

# Climate Finance

## Introduction

How are we going to finance climate restoration and the UN's Sustainable Development Goals (SDGs)? A preliminary summary of financial mechanisms is presented here with the aim of identifying those mechanisms that have the best attributes for mobilizing trillions of dollars and managing a socio-economic transformation for climate restoration.

This preliminary summary includes a subjective ratings table, with each financial mechanism being rated from 1 star (bad) to 5 stars (good) in relation to its (a) political and social feasibility, (b) technical feasibility, (c) speed of finance, and (d) scalability of finance. This summary may be used to inspire a more detailed assessment of financial mechanisms.



## Scale of Finance

A clean energy transition and climate restoration is expected cost trillions of USD per year in additional finance. According to UNEP (2015), an estimated USD \$5-7 trillion per year is needed to realize the U.N. Sustainable Development Goals (SDGs). The total cost of climate restoration will be more than is needed to achieve the 2°C ambition of the 2015 Paris Climate Agreement. There may exist opportunity costs and hidden costs due to the impacts of dirty growth, societal behavior, climate tipping points, and a need for carbon dioxide removal.

**Table 1.** Preliminary summary of possible financial mechanisms for funding an international climate restoration program. Ratings are 1 (bad) to 5 (good).

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Ref.	Financial Mechanism	(a) Political and Social Feasibility	(b) Technical Feasibility	(c) Speed of Finance	(d) Scalability of Finance	Wegted Average
1	Carbon Markets	4	5	2	2	3.3
2	Carbon Credit or Carbon Offset	4	4	4	2	3.5
3	Carbon Quantitative Easing	3	4	5	5	4.3
4	Carbon Subsidies	4	4	4	3	3.8
5	Carbon Taxes	2	5	2	2	2.8
6	Climate Bonds	5	5	3	3	4.0
7	Development Banks	5	5	3	3	4.0
8	Extra Special Drawing Rights	3	4	4	4	3.8
9	Fee and Dividend	3	5	2	2	3.0
10	Financial Transaction Tax	4	5	4	4	4.3
11	Global Carbon Reward	3	4	4	5	4.0
12	Green Banks	5	5	3	3	4.0
13	Green Bonds	5	5	3	3	4.0
14	Green Climate Fund	4	5	3	2	3.5
15	Green New Deal	3	4	3	4	3.5
16	Green Quantitative Easing	3	4	5	3	3.8
17	Nationalization of Fossil Fuel Companies	3	4	4	3	3.5
18	Parallel Currency	3	4	4	5	4.0
19	Philanthropy	5	5	4	2	4.0
20	Public Banks	4	5	3	3	3.8

**Footnote:** These ratings are the author's own interpretations. The ratings are qualitative, preliminary, subject to revision, and are provided without warranty.

## A-to-Z of Financial Mechanisms

### ★ Cap-and-Trade (see Carbon Markets)

**1. Carbon Markets** Carbon markets are trading platforms for (1) compliance permits that allow carbon emissions (i.e. emissions quotas), and (2) carbon credits that represent an offset of carbon emissions that has occurred outside of the compliance market (i.e. additional emissions reductions). The underlying financial mechanism is called Cap-and-Trade (CAT). In theory, CAT should deliver cost-effective emissions reductions by inviting firms to compare their marginal abatement costs with the market price for compliance permits and carbon credits. Firms subject to the CAT are encouraged to reduce the emissions intensity of their production, raise prices, reduce production, or buy additional compliance permits or carbon credits. The average carbon price is currently about 1/20<sup>th</sup> of that required to achieve the 2°C ambition of the 2015 Paris Climate Agreement. Existing carbon markets are not designed to finance Carbon Dioxide Removal (CDR) or climate restoration (see Carbon Credit).

**2. Carbon Credit or Carbon Offset** This is a tradable certificate that is issued by an authority to projects that have reduced or sequestered carbon emissions. There are two types of buyers of carbon credits: (a) firms in compliance markets, and (b) voluntary buyers. Carbon credits are a source of income for certain projects that provide renewable energy, energy efficiency, the destruction of pollutants, or forestry management. Within the compliance market, carbon credits are a “zero sum game” in terms of total emissions. Carbon credits may lower the cost of polluting, but they also introduce risks because of ‘additionality’, carbon leakage, corruption, and they can have serious unintended impacts on indigenous communities who depend on forests (see Carbon Markets).

**3. Carbon Quantitative Easing** Carbon Quantitative Easing (CQE) is a newly proposed monetary policy for central banks to manage the risks of unwanted climate change. CQE is associated with the “Global Carbon Reward”, and it involves a new type of Central Bank Digital Currency (CBDC). CQE requires new mandates for central banks so that they can trade the CBDC with hard currencies. CQE is different to Green Quantitative Easing (GQE) in one major way: CQE involves the trading a CBDC that is supply-pegged to a global carbon stock-take. CQE does not involve the purchase of bonds, and it does not create private debt in the economy. The CBDC is linked to a transparent accounting system for quantifying the “shade of green” of projects. CQE is a scalable long-term stimulus program that makes low-carbon projects more profitable, reduces private debt, and improves the quality of economic growth by transferring wealth into climate mitigation/restoration and co-benefits. The exchange rate of the CBDC, which is backed by CQE, has the effect of pricing the risk of unwanted climate change into all investment decisions by adjusting the risk-free rate of

return (see Global Carbon Reward; Central Bank Digital Currency, Monetary Policy 3, Parallel Currency).

**4. Carbon Subsidies** Carbon subsidies are positive financial incentives for abating carbon emissions and for carbon sequestration. Carbon subsidies may be given as cash grants, interest-free or low-interest loans, tax breaks, low-cost insurance, accelerated depreciation, or rent rebates. A recent example is Section 45Q of the U.S. tax code, which offers a performance-based tax credit for carbon capture projects. The 45Q tax credit is offered for carbon dioxide (CO<sub>2</sub>) captured in geologic formations, or captured in the feedstock of certain products (see Global Carbon Reward).

**5. Carbon Taxes** Carbon taxes are negative financial incentivizes for reducing carbon emissions. Under standard neoclassical market theory, the carbon tax is needed to improve the efficiency of markets (i.e. to internalize the Social Cost of Carbon). The tax revenue may be pre-allocated for climate mitigation projects, or for paying dividends (see Fee and Dividend). The pre-allocation of tax revenue goes beyond standard market theory, however the allocation of public money does not depend on tax revenue if the government can deficit spend (refer Deficit Spending). Carbon taxes are contentious in various countries, and there is growing awareness that carbon taxes alone are unlikely to prevent catastrophic climate change. There are at least three ‘camps’ with respect to the carbon tax debate: (1) market-optimists who recommend carbon taxes to achieve the 2015 Paris Agreement; (2) market-traditionalists who recommend carbon taxes to maximize market efficiency; and (3) market-skeptics who recommend strong government intervention and other policies. The average carbon price is about 1/20<sup>th</sup> of that estimated to be required to achieve the 2°C ambition of the Paris Agreement.

★ **Central Bank Digital Currency** Central Bank Digital Currencies (CBDCs) are a new type of digital money created and managed by central banks. CBDCs are a type of “outside money” because they originate outside of the private sector and are not balanced by private debt. China and a few other countries are developing CBDCs. In the future, CBDC’s may be owned and traded by citizens and businesses everywhere, and so CBDCs offer a new paradigm in economic policy especially if CBDCs are developed with new social agreements enabled using Distributed Ledger Technology (DLT) and “Smart Contracts”. CBDCs combined with expansive monetary policy can provide new channels for scalable finance for climate restoration. The main barriers to such innovations in monetary policy are (a) the existing mandates of central banks, which are designed to maintain central bank independence, and (b) the orthodox thinking of economists. CBDC’s are financial tools and so they are not listed in Table 1 (see Carbon Quantitative Easing, Parallel Currency).

**6. Climate Bonds** A climate bond is a specific kind of green bond, and it is a fixed-income debt instrument that attracts finance for projects that meet the Climate Bonds Standard. This standard aims for consistency with the 2°C global warming limit of the 2015 Paris Climate Agreement. Yields on climate bonds are guaranteed by governments, banks and corporations that have sufficient credit-worthiness. Climate bonds might be used to raise finance for clean energy projects, energy efficiency improvements, flood defenses, etc. Buyers of climate bonds include pension funds, governments, insurance funds, and sovereign wealth funds (see Green Bonds).

★ **Climate Change Litigation** Citizens, cities and counties in the United States have filed lawsuits against fossil fuel companies under tort law to seek compensation for climate damages and adaptation costs. The claimants need to show that they have suffered a foreseeable loss or harm as a direct result of a breach of duty by the defendants. In a society built on fossil fuels, both consumers and producers are responsible for climate change however fossil fuel companies make profits by polluting and certain fossil fuel companies knew about global warming while allegedly blocking progress on climate mitigation. A group of fossil fuel companies (incl. BP, ExxonMobil, Shell, Total and ConocoPhillips) and Microsoft have established the Climate Leadership Council (CLC) to obtain immunity from climate litigation in exchange for \$40-a-ton fee on carbon dioxide emissions. Climate change litigation is a legal process and not a financial mechanism, and so it is not listed in Table 1.

★ **Climate Change Reparations** Climate change reparations have been proposed as a means of rectifying harms to society caused by polluters. Monetary restitution is the most common form of reparation, however reparations may include non-monetary compensation, rehabilitation, apologies, guarantees of non-repetition, and resources to improve peoples lives. The victims of climate change might include, for example, the inhabitants of low-lying islands that are catastrophically impacted by >1.5°C of global warming. The polluters might include the rich countries that understood the implications of climate change since the establishment of the UNFCCC in the 1990s.

*"Applying a reparations frame to the climate change context arguably stretches the concept of reparations further than it has gone before."*

*"Generally speaking, researchers have found that there is a significant ecological debt owed to low-income nations from rich nations for various environmental consequences of human activity, including the disproportionate emissions of greenhouse gases." - Maxine Burkett (2009)*

War reparations have a long history, involving payments by vanquished nations to victor nations. Climate reparations will depend on the interpretation of international law and legal principles, and it will require the identification of

polluters, victims, and damages. The International Court of Justice has a function of settling international legal disputes. Climate reparations are legal actions with a moral framing, and they are not financial mechanism and so they are not listed in Table 1.

★ **Deficit Spending** The United States government finances its deficit spending by selling government bonds (Treasury securities) to the Federal Reserve (the Fed) and to other governments and private buyers. The Fed creates currency from nothing—because it can “print” digital currency at virtually zero cost—and it uses the extra currency to buy government bonds. The Fed earns interest on the bonds, and it then remits the revenue back to the Treasury, subsequently:

*“...It is as if the Treasury paid nothing at all. In effect, the interest rate on these bonds is zero. If you issue a bond, and never pay either interest or principal (the bonds are typically rolled into new bonds upon maturity), then it is as if you made them disappear. The Treasury has, over the course of decades, managed to make \$2.2 trillion of bonds disappear. This is functionally similar to if the Treasury simply ordered up \$2.2 trillion in the form of \$100 bills on forklift pallets, and used them [to] pay bills.” – Nathan Lewis (2019).*

Deficit spending is a fiscal concept, and as such it is not listed in Table 1 (see Green New Deal, Global Carbon Reward; see Modern Monetary Theory in Appendix A).

**7. Development Banks** A development bank is a Development Finance Institution (DFI) or Development Finance Company (DFC). Development banks can be multilateral, national, bilateral, and community-based, and they are often supported by institutions of more developed economies. Development banks provide capital for projects that would otherwise not be able to attract funds from commercial lenders. They provide credit in the form of higher-risk loans, equity positions, and risk guarantees, and they may adopt mandates for socially responsible investing.

**8. Extra Special Drawing Rights** Michael Metcalfe first proposed the idea of giving the International Monetary Fund (IMF) special powers to expand the supply of Special Drawing Rights (SDRs) to finance climate mitigation. The idea of issuing Extra SDRs would be most effective if the extra SDRs were given debt-free (i.e. at zero interest). Extra SDRs could be used to fund the Green Climate Fund (GCF) or to fund climate mitigation/restoration projects. The approach has some similarities with the Global Carbon Reward, however the Global Carbon Reward involves a Central Bank Digital Currency (CBDC) as part of central bank administration, and to ensure that the new finance is provided on a performance basis (see Green Climate Fund, Global Carbon Reward, Central Bank Digital Currency, Parallel Currency; see Special Drawing Rights in Appendix A).



**9. Fee and Dividend** A carbon Fee and Dividend (FAD) imposes a carbon tax on fossil fuels and distributes the revenue to the public as a regular payment. This policy is an alternative to Cap and Trade (CAT) and the simple carbon tax. The tax revenue is given back to citizens as a socially progressive dividend, and as a pricing system to reduce demand for fossil fuels. The objective of FAD is to attract political support while encouraging market-based solutions. The dividends might have a rebound effect (see Carbon Taxes, Carbon Markets).

**10. Financial Transaction Tax** The Financial Transaction Tax (FTT) is a small levy—typically 0.05% to 1%—imposed on securities transactions (stocks, bonds, futures) or currency transactions. The economist James Tobin proposed an FTT for foreign currency transactions to discourage excessive speculation. The North-South Institute estimates that a levy of 0.075% on currency transactions in dealer markets would yield approximately \$500 billion annually, assuming a 14.5% drop in trade. There are now about 20 FTTs in the world, however many attempts at applying FTTs have failed and a global agreement on FTTs has proven to be difficult. Detractors of the FTT say that the costs will be passed down to retail customers and investors.

★ **Fossil Fuel Subsidies** According to the International Energy Agency (IEA), fossil fuel subsidies are currently worth several US \$100's billions per year. The removal of these subsidies would be effective in reducing carbon emissions via a change in the price of carbon intensive goods and services.

**11. Global Carbon Reward** The Global Carbon Reward is a proposed new policy that provides scalable climate finance and acts as preventative insurance against unwanted climate change. Projects that abate or sequester carbon may earn the reward as a source of foreign income. No person, firm, or government is required to fund the policy, because mitigation costs are covered by central bank monetary policy and a thin inflation levy that is spread globally. The aim of the policy is to ensure that the Global Carbon Reward is sufficient to limit maximum global warming to an agreed level and with an agreed probability of success. A unique feature of the Global Carbon Reward is the use of a Central Bank Digital Currency (CBDC) that has a unit of account of “100 kg of CO<sub>2</sub>e mitigated” and is issued with service agreements that last for 100 years. The Global Carbon Reward injects debt-free liquidity into the financial system, whereas other monetary policies, such as Green Quantitative Easing (GQE), require the purchase of Green Bonds or Climate Bonds (see Central Bank Digital Currency, Carbon Quantitative Easing and Modern Policy 3).

**12. Green Banks** A green bank is a type of public bank or quasi-public financial institution that typically uses public funds to leverage private investment in renewable energy utilities or other low-carbon projects. Green banks seek to reduce energy costs for ratepayers, stimulate private investment, and expedite a low-carbon economy (see Public Bank).

**13. Green Bonds** Green bonds are interest-bearing securities that are issued to raise finance for projects that meet Green Bond Principles. According to the Climate Bonds Initiative, the traded volume in green bonds has grown rapidly since 2012, with the traded volume in 2018 reaching US \$167 billion, and the traded volume in 2019 already passing US \$150 billion and expected to reach US \$250 billion by end of year (see Climate Bonds).

**14. Green Climate Fund** The Green Climate Fund (GFC) is a fund that was established by the UNFCCC to assist developing countries with projects for climate adaptation and climate mitigation. Strictly speaking, the GCF is not a financial mechanism because the GCF relies on the generosity of donor nations. The GFC originally set a goal of raising USD \$100 billion per year by 2020 however the actual donations fall far short of this goal. The GCF has only received USD \$5.2b of committed finance, and currently the GCF only manages projects worth a total of USD \$2.59b [1]. The GCF is collaborating with the private sector to leverage this finance [2]. (see Extra Special Drawing Rights)

**15. Green New Deal** The Green New Deal (GND) is a proposal for a major new public works program for decarbonizing the United States economy. The GND includes provisions for a “just and equitable” low-carbon transition, and in this respect the GND considers social and environmental issues to be linked. The additional costs of the GND may be funded by deficit spending, a wealth tax, and cuts in military and other discretionary spending (see Quantitative Easing, Deficit Spending, and Modern Monetary Theory in Appendix A).

**16. Green Quantitative Easing** Green Quantitative Easing (GQE) is a proposed monetary policy for central banks to undertake strategic Quantitative Easing (QE) that involves buying “green” assets, such as Climate Bonds, to reduce the cost of borrowing for low-carbon projects. A study by the Greenwich Political Economy Research Centre finds that the effectiveness of GQE depends on the resulting change in the interest rate for raising finance for low-carbon projects. It appears that GQE by itself is unlikely to have a significant climate mitigation benefit although it could boost employment and economic growth (see Carbon Quantitative Easing; see Quantitative Easing in Appendix A).

★ **Monetary Policy 3** Monetary Policy 3 (MP3) is a term coined by Ray Dalio, founder of Bridgewater Associates, the world’s largest hedge fund. Dalio defines MP3 as “fiscal and monetary policy working together, with fiscal policy producing deficits that are monetized by the central bank.” Dalio argues that MP3 is appropriate and inevitable for developed nations to avoid recessions. Richard Duncan, an economist and author, recommends that the U.S. adopt MP3 to fund a “multi-trillion dollar investment program” in new technologies. MP3 reflects the idea that the 21st century economy is driven by credit growth and not by savings, because money ceased to be backed by gold in the 1970’s. Duncan



suggests that the Fed provide an \$8 trillion investment program to “turbocharge” the U.S. economy and reduce government debt. MP3 is not listed in Table 1 because it is a generic policy. See the Green New Deal and the Global Carbon Reward (see Modern Monetary Theory in Appendix A).

**17. Nationalization of Fossil Fuel Companies** Nationalization of fossil fuel companies requires that the government purchase a controlling interest (i.e. 51%) of outstanding shares of company stock, thereby controlling the vote on business decisions in these companies. Another option is to use government funds to purchase specific assets (e.g., refineries, pipelines, oil and gas fields) and to manage the closure, dismantling and decontamination of these assets. The government could legislate fossil fuel corporations to submit and execute closure plans. With the nationalization of assets, the government will need to consider its legal and financial options for a “just transition” and to force shareholders to carry a portion of the decommissioning and decontamination costs.

**18. Parallel Currency** The World Academy of Art and Science (WAAS) has an initiative that proposes a parallel currency, or dual currency system, to provide about USD \$5 trillion per year of additional liquidity for realizing the United Nations Sustainable Development Goals (SDGs). The WAAS initiative is part of their “Financing the Future” project to address an inherent lack of scalable finance for the SDGs. The WAAS initiative argues that conventional methods of raising project finance is too slow, too small, and depends on complex administration. The parallel currency overcomes certain constraints of the global economy by providing finance at speed and at scale for addressing global challenges. The WAAS initiative proposes that the parallel currency could operate on a Distributive Ledger Technology (DLT). This proposal is similar to the Global Carbon Reward (see Global Carbon Reward, Central Bank Digital Currency; see Fiat Currency in Appendix A).

**19. Philanthropy** Philanthropy is long-term strategic giving whereas charity refers to short-term emotional giving. About 30 wealthy donors, mostly based in the U.S., intend to donate roughly USD \$1 billion per year to climate change. Most populations collectively donate an amount equal to 0.1% to 1% of GDP to charity. If we assume 0.5% of Gross World Product (GWP) is donated to climate restoration this would equate to USD \$0.4 trillion per year. A risk of relying on philanthropy is that donors can easily abandon their commitments as circumstance change.

**20. Public Banks** A public banks are banks under government control. Public banks collectively own about 25% of global bank assets. Public banks provide loans to households and businesses at a lower cost compared with commercial banks. Public banks may lend to projects that produce positive social and environmental outcomes. Private investors may join with public banks in a public-private partnership that ‘wraps’ a guarantee around projects for the

purpose of socializing some of the risks and privatizing some of the profits. (see Green Banks)

★ **Seigniorage** The state-sanctioned power to issue currency is called the “Right of Issuance” or “seigniorage”, and this power belongs to the central bank via the government. Seigniorage is the income earned by issuing a currency with a face value greater than the cost of production. Central banks usually create banknotes, coins, and digital fiat currency in exchange for interest-bearing assets, such as government bonds, commercial bonds, and other assets. The US Federal Reserve remits its profits to the U.S. Treasury. The European Central Bank remits its interest income to the central banks of the European Union (EU). Seigniorage is a monetary process, and so it is not listed in Table 1.

★ **Tobin Tax** (see Financial Transaction Tax)

### Appendix A: Other Important Terms and Concepts

- Alien Tort Statute
- Brown Growth
- Central Banks
- Fiat Currency as “Inside Money”
- Fiat Currency as “Outside Money”
- Government Bonds
- Impact Investing
- Interbank Currency Market
- Interbank Lending Market
- Modern Monetary Theory
- Quantitative Easing
- Special Drawing Rights

The bibliography and Appendix A are not provided here for reasons of brevity.

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