blowing a hole in the budget — or to let prices rise and risk unrest. A single external shock, transmitted through the energy system, becomes at once an inflation problem, a balance-of-payments problem, and a fiscal problem. This is the coupling of Section 2 made concrete.

Sustainable infrastructure severs the channel. Electricity generated from domestic sun, wind, water, and heat has no fuel bill and therefore no fuel-price risk; its cost is fixed at the moment of construction and does not lurch with a distant war or a cartel decision. A country that shifts its power system from imported fuel to domestic renewables converts a large, volatile operating cost into a fixed capital cost it controls — trading exposure to an unpredictable external price for a predictable domestic one. The energy-security benefit is not a vague notion of self-sufficiency; it is the concrete removal of a specific, quantifiable transmission channel through which global shocks become domestic crises.

7.1 The fiscal co-benefit

The fiscal dimension deserves emphasis because it is where the macro-financial threat bites hardest. Many developing countries spend heavily on fossil-fuel import bills and on subsidies to shield consumers from their volatility; both drain the fiscal space that would otherwise fund health, education, and resilience. Displacing imported fuel with domestic clean power relieves both pressures — a smaller import bill and a smaller subsidy burden — freeing resources precisely where the debt data of Section 2 show they are scarcest. In a world where 3.4 billion people live in countries spending more on debt interest than on health or education, an investment that widens fiscal space is not merely an energy project; it is a debt-sustainability and human-development project wearing an energy project's clothes.

This is why energy investment patterns matter so much, and why their current distribution is a problem. As the IEA's World Energy Investment 2025 records, global clean-energy investment has reached roughly US$2.2 trillion a year, about twice the US$1.1 trillion still flowing to fossil fuels — a genuine turning point. Figure 6 shows the split. But the clean investment is heavily concentrated in advanced economies and China; it barely reaches the developing economies outside China that most need the energy-security and fiscal co-benefits, and that face the highest cost of capital. The transition is real but uneven, and the unevenness maps almost exactly onto where the co-benefits would do the most good.

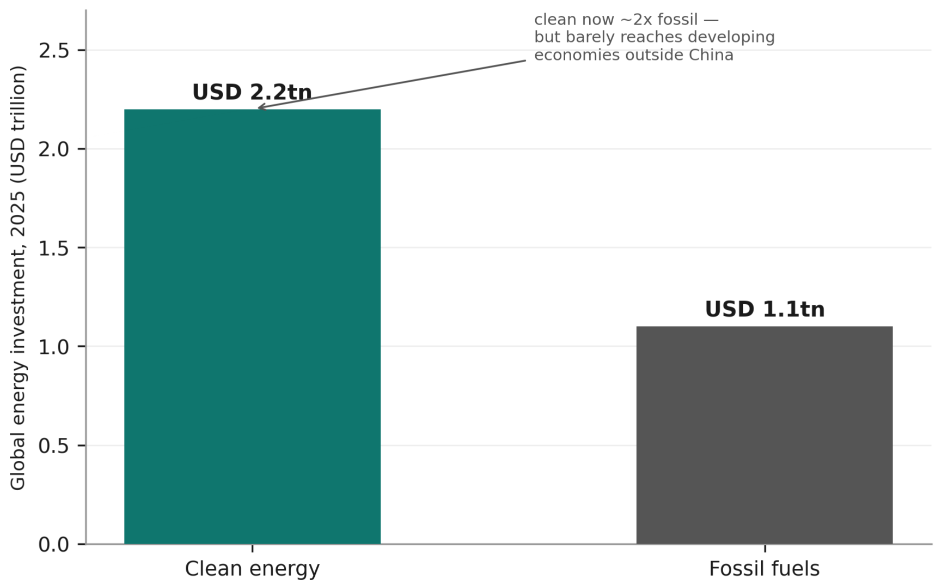

Figure 6. *Global energy investment, clean versus fossil: a turning point, unevenly shared.*
IEA, World Energy Investment 2025. Clean-energy investment concentrated in advanced economies and China.

7.2 Geopolitics and critical minerals

Energy security shades into geopolitics. Fossil-fuel dependence has long been a vector of coercion — the ability to withhold supply or manipulate price is a weapon, and importers know it. A domestic renewable base blunts that weapon. But the transition introduces a dependency of its own: the critical minerals — lithium, cobalt, rare earths, copper — on which clean technologies rely are geographically concentrated, in both mining and processing, and the IEA has warned that this concentration is itself a security risk. The honest conclusion is not that clean development eliminates geopolitical risk but that it changes its shape: from a recurring exposure to volatile fuel flows, which must be paid for continuously, to a one-time exposure in the supply chain for equipment, which can be diversified, recycled, and stockpiled. It is a better class of problem to have, but it is not no problem, and Section 11 returns to it.

8. Water, Food, and the Nature Nexus

> *The final cluster of threats — water stress, food insecurity, and the loss of nature — is bound together so tightly that it is best treated as a single nexus, and it is the domain where nature-based infrastructure earns its place alongside the engineered kind.*

Water, food, and nature form a nexus because each depends on the others. Food production is the largest single use of freshwater; freshwater supply depends on the health of watersheds, wetlands, and forests; and those ecosystems depend, in turn, on a stable climate and on not being cleared for the very agriculture that water scarcity makes less productive. A shock to any one — a drought, a collapsed fishery, a deforested catchment — propagates to the others. The nexus is a coupling within the portfolio, and it responds to a distinctive mix of engineered and natural infrastructure.

On the engineered side, efficient irrigation, water storage, treatment, and sanitation infrastructure secures the resource and breaks the disease pathways that unsafe water opens. Clean, reliable power is a quiet enabler here: pumping, desalination, treatment, and cold storage all require energy, and where that energy is expensive, imported, or unreliable, water and food systems are throttled. Solar-powered irrigation, for instance, gives a smallholder a fixed-cost water supply immune to fuel prices — an energy, water, food, and fiscal intervention in one, and another entry in the clean-development multiplier.

8.1 Nature-based infrastructure as a risk-reduction technology

The natural side of the nexus is where a category often treated as conservation reveals itself as infrastructure. A restored mangrove belt is a storm barrier that also nurses fisheries, stores carbon, and filters water; a protected upland forest is a water-supply system that also regulates floods, sustains biodiversity, and sequesters carbon; urban green space cools cities, manages stormwater, and improves health. These systems provide, for free and in perpetuity, regulating services that engineered substitutes deliver only expensively and partially. Valued as infrastructure — by the losses they avoid and the services they render — nature-based solutions frequently outperform grey alternatives, and they carry co-benefits across more columns of the matrix than almost any engineered asset.

The catch is that nature-based infrastructure is even more poorly served by conventional appraisal than its engineered cousins. Its benefits are diffuse, non-market, and shared; its returns are avoided losses that, if the investment works, are never observed; and no developer can easily capture its value in a revenue stream. It is, in the language of Section 9, the extreme case of the under-counting problem — enormously valuable across the portfolio, and almost invisible to the accounts that allocate capital. That mismatch, more than any physical limit, is why the natural infrastructure that would do so much is so consistently under-provided.

9. Why the Multiplier Is Under-Counted: The Appraisal Gap

> *The report's diagnosis converges here. If sustainable infrastructure reduces so many threats at once, and if the core technologies are now often the cheapest available, why is it not simply built? The answer is not mainly technological or even financial in the first instance; it is an accounting failure, and it has a precise mirror image in how the incumbent system is priced.*

Recall the arithmetic of Section 4. An asset that reduces four threats but is credited with reducing one is measured at roughly a quarter of its worth. This is not a hypothetical; it is how public appraisal and private finance actually work. A power project is evaluated by the energy ministry against energy objectives, financed by lenders against a revenue stream, and, at best, credited with a carbon value. The health co-benefit accrues to a different ministry; the energy-security and fiscal co-benefits accrue to the finance ministry and the central bank; the water, nature, and productivity co-benefits accrue to still others, and to the future. None of these is charged with valuing the investment as a whole, so none does, and the investment presents to its decision-maker as far less valuable than it is. Figure 7 renders the gap.

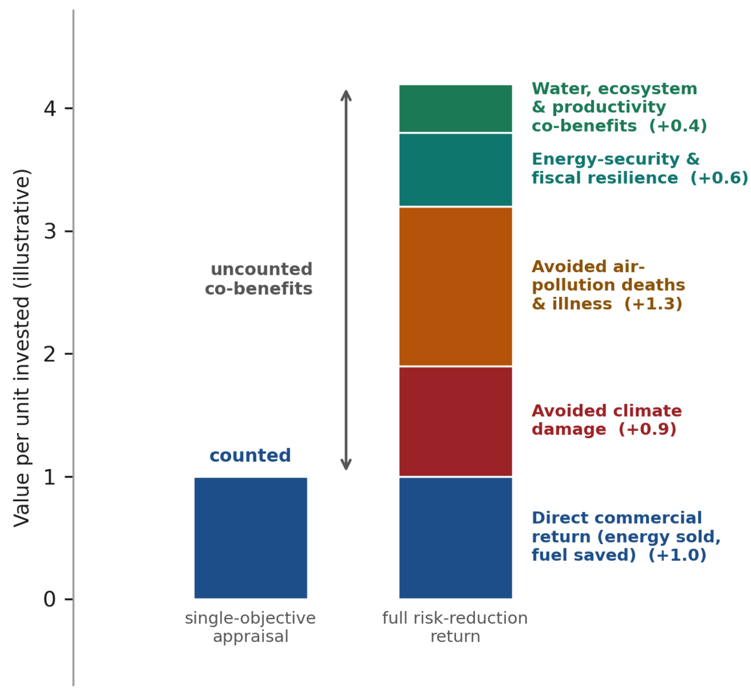

Figure 7. *The appraisal gap: a single-objective appraisal counts a fraction of the full risk-reduction return.*
Author's schematic. Component values are illustrative and stylised to show structure, not calibrated to a specific project.

Figure 7 contrasts two valuations of the same investment. On the left is what a single-objective appraisal counts: the direct commercial return — the energy sold, the fuel saved. On the right is the full risk-reduction return: the same commercial return, plus the avoided climate damage, plus the avoided air-pollution deaths and illness, plus the energy-security and fiscal resilience, plus the water, ecosystem, and productivity co-benefits. The uncounted portion is not a garnish on the counted one; in this stylised rendering it is the majority of the total. An investment that is overwhelmingly worthwhile in full appears, to the budget that must fund it, to be a marginal call. The market and the ministry both build too little, not because they miscalculate, but because they are each answering a narrower question than the one that matters.

9.1 The mirror image: unpriced fossil subsidies

The under-counting of clean development's co-benefits has an exact counterpart in the over-subsidising of its fossil alternative, and seeing the two together clarifies both. The International Monetary Fund estimates that fossil fuels received about US$7 trillion in subsidies in 2024 — close to 7 percent of world GDP. Only a small part of that, on the order of US$0.7 trillion, is explicit: budgetary support that undercharges for the fuel's supply cost. The great majority, some US$6.7 trillion, is implicit — the value of the harms the price does not include, above all the air pollution and climate damage that the burning inflicts on others. Three-quarters of the implicit subsidy is the unpriced cost of pollution and warming. Figure 8 shows the split.

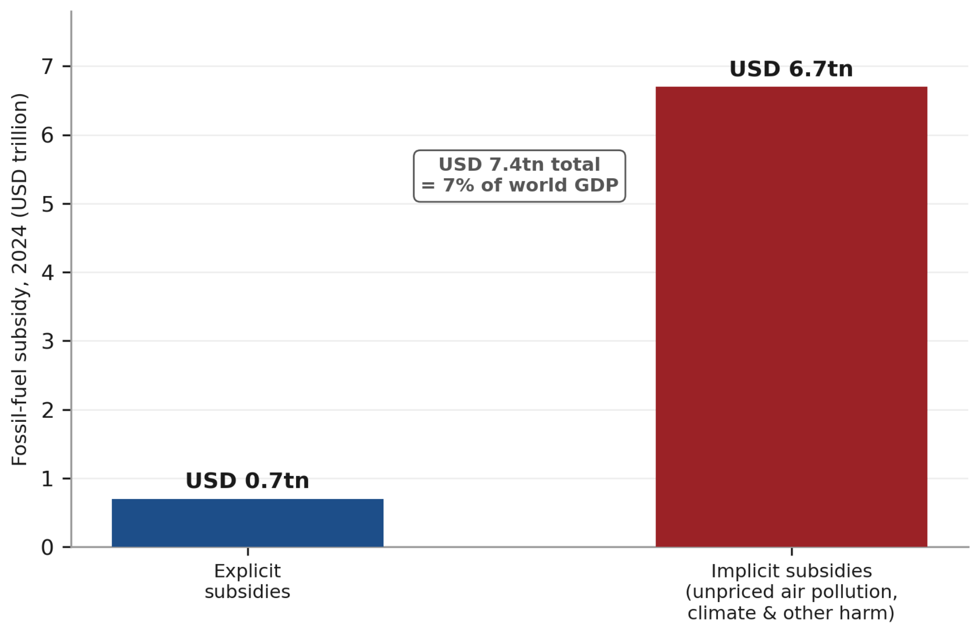

Figure 8. *The fossil-fuel subsidy, 2024: a small explicit component and a vast implicit one from unpriced harm.*

IMF, Underpriced and Overused: Fossil Fuel Subsidies Data 2025 Update. Implicit subsidy = unpriced local air pollution, climate damage, and other externalities.

The symmetry is the point. Fossil fuels are cheap at the point of sale precisely because their co-harms are not priced in; sustainable infrastructure looks dear precisely because its co-benefits are not priced in. The same failure to value externalities flatters the incumbent and penalises the challenger, twice over. A US$6.7 trillion implicit subsidy to fossil fuels and a systematic under-counting of clean development's co-benefits are two faces of one accounting regime — one that prices private costs and revenues accurately and social costs and benefits barely at all. Correcting it does not require subsidising clean development; it requires only ceasing to hide the true costs of its competitor and the true benefits of the thing itself.

9.2 What correcting the gap would take

The remedy follows from the diagnosis. First, integrated appraisal: public investment decisions should be evaluated against the full portfolio of threats they affect, with health, energy-security, fiscal, and ecosystem co-benefits counted in the same analysis as energy returns and carbon. The methods exist — the health-co-benefit and avoided-damage literatures are mature — and lack only the institutional mandate to be applied. Second, corrective pricing: phasing out explicit fossil subsidies and moving, however gradually, toward prices that reflect the pollution and climate harm, which the IMF estimates would raise trillions in revenue while saving lives. Third, standards and mandates that hard-wire the co-benefit into the decision — efficiency codes, clean-procurement rules, siting requirements — for the many cases where an appraisal is never formally run at all. None of these is technically difficult. Each runs into the political economy of concentrated incumbents and diffuse beneficiaries, which is the true binding constraint and the subject of the sections that remain.

10. The Financing Constraint: Paying for Diffuse Returns

> *Even a correctly valued investment must be financed, and here clean development meets its hardest practical obstacle. The returns are real but diffuse, deferred, and partly non-market — exactly the profile that private capital prices most harshly, and that is most expensive to fund where it is most needed.*

Sustainable infrastructure is capital-intensive and front-loaded: it substitutes a large upfront investment for a stream of avoided future costs — fuel not bought, damage not suffered, illness not incurred. That structure makes its economics acutely sensitive to the cost of capital, because almost the entire cost is financing. And the cost of capital is precisely what is highest in the developing economies that most need the co-benefits. The all-in cost of capital for a clean-energy project in a developing economy can run several times that in an advanced one — a wedge on the order of 400 to 800 basis points — driven by real and perceived country, currency, and off-taker risk. A technology that is the cheapest in the world on a level-cost basis can be uneconomic in a particular country solely because capital there is dear.

The cost-of-capital wedge is not a fact of nature; it is, to a substantial degree, a policy variable. It can be narrowed by instruments that address the specific risks lenders price — foreign-exchange hedging facilities, partial guarantees, first-loss public capital, and credit enhancement from multilateral banks — and by the domestic reforms that reduce off-taker and regulatory risk at the source. Concessional and public finance is most powerful not when it funds projects directly but when it is used as leverage: to absorb the risks that keep private capital away, so that each public dollar mobilises several private ones toward investments whose social return, correctly counted, already justifies them. The financing problem is, in large part, the appraisal problem of Section 9 transposed into the language of risk premia.

10.1 Debt as the binding constraint

For many countries the deeper obstacle is the debt overhang. A government spending more on interest than on health cannot find the fiscal space to co-invest, to provide guarantees, or to take on new borrowing even for investments that would pay for themselves. Debt, as Section 2 argued, is the channel through which every other threat becomes unrecoverable, and it is equally the channel that blocks the response. This is why debt relief, restructuring, and instruments that link repayments to shocks — pause clauses that suspend debt service after a disaster, debt-for-climate and debt-for-nature swaps — are not a separate agenda from clean development but a precondition for it. Clearing the debt channel is what makes the fiscal space for everything else.

10.2 The emerging architecture

An institutional architecture to do these things has begun to assemble, piece by piece. Multilateral development banks are under pressure to expand lending headroom and to price and share risk more aggressively; new facilities blend concessional and private capital; sovereign instruments increasingly embed disaster clauses; and initiatives aimed at closing the energy-access gap in the world's poorest regions have set concrete targets for connecting hundreds of millions of people. The architecture remains fragmented, under-capitalised relative to the need, and slow. But its logic is converging on the report's: that the task is to make investments whose full social return is already high actually financeable, by clearing debt, sharing risk, and lowering the cost of capital until the private returns catch up to the social ones.

11. Designing for Co-Benefits: Trade-Offs and the Conditions for Success

> *The argument so far has stressed how much clean development can deliver. Intellectual honesty requires the counter-case: co-benefits are potential, not automatic, and a poorly designed clean investment can create harms as surely as a fossil one. This section sets out when the multiplier fails, and what it takes to secure it.*

The co-benefit matrix describes what is possible when investments are well chosen and well built. It is not a guarantee. A large hydropower dam can generate clean electricity while displacing communities, drowning ecosystems, disrupting fisheries, and emitting methane from a flooded reservoir — reducing one threat while worsening others. A rush for the critical minerals that clean technologies require can reproduce, in lithium and cobalt, the extractive harms long associated with oil. Biofuels pursued carelessly can compete with food and clear forests. Efficiency gains can be partly eaten by rebound, as cheaper energy services are consumed in greater quantity. Even solar mini-grids, if built without attention to productive use, can deliver light without the income that makes them sustainable. Clean development is not automatically benign; it is a set of technologies that can be deployed well or badly.

The failures share a common signature: they occur when an investment is optimised for a single objective in isolation — maximum generation, minimum upfront cost, fastest mineral supply — without regard to the wider portfolio it touches. This is the same single-objective myopia that Section 9 identified in appraisal, now showing up on the cost side rather than the benefit side. The discipline that secures co-benefits is therefore the same discipline that reveals them: evaluate the investment against the whole portfolio of threats it affects, count the harms as carefully as the benefits, and design to maximise the net effect across all of them rather than the gross effect on one.

11.1 Design principles that secure the multiplier

Several principles follow, and Table 3 organises them against the barrier each addresses. Integrated, cross-sectoral appraisal counts the full portfolio and so both reveals co-benefits and catches co-harms. Corrective pricing and subsidy reform level the field against the incumbent. Standards and mandates hard-wire good outcomes where appraisal is absent. Risk-sharing finance and debt relief unlock capital for high-social-return investments. Safeguards and participatory siting prevent the displacement and ecosystem harms that turn a clean investment sour. And attention to productive use and local capability ensures that the infrastructure translates into the development gains that make it durable. None of these is novel; the contribution is to see them as a single, coherent programme for capturing a multiplier that the default system leaves uncaptured.

Table 3. Securing the multiplier: design principles and the barrier each removes.

Design principle	Barrier it removes	Instruments
Integrated cross-sectoral appraisal	Co-benefits (and co-harms) uncounted	Full-portfolio cost–benefit analysis; shadow prices for health, carbon, ecosystems

Design principle	Barrier it removes	Instruments
Corrective pricing & subsidy reform	Incumbent flattered by unpriced harm	Phase-out of fossil subsidies; carbon and pollution pricing; targeted transfers to protect the poor
Standards, codes & mandates	No appraisal run at all	Efficiency codes; clean-procurement rules; siting and safeguard requirements
Risk-sharing finance & debt relief	High cost of capital; fiscal space absent	Guarantees; FX hedging; first-loss capital; disaster clauses; debt-for-nature swaps
Safeguards & participatory siting	Displacement and ecosystem harm	Free, prior and informed consent; environmental and social standards; strategic siting
Productive use & local capability	Infrastructure without development gain	Enterprise finance; skills; local manufacturing and maintenance; anchor demand

12. Evidence from Practice: Clean Development as Multi-Threat Policy

> *The argument is general; the evidence is specific. This section grounds the multiplier in real programmes, chosen because each was undertaken for one reason and delivered across several — the co-benefit thesis observed in the field rather than asserted on a matrix.*

12.1 China: a war on pollution that became a climate and industrial policy

China's clean-development story began not with climate but with air. The smog crises of the early 2010s made air pollution a domestic political emergency, and the government's response — a declared "war on pollution", coal controls, and the fastest build-out of renewables, nuclear, and electric vehicles the world has seen — was framed as a public-health measure. It delivered as one: urban particulate concentrations fell sharply, with large gains in life expectancy in the most polluted cities. But the same programme made China the world's dominant manufacturer of solar panels, batteries, and electric vehicles, driving down their global cost; it improved energy security by reducing reliance on imported fuel; and it bent the country's emissions trajectory. A health investment became, without that having been its stated purpose, an industrial, security, and climate investment — the multiplier realised at national scale.

12.2 India: clean cooking and solar as a health-and-fiscal strategy

India illustrates two co-benefit channels at once. Its programme to extend clean cooking fuel to hundreds of millions of poorer households was justified primarily on health and welfare grounds — attacking the household air pollution that is among the country's leading killers and freeing women from hours of fuel-gathering — but it also reduced pressure on forests and, at the margin, on the fuel-import bill. In parallel, India's aggressive expansion of solar power, pursued for energy security and cost as much as for climate, has begun to displace the coal generation responsible for much of the country's lethal ambient pollution while insulating its power system from fuel-price shocks. Neither programme was sold chiefly as climate policy; both are, among other things, exactly that.

12.3 Morocco: solar as energy security and fiscal relief

Morocco imports the overwhelming majority of its energy, and built one of the developing world's largest concentrated-solar and wind programmes primarily to reduce that dependence and the fiscal drain of fuel imports and subsidies. The climate benefit was real but secondary to the national motive: to convert a large, volatile, foreign-currency import cost into a fixed, domestic one, and to reclaim the fiscal space that fuel subsidies had consumed. Morocco's transition is, in the terms of Section 7, a textbook severing of the fuel-price transmission channel, undertaken for hard-headed macroeconomic reasons and delivering climate and air-quality co-benefits as a bonus.

12.4 Europe: renewables as the answer to an energy weapon

The clearest recent demonstration that clean development is security policy came from Europe after 2022. Confronted with the use of gas supply as an instrument of coercion, the European Union's response was to accelerate renewables, efficiency, and electrification as the durable route out of dependence — energy security pursued through clean infrastructure rather than through a scramble for alternative fossil suppliers alone. The episode showed, at the scale of a continent, that the fastest way to blunt an energy weapon is to stop needing the fuel, and that the climate agenda and the security agenda, so often posed as competitors, in fact point the same way.

12.5 Kenya and Ethiopia: clean power as access and resilience

In East Africa, geothermal and hydropower in the grid and solar beyond it have been pursued first as development — as the fastest, cheapest route to the electricity that schools, clinics, and businesses need. Kenya draws much of its power from domestic geothermal and other renewables, giving it a low-carbon grid built for reasons of cost and reliability rather than climate; off-grid solar has extended a first rung of access to millions beyond the grid's reach. The co-benefits follow the pattern: domestic, renewable power that avoids fuel imports, reduces exposure to price shocks, and supports the digital and early-warning systems that build resilience — a development investment that reduces several systemic threats because of what it is, not because of what it was called.

12.6 What the cases share

Across these very different countries a single pattern recurs. In none was the investment undertaken primarily as climate policy; each was driven by a local, immediate, appropriable motive — clean air, secure energy, fiscal relief, basic access, industrial advantage. And in each, the investment delivered across several threats at once, climate included, because the underlying infrastructure reduces coupled risks as a matter of physics and economics. The cases are the report's thesis observed rather than argued: clean development is most powerful, and most politically durable, when it is pursued for its nearest benefit and allowed to deliver the rest. The task for policy is not to persuade countries to sacrifice for a distant global good, but to help them see, count, and finance the full return on what is already in their interest.

13. Conclusion: Infrastructure as Risk Policy

> *The report's claim can be put in a sentence: the most powerful instrument of global risk reduction available is not a new technology or a new treaty but a change in how we value the infrastructure we were going to build anyway.*

The world faces not one systemic threat but a portfolio of them — climate disruption, an air-pollution death toll of millions, energy insecurity, macro-financial fragility, water and food stress, the loss of nature, and the geopolitics of scarce resources. These threats are usually addressed one at a time, each by its own institution with its own budget, and treated that way each looks nearly unaffordable. But the threats are coupled through shared physical drivers, above all the combustion of fossil fuels and the degradation of ecosystems, and that coupling is the opening. An investment made at a node of coupling relieves several threats at once. Sustainable infrastructure — clean power, efficiency, clean cooking and transport, resilient water, nature-based systems, and the digital backbone that ties them together — sits at exactly those nodes, which is why a single act of clean development reduces, on the reading of this report, three to five distinct systemic risks simultaneously.

The obstacle is not mainly that the technologies are lacking or costly; across much of the world the core technologies are now the cheapest available. The obstacle is that we mis-measure their worth. Appraisal, budgeting, and finance are organised threat by threat, so an investment that reduces four threats is credited with reducing one, and its measured return is a fraction of its true return. The same accounting regime that hides clean development's co-benefits also hides fossil fuels' co-harms — the roughly US$6.7 trillion of implicit subsidy that unpriced pollution and climate damage represent — flattering the incumbent and penalising the alternative in a single stroke. The binding constraint is an accounting failure with a political economy behind it, not a technological one.

The implication is a reframing more than a new programme. Sustainable infrastructure should be appraised, budgeted, and financed as portfolio risk reduction — as the shared answer to many threats — rather than as sectoral climate policy competing for a slice of an environmental budget. Concretely, that means counting the full portfolio of co-benefits in every major public investment decision; ending the implicit subsidy that unpriced harm gives to fossil fuels; hard-wiring good outcomes through standards where appraisal is absent; clearing the debt and cost-of-capital barriers that keep high-return investments unfinanced; and designing each investment against the whole portfolio so that co-benefits are secured and co-harms avoided. None of this requires a technological breakthrough. It requires seeing infrastructure for what it is — the physical substrate through which almost every systemic threat is either transmitted or contained.

The countries that navigate the coming decades well will not be those that solved their threats one at a time; there is neither money nor time enough for that. They will be those that recognised the overlap — that the same investment which cleans the air also stabilises the climate, secures the energy, steadies the budget, and hardens the water and food systems — and that built, financed, and valued their infrastructure accordingly. Clean development is not a cost to be borne for the planet's sake. It is the rare investment that pays many times over, in many currencies of risk at once, for those with the accounting to see it and the finance to build it.

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A note on figures and estimates

Figures 1 and 3 are conceptual schematics; Figure 3's cell intensities and Figure 4's counts are a qualitative expert reading of the mechanisms and sources cited in Sections 5–8. Figure 2's bar lengths are an illustrative severity ranking rather than a common unit, with the real headline metric printed for each threat. Figure 7's component values are stylised to show the structure of the appraisal gap, not calibrated to a specific project. Figures 5, 6, and 8 present values reported by the cited primary sources (State of Global Air 2024; IEA World Energy Investment 2025; IMF Fossil Fuel Subsidies 2025 Update). Every quantitative claim in the text is attributed inline to a primary or authoritative secondary source. The report is analytical rather than predictive.