TASK BY Sulitest 3.1.1 — Laws, Policies, and Institutions

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Governance → **Subject**: 3.1.1 – Laws, Policies, and Institutions

Laws. Transformative change requires reconfiguring social practices, norms, values, and laws that promote unsustainable or discriminatory behavior (GSDR, 2019, 35). Laws, regulations, taxes, and fines signal societal priorities. Governments should strengthen the rule of law, enforce anti-discrimination laws, and address discriminatory social norms to ensure access to justice. Deprivations that people experience are often rooted not only in resource limitations but in structural social and political inequalities and discriminatory laws and norms, which must be changed (GSDR, 2019, 35–41). **Policies**. Policies result from debate and struggle among actors, with unequal societies often dominated by powerful interests. Policies must address environmentally damaging behaviors through economic incentives, including removing harmful subsidies, taxation, and regulation such as progressive carbon taxation. They should serve the common good across public and private sectors, and policies that impede transformative change should be reversed (GSDR, 2019, xx). **Institutions**. Effective, transparent, accessible, and inclusive institutions underpin governance by goals. They must protect the rule of law, ensure access to justice, and support civil society. Governments should integrate targets into national plans and budgets and establish systems to manage risks, monitor progress, and evaluate outcomes (GSDR, 2019, 30).

1. Human Well-Being and Capabilities

- **Rights-based, transparent, and accountable institutions**: Ensure rule of law, due process, access to justice, non-discrimination, transparent policymaking, evidence-based regulation, open information, and active civil society. Protect laws, policies, and institutions from anti-democratic populism.
- **Access to essential services**: Guarantee as legal rights universal access to health care (UHC), food security, safe water, and sanitation. Provide affordable and safe housing, clean and affordable utilities, and access to mobility.
- **Gender-equal and inclusive decision-making**: Guarantee gender-responsive governance, constitutional parity, gender quotas, GBV elimination, family planning and reproductive rights, menstrual-health access, and inclusion of marginalized groups—especially girls, Indigenous People, and minorities.
- **Progressive social and economic policies**: Enhance livelihoods, skills, and job security via green-job upskilling and social protections (e.g., universal basic income, decent work standards, safe labor conditions, etc.) Ensure anti-discrimination laws in hiring and wages.
- **Multi-level governance**: Fight corruption. Address structural barriers to well-being. Enhance coordination across sectors, stakeholder participation, and transformative multilateral participatory processes and alliances (public–private–civil society–Indigenous). Ensure SDG monitoring. Address governance impediments (e.g., corruption, violence, weak enforcement, inefficiency, etc.).

2. Sustainable and Just Economies

- **Effective fiscal and regulatory policies**: Differentiated carbon pricing, urgent fossil phase-out, polluter-pays principles. Regulate harmful substances and enforce global conventions. Eliminate fossil fuel subsidies and institute environmental taxation.
- **Fair economic and social policies**: Ensure economic development raises income for the poor rather than deepening inequality.
- **Effective and significant public, private, and multilateral finance**: Scale public and private finance for adaptation and net-zero transitions. Decolonize development finance and global assistance structures (e.g., debt relief, trade policies, assistance, etc.). Reinforce global partnerships for sustainable, innovative, knowledge-sharing.
- **Robust national and global governance**: Uphold international justice, advocate for collective action, and improve treaty reporting, compliance and enforceability. Address structural barriers and impediments (e.g., corruption, opaque indicators, lobbies, interest-group resistance, etc.). Support inclusive governance with civil society, Indigenous Peoples, workers, and city governance.

3. Sustainable Food Systems and Healthy Nutrition

- **Agroecological food production systems**: On multiple governance scales, strengthen land access and protection (particularly on indigenous lands). Institute degraded-land and landscape restoration policy. Ensure land-tenure reform for security.
- **Low impact production, distribution, and resilience**: Adopt policy reform and investment in enabling conditions across the whole value chain (e.g., improved value chains, carbon payments, subsidies, irrigation efficiency, overfishing reduction, nutrient-management, etc.).
- **Healthy and sustainable diets**: Mobilize regulatory, financial, and social-protection instruments for good nutrition, and leverage public-health information and educational materials. Institute incentives/disincentives for guided food choices. Mobilize cash transfers and public funding schemes against child malnutrition. Invest in public school meals. Support clean cooking everywhere.
- **Human rights-based approach to food systems**: Secure women's rights. Protect subsistence of agricultural workers. Defend Indigenous cultivation practices. Establish food as a human right, including in conflict. Address excessive market power and corporate monopolies. Ensure protection of civic space for grassroots food movements.

4. Energy Decarbonization with Universal Access

- **Legal frameworks for rapid energy decarbonization**: Adopt economy-wide carbon pricing of fossil CO_2 emissions, mandatory targets to increase renewable electricity shares, bans on new coal installations (2025-2030), and regulations tightening energy efficiency, appliance standards, cool-roof requirements, and building performance, paired with policies to phase out fossil energy subsidies, restrict traditional biomass and high-risk nuclear expansion.

5. Urban and Peri-Urban Development

- **Urban planning and building regulation**: Adopt net-zero planning frameworks for cities and regions that: include housing design standards, articulate energy-efficient building codes; regulate or ban refrigerants; rationalize retrofits; and require climate adaptation measures in all new urban development (e.g. C40 cities initiative).
- **Institutional systems for climate risk management, early warning, and public safety**: Develop early-warning systems for natural disasters. Ensure adaptation plans are locally led.

6. Global Environmental Commons

- **Conservation laws, protected-area governance, and ecosystem-restoration policies**: Establish and expand protected areas, land-use regulations, protected-area management and monitoring, ecosystem/landscape restoration goals and policies (e.g., re-/pro forestation, wetland and peatland recovery, rewilding, etc.).
- **Structural barriers**: Challenge impediments (e.g., tragedy of the commons, treaty violation, greed, anti-science, national sovereignty refuge, etc.).

- **Affordable, modern, and clean energy services as rights**: Institute subsidies for clean fuels and technology. Phase-out of biomass cookstoves. Create rights-based energy access frameworks and introduce justice and affordability in energy transitions via micro-credit access, rebates, and national standards. Reform labelling for efficient household equipment.
- **Resilient, electrified, and renewable-based energy systems**: Pass laws and implement policies for smart/net-zero energy systems, battery and energy-storage deployment, and microgrids. Regulate and incentivize large-scale and distributed renewable technologies (solar PV, wind, geothermal, hydropower, tide/wave, agrivoltaics). Create frameworks and standards for green hydrogen and electrification of all sectors. Electrify everything.
- **Fossil fuel phase-down and methane mitigation**: Mandate rapid coal phase-outs and retirement schedules for fossil infrastructure. Regulate oil and gas production reduction and require methane controls for coal mines and petroleum systems.

- **Sustainable urban mobility, transport, and waste systems:** Codify regulations and incentives for public transport, multi-modal mobility, and electric vehicle uptake. Set standards for passenger cars and aviation. Expand municipal waste collection, composting, and recycling.
- **Nature-based solutions and integrated urban environmental governance**: Use nature-based solutions to address urban and rural challenges and enhance health, cohesion, and environmental sustainability (e.g., greening urban areas, protecting urban water resilience, restoring wetlands, and integrating green spaces into urban planning).

- **Sustainable land and sea use management via policy**: Improve land tenure, area-based conservation, integrated land-use planning, agroforestry integration, water-rights frameworks, water-pricing and withdrawal limits, transboundary water treaties and cooperative freshwater governance.
- **International environmental law, treaties, and multilateral governance mechanisms to protect global commons**: Implement Paris Agreement, Montreal Protocol, IPCC/IPBES, COP, etc. Improve treaty compliance and enforcement. Apply emerging eco-principles (e.g., ecosystem rights, legal personhood for nature, ecocide, etc.).
- **Inclusive, multi-stakeholder, and Indigenous governance of shared ecosystems**: Uphold Indigenous land and water rights, traditional ecological knowledge in policy, and community-based water and ecosystem governance.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. United Nations. (n.d.). *Sustainable Development Goals: 17 goals, 169 targets, indicators & progress*. Retrieved from https://sdgs.un.org/goals
4. United Nations. (annual). *The Sustainable Development Goals Report*. Annual editions available at: https://unstats.un.org/sdgs
5. United Nations. (annual). *The Sustainable Development Goals Report – Extended report: Goal 16 (Peace, justice and strong institutions)*. Annual editions available at: https://unstats.un.org/sdgs/report/2025/extended-report/
6. United Nations. (annual). *The Sustainable Development Goals Report – Extended report: Goal 17 (Partnerships for the Goals)*. Annual editions available at: https://unstats.un.org/sdgs/report/2025/extended-report/
7. United Nations Educational, Scientific and Cultural Organization (UNESCO). (2017). *Education for sustainable development goals: Learning objectives and discussion topics*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000247444
8. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
9. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
10. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf

3.1.2 — Infrastructure, Planning, and Natural Resource Management

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Governance → **Subject**: 3.1.2 — Infrastructure, Planning, and Natural Resource Management

Definition: Infrastructure is the human-designed set of built equipment, utilities, installations, and services, in addition to their coordinated efforts, that support and promote well-defined societal objectives, such as economic growth, health, and quality of life. Sustainable infrastructure is infrastructure that delivers long-term economic, social, and environmental benefits (PPAAF-GI Hub, 2026). Natural resource management is a set of policies and practices aimed at the sustainable use of land, water, air, soil, minerals, and wild flora and fauna, while conserving biodiversity and ecology to promote ecosystem resilience and ensure resource availability for future generations (adapted from Ullah et al, 2021).

1. Human Well-Being and Capabilities

- **Climate-resilient essential services infrastructure**: Prioritize water, WASH, health, housing, and education. Ensure access for all, with priority to vulnerable populations: e.g., Small Island Developing States, low-income groups, women and girls, minorities, and children. Ensure inclusive service provision, disaster-risk reduction, social protection and access to long-term food and water.
- **Capacity building**: Strengthen infrastructure, planning and natural resource management via education, empowerment, green-job upskilling, environmental education, girls' education, family planning, and community empowerment—including Indigenous sovereignty and local governance. Empower people to drive social, economic, and environmental transformation.
- **Life-work balance**: Promote equitable, just transitions that protect workers, communities, and consumers. Align transitions with industrial decarbonization and just-transition planning to protect workers and communities.

2. Sustainable and Just Economies

- **Transition to circular, low-waste, resource-efficient economic systems**: Institute a circular economy, waste minimization, RRR (reduce–reuse–recycle), extended producer responsibility, product lifecycle management, regenerative design. Promote recycling and composting infrastructure, materials recovery, reduce leakage/ pollution.
- **Decarbonize and modernize industrial systems**: Trace low-carbon pathways in cement, steel, chemicals, aluminium, refrigerants, industrial heat, green hydrogen, industrial electrification, and methane reduction. Encourage innovation, standards, efficiency upgrades, and alternative feedstocks to reduce carbon and material footprints.
- **Critical raw materials**: Ensure sustainable, ethical, and low-impact extraction and management of CRM such as lithium, cobalt, copper, aluminium, uranium, potash, sand, gravel, and rare earth elements, including reducing environmental harm, community health impacts, and corruption risks. Strengthen recycling, circularity, and alternative materials to reduce resource depletion and geopolitical vulnerability.
- **Resilient, low-emission transport and mobility systems**: Promote zero-emission vehicles, green shipping fuels, sustainable aviation, & climate-resilient transport infrastructure.

3. Sustainable Food Systems and Healthy Nutrition

- **Resilient, regenerative, and agroecological food systems**: Promote agroecology, regenerative agriculture, integrated crop–livestock systems, perennial crops, silvo-pasture, vermiculture, agroforestry, climate-resilient cropping, sustainable forest management, and soil-restoring methods (e.g., cover crops, minimal tillage, biological nitrogen fixation).
- **Land, water, and nutrient management**: Institute water-efficient agriculture (e.g., drip irrigation, agricultural water productivity), nutrient management (e.g., phosphorus limits, precision farming). Restore degraded land to enhance ecosystem services and protect long-term food security.
- **Food value chains and reduced waste**: Implement circular and localized systems, localized production, composting, circular nutrient loops, food waste and loss reduction. Address bycatch, waste-to-fertilizer strategies, and regenerative value-chain approaches.
- **Monitoring and assessment**: Engage in impact analysis vis-à-vis land artificialization related to food production. Integrate environmental impact and assessment processes into food production decision-making and cost analysis

4. Energy Decarbonization with Universal Access

- **Clean, renewable, resilient energy systems**: Accelerate deployment of solar PV (utility-scale and distributed), wind (on- and offshore), geothermal (including enhanced geothermal), hydropower, tidal/wave, microgrids, agrivoltaics, and ocean power. Expand battery storage, power-pool integration, grid upgrades, and nuclear technologies.
- **Electrify everything and improve energy efficiency**: Prioritize transport, buildings, and industry. Deploy heat pumps, LED lighting, efficient appliances, district heating and cooling, and energy-efficient buildings. Impose mandatory efficiency standards, national labeling schemes, incentives, rebates, and behavioral interventions.
- **Fossil energy phase-out**: Cease carbon extraction. Manage use of methane and address just-transition risks. Introduce carbon pricing. Phase out fossil fuel subsidies. Retire coal (up to 90% by 2030 in high-income countries). Ban new coal plants. Reduce oil and gas methane leakage. Address legacy emissions from coal mines and extraction sites. Regulate fracking and plan for socioeconomic impacts of fossil fuel decline.

5. Urban and Peri-Urban Development

- **Climate-resilient, low-carbon, and inclusive environments**: Promote net-zero and resilient building standards, passive architecture, climate and disaster resilient construction, and energy-efficient retrofits. Invest in bio-based and low-carbon materials, modular housing, material reuse, and circular construction methods to reduce emissions and improve safety.
- **Urban planning for accessibility, equity, and spatial justice**: Promote 15-minute city models. Encourage upgrades co-designed with marginalized or informal-settlement residents. Adopt zero-eviction policies. Develop green spaces, transit, and social infrastructure in underserved communities.
- **Sustainable mobility and urban infrastructure systems:** Promote public transport, multimodal mobility, EV incentives and mandates, fuel-efficiency standards, and walkable/cyclable urban design.
- **Urban green, blue, and nature-based infrastructure:** Develop parks, green roofs, wetlands, and nature-based drainage systems. Achieve urban water resilience via decentralized water systems, leakage

6. Global Environmental Commons

- **Ecosystems and carbon sinks**: Promote conservation and restoration of forests (boreal, temperate, tropical), peatlands, grasslands, wetlands, degraded lands, and wildlife corridors. Implement afforestation, reforestation, pro-forestation, agroforestry, silvo-pasture, fire ecology management, and sustainable forest stewardship. Improve land tenure, monitoring.
- **Ocean and freshwater ecosystems and blue carbon systems**: Protect and regenerate mangroves, seagrasses, tidal marshes, salt marshes, coral reefs, and riparian zones. Expand marine protected areas, regulate overuse, limit nutrient runoff, and invest in ocean and freshwater ecosystem restoration. Up-scale seaweed and sea-forestation initiatives that enhance biodiversity, local climate regulation, and carbon sequestration.
- **Governance, regulation, and equitable management of shared global resources**: Implement conservation policies, protected areas, land-use regulation, enforcement against illegal extraction and wildlife trade, sustainable commodity chains, certification systems, ecosystem-service-based water management, limits on water

• **Energy transitions**: Strengthen national planning for energy adaptation, invest in resilience for power systems, expand green hydrogen for hard-to-abate sectors, support district energy systems, and address rare earth element supply chains and recycling.	reduction, and water reuse. Promote urban farming and circular water flows. • **Risk management and adaptation capacities**: Install early warning systems. Ensure universal access to risk information. Promote adaptive management, locally led adaptation principles, and integrated resource planning vis-à-vis land, water, waste, and energy. • **Monitoring and assessment**: Engage in impact analysis vis-à-vis land artificialization related to urban growth. Integrate environmental impact and assessment processes into urban planning decision-making and cost analysis.	withdrawals, and integration of ecosystem values in infrastructure and planning. • **Integrated landscape and watershed strategies**: Promote landscape-wide strategies such as rewilding, habitat mosaic restoration, managed grazing, fire and water flow management, nurse planting, artificial reefs, regenerative agriculture, and soil regeneration. • **Addressing extraction, pollution, and climate change**: Regulate mining and critical raw material extraction (e.g., copper, cobalt, REEs, uranium, aluminum, etc.). Mitigate land and water pollution, reduce biodiversity loss from extraction, manage climate-driven risks (droughts, floods), incorporate ecosystem limits into planning, and promote nature-based solutions for mitigation and adaptation.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Circle Economy Foundation. (annual). Circularity Gap Report. Annual editions available at: https://www.circularity-gap.world/
4. International Energy Agency (IEA). (annual). Global Energy and Climate Model. Paris: IEA. Annual editions available at: https://www.iea.org/reports/global-energy-and-climate-model
5. International Energy Agency (IEA). (annual). World Energy Outlook. Paris: IEA. Annual editions available at: https://www.iea.org/analysis?type=report
6. Intergovernmental Panel on Climate Change (IPCC). (2022). Climate change 2022: Mitigation of climate change. Contribution of Working Group III to the Sixth Assessment Report of the IPCC. Retrieved from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
7. United Nations. (n.d.). Sustainable Development Goals: 17 goals, 169 targets, indicators & progress. Retrieved from https://sdgs.un.org/goals
8. World Bank. (2017). The growing role of minerals and metals for a low-carbon future. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/207371500386458722
9. World Bank. (2018). What a waste 2.0: A global snapshot of solid waste management to 2050. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/303171545326325241
10. Project Drawdown. (n.d.). Drawdown Explorer: The world's climate solutions platform. Retrieved from https://drawdown.org/explorer
11. Regeneration International. (n.d.). Nexus library of solutions. Retrieved from https://regeneration.org/nexus
12. United Nations Framework Convention on Climate Change (UNFCCC). (2024). 2030 climate solutions: An implementation roadmap. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf

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TASK BY Sulitest 3.2.1 — Macroeconomic Considerations and Finance

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Economy and Finance → **Subject**: 3.2.1 — Macroeconomic Considerations and Finance

Definition: Macroeconomics is a branch of economics that deals with the performance, structure, behavior, and decision-making of an economy. "Economic policy typically encompasses fiscal, monetary and trade policy, while financial flows include flows from public and private sources, within and across national borders" (GSDR, 2019). Macroeconomic considerations affect economic activity and therefore both the usage rates of Earth's natural resource base and the generation of various forms of waste and pollution. As such, numerous macroeconomic parameters accelerate energy and resource use and contribute to the social consequences and environmental footprint of all economies. (Nadal, 2015)

1. Human Well-Being and Capabilities

- **Human development public investment**: Invest in essential human development systems such as primary health care, water and sanitation, nutrition, housing. Ensure inclusive access / affordability.
- **Labor force upskilling**: Transition labor force to green jobs. Provide support that enables women's and minority empowerment through basic income and decent work.
- **Redistributive and welfare-state financing**: Institute progressive taxation, wealth taxes, Universal Basic Income models (universal, unconditional, periodic) and schemes to reduce inequality.
- **Fiscal policy for health, environmental, and social objectives**: Implement targeted incentives and disincentives such as polluter-pays taxes. End subsidies for unhealthy or harmful commodities (e.g., industrial agriculture and fisheries, ultra-processed foods, chemical pesticides, etc.) and redirect financial flows. Embed doughnut economics, social foundations, ecological ceilings, and human-development metrics into macroeconomic planning.
- **Sustainable capital investment**: Shift capital toward sustainable, long-term, capability-enhancing investments. Steer public and private capital away from short-term speculative activities. Set interest rates that incentivize future preferences over present ones.

2. Sustainable and Just Economies

- **Equitable and sustainable financial systems**: Launch progressive tax reforms, carbon taxes (with redistribution), wealth/inheritance taxes, and taxation of fossil fuel companies to fund public services and accelerate green transitions, mostly in low-income countries.
- **Green investment**: Institute concessional finance, public-private partnerships, SDG and gender-lens bonds, and climate finance mechanisms (e.g., MDBs, Green Climate Fund) to support net-zero transitions and circular economic activity.
- **Green metrics and assessment**: Transition to Human Development Index, Social Progress Index, inclusive wealth, Genuine Progress Indicator, environmental-economic accounting (SEEA), valuation of ecosystem services, climate disclosures (e.g., TCFD, GRI, ISSB), etc.
- **Just transitions and labor shifts**: Invest in decent work, care infrastructure, skills retraining, and social protections for workers in transitioning sectors.
- **Harmful financial flows**: Address harmful flows vis carbon pricing, polluter-pays principles, and removal of subsidies around fossil fuel, fertilizer, industrial fisheries etc.

3. Sustainable Food Systems and Healthy Nutrition

- **Green agricultural systems**: Phase out harmful subsidies and redirect public finance into agroecological agriculture, climate-smart practices, agroforestry, efficient irrigation, green bonds and climate funds to restore land and ecosystems.
- **Universal access to healthy nutrition**: Increase international funding for resources to address hunger, stunting, wasting, anemia, and food insecurity.
- **Transparency of true cost of foods:** Include health and climate externalities into pricing. Redirect agricultural subsidies into local, sustainable food systems. Ensure labelling and monitoring / accounting for sustainable food systems reflect land use cost, artificialization, biodiversity impacts, soil health, etc.
- **Food trade and governance**: Leverage international trade policy against food insecurity. Lower environmental footprints of domestic food consumption. Ensure access to markets for small producers.

4. Energy Decarbonization with Universal Access

- **Investment in clean energy access**: Invest in infrastructure for clean energy, cooking, and electrification. Address funding as main obstacle to SDG-7. Prioritize on/off-grid solutions & local ownership.
- **Fossil fuel divestment**: Divest and end fossil fuel subsidies globally and use revenues to fund renewable access, fossil-free GDP, and just transition measures.
- **Targeted subsidies and demand-side investments**: Subsidize cleaner cookstoves, support low-income electrification, and accelerate adoption of energy-efficient appliances.
- **Finance technology for decarbonization**: Promote increased public and private funding for R&D in renewables, smart grids, storage, green hydrogen, and carbon dioxide removal technologies.

5. Urban and Peri-Urban Development

- **Climate-resilient infrastructure**: Leverage green and social housing bonds. Direct public capital to low-carbon, affordable projects, public-private investments, and grants for retrofits, smart cities, and net-zero buildings.
- **Green housing investment**: Dis-incentivize housing speculation and embed housing as a right. Engage needed market corrections in housing real estate and short-term rentals.
- **Invest in inclusive and sustainable urban transitions**: Invest in collective transport, green public spaces, innovation in solid waste reduction, and smart city technologies. Support electric vehicle market penetration, green/clean tech, etc.
- **Systemic urban financing gaps**: Address infrastructure underinvestment, large sunk costs, and institutional weaknesses.
- **Global solidarity mechanisms**: Increase climate relief funds, sovereign green bonds, and debt-for-nature. Implement disaster reconstruction instruments to support post-crisis recovery and resilience.

6. Global Environmental Commons

- **Conservation and restoration funding**: Ensure sustained funding for protected areas and conservation.
- **Finance and debt instruments for nature**: Leverage sovereign bonds, blue bonds, debt-for-nature swaps. Mobilize resources for Kunming-Montreal Biodiversity Framework.
- **Harmful financial flows and mal-aligned markets**: Realign subsidies for land conversion. Redirect flows from harmful fisheries, and extractive sectors towards biodiversity positive sectors, green finance, ESG , and financial risk integration incorporating biodiversity, water, and health.
- **Blended mechanisms**: Introduce PES schemes, blue/green bonds, and ESG-linked financing to fund commons protection. Create incentives for sustainable land, ocean, and water management.
- **Fiscal levers**: Redirect taxes on pollution/profits as revenues for eco-system services, restoration jobs, and community-led conservation. Adjust risk profiles to aid sustainable investment in vulnerable countries.
- **Planetary limits**: Integrate into thinking and policy key concepts such as limits to growth, degrowth, post-growth, green growth, decoupling, steady state, planetary boundaries, environmental economics, etc.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Financial Stability Board. (2022). Task Force on Climate-related Financial Disclosures: 2022 status report. Retrieved from https://www.fsb-tcfd.org/publications/
4. Intergovernmental Panel on Climate Change (IPCC). (2022). Climate change 2022: Mitigation of climate change. Contribution of Working Group III to the Sixth Assessment Report of the IPCC. Retrieved from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
5. Nadal, A. (2015). *Macroeconomic policies and environmental sustainability*. Economics 2015. Retrieved from https://china.elgaronline.com/edcollchap/edcoll/9781783471409/9781783471409.00010.xml?rskey=c6e4Tk&result=2
6. Oxfam International. (2020). Time to care: Unpaid and underpaid care work and the global inequality crisis. Retrieved from https://www.oxfam.org/en/research/time-care
7. Parrique, T. (2019). The political economy of degrowth. Doctoral dissertation, Université Clermont Auvergne and Stockholms universitet. Retrieved from https://theses.hal.science/tel-02499463
8. Polanyi, K. (1944). The great transformation: The political and economic origins of our time. New York: Rinehart.
9. Piketty, T. (2013). Le capital au XXIe siècle. Paris: Seuil.
10. Piketty, T. (2019). Capital et idéologie. Paris: Seuil.
11. Raworth, K. (2017). Doughnut economics: Seven ways to think like a 21st-century economist. White River Junction, VT: Chelsea Green Publishing.
12. International Labour Organization (ILO). (2023). World employment and social outlook 2023: The value of essential work. Geneva: International Labour Office. Retrieved from https://www.ilo.org/digitalguides/en-gb/story/weso2023-key-workers#home
13. Project Drawdown. (n.d.). Drawdown Explorer: The world's climate solutions platform. Retrieved from https://drawdown.org/explorer
14. Regeneration International. (n.d.). Nexus library of solutions. Retrieved from https://regeneration.org/nexus
15. United Nations Framework Convention on Climate Change (UNFCCC). (2024). 2030 climate solutions: An implementation roadmap. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf

3.2.2 - Microeconomic Considerations, Business & Industry

Subject Knowledge

Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Economy and Finance → **Subject**: 3.2.2 – Microeconomic Considerations, Business and Industry

Definition: Microeconomics is a branch of economics that studies the behavior of individuals and business firms in making decisions regarding the allocation of scarce resources as well as the commercial interactions among these individuals and firms. (Hoagland, 2021) Microeconomic considerations and decision-making affect economic activity and therefore both the usage rates of Earth's natural resource base and the generation of various forms of waste and pollution. Numerous microeconomic parameters accelerate energy and resource use and contribute to the social consequences and environmental footprint of economic activity. (Nadal, 2015)

1. Human Well-Being and Capabilities

- **Business for social resilience**: Promote social entrepreneurship, community-ownership models, cooperatives, economic diversification, and social innovation.
- **Universal services as economic drivers**: Support private sector roles in WASH, health, upskilling to green jobs, and health.
- **Gender equity in business**: Promote the creation of inclusive workplaces, equal-pay audits, and STEM recruitment access.

2. Sustainable and Just Economies

- **Green business models**: Transition from linear to circular and sharing economy frameworks, product-service systems, cradle-to-cradle design and lifecycle support, and regenerative enterprise models. Internalizing environmental costs.
- **Transparency in supply chains**: Ensure sustainable sourcing, life-cycle assessments, and traceability systems (blockchain, etc.), fair trade, and sustainable procurement. Combat greenwashing and planned obsolescence (e.g., fast fashion, single-use items, etc.).
- **Corporate governance and reporting**: Embed CSR standards, stakeholder engagement, triple bottom line accounting, ESG, and natural capital valuation into reporting and investment strategies.
- **Corporate accountability**: Counter greenwashing through third-party certification and tools, consumer behavior shifts through eco-labeling, education, social influence, and environmental legislation.
- **Just transitions in the private sector**: Fund reskilling, regional, place-based reinvestments, and adopt public carbon-pricing.

3. Sustainable Food Systems and Healthy Nutrition

- **Agrifood business models**: Promote regenerative, circular, and farmer-owned enterprises, cooperatives, localized value chains, and enable smallholder intensification, with particular attention to low-income countries.
- **Pricing and market tools**: Ensure food prices align with nutrition and sustainability (e.g., pricing ultra-processed products, VAT exemptions on pulses, incentives for nutrient-dense crops, etc.).
- **Agricultural business**: Facilitate generational transmission, (women-led/ local) food initiatives, climate-smart agri-business innovations, sustainable cold chains, and co-operative distribution models.
- **Agroecological entrepreneurship**: Ensure private-sector investment in composting, biochar, pasture and land restoration, sustainable aquaculture, etc.

4. Energy Decarbonization with Universal Access

- **Green industrial transitions**: Ensure decarbonization and sustainability strategy and transition is done at business-levels and is business-led.
- **Sustainable energy enterprises**: Promote small-scale renewables, clean cooking businesses, and distribute solar models targeting underserved regions especially in Sub-Saharan Africa and Southeast Asia.
- **Corporate climate neutrality**: Establish business level net-zero targets and pathways and limit reliance on offsets, emission disclosure, including Scope 3.
- **Energy-efficient manufacturing**: Promote industrial symbiosis, industrial ecology energy-efficient retrofits, EMS certification, circular production systems, etc.
- **Definition of scope**: Ensure business and corporate understanding of all scopes.

5. Urban and Peri-Urban Development

- **Green urban business ecosystems**: Develop business models around net-zero buildings, circular construction, nature-based solutions, and urban mobility, urban farming.
- **Circularity**: Finance corporate investment in waste-to-value systems, closed-loop materials, solid waste solutions, etc.
- **Resilient infrastructure markets**: Finance private-sector engagement in climate-adaptive infrastructure and disaster-risk services.

6. Global Environmental Commons

- **Nature-based solutions in business**: Foster business models for reforestation, wetland restoration, agroforestry, marine protection. Develop carbon and biodiversity markets.
- **Biodiversity-positive supply chains**: Ensure corporate biodiversity disclosure, traceability tools, certified production processes.
- **Forest and fisheries sectors reform**: Redesign business models in extractives and forestry sectors. Integrate externalities. Include Indigenous and local stewardship.
- **Cultivate science-business partnerships:** Develop collaborative platforms between research institutions, civil society, and business interests and stakeholders.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Circle Economy Foundation. (annual). Circularity Gap Report. Annual editions available at: https://www.circularity-gap.world/
4. Hoagland, S. (2021). Principles of Microeconomics. EBSCO Knowledge Advantage. Retrieved from https://www.ebsco.com/research-starters/economics/principles-microeconomics
5. Nadal, A. (2015). *Macroeconomic policies and environmental sustainability*. Economics 2015. Retrieved from https://china.elgaronline.com/edcollchap/edcoll/9781783471409/9781783471409.00010.xml?rskey=c6e4Tk&result=2
6. International Co-operative Alliance. (2015). *Guidance notes to the co-operative principles*. Retrieved from https://www.ica.coop/en/media/library/research-and-reviews/guidance-notes-cooperative-principles
7. Intergovernmental Panel on Climate Change (IPCC). (2022). *Climate change 2022: Mitigation of climate change*. Contribution of Working Group III to the Sixth Assessment Report of the IPCC. Retrieved from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
8. Parriqué, T. (2019). *The political economy of degrowth*. Doctoral dissertation, Université Clermont Auvergne and Stockholm university. Retrieved from https://theses.hal.science/tel-02499463
9. Science Based Targets initiative (SBTi). (2023). *SBTi progress report: Scaling Urgent Corporate Climate Action Worldwide*. Retrieved from https://sciencebasedtargets.org/reports/sbti-progress-report-2021
10. Task Force on Climate-related Financial Disclosures (TCFD). (2017). *Recommendations of the Task Force on Climate-related Financial Disclosures*. Retrieved from https://www.fsb-tcfd.org/recommendations/
11. United Nations Industrial Development Organization (UNIDO). (2011). *Green industry: Policies for supporting green industry*. Retrieved from https://www.unido.org/sites/default/files/2011-05/web_policies_green_industry_0.pdf
12. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
13. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
14. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf

TASK BY Sulitest 3.3.1 — Sustainability Science

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Science and Technology → **Subject**: 3.3.1 – Sustainability Science

Definition: "An emerging field of research dealing with the interactions between natural and social systems, and with how those interactions affect the challenge of sustainability: meeting the needs of present and future generations while substantially reducing poverty and conserving the planet's life support system" (Kates, 2011, in *Global Sustainable Development Report* 2019). As such, sustainability science is a transdisciplinary exploration of the interactions between global, social, and human systems with a focus on the mechanisms leading to their degradation and associated risks to human well-being (Springer Journal, *Sustainability Science*, 2025). While sustainability science has largely focused on technological, economic, and regulatory solutions, it should also include analysis of cognitive architectures and epistemic foundations that drive ecological behavior and decision-making (Arena, 2025).

1. Human Well-Being and Capabilities

- **Education systems and careers for sustainability**: Drive *Education for Sustainable Development* (ESD) at all levels via sustainability in curricula, research, assessment, evaluation, accreditation, and rating/ranking systems. Promote interdisciplinary & action research, open science, system dynamics and leverage points (Meadows).
- **Citizen science, learning, and anti-science**: Promote cognitive sustainability, critical thinking, digital literacy, carbon literacy, citizen science. Support participatory health and environment monitoring. Identity and debunk anti-science and pseudoscience (e.g., FLICC).
- **Equitable access to scientific knowledge**: Ensure open source, access, data, and tools, particularly in low- and middle-income countries. Protect humanity's "global intellectual commons".
- **Science-policy-society partnerships**: Adopt co-designed, transdisciplinary approaches (e.g., *One Health*) addressing interconnected issues, particularly for social and health matters.
- **Gender equity and Indigenous knowledge in science**: Address bias, promoting gender equality and recognizing diverse knowledge systems, including *Traditional Ecological Knowledge* (TEK).

2. Sustainable and Just Economies

- **Finance for R&D and green innovation**: Promote public and private R&D funding, science grants, and public finance to support sustainable industrial innovation (e.g., low-carbon materials, electrification, circular manufacturing, etc.).
- **Just transition:** Provide finance for policy-research coalitions in carbon-intensive sectors. Maintain vigilance against injustice.
- **Sustainability science in economic governance**: Engage in research in evaluation criteria, funding mechanisms, and economic systems for positive sustainability outcomes (e.g., Overshoot Day, Planetary Boundaries, Donut Economics, etc.).
- **Science–private sector collaboration for climate adaptation and decarbonization**: Establish science-based methodologies and targets (e.g., Life Cycle Analysis, green certifications) and integrate into business practice and investment strategy.
- **Research for development**: Develop long-term partnerships with low- and middle-income countries for green economic growth.

3. Sustainable Food Systems and Healthy Nutrition

- **Agroecological science**: Invest in interdisciplinary research for regenerative agriculture, agroforestry, silvopasture, and integrated food-energy-water systems.
- **Open, participatory innovation in food systems**: Promote open data in food systems, citizen-science for nutrition, interdisciplinary research, and green policy (e.g., nutrient cycles, soil degradation).
- **Food science**: Invest in research for altering behavioral consumer patterns. Promote science to reduce meat production, limit ultra-processed food consumption, and improve food innovation for better nutrition. Use precautionary principle vis-à-vis GMOs. Weigh trade-offs of cellular agriculture.
- **Food systems science for the Global South**: Engage in R&D for improved crop varieties, irrigation, aquaculture, food insecurity, etc.
- **Science-policy partnerships for resilience**: Promote food policies based on co-produced knowledge between scientists, producers, policymakers, and civil society. Support food industry when managing trade-offs.

4. Energy Decarbonization with Universal Access

- **Clean energy innovation**: Advance R&D in renewable energy, battery storage, green hydrogen, and smart grids. Create shared technology roadmaps, scenario modelling, and transdisciplinary experimentation (e.g., living labs).
- **Just and inclusive energy transitions**: Support participatory research into energy transition planning—especially in regions facing energy poverty. Institute fair carbon tax.
- **Clean cooking and end-use energy access**: Invest in research and monitoring on appliance efficiency, new clean cooking solutions, household energy sufficiency, etc.
- **Low-energy consumption**: Pursue interdisciplinary research on low-energy consumption, efficient building design, low-energy lifestyles, social norms. Use insights from behavioral science.
- **Science–policy–society fossil fuel-free**: Continue coal phase-out dialogues globally as done in Europe. Research and build economic/governance pathways for full fossil fuel phase-out.

5. Urban and Peri-Urban Development

- **Urban planning**: Promote participatory urban planning research, spatial modelling, open risk data, and science-based tools in disaster risk reduction and urban resilience.
- **Urban innovation**: Extend research on the "science of cities", circular construction, urban ecosystems/metabolisms, infrastructure decarbonization, and city partnerships between North & South.
- **Education**: Integrate sustainable development principles into the curriculum of architecture, engineering, urban planning, etc.
- **Digitalization for urban sustainability**: Develop smart (data) tools and platforms for air quality monitoring, emissions monitoring, waste generation, mobility impacts, etc.
- **Circular and nature-based cities**: Innovate and invest for urban green infrastructure, circular waste systems, and climate-resilient buildings.

6. Global Environmental Commons

- **Large-scale ecosystem restoration/protection**: Advance biodiversity and ecosystem restoration science (e.g., afforestation, rewilding, peatland conservation etc.). Develop monitoring platforms and spatial data hubs (e.g., OneMap, ICIMOD).
- **International science–policy–society mechanisms**: Promote cooperation among international climate science bodies (IPCC, IPBES, etc.). Develop UN-based platforms for international environmental policy, transboundary commons governance, etc.
- **Indigenous and local knowledge systems**: Integrate TEK into global assessments and agreements (e.g., IPBES, IPCC).
- **Ocean and freshwater**: Develop marine science for sustainable fisheries, renewables, coral and mangrove restoration, governance, and freshwater restoration plans on water basin basis, etc.
- **Indicators**: Adopt sustainability indicators and calculations that reflect ecological limits and/or social equity (e.g., Planetary Boundaries, Donut economics, IPCC, Drawdown, tipping points) to guide governance at all levels. Consider "Anthropocene" markers and controversy.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, 1(1), 24–40. https://www.sciencedirect.com/science/article/pii/S2210422411000050
4. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (2019). *Global assessment report on biodiversity and ecosystem services*. Retrieved from https://doi.org/10.5281/zenodo.3831673
5. Intergovernmental Panel on Climate Change (IPCC). (2023). *AR6 synthesis report: Climate change 2022*. Retrieved from https://ipcc.ch/report/ar6/syr/
6. Meadows, D., et al. (1972). *The limits to growth: A report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.
7. Missimer, M., et al. (2017). A strategic approach to social sustainability – Part 1: Exploring the social system. *Journal of Cleaner Production*, 140(Part 1), 32–41. https://doi.org/10.1016/j.jclepro.2016.03.170
8. Missimer, M., et al. (2017). A strategic approach to social sustainability – Part 2: A principle-based definition. *Journal of Cleaner Production*, 140(Part 1), 42–52. https://doi.org/10.1016/j.jclepro.2016.04.059
9. Oreskes, N., & Conway, E. M. (2010). *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. New York: Bloomsbury Press.
10. Popper, K. (1959). *The logic of scientific discovery*. New York: Basic Books.
11. Steffen, W., et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223). https://doi.org/10.1126/science.1259855
12. Kriebel, D., Tickner, J., Epstein, P., Lemons, J., Levins, R., Loechler, E. L., Quinn, M., Rudel, R., Schettler, T., & Stoto, M. (2001). The precautionary principle in environmental science. *Environmental Health Perspectives*, 109(9), 871–876. https://doi.org/10.1289/ehp.01109871
13. Arena, F., & Andrew, F. (2025). *Cognitive sustainability: How conscious systems can inform ecological decision-making*. Retrieved from https://www.researchgate.net/publication/392086642
14. Csete, M. (2024). Exploring the field of cognitive sustainability. *Cognitive Sustainability*, 3. https://doi.org/10.55343/cogsust.99
15. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
16. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
17. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf

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3.3.2 — Technology and Innovation

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Science and Technology → **Subject**: 3.3.2 — Technology and Innovation

Definition: "Technological innovation has long been recognized as crucial to achieving development objectives. Scaling up applications of existing scientific knowledge and technological innovation – in both the natural and social sciences – while pursuing further research, can enable shifts away from business-as-usual actions and address development challenges across many sectors. (Global Sustainable Development Report, 2019: 36) In the context of the Sustainable Development Goals, technology can be central to resolving trade-offs that can arise if individual Goals and targets are addressed in isolation. Many [innovative technological] applications are under development [such as AI, gene editing, AI, geoengineering, etc.], but need careful assessment of potential broader consequences before deployment. It is critical to ensure that the digital revolution is shaped in a comprehensive and far-sighted manner that prioritizes equity, accessibility, inclusion, human dignity, international collaboration and sustainability.

1. Human Well-Being and Capabilities

- **Digital health tech**: Invest in telemedicine, AI diagnostics, health apps, drone delivery of medicine in remote areas, e-health records. Ensure context-appropriate tech per WHO guidelines.
- **Water/ sanitation infrastructure and smart systems**: Develop climate-resilient WASH systems, smart water grids, leakage reduction, wastewater reuse, desalination, and rainwater harvesting.
- **EdTech and STEM education**: Invest in STEM/ICT education (esp. girls and women). Invest in digital tools for access to quality education.
- **Green job transitions and upskilling**: Ensure digital upskilling and labor market realignment in line with technological innovation, AI. Promote vocational and technical innovation in training / upskilling.
- **Tech access**: Promote open-source data, tools, just AI/data standards, and universal design for digital inclusion and equity. Explore potential of nanotechnology. Monitor drone, robotics tech.

2. Sustainable and Just Economies

- **Industrial decarbonization technology**: Promote electrification and low emissions production technologies (e.g., clinker substitution, alternative refrigerants/insulation, low-emission feedstocks, methane digesters, circular material innovation, etc.)
- **Sustainable mobility and logistics technology**: Invest in electric and hybrid vehicles, micromobility, high-speed rail, freight efficiency, green shipping & aviation. Decentralize logistics via. virtual meetings.
- **Green tech design**: Pursue frugal/low-tech innovation, eco-design, modularity, biomimicry, universal design/accessibility standards. Combat planned obsolescence. Analyze risk in AI development and deployment. Monitor for Jevons paradox (rebound effect).

3. Sustainable Food Systems and Healthy Nutrition

- **Agri-tech**: Develop sustainable intensification, nutrient recycling, sustainable rice/aquaculture practices, anaerobic digesters, etc.
- **Food loss tools:** Develop digital tools for dietary shifts, meat consumption reduction tech (e.g. labeling, plant-based alternatives, etc.), food waste and cold chain innovations, etc.
- **International open data dashboards**: Build disease surveillance, seed/genetic diversity, labeling/traceability tech. Develop mobile bundling of food security services (e.g., alerts, insurance, info, etc.).
- **Technology access**: Ensure widespread Agri-tech deployment and tech sharing platforms that increase access and inclusion.

4. Energy Decarbonization with Universal Access

- **Clean energy diversification and deployment**: Invest in solar PV, offshore/onshore wind, geothermal (including enhanced), hydropower, blue energy (e.g., tidal, wave), bioenergy. Expand solar thermal, district heating/cooling, LED lighting.
- **Next-generation and bridge solutions**: Deploy green hydrogen, heat pumps, small modular reactors, battery and grid storage, smart grids, AI. Explore carbon capture & storage (CCS), biofuels, etc.
- **End-use electrification & energy efficiency**: Expand electrification of cooking, heating, transport, heavy industry, energy-efficient appliances, etc. Weigh pros and cons of nuclear energy.
- **Access**: Decentralize energy generation (agrivoltaics, microgrids). Tailor tech deployment to SSA and LMIC contexts. Develop digital tools for access and efficiency. Ensure technology N-S transfers.

5. Urban and Peri-Urban Development

- **Retrofitting and building**: Deploy heat-pump/insulation retrofitting, passive solar design, cool roofs, district heating, material shifts (bamboo composites, low-carbon cement, etc.), digital blockchain material passports.
- **Urban infrastructure**: Develop digital waste tracking, high-tech recycling, air pollution mitigation tech (e.g. scrubbers), etc.
- **Urban mobility**: Deploy EV cars, scooters, rail, bikes. Improve battery recyclability and reuse. Develop micromobility systems.
- **Digitalization**: Expand digital technologies for urban planning, emissions management, service delivery. Invest in integrated "smart city" development.

6. Global Environmental Commons

- **Ecosystem restoration**: Promote biochar, enhanced weathering, rewetting of peatlands, habitat rewilding, etc.
- **Monitoring**: Install remote sensing, field-based ecosystem surveillance, satellite-sharing protocols. Deploy tech for disaster early warning and response. Monitor for wildlife protection.
- **Freshwater and coastal commons**: Develop precision irrigation, wastewater reuse, nature-based water solutions, marine and coastal restoration (e.g., seaweed farming, artificial reefs).
- **Carbon/ natural capital accounting:** Develop carbon credit systems in land-use sectors, tools for natural capital risk assessment, monitoring, and scenario analysis.
- **Climate engineering and AI**: Explore options with precaution (e.g., carbon dioxide removal (CDR), direct air capture (DAAC), solar radiation management (SRM), etc. Use caution in AI development and deployment.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. International Energy Agency (IEA). (annual). *World Energy Outlook*. Paris: IEA. Annual editions available at: https://www.iea.org/reports/world-energy-outlook
4. International Energy Agency (IEA). (annual). *Global energy and climate model*. Paris: IEA. Annual editions available at: https://www.iea.org/reports/global-energy-and-climate-model
5. Intergovernmental Panel on Climate Change (IPCC). (2022). *Climate change 2022: Mitigation of climate change*. Contribution of Working Group III to the Sixth Assessment Report of the IPCC. Retrieved from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf
6. United Nations. (n.d.). *Sustainable Development Goals: 17 goals, 169 targets, indicators & progress*. Retrieved from https://sdgs.un.org/goals
7. United Nations. (annual). *The Sustainable Development Goals Report*. Annual editions available at: https://unstats.un.org/sdgs
8. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
9. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
10. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf
11. Arena, F. (2025). *Cognitive sustainability*. Retrieved from https://www.researchgate.net/publication/359651114
12. Arena, F., & Andrew, F. (2025). *Cognitive sustainability: How conscious systems can inform ecological decision-making*. Retrieved from https://www.researchgate.net/publication/392086642

TASK BY Sulitest 3.4.1 — Transformative Change

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Individual and Collective Action → **Subject**: 3.4.1. — Transformative Change

Definition: Transformative change is a fundamental, intentional, system-wide reorganization across political, technological, economic, and social factors, including paradigms and models, social norms and practices, goals and values, and policies and laws. Such change is premised upon harnessing bottom-up technology and innovation, applying indigenous knowledge, engaging grassroots participation across emerging economies, achieving outcomes at scale, and embodying the concept of institutionally-sustained results, i.e., consistency of achievement over time that excludes short-term, transitory impact (IPBES, 2019; UNEP, 2019).

1. Human Well-Being and Capabilities

- **Education for sustainability**: Teach towards the 8 sustainability competencies. Foster ecological literacy, collective empowerment, and life-long learning. Value Traditional Ecological Knowledge and nature-based learning. Explore feminist pedagogy, critical ecopedagogy, Indigenous pedagogy, etc.
- **Universal health and social protection**: Establish as a human right well-being, mental health integration, universal health coverage with adaptive social protection, particularly for women, marginalized groups, and crisis-affected populations.
- **Participatory governance and justice**: Develop citizen assemblies and social labs to realize mutual aid, climate justice, inclusive decision-making, deep democracy, & intergenerational equity.
- **Paradigm shifts**: Work towards collaborative, interdisciplinary, and strategic integration of levers of action. Transform global institutions for equity, sustainability, and conflict transformation (over extractivism and militarization). Build new social relationships (community over individualism). Favor preventative medicine (health in lifestyle and environment over laissez-faire).
- **Cultural transformation pathways**: Upskill for green jobs, STEM education for girls, and community training for sustainable infrastructure, citizen mobilization and increased democracy. Identify social tipping points for transformative change.

2. Sustainable and Just Economies

- **Economic structures for equity and sustainability**: Develop low ecological and resource business models. Adopt redistribution measures to reduce structural inequality. Build circular, cooperative, sharing economies, facing and integrating social and environmental externalities across Global North-South trade.
- **Just transitions (anticipatory planning)**: Plan for fair transitions for workers and regions negatively impacted by decarbonization. Develop social safety nets and upskilling processes.
- **Cultural shifts away from high-carbon lifestyles**: Challenge imaginaries of (ultra)consumerism ("human as consumer"). Foster ownership paradigm shifts (lease, rent, etc.), human need versus satisfier (Max-Neef), and material wealth as status.
- **Finance and accountability**: Increase transparency and scrutiny of corporate environmental footprints and financial risks (e.g., through ESG, CDP disclosure). Encourage strong climate litigation, citizen activism, and media engagement to pressure industry and policymakers toward sustainable transformation.

3. Sustainable Food Systems and Healthy Nutrition

- **Agroecology as production paradigm**: Prioritize nature-based solutions, localized food production and governance, soil health as wealth, biodiversity as indicators of ecological system health, cultural reconnection to food, land, & place (agroforestry, biochar, silvopasture).
- **Healthy Diets**: Incentivize healthy, low-footprint, plant-rich diets via education and public procurement. Reduce (over)consumption of animal-based foods and ultra-processed products (i.e., protein transition), (e.g., EAT-Lancet ,WHO dietary targets). Use a human right-based approach to food, even in conflict situations.
- **Food loss, waste, inefficiencies**: Tackle food waste globally. Reduce nutrient loss and fertilizer inefficiencies. Increase irrigation efficiency. Innovative for circular low impact approaches in processing, packaging, and distribution.
- **Resilient food systems**: Promote food and seed sovereignty, food localization, and community-level governance. Support continued research in food systems resilience in local contexts. Fund ecological restoration of degraded landscapes.
- **Address impediments**: Avoid land ownership concentration and promote land rights. Address weak governance, global monopolies in food trade, speculation on food stuffs, market distortions (e.g., fertilizer and water subsidies). Internalize social and environmental externalities. Address funding gap for SDG-2.

4. Energy Decarbonization with Universal Access

- **Just energy transition**: Pursue rapid phase out fossil fuels-based energy systems and infrastructure. Assign historical responsibility of high-emitter countries. Adapt carbon pricing to high-income countries. Expand and extend fossil-fuel exploration bans. Support, capacity building & finance in low- / middle-income countries.
- **Universal access to clean, affordable energy**: Promote clean electricity and clean cooking as lever for improving education, gender equality, and health goals. Invest in renewable infrastructure, particularly in sub-Saharan Africa.
- **Reduce energy demand**: Seek "energy sobriety" lifestyles. Promote large-scale electrification of end-uses. Reduce energy needs for heating/cooling (via innovation, retrofitting, etc.). Seek energy efficiency in appliance design. Develop decentralized energy grids.
- **Electrify and decarbonize industry, transport, and infrastructure**: Incentivize zero-emission vehicles, electrified freight, green aviation, public transport. Innovate for industrial transformation in high-emitting industries (e.g., steel, aluminum, cement, etc.).

5. Urban and Peri-Urban Development

- **Green infrastructure**: Build infrastructure for collective and low-carbon mobility. Design for energy conservation in buildings, circularity in waste management. Seek nature-based solutions (e.g., urban greening, composting, green roofs, etc.).
- **Urban planning**: Develop integrated strategy for SDG implementation, climate adaptation, disaster risk reduction, food and health systems resilience, and participatory planning (e.g., multi-stakeholder housing councils). Ensure inclusive planning.
- **Affordable housing**: Build social and cooperative housing. Promote community land trusts and shared equity models. Build safe, inclusive, urban, social infrastructure.
- **Connectivity**: Connect urban and surrounding rural/peri-urban regions to support food systems and reduce rural-urban divisions.
- **Urban transitions**: Expand EV adoption and public transport supply. Imagine and build nature-integrated cities.

6. Global Environmental Commons

- **Protect and restore ecosystems**: Grow protected areas (especially biodiversity hotspots) and regions essential to ecosystem function. Institute landscape-level planning and restoration strategies. Pursue rewilding and prioritize wetland and coral recovery and resilience.
- **People-Nature relations**: Foster cultural reconnection to the biosphere and cultivate ecocentric values beyond anthropocentrism via education, rituals, eco-tourism, storytelling, and experiential practices). Teach the values of stewardship, reciprocity, and planetary interdependence in governance, civil society, culture, business, and education.
- **Govern the commons**: Uphold the Kunming-Montreal Global Biodiversity Framework. Increase Indigenous rights & institutional capacity-building for biodiversity action, particularly in systems under rising pressure.
- **Planetary health in policy and finance**: Establish 'nature' metrics and indicators of ecosystem well-being and social equity (e.g., functional biodiversity, soil health, ecological integrity, resilience-as-metrics, etc.). Align action with ecological restoration and consider nature as a finite, irrecoverable global right and responsibility.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Broman, G., & Robèrt, K.-H. (2017). A framework for strategic sustainable development. *Journal of Cleaner Production*, 140(Part 1), 17–31. https://www.sciencedirect.com/science/article/abs/pii/S0959652615015930
4. Hassan, Z. (2014). *The social labs revolution: A new approach to solving our most complex challenges*. San Francisco: Berrett-Koehler Publishers. https://ssir.org/books/excerpts/entry/the_social_labs_revolution_a_new_approach_to_solving_our_most_complex_chall
5. Lamb, W. F., Mattioli, G., Levi, S., Roberts, J. T., Capstick, S., Creutzig, F., … Steinberger, J. K. (2020). Discourses of climate delay. *Global Sustainability*, 3, E17. https://doi.org/10.1017/sus.2020.13
6. Stoddard, I., et al. (2021). Three decades of climate mitigation: Why haven't we bent the global emissions curve? *Annual Review of Environment and Resources*, 46, 653–689. https://doi.org/10.1146/annurev-environ-012220-011104
7. Missimer, M., Robèrt, K.-H., & Broman, G. (2017). A strategic approach to social sustainability – Part 1: Exploring the social system. *Journal of Cleaner Production*, 140(Part 1), 32–41. https://www.sciencedirect.com/science/article/pii/S0959652616302645
8. Missimer, M., Robèrt, K.-H., & Broman, G. (2017). A strategic approach to social sustainability – Part 2: A principle-based definition. *Journal of Cleaner Production*, 140(Part 1), 42–52. https://www.sciencedirect.com/science/article/abs/pii/S0959652616303274
9. United Nations Environment Programme (UNEP). (2019). *Global environment outlook – GEO-6: Healthy planet, healthy people*. Cambridge: Cambridge University Press.
10. United Nations. (annual). *The Sustainable Development Goals Report*. Annual editions available at: https://unstats.un.org/sdgs
11. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
12. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
13. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf
14. Brice, E., Thai, H. T. M., Pham, H. T. M., & Béné, C. (2024). Defining barriers to food systems sustainability: A novel conceptual framework. *Frontiers in Sustainable Food Systems*, 8. https://doi.org/10.3389/fsufs.2024.1453999

TASK BY Sulitest 3.4.2 — Cognitive Capacity for Sustainability

Subject Knowledge Navigational Chart

TASK Framework: Levers of Opportunity → **Domain**: Individual and Collective Action → **Subject**: 3.4.2 – Cognitive Capacity for Sustainability

Definition: When addressing societal-wide challenges that require individual and collective behavioral change, a person's cognitive capacity for sustainability refers to a generalized ability to make qualitatively different choices that support and accelerate a transition to a sustainable future (GSDR 2019, 35). This ability is also described as sustainability literacy, i.e., the knowledge, skills, and mindsets that help compel an individual to become deeply committed to building a sustainable future and making informed and effective decisions to that end (Sulitest.org, 2025). Closely related, sustainability competency denotes a disposition comprising interrelated knowledge, skills, motives, and attitudes that enable successful sustainability-related action (Wiek, 2011, 2016; Redman and Wiek, 2021, 2022). These competencies—including systems-, futures-, values-, strategic-, interpersonal, intrapersonal, implementation, and integrated problem-solving competencies—empower learners to engage with complex systems, embody sustainability values, and support ecosystem health and justice (GreenComp, 12). Understanding how individuals, as consumers and citizens, make such decisions can further motivate action, with insights from cognitive science, psychology, behavioral economics, and neuroscience contributing to this understanding (GSDR 2019, 35).

1. Human Well-Being and Capabilities

- Education for sustainability: Use holistic, experiential approaches to teaching and learning (e.g., nature-based, forest schools). Foster UNESCO's 8 key competencies, (systems, futures, values, strategic thinking, inter-/intra-personal, etc.), EU's 12 GreenComp, Inner Development Goals. Build environmental, sustainability, eco-literacy.
- **Inner and collective capacities**: Pursue *Inner Development Goals* (IDGs). Foster long-term orientation, sense-making, critical thinking, relational, ethical, and strategic competencies, empathy, openness, connectedness, and collective agency as essential skills. Articulate cognitive sustainability as key to ecological decision-making.
- **Indigenous knowledge systems**: Engage traditional ecological knowledge, place-based worldviews, and diverse ontologies that see humans as "within & part of Nature," vis-à-vis anthropocentrism.
- **Psychological & cognitive barriers to action**: Engage eco-anxiety, solastalgia, cognitive bias, decision-making under uncertainty, and insights from environmental/behavioral psychology/brain research.

2. Sustainable and Just Economies

- **Long-term sustainable economic thinking**: Challenge economics' value-neutral assumptions. Integrate environmental limits, justice, and interdisciplinary knowledge. Transform economic paradigms to reflect complexity, nonlinear risk, ecological boundaries. Align financial systems with sustainability and scale up pro-poor, gender-equitable, and resilience-based economic reforms.
- **Consumer and investment education**: Build sustainability literacy into market practices among investors and consumers to foster responsibility across resource extraction and supply chains.
- **Build capacities**: Strengthen individual and collective capacities to overcome barriers to fair and meaningful work. Train workforce to support just transitions and manage complex trade-offs.
- **The age of AI**: Preserve human work, expertise, and foresight in technologically mediated environments, counteract "expertise atrophy," and privilege meaningful and ethical employment. Apply precautionary principle in all societal applications.

3. Sustainable Food Systems and Healthy Nutrition

- **Food and nutrition literacy**: Address the cognitive load involved in food choices and its impact on health, sustainability, and well-being. Empower people to understand the environmental, social, and economic implications of diets and food habits (e.g., waste).
- **Psychology of food**: Leverage behavioral insights that affect sustainable food outcomes and alter diets (esp., among youth).
- **Empower farmers via peer learning**: Facilitate local participatory learning infrastructures for agroecological practices via farmer-to-farmer networks and use of digital tools.
- **Cultural shifts**: Interrogate cultural values and collective behaviors around food production, carbon and water footprints, use and waste. Support local food sovereignty and farm-to-fork habits.

4. Energy Decarbonization with Universal Access

- **Energy literacy**: Ensure individuals and communities can make informed, energy-related decisions. Address energy poverty, energy blindness, etc.
- **Energy awareness**: Shift attitudes and behaviors towards energy sobriety, conservation, clean cooking, energy-efficiency, etc.
- **Education and training for a just energy transition**: Develop skills and capacity for clean energy sectors, particularly in regions facing energy poverty and infrastructure gaps.

5. Urban and Peri-Urban Development

- **Education and training for the sustainable city**: Develop skills and capacity for sustainable urban management, particularly in regions facing population growth and infrastructure challenges. Build urban sustainability literacy through campaigns and education on waste (e.g., composting, recycling). Invest in public transportation and micromobility, urban farming, food security, etc.
- **Empower urban citizens via peer learning**: Facilitate local participatory learning infrastructures for civic engagement, lifelong learning. Develop sharing libraries, digital tools, etc.
- **Cultural shifts**: Shape cultural values and collective behaviors around waste, housing as a human right, local democracy and engagement. Strengthen participatory governance structures.
- **Reframe the city**: Use education, storytelling, public imagination, and cultural narratives to highlight the better future of cities.

6. Global Environmental Commons

- **Land use and resource literacy**: Ensure individuals/communities make informed decisions and address resource blindness, etc.
- **Advance collective ecological literacy**: Build capacity for individuals and communities via systems thinking, foresight intelligence, and, shared ecological knowledge, including valuing Indigenous and local knowledge systems. Develop foresight intelligence and always apply precautionary principle.
- **Reframe life on Earth**: Invest collective in education, storytelling, and public imagination. Create cultural narratives to highlight interdependence with Earth's life.
- **Knowledge for ecosystem restoration**: Leverage insights from behavioral and cognitive sciences to reduce ecological disconnection, and apathy.

Selected Bibliography

1. Independent Group of Scientists appointed by the Secretary-General. (2019). *Global Sustainable Development Report 2019: The future is now – Science for achieving sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/publications/future-now-science-achieving-sustainable-development-gsdr-2019-24576
2. Independent Group of Scientists appointed by the Secretary-General. (2023). *Global Sustainable Development Report 2023: Times of crisis, times of change – Science for accelerating transformations to sustainable development*. United Nations, New York. Retrieved from https://sdgs.un.org/gsdr/gsdr2023
3. Ayers, J., Missimer, M., & Bryant, J. (2023). Intrapersonal capacities for sustainability: A change agent perspective on the inner dimension of sustainability work. *Sustainability Science*, 18(3), 1181–1197. https://doi.org/10.1007/s11625-022-01288-8
4. Bianchi, G., Pisiotis, U., & Cabrera, M. (2022). *GreenComp – The European sustainability competence framework*. Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/13286
5. Fadel, C. (2020). *Redesigning the curriculum for a 21st-century education: The CCR foundational white paper*. Retrieved from https://curriculumredesign.org/wp-content/uploads/CCRFoundationalPaper-rev2-Oct.-2020.pdf
6. Fadel, C., Bialik, M., & Trilling, B. (2015). *Four-dimensional education: The competencies learners need to succeed*. Boston: Center for Curriculum Redesign. https://curriculumredesign.org/framework/
7. Hassan, Z. (2014). *The social labs revolution: A new approach to solving our most complex challenges*. San Francisco: Berrett-Koehler Publishers. https://ssir.org/books/excerpts/entry/the_social_labs_revolution_a_new_approach_to_solving_our_most_complex_chall
8. Max-Neef, M. (1991). *Human scale development*. New York: Apex Press.
9. Steg, L., et al. (2014). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors & goals. *Journal of Environmental Psychology*, 38, 104–115.
10. United Nations Educational, Scientific and Cultural Organization (UNESCO). (2017). *Education for sustainable development goals: Learning objectives*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000247444
11. United Nations Educational, Scientific and Cultural Organization (UNESCO). (2018). *Issues and trends in education for sustainable development*. Paris: UNESCO. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000261802
12. United Nations. (n.d.). *Sustainable Development Goals: 17 goals, 169 targets, indicators & progress*. Retrieved from https://sdgs.un.org/goals
13. Wiek, A., Keeler, L., & Redman, C. (2011). Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science*, 6, 203–218. https://doi.org/10.1007/s11625-011-0132-6
14. United Nations Framework Convention on Climate Change (UNFCCC). (2024). *2030 climate solutions: An implementation roadmap*. Retrieved from https://unfccc.int/sites/default/files/resource/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf
15. Project Drawdown. (n.d.). *Drawdown Explorer: The world's climate solutions platform*. Retrieved from https://drawdown.org/explorer
16. Regeneration International. (n.d.). *Nexus library of solutions*. Retrieved from https://regeneration.org/nexus
17. Arena, F. (2025). *Cognitive sustainability*. Retrieved from https://www.researchgate.net/publication/359651114
18. Andrew, F. (2025). *Cognitive sustainability: How conscious systems can inform ecological decision-making*. Retrieved from https://www.researchgate.net/publication/392086642
19. Yadav, P. S. (2025). *Cognitive sustainability in the age of AI: A philosophical framework for understanding competency erosion and cognitive stratification in human–AI systems*. SSRN. https://doi.org/10.2139/ssrn.5317987
20. Salahodjaev, R. (2018). Is there a link between cognitive abilities and environmental awareness? Cross-national evidence. *Environmental Research*, 166, 86–90. https://doi.org/10.1016/j.envres.2018.05.031
21. Langenbach, B. P., Berger, S., Baumgartner, T., & Knoch, D. (2019). Cognitive resources moderate the relationship between pro-environmental attitudes and green behavior. *Environment and Behavior*, 52(9), 979–995. https://doi.org/10.1177/0013916519843127
22. Glenisson, L., Hallez, L., & Smits, T. (2025). Thought for food: A systematic review of how psychological state factors affect sustainable food outcomes. *Sustainable Production and Consumption*, 57, 277–291. https://doi.org/10.1016/j.spc.2025.05.022

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