The Green Impact Fund for Technology

Thomas Pogge

Abstract: The Green Impact Fund for Technology (GIFT) is a proposed new international financing facility that would enable originators of innovative green technologies to exchange some of their monopoly privileges in return for impact rewards.

The invited exchange would apply only in the lower-income countries: originators choosing to forgo their monopoly markups in this GIFT Zone would receive annual premiums based on the emission reductions achieved with deployments of their “greenovation” in that GIFT Zone.

The GIFT’s main purpose is greatly to improve the diffusion of impactful green technologies in the Global South. It would do so first by inducing participating originators to waive licensing fees and monopoly markups, and second by giving these originators a financial interest in the wide and effective use of their participating innovations. In addition, the GIFT would stimulate development of additional greenovations that – tailored to prevailing needs, cultures, circumstances, and preferences in the GIFT Zone – would be especially impactful there. These two effects would produce a third: the GIFT would help build capacities to develop, manufacture, distribute, install, operate, and maintain greenovations in the GIFT Zone.

Monopoly patents and externalities

Globalized in 1995 through the TRIPs Agreement, humanity’s dominant mechanism for encouraging innovations involves 20-year product patents, whose monopoly provisions enable originators to reap substantial markups or licensing fees from early users. Insofar as such monopoly markups reward originators, they also raise the price of innovative products. This is appropriate in many cases: willing buyers pay a monopoly markup on a novel product they prefer – on a new gadget or toy or cosmetic, perhaps – and thereby ensure that judicious investments in desirable innovations are rewarded and incentivized. Both buyers and originators benefit from this arrangement without directly imposing costs upon third parties.

The reliance on monopoly rents is not always unproblematic, however. In our world of widespread poverty, monopoly markups exclude many poor people from badly needed products that they would have been able to afford at a competitive price. Often, such products are then not even made available in poor countries. And many other technologies, tailored to the needs and circumstances of poor people, are never even developed because they are not expected to yield attractive monopoly rents. These problems occur in the green technology sector but are even more pressing elsewhere, especially in pharmaceuticals.
Highly relevant to the green technology sector is another serious problem arising specifically for innovations whose use produces substantial benefits mainly for third parties. Green technologies overwhelmingly fall into this special category, with their main benefit being the averting of emissions that would harm most living beings on the planet, present and future. Even when they are very high, such third-party benefits often remain unrealized because neither potential buyers (through a price surcharge) nor potential suppliers (through a price discount) are willing and able to finance them privately. The resulting lack of turnover is predictable, and many green innovations are therefore not even developed – despite their high third-party benefits.

To illustrate, consider a kind of factory that could be operated with or without a certain filtering device that reduces emissions. Deploying this device is expensive, partly because it requires paying a licensing fee to the patentee. Some plant owners may be willing to bear such costs if the averted local health damage, to themselves and their employees, is sufficiently large. But hardly any factory owners are willing and able to pay for the device a price commensurate to the huge losses that its deployment would aver from the whole planet, including future generations.

Let's assume that, over time, the deployment of each filtering device has a small effect on the composition of Earth's atmosphere, increasing the life expectancy of 20 billion present and future people by an average of 63 seconds. That's 40,000 human life years per device installed. Nevertheless, many factory owners will not be willing to pay even $20,000 more for this third-party benefit. And typical patent holders will not attach adequate weight to this third-party benefit either. As rational market actors, they focus on selling licenses at the profit-maximizing price. Such a patent holder would thus rather sell 100 licenses at $20,000 each than 150 licenses at $13,000 each – even if the latter decision would avert the loss of over 2 million human life years at a total cost of only $50,000.³ For every additional dollar earned by this patentee, the world is losing forty years of human life!

The problem is then that technologies with high positive externalities are underutilized, which in turn discourages innovators – expecting paltry uptake – from attempting to develop such technologies in the first place. In the green technology sector, this problem is severely depressing the earnings/benefit ratio for research and development (R&D) investments so that innovations in this sector fall far short of the socially optimal level.

This problem is known as a classic instance of market failure. It can be solved through political action, specifically through governments instituting environmental regulations, levies on emissions, or green subsidies, all of which incentivize the choice of green technologies by prohibiting, limiting, or discouraging the use of their dirtier alternatives. Among these three options, emission levies – denominated as a certain monetary charge per metric ton of CO₂e emitted ($/tCO₂e)⁴ – seem especially suitable because they favor the development and deployment of the most cost-effective greenovations while avoiding unfair burdens on non-polluting taxpayers (who would be saddled with some of the cost of green subsidies).
Environmental regulations might be said to share the advantage of favoring development and deployment of those greenovations that can achieve the most cost-effective compliance. But they ensure only “local” cost-effectiveness, in response to each area of regulation. They do not ensure that all the many regulations (of air traffic, cement production, oil well maintenance, animal feed, etc.) are holistically designed to instantiate the same marginal cost-benefit threshold. Even the best of experts, continuously monitoring and adjusting all the diverse regulations in view of changing technologies and circumstances, would fall well short of maintaining an optimally cost-effective design. Being subject to various political pressures, real-world politicians fall short to an even much larger extent. Better, then, to impose a simple levy on emissions, or an overall emissions limit with market trading, to ensure “global” cost-effectiveness: to ensure that we collectively avert the emissions that are cheapest to avert. Such a uniform emission levy is further optimized when it is made international, that is, when it covers activities associated with harmful emissions in all sectors and all countries. Such a fully global levy at a reasonable level would lead all actors toward avoiding the more cheaply avoidable emissions and ensure that the negative externalities of the remaining emissions are fully internalized: those who enjoy the benefits of activities associated with harmful emissions pay, embedded in the cost of their activity, a proportionate penalty at a globally uniform rate ($/tCO₂e).

However compelling intellectually, such a uniform emission levy is politically difficult to institute in a world of some 200 sovereign states. One obstacle is political resistance from fossil fuel producers and consumers, who work hard to prevent or to lower the levy in specific countries. The damage they do is magnified by another collective action problem: states are disadvantaged when they charge a higher emission levy than other states. This fact creates a competitive pull toward lower levy rates, which makes it difficult for any state to lead by example and makes achieved agreements vulnerable to unravelling into a race to the bottom. This background helps explain why the total amount of emission levies – $84 billion in 2021⁵ – is still much too small relative to the great harms that our present emissions do and will continue to do in coming decades. Less than a quarter of all emissions worldwide are subject to any kind of levy, and the levies imposed are often much too low to have a meaningful impact on investment decisions.⁶ If appropriate levies of $50–100 per metric ton of CO₂e were imposed, then annual emission levies on over 40 billion metric tons of anthropogenic emissions would raise somewhere around $3 trillion annually, many times more than the actual $84 billion revenue.

There are two additional sources of political resistance to emission levies, especially significant in the Global South. One is the moral argument that it would be unfair to expect the developing world to impede its own economic development by putting a price on emissions, given that the present high-income countries emitted with abandon when they passed through similar phases in their development. Why should China, India, Brazil and Nigeria have to subject their development to ecologically sound restraints while the U.S., Germany, Britain and Japan are enjoying far superior wealth accumulated over a development process that lacked such
ecological restraints? Here the South is, as it were, saying to the North: “You say that you did nothing wrong when you imposed heavy losses and damages on the rest of the world in the course of your economic development (cf. note 10, infra). You say that you owe us no part of your accumulated riches as compensation. How then can you demand from us that we refrain from pursuing a similar growth path to yours, unhampered by ecological restraints?” This argument has much rhetorical appeal, but it misses the crucial fact that the people most vulnerable to air pollution and climate change are in the Global South. Constituting an ever-increasing share of the global total, emissions originating in the Global South are harming and killing mostly people in the Global South.  

Another source of political resistance to a global emission levy in the Global South has to do with the distribution of ownership of green technology patents, which mostly belong to originators in affluent countries. The main point of emission levies is to encourage decision makers to adjust their activities so as to reduce what they must pay. Doing so involves forgoing polluting activities in some cases, but far more often it involves modifying activities to make them less polluting: Putting a price on emissions creates financial incentives and thereby greater willingness to deploy green technologies, of which some 15,000 are newly patented each year in the U.S. alone. This makes emission levies profitable for patentees: they can sell more licenses, at higher prices, because deployment of their green technology now produces large savings in emission levy costs. Such increased rents have the welcome effect of attracting greater R&D investments to the green-technology sector, thereby accelerating the pace of green innovation.

There is one big catch, however. The holders of green patents are heavily concentrated in the wealthier countries whose innovative corporations, often with government support, have the capital and human resources to advance the technology frontier. Firms in the lower-income countries are, by and large, unable to compete effectively. This asymmetry in innovation capacities creates an asymmetry in the flow of additional licensing fees that a worldwide emission levy would produce: the lion’s share of licensing fees paid on greenovation deployments in the lower-income countries would go to Northern patentees. Unsurprisingly, lower-income countries are reluctant to support such a redistributive mechanism that, subjecting them to massive capital outflows, would significantly slow their development. This reluctance is reinforced by the preceding realization that the now-wealthy states got this way on a “dirty” path of economic development. Why should lower-income countries impose on themselves an emission levy that would cause them to bleed large amounts in licensing fees to the vastly richer global North for permission to help avert a global disaster that the North has unleashed through its disproportional production and consumption? This compelling question indicates not merely a political obstacle to a universal emission levy, but a moral obstacle as well. It would be unjust to arm-twist the poorer, developing countries into accepting such a universal levy and unjust also for the governments of those countries to impose it on their populations.
The arm-twisting just criticized is central to the Climate Club idea that – pioneered by William Nordhaus – is being promoted by some affluent states. The Nordhaus proposal is to create a club of states that meet two requirements:

- Each member state imposes an emission levy within its jurisdiction, starting at a certain level and then gradually increasing on a pre-agreed schedule (Nordhaus uses a base level of $50 per metric ton of CO\(_2\) in 2025, set to increase 3% annually in real terms).
- Each member state imposes a flat tariff (Nordhaus envisions 5–10%) on all imports from exactly those states that refuse to be members.\(^9\)

This Climate Club proposal appears fair because it treats all countries equally. But in fact, it is profoundly unfair by ignoring great differences among them. Three are especially important. Some countries are as much as 100 times more affluent than others and can therefore much more easily afford to slow their economic growth. Those richer countries have become rich in emission-intensive ways, causing great harm especially to poorer populations; it is estimated that the emissions of just the U.S. during the 1990–2014 period have caused damages abroad in the amount of nearly $2 trillion.\(^10\) Thirdly, worldwide levies on emission, by greatly multiplying the use of green technologies, would thereby also massively increase income from green patents, which are mostly owned by Northern corporations. As a result, poorer countries would suffer substantial new capital outflows, retarding their economic growth even further. Forcing lower-income countries to join such a club on pains of canceling their free-trade privileges would substantially exacerbate the injustice of the global economic order.

One obvious way of avoiding such injustice is to exempt the lower-income countries from the punitive tariffs, allowing them to stay outside the Climate Club without penalty.\(^11\) But this solution damages the urgent struggle to bring climate change under control. It is true that lower-income countries emit at much lower per-capita rates – U.S. emissions per capita are some eight times higher than India’s, for example. But this does not mean that we can afford to ignore India’s emissions! Given the size of India’s population, these emissions are already quite large and have the potential to grow massively as India’s economy continues to expand at a rapid rate. It is crucially important to strengthen, also in the Global South, the incentives to deploy green technologies.

As it is, such incentives are quite weak in the lower-income countries, leading to massive underutilization of green technologies there. An actual example in the area of coal-fired power plants may illustrate. Frontier technologies can substantially reduce emissions but cost more because of licensing fees to patentees. Mitsui Babcock charged manufacturers of steam boilers about $1.5 million per 600 MW boiler for using its patented “ultra-supercritical” technology.\(^12\) Consequently, many plants in India and other lower-income countries deployed less efficient subcritical or supercritical technologies\(^13\) that will generate up to 30% higher emissions for decades.\(^14\)
Scant deployment of green technologies in the Global South is a big problem. In the remainder of this 21st century, these countries will experience massive economic growth, intensified by large increases in population. The technologies they will use, the practices and habits they will form, the roles they will be prepared to play in the fight for a livable planet will matter far more than any choices affluent nations will make within their own borders. Rapid emissions reduction requires that highly effective and locally appropriate green technologies be widely and quickly deployed throughout the Global South.

These reflections set the stage for the GIFT. We need a structure that

(i) provides cost-effective incentives toward developing and deploying emission-reducing innovations worldwide,

(ii) treats countries of the Global South fairly, and,

(iii) mainly for reasons of feasibility, preserves the patent regime in its present globalized form.

One obvious way to conceive such a structure would supplement the global Climate Club with side payments that compensate poor countries for the outflow of licensing fees. For each such fee that users of a greenovation in a country of the Global South pay to Northern patentees, Northern states would make a compensating payment to the Southern country concerned.

The GIFT offers a different, better solution that, distributively similar, offers substantial advantages in efficiency and political realizability. Briefly put, a universal emission levy has the great merit of substantially increasing deployments of green technologies, thereby accelerating the pace of green technology progress by drawing investment capital into green R&D. But, when combined with an innovation regime reliant on monopoly patents, a universal emission levy also has the serious drawback of raising the share of the social product earned as income from patents. Monopolies entail large inefficiencies: they impede diffusion of innovative technologies, thereby causing substantial deadweight losses and slowing ecological progress. The GIFT provides, at least for the Global South, a different financing mechanism that achieves the great advantages of an emission levy without the substantial drawback of reliance on monopoly rents.

**The GIFT**

Rapid emissions reduction requires that highly effective and locally appropriate green technologies are widely and quickly deployed throughout the Global South. The Green Impact Fund for Technology promotes this goal by inviting originators to GIFT-register any new green technology, with two legal effects in all countries below a specified per-capita income:

- the originator permanently forgoes, throughout the GIFT Zone, any monopoly rents it could earn from its registered technology; and
The GIFT rewards this technology for the emissions averted with it in the GIFT Zone through deployments completed within six years of market entry.\textsuperscript{16} The GIFT would support diffusion of green technologies in the GIFT Zone in two ways: by avoiding the headwind of monopoly markups (delinking the sales price from the fixed cost of R&D) and by adding the tailwind of impact rewards. This substitution of impact rewards for monopoly rents transforms originator motivations. While monopoly rewards incite considerable efforts to find, stop, prevent, and deter patent infringements, impact rewards encourage originators actively to promote the rapid, frequent, and effective deployment of their greenovation for increased impact rewards. Even without profiting from its sales price, such originators would nonetheless promote its effective deployment by providing technical support, maintenance, and sometimes even subsidies — insofar as they expect the increase in impact rewards earned through such promotional investments to exceed their cost.

GIFT rewards might be paid through preannounced annual disbursements that could be scaled up over time. Any patentable new green technologies could be registered for participation in six consecutive such disbursements, each divided among registered innovations according to emissions averted with them in the GIFT Zone in the preceding year. This principle of division ensures fairness among participating originators, who are rewarded in proportion to emissions averted, all at the same reward-to-benefit rate ($/t\text{CO}_2\text{e})

Because participation is optional, the GIFT’s reward rate emerges endogenously and equilibrates to a level that makes participating originators content with their GIFT Zone-limited trade — permanent waiver of monopoly rents in exchange for six years of impact rewards.\textsuperscript{17} When originators find the going rate unattractive, registrations dry up and the reward rate rises as older innovations exit at the end of their reward period. When the reward rate is seen as generous, registrations multiply, and the reward rate declines. Such equilibration reassures participating originators and contributors that the reward rate will be fair between them, and stable over time.

The easiest way for registrants to waive their potential monopoly rents in the GIFT Zone is not to patent their registered greenovations there. This would save the registrant much effort and expense and would allow competing manufacturers to produce and sell the technology at competitive prices. Alternatively, registrants might meet the condition by patenting the registered greenovation in some or all GIFT Zone countries and then, during the patent period, offering cost-free licenses to those who want to produce or sell it there.\textsuperscript{18} Either way, the registrant itself would be free to manufacture and sell the registered technology too, but would have to do so, in the GIFT Zone, at a competitive price. Deriving its earnings from impact rewards, the registrant would be motivated to ensure that its registered technology is widely and cheaply available throughout the GIFT Zone, and deployed in an impactful way. To this end, the registrant would collaborate with manufacturers and sellers of its technology and keep its own sales price low, often even below its own cost.
In specifying the GIFT, a central guideline is to design it so that its reward rate equilibrates to a low level. The GIFT should be as efficient (tCO$_2$/e/$) as possible at averting emissions. For this reason, the GIFT should not demand too much from registrants. This thought motivates limiting the GIFT to the lower-income countries. Because demand for greenovations at monopoly prices is much weaker there, limiting the GIFT to those countries greatly reduces the opportunity costs of GIFT registration, and therefore the GIFT’s endogenous reward rate ($/tCO$_2$e), while correspondingly increasing its ecological impact relative to the amounts it disburses (tCO$_2$e/$). The exact qualification for membership in the GIFT Zone could then be determined in light of the same desideratum: the GIFT Zone should include the countries in which uptake of patented green technologies has been poor. This would likely include at least the ca. 130 countries whose annual *per capita* gross national incomes fall below $10,000.

Other design question can be approached with the same guideline. Thus, consider the question whether, during the reward period, the registrant should have the option to offer its registered technology at a nonprofit price throughout the GIFT Zone without having to permit others to manufacture and sell it as well. If it turned out that many potential registrants strongly value this option, then this would be a good reason to give it to them in order to lower their reservation price and thereby to achieve a lower GIFT reward rate. With this option one would need to make sure that originators derive their profits only from impact rewards, not from the sales price.

The GIFT would organize a wide competition across the whole greenovation sector, including the areas of electricity generation, traffic, residential and office heating and cooling, construction, meat production, agriculture, forestry, industrial manufacture of steel, cement and other commodities. High-impact greenovations from all these areas would be competing on one GIFT-created market toward the single goal of averting emissions. In this competition, all participants can be winners, that is, earn more in premiums than they have invested. And a registrant with low premium income can still be the most successful, if its income is especially high relative to its investment.

Participation in this market would train originators to holistically organize their research, development, marketing, and delivery operations toward realizing the most cost-effective impact. Covering R&D costs and originator profits as public goods, the GIFT would make access to registered greenovations widely affordable at competitive prices – with registrants highly motivated to promote impactful deployments.

The GIFT would boost diffusion of high-impact green technologies in the GIFT Zone, with massive reduction of emissions in the Global South. The constrained sales price, supplemented with impact rewards would further benefit lower-income populations by enabling originators to make good profits from selling to people who cannot pay high markups. This would encourage R&D that targets their specific needs within their specific circumstances: locally appropriate greenovations that are sensitive to socio-cultural context and congruent with equitable access so
that they mitigate rather than exacerbate existing socio-economic inequalities. In this way, the GIFT would open whole new areas of green R&D (reliable small-scale local energy generation, pollution-free stoves, etc.) and accelerate the overall pace of green innovation. In the competition to develop greenovations geared to the Global South, innovators in the GIFT Zone would not face the usual crushing head start by Northern originator firms. The GIFT would therefore also help build, in lower-income countries, capacities in R&D, manufacturing, distribution, installment, operation and maintenance of green technologies.

The evolving GIFT reward rate would be indicative of the GIFT’s efficiency – but would also understate it substantially because the GIFT’s entire ecological impact greatly exceeds the sum of the assessed and rewarded impacts of all GIFT-registered innovations. This is so not only because the GIFT confines the rewardable impact of a registered greenovation to deployments during the first six years. A more important reason is that, by accelerating the pace of innovation, the GIFT raises the standard against which newly registered innovations will be assessed. Over time, this effect will grow to be quite large. A greenovation registered in 2040 will be rewarded for the emission reductions it achieves relative to the alternatives being deployed in that year. But this 2040 state-of-the-art will be far superior to what it would have been if the GIFT had not been in operation for the preceding decade or more. This acceleration of green innovation is an achievement the GIFT need not pay for. It is likely to be especially significant in classes of green technologies that, under the current regime, suffer neglect because they are suitable for use only in the Global South, are more expensive to manufacture and deploy than their dirtier alternatives, or bring widely diffused benefits that buyers care little about.

An experimental pilot could test and refine the GIFT idea and thereby make adoption of the GIFT more feasible and likely. This pilot might involve a single reward pool of, say, $100 million, to be split among preselected green originators in proportion to the emission reductions they achieve with their respective innovations, affordably priced, in a self-selected region of the GIFT Zone over a 2-year period. The pilot would show concretely how green originators respond to competitive impact rewards and how ecological impact can be assessed in a reliable and timely manner. It would help refine impact assessment and provide an indication of the cost-effectiveness of the new impact rewards. The GIFT pilot would also yield its own ecological benefits and policy insights through the pilot projects it monitors and rewards.

The UNFCCC’s Green Climate Fund – mandated to “promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions”\textsuperscript{19} – is well suited to administering the GIFT and its pilot. Both should be financially supported by high-income countries, which can most easily afford the cost, have contributed most to the global climate emergency, and continue to benefit from the great wealth they have accumulated through their decades of high pollution. Supporting the GIFT would help the high-income countries to discharge their responsibilities
under Sustainable Development Goals 13 and 17\textsuperscript{20} and to fulfill their 2009 promise to devote $100 billion annually to climate change mitigation and adaptation in the developing world.\textsuperscript{21} The GIFT would benefit high-income countries by reducing emissions and also by augmenting the income that innovative firms in the global North derive from their greenovations.

The GIFT has no optimal size. It might be started with modest annual disbursements of, say, $1 billion by a few willing states or other contributors.\textsuperscript{22} This level could then be gradually raised as contributors decide to increase their contributions or new contributors join the partnership.\textsuperscript{23} As the GIFT grows, its reward rate will tend to rise as less efficient technologies get registered. But a larger GIFT also brings two advantages: greater efficiencies in running the GIFT (impact assessment and administration), as well as greater impact on the pace of green innovation which increases that part of its ecological impact that the GIFT need not pay for. Studying the actual operation of the GIFT will provide real data toward assessing its effectiveness. Such data can help potential contributors decide whether to contribute and at what rate. Such data might also allow the GIFT to raise additional funds in the international offset markets that corporations use to purchase greenhouse-gas offsets that allow them to claim that they are compensating some or all of their emissions and thus approaching or attaining climate neutrality. In any case, the various financing commitments sustaining the GIFT must be designed so that it can meet the legitimate expectations of registrants who have developed and registered a greenovation in anticipation of a six-year reward period.

The GIFT is politically realistic because it requires no painful concessions. It can be implemented unilaterally by a few willing states and other funders looking for a new method of reducing emissions in a highly cost-effective way. Conferring clear benefits, the GIFT would be welcomed by the countries of the GIFT Zone whose governments and populations would benefit from better and cheaper options for greening their operations, from domestic capacity building, from substantial declines in air pollution, and from a deceleration of climate change. The GIFT proposal will find support also among firms with significant green technology patent portfolios, as it would substantially increase their opportunities to make money from developing and selling greenovations into the GIFT Zone while leaving them the choice whether to pursue these opportunities. Green movements around the world would applaud the GIFT, as would organizations concerned for living conditions in the Global South. Defenders of intellectual property rights would find the GIFT palatable because it applies only to the GIFT-Zone countries and, with each greenovation, lets its originator choose between the two rewards. Some wealthy states might be initially reluctant to contribute to the GIFT’s cost – but others could and should readily proceed without them. The GIFT would, as intended, reduce demand for obsolete dirty technologies throughout the GIFT Zone but would also give the firms selling such technologies ample new opportunities to supply state-of-the-art green substitutes. With support from a few major states or other donors, the GIFT could be instituted without significant political resistance.
Endnotes


3 The relative loss amounts to 2 million years of human life because each of the 50 (=150–100) devices not licensed would have averted the loss of 40,000 life years. The patentee’s $50,000 in extra earnings are the difference between licensing fees of 100 x $20,000 versus 150 x $13,000.

4 ‘\(\text{CO}_2\text{e}\)’ stands for \(\text{CO}_2\) equivalent, a measure that converts other greenhouse gases according to their global warming impact over a specific time horizon (such as 20 or 100 years). Specifying the time horizon is important, because different greenhouse gases fade from the atmosphere at different rates. Methane (\(\text{CH}_4\)), for example, has over 80 times the warming potential of \(\text{CO}_2\) over a 20-year horizon, but only about 30 times its warming potential over 100 years. While a 100-year time horizon is commonly used, I favor a 20-year horizon, which assigns higher importance to short-lived gases like methane. This can be justified by the crucial importance of the level at which we can get global warming to peak. The higher this peak, the more deeply the Earth’s patterns will be disturbed, with increasing risks of potentially massive positive feedback effects on its future climate.

It is worth pointing out that, while \(\text{CO}_2\) and \(\text{CH}_4\) contain carbon, some other greenhouse gases – such as \(\text{N}_2\text{O}\), \(\text{SF}_6\), and \(\text{NF}_3\) – do not. Since the GIFT should include these gases, it is best to avoid expressions like “carbon emissions” and “carbon neutrality” in connection with the GIFT.


7 It is estimated that air pollution alone causes some 8.7 million (15% of) premature deaths annually, mainly in India and China. See Karn Vohra and Alina Vodonos et al., “Global Mortality from Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion: Results from GEOS-Chem,” Environmental Research 195 (2021): 110754, https://doi.org/10.1016/j.envres.2021.110754. See also the series of essays in the New England Journal of Medicine on the topic: “Fossil-Fuel Pollution and Climate Change — A New NEJM Group Series,” https://www.nejm.org/dof/full/10.1056/NEJMe2206300. Also disproportionately affecting people in the Global South are the other negative effects of human emissions such as extreme weather events (floods, droughts, heat waves), the expanded reach of tropical diseases, and the increasing scarcity of food and water.


11 Club members could nonetheless institute a carbon border adjustment in order to neutralize the incentive to move polluting activities from Club countries to countries in the Global South.


14 If only 35% rather than 45% of the coal’s energy content is converted into energy, then one needs 30% more coal to generate the same amount of electricity. See Rosamund Pearce and Tom Prater, “Mapped: the World’s Coal Power Plants” (London: Carbon Brief 2020). https://www.carbonbrief.org/mapped-worlds-coal-power-plants

15 For example, sub-Saharan Africa’s electricity production will increase dramatically as its *per capita* consumption — currently well below 2% of the US level — will catch up and its population will increase from the current 1.2 billion to about 4 billion by 2100.

16 Thus, if the first specimens of a new technology are put into service on 1 March 2027, then the GIFT takes account of all specimens put into operation in the GIFT zone before March 2033. Discussion of this and other specific details concerning the GIFT proposal are available at https://globaljustice.yale.edu/green-impact-fund-technology. Also available there is a statement by TÜV SÜD on the feasibility of assessing the emission reductions achieved with particular green technologies.

17 The precise length of the reward period is not very important because the reward rate adjusts to it: with the longer/shorter reward period, the number of registrations will remain roughly the same, but each registered greenovation will receive smaller/larger annual rewards for a larger/smaller number of years. The reward period should not be so short that some registered innovations do not have a decent chance to establish themselves in the GIFT Zone – a problem that can also be mitigated by allowing registrants to defer their reward period, e.g., to be rewarded in years 3-8, rather than in years 1-6, after market introduction. Nor should it be so long that the GIFT rewards some old and obsolete greenovations that are no longer cutting edge. A shorter reward period has the further advantage of reduced assessment expenses.

18 One possible reason for an originator to prefer the latter option is because it affords some control over follow-on innovations. Another reason is to facilitate monitoring of manufacturers and sellers in the interest of tracking all rewardable emission reductions.


20 “Take urgent action to combat climate change and its impacts” and “strengthen the means of implementation and revitalize the global partnership for sustainable development.” https://sdgs.un.org/goals.


22 With a substantially smaller GIFT, the costs of administration and impact assessment might consume too large a percentage of the GIFT’s budget.

23 Contributing states might agree on a contribution formula that would tie their annual contribution to their *per capita* gross national income (g) and populations size (p). For example: 

\[ p \times \frac{(g - 10000)}{10000} \]

Pursuant to this formula, high-income countries would on average contribute about $4 per year for each of their residents. With \( p = 333,000,000 \) and \( g = 73,000 \), the US share would initially amount to $2.1 billion annually, still much smaller than the damage U.S. emission annually inflict on foreigners (see *supra* note 10).