

Climate Change Law and Energy Policy

Adaptation – The process of adjusting systems to reduce vulnerability to climate impacts. Resilience, mitigation – Involves redesigning infrastructure, such as elevating flood-prone roads, to sustain functionality under new climate conditions. Challenges include financing and integrating local knowledge.

Air-Source Heat Pump (ASHP) – A device that extracts heat from ambient air to provide heating or cooling. **Ground-Source Heat Pump, coefficient of performance** – Used in residential retrofits to lower fossil-fuel consumption, yet performance drops in extreme cold, requiring backup systems.

Baseline Scenario – A reference pathway outlining emissions without additional policy interventions.

Business-as-usual, reference case – Serves as a benchmark for assessing the impact of new climate legislation; uncertainty in economic assumptions can affect its reliability.

Carbon Accounting – The systematic measurement of greenhouse-gas (GHG) emissions across scopes.

Scope 1, Scope 2, Scope 3 – Enables corporations to report to regulators and investors; challenges involve data quality, boundary setting, and scope-expansion over time.

Carbon Border Adjustment Mechanism (CBAM) – A tariff-like instrument levying fees on imported goods based on their carbon intensity. **Border carbon adjustment, emissions pricing** – Aims to prevent carbon leakage and level the playing field for domestic producers, but may raise WTO compliance questions.

Carbon Capture, Utilization, and Storage (CCUS) – Technologies that capture CO₂ from point sources, convert it into useful products, or store it underground. **Carbon sequestration, enhanced oil recovery** – Provides a pathway for hard-to-abate sectors like cement; high capital costs and long-term liability remain major hurdles.

Carbon Credit – A tradable permit representing the right to emit one tonne of CO₂ equivalent. **Offset, cap-and-trade** – Companies can purchase credits to meet compliance obligations; market integrity depends on robust verification and avoidance of double counting.

Carbon Pricing – Economic tools that assign a cost to carbon emissions, typically via taxes or market mechanisms. **Carbon tax, emissions trading system** – Encourages low-carbon investment by internalizing externalities; political resistance and price volatility are common obstacles.

Carbon Tax – A levy imposed on the carbon content of fossil fuels. **Carbon pricing, fuel duty** – Provides a predictable price signal to reduce emissions; effectiveness hinges on tax level and coverage breadth.

Climate Finance – Funding flows directed toward mitigation and adaptation projects. **Green bonds, multilateral development banks** – Mobilizes capital for renewable energy, resilient infrastructure, and climate-smart agriculture; tracking and ensuring additionality are persistent challenges.

Climate Justice – The principle that climate actions must consider equity, historical responsibility, and vulnerable populations. **Just transition, environmental equity** – Influences policy design, such as allocating adaptation funds to low-income regions; operationalizing fairness can be complex.

Climate Risk Disclosure – Requirements for entities to report climate-related financial risks. **TCFD, ESG reporting** – Helps investors assess exposure to physical and transition risks; lack of standardization leads to inconsistent disclosures.

Climate-Resilient Infrastructure – Physical assets designed to withstand climate stresses. **Adaptation, risk assessment** – Examples include flood-resilient bridges and heat-tolerant power lines; financing and long-term maintenance pose difficulties.

Co-benefits – Positive side effects of climate policies, such as improved air quality or job creation. **Synergies, ancillary benefits** – Highlighted in policy justification; quantifying co-benefits can be methodologically challenging.

Commission on Climate Change (CCC) – A body that provides scientific advice to governments on climate policy. **IPCC, advisory panel** – Influences national targets and regulatory frameworks; its recommendations may clash with short-term political agendas.

Compliance Market – A market where regulated entities trade emission allowances to meet legal obligations. **Cap-and-trade, allowance** – Enables cost-effective emissions reductions; market manipulation and overall cap stringency are key concerns.

Concessionary Funding – Financial support offered on terms more favorable than market rates, often tied to climate objectives. **Development aid, soft loans** – Encourages deployment of renewable projects in developing nations; repayment risk and monitoring are critical.

Corporate Renewable Energy Procurement – Strategies by which companies purchase renewable electricity, often via **Power Purchase Agreements (PPAs)**. **Virtual PPA, green tariffs** – Reduces Scope 2 emissions and supports new renewable capacity; contract complexity and regulatory uncertainty can impede adoption.

Decarbonization – The systematic reduction of carbon emissions across an economy or sector. **Low-carbon transition, net-zero** – Involves energy efficiency, fuel switching, and technology deployment; requires coordinated policy, finance, and innovation.

Deglobalization – A trend toward reduced international trade and supply-chain interdependence, often in response to climate or geopolitical pressures. **Reshoring, supply-chain resilience** – May affect emissions accounting and carbon border measures; balancing economic efficiency with climate goals is contentious.

Digital Twin – A virtual replica of a physical asset used for simulation and optimization. **IoT, real-time monitoring** – Applied to power grids to predict load flows under climate stress; data privacy and model accuracy are ongoing issues.

Emission Factor – A coefficient that relates activity data to GHG emissions. **Carbon intensity, inventory methodology** – Used in carbon accounting for sectors like transportation; variability across regions can

affect comparability.

Emission Trading System (ETS) – A cap-and-trade program where allowances are allocated or auctioned and can be traded. Carbon market, compliance market – The EU ETS is a leading example; allowance overallocation and carbon leakage remain policy challenges.

Energy Access – The availability of reliable, affordable, and modern energy services. Universal energy, electrification – Central to Sustainable Development Goal 7; integrating renewable mini-grids poses technical and financing barriers.

Energy Efficiency – The practice of using less energy to provide the same service. Demand-side management, retrofits – Provides low-cost emissions reductions; market failures often require standards or incentives to trigger adoption.

Energy Policy – The set of government actions that shape energy production, distribution, and consumption. Regulation, market design – Balances security, affordability, and environmental objectives; policy coherence across ministries can be difficult.

Energy Transition – The shift from fossil-fuel-dominant systems to low-carbon or renewable energy sources. Decarbonization, just transition – Involves grid modernization, workforce reskilling, and new market structures; social acceptance and financing are critical.

Environmental Impact Assessment (EIA) – A process that evaluates the potential environmental effects of a proposed project. Strategic environmental assessment, mitigation – Required for large energy infrastructure; inadequate baseline data can undermine conclusions.

Equitable Transition – A transition framework that ensures fair distribution of costs and benefits. Just transition, climate justice – Includes job retraining programs for coal workers; funding gaps and stakeholder alignment are common challenges.

European Green Deal – The EU's roadmap for making its economy climate-neutral by 2050. Fit for 55, climate law – Sets binding emissions targets and invests in clean technologies; implementation across Member States varies.

Fit for 55 – EU legislation package aiming to reduce net greenhouse-gas emissions by at least 55 % by 2030. European Green Deal, climate law – Introduces stricter vehicle standards and expands the ETS; political opposition may delay adoption.

Forest Carbon Sink – The net amount of CO₂ absorbed by forests through photosynthesis. Afforestation, REDD+ – Can be accounted for in national GHG inventories; permanence and leakage concerns affect crediting schemes.

Green Bond – A debt instrument whose proceeds are earmarked for environmentally beneficial projects. Climate finance, ESG – Provides capital for renewable installations; lack of universal standards can lead to green-washing.

Greenhouse Gas (GHG) – Gases that trap heat in the atmosphere, such as CO₂, CH₄, and N₂O. Carbon dioxide equivalents, climate forcing – Core metric for climate policy; measurement accuracy is essential for compliance.

Greenhouse Gas Inventories – Comprehensive accounting of a country's or organization's emissions. Carbon accounting, reporting – Forms the basis for national targets and international reporting; data gaps and methodological differences pose challenges.

Hydrogen Economy – A vision where hydrogen, especially green hydrogen, plays a central role in energy systems. Electrolysis, fuel cells – Supports decarbonization of heavy industry and transport; scaling production and establishing standards remain hurdles.

Internationally Transferred Mitigation Outcomes (ITMOs) – Emission reductions transferred between countries under the Paris Agreement. Carbon market, Article 6 – Enables cost-effective compliance; robust accounting is required to avoid double counting.

Just Transition – A policy approach that safeguards workers and communities as economies shift away from carbon-intensive activities. Equitable transition, climate justice – Involves retraining programs, social safety nets, and community engagement; funding and political will are key constraints.

Land-Use Change – Alterations in the way land is utilized, affecting carbon stocks. Deforestation, afforestation – Influences national emissions inventories; monitoring via remote sensing improves accuracy but requires technical capacity.

Low-Carbon Economy – An economic system with minimal carbon emissions relative to its output. Decarbonization, clean growth – Encourages renewable energy, circular production, and carbon pricing; transition pathways must balance growth and sustainability.

Marginal Abatement Cost Curve (MACC) – A graphical representation of the cost and potential of different emission reduction options. Cost-benefit analysis, policy prioritization – Guides policymakers in selecting low-cost measures; data quality and assumptions can skew rankings.

Nationally Determined Contribution (NDC) – Each country's self-set climate target under the Paris Agreement. Paris Agreement, climate ambition – Forms the backbone of global mitigation efforts; many NDCs are currently insufficient for the 1.5 °C pathway.

Net-Zero – The balance between anthropogenic GHG emissions and removals, achieving an overall neutral impact on the climate. Decarbonization, carbon removal – Targets for 2050 dominate corporate roadmaps; residual emissions require reliable negative-emission technologies.

Negative Emission Technology (NET) – Methods that remove CO₂ from the atmosphere, such as bioenergy with carbon capture and storage (BECCS). Carbon removal, carbon sink – Considered essential for meeting net-zero goals; scalability and land-use competition are contentious.

Offshore Wind – Wind turbines installed in marine environments to generate electricity. Renewable energy, grid integration – Offers high capacity factors and reduced land use; challenges include marine permitting

and transmission infrastructure.

Oil-and-Gas Climate Litigation – Legal actions against fossil-fuel companies for contributing to climate change. Public nuisance, fiduciary duty – Recent court rulings have imposed liability for emissions; precedent-setting cases may reshape corporate risk.

Paris Agreement – The 2015 global accord that aims to limit warming to well below 2 °C, pursuing 1.5 °C. UNFCCC, NDC – Establishes a framework for mitigation, adaptation, and finance; implementation gaps and withdrawal threats persist.

Policy Mix – The combination of regulatory, fiscal, and voluntary measures used to achieve climate objectives. Carbon pricing, standards – Effective mixes align incentives across sectors; coordination complexity can lead to policy overlap.

Power Purchase Agreement (PPA) – A contract where a buyer agrees to purchase electricity from a renewable generator at a predetermined price. Corporate renewable procurement, virtual PPA – Secures revenue streams for projects; contract negotiation and credit risk are notable barriers.

Renewable Portfolio Standard (RPS) – A regulatory mandate requiring utilities to source a specified share of electricity from renewable resources. Clean energy standard, renewable targets – Drives market demand for renewables; compliance mechanisms and cost impacts vary by jurisdiction.

Renewable Energy Certificates (RECs) – Tradable units representing the environmental attributes of one megawatt-hour of renewable electricity. Green tags, carbon offset – Allow organizations to claim renewable procurement; double counting and verification are critical concerns.

Resilience – The capacity of systems to absorb disturbances and retain essential functions. Adaptation, risk management – Measured through stress tests on power grids; building resilience often requires upfront investment with uncertain returns.

Risk-Adjusted Return – The expected profit of an investment after accounting for its climate-related risks. ESG, climate-risk disclosure – Guides investors toward low-carbon assets; quantifying climate risk remains an evolving science.

Sectoral Decarbonization Approach (SDA) – A methodology that sets sector-specific pathways to achieve overall climate targets. IPCC scenarios, net-zero – Used by the International Energy Agency to design roadmaps for transport, industry, and power; data intensity and cross-sector coordination are demanding.

Strategic Environmental Assessment (SEA) – An appraisal of environmental effects of policies, plans, or programs before they are adopted. Environmental impact assessment, integrated assessment – Ensures climate considerations are embedded early; limited capacity can delay implementation.

Sustainable Development Goal 7 (SDG 7) – The UN goal focusing on affordable, reliable, sustainable, and modern energy. Energy access, clean energy – Aligns with climate policy and development agendas; financing gaps hinder universal achievement.

Technology Transfer – The dissemination of low-carbon technologies from developed to developing countries. **Capacity building, climate finance** – Facilitates global mitigation; intellectual-property rights and local adaptation can impede uptake.

Thermal Pollution – The degradation of water bodies caused by discharge of heated water from power plants. **Cooling technologies, environmental impact** – Mitigation includes closed-loop cooling and hybrid systems; regulatory limits vary.

Transition Finance – Capital directed toward projects that facilitate the shift from high- to low-carbon activities. **Green bonds, climate-aligned loans** – Supports retrofits, clean-fuel adoption, and workforce retraining; measuring alignment with climate pathways is complex.

Transport Decarbonization – Strategies to lower emissions from road, rail, aviation, and maritime sectors. **Electrification, alternative fuels** – Includes EV incentives, hydrogen fuel-cell ships, and modal shift policies; infrastructure readiness and consumer behavior are major determinants.

Triple Bottom Line (TBL) – A framework assessing performance based on social, environmental, and financial outcomes. **Sustainability, ESG** – Helps organizations balance profit with climate and societal goals; quantifying non-financial metrics can be subjective.

UN Framework Convention on Climate Change (UNFCCC) – The international treaty that underpins global climate governance. **Paris Agreement, COP** – Provides the arena for negotiations and reporting; compliance mechanisms rely on voluntary transparency.

Voluntary Carbon Market (VCM) – A market where entities purchase carbon offsets on a non-regulatory basis. **Carbon credit, offset projects** – Enables corporations to meet net-zero pledges; credibility hinges on rigorous verification and avoidance of double counting.

Water-Energy Nexus – The interdependence between water resources and energy production. **Thermal pollution, renewable energy** – Highlights the need for integrated planning, especially for hydropower and cooling-intensive plants; climate-induced water scarcity intensifies the nexus.

Zero-Carbon Building – A structure that generates as much renewable energy as it consumes over a year. **Energy efficiency, net-zero** – Demonstrates the feasibility of deep decarbonization in the built environment; upfront costs and occupant behavior influence outcomes.