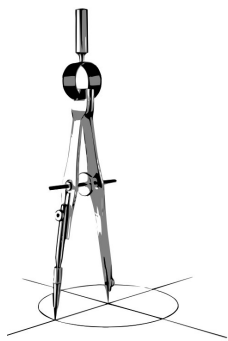




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A Proposal to Create a Single Global Cap-and-Trade Scheme to Ensure a Ceiling on Gross CO₂ Emissions below a Pre-set Allowable Carbon Budget

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[English video] https://youtu.be/lo8dfnSTw_c

[Japanese video] https://youtu.be/da_3vxeU8-M





OUTLINE OF THE PROPOSAL

It is time for faithful and trustworthy world leaders to lead in establishing a “**Global Cap-and-Trade regulatory framework**” to change our course promptly. This framework aims to establish an institutional mechanism that ensures steadily decreasing global emission limits. The Scheme regulates **upstream entities that import or produce fossil fuels**, with the initiation of countries that share the objective and choose to participate voluntarily, and guides us toward a global carbon-neutral economy.

In addition, the Scheme can enable a major **global paradigm shift** not only for climate issue but also for financing SDGs, and addressing fossil fuel resource concerns, notably:

- (a) *a global emissions cap trajectory setting based on the pre-agreed remaining gross carbon budget to be decided by the CMA of the Paris Agreement;*
- (b) *initiated by a highly conscious club of countries and building in incentives for other countries to participate;*
- (c) *a fully auctioning upstream-type regulatory scheme with a single market of international allowance as a new energy commodity [for supply-side of fossil fuels];*
- (d) *a uniform—theoretically ideal—international carbon pricing scheme to realise the minimum cost (and no need for the border adjustment), as an external common factor, while it respects national sovereignty [for demand-side of energy];*
- (e) *becoming an economic framework with no need for awareness of CO₂ ceiling explicitly [for demand-side of energy];*
- (f) *generation of a trillion-dollar auctioning proceeds stream—equivalent to an agreed amount of total financial transfer at the COP29—for financing SDGs and regressive mitigation for low-income people, and incentivising developing countries for participation;*
- (g) *together with a carbon crediting scheme enabling fossil fuel production without limitation by carbon capture and storage (CCS) [for supply-side of fossil fuels]; and*
- (h) *enhanced fossil fuels predictability for production investment [supply-side] and effective utilisation [demand-side] under clear rules with a price stabilisation effect.*

We look forward to the **strong will** of current world leaders for future generations.





The Essence of Proposed Global Cap-and-Trade Scheme

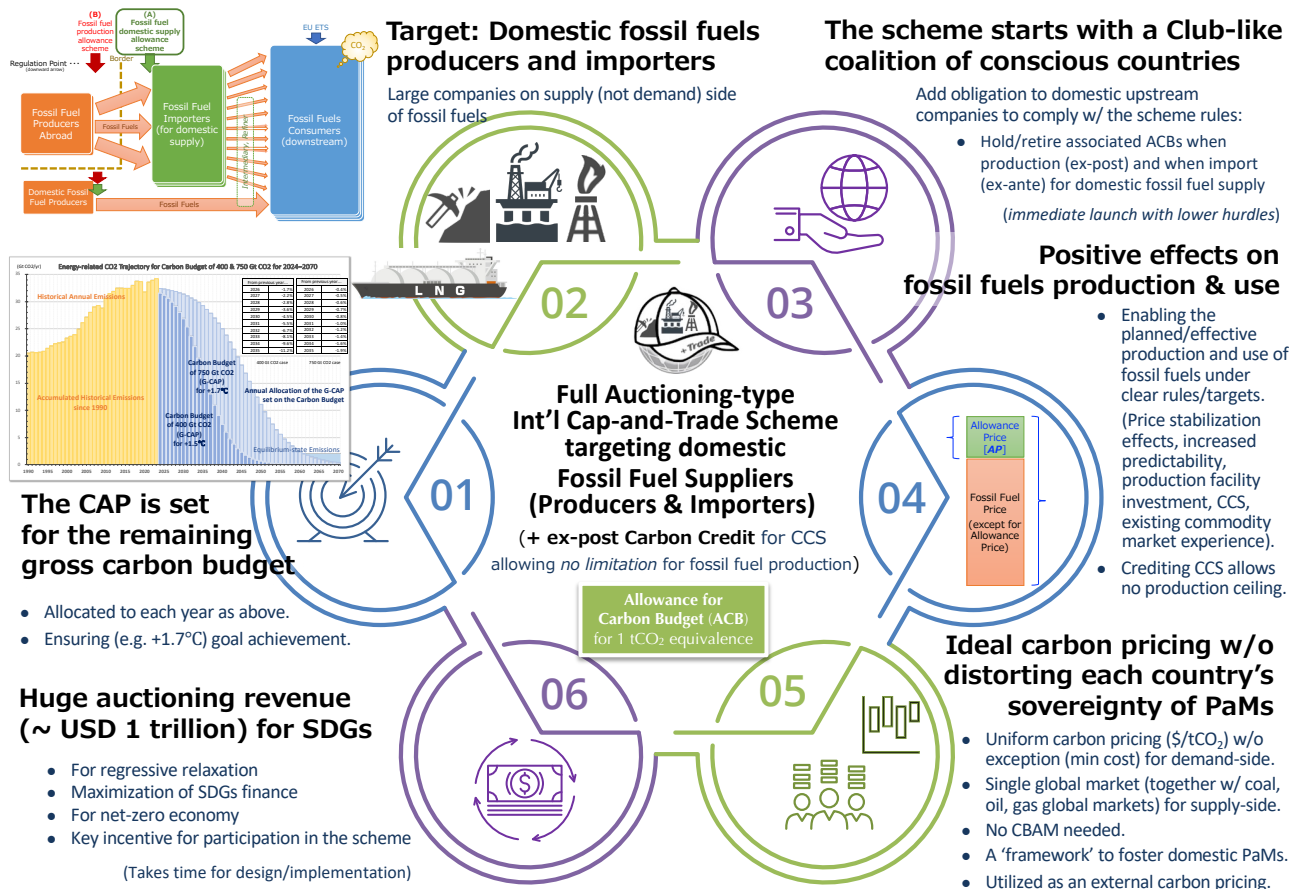


Figure for the Outline: The essence of the proposed Global Cap-and-Trade Scheme





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The Big Challenge

The year 2023 and 2024 were the first and consecutive years on record in which the average global surface temperature reached +1.5°C. However, global emissions have not reached a downward trend yet. The IPCC SYR clarifies that current emission trends and actions are far from achieving the temperature goal specified in the Paris Agreement and the remaining carbon budget for the 1.5°C goal will be used up in about 6 years (for a 50% probability).¹

On the other hand, the SYR also expresses hope that it is not too late for sufficient and appropriate action.² Now, over 150 countries have pledged or proposed to achieve carbon neutrality, building a global consensus towards limiting the average global temperature increase to 1.5°C above pre-industrial levels. The Synthesis Report (SYR) (2023) of the IPCC's 6th Assessment Report (AR6) repeatedly emphasises the critical importance of actions to be taken this decade.³

However, the fundamental question remains: “How and what kind of mechanism should we introduce for major actions that will lead to a significant GHG reduction trend globally in a 5–10-year timeframe?”

World Leaders' Role

To solve the question of entering a steady declining stage of global GHG emissions within a 5–10-year timeframe and keeping/strengthening this trend, three key elements are required:

- (A) the existence of technologies and domestic policies and measures to propel them;
- (B) institutional framework/mechanisms to ensure global achievement; and
- (C) the firm willingness to introduce and implement them.

¹ “If the annual CO₂ emissions between 2020–2030 stayed, on average, at the same level as 2019, the resulting cumulative emissions would almost exhaust the remaining carbon budget for 1.5°C (50%), and deplete more than a third of the remaining carbon budget for 2°C (67%). ... (*high confidence*)” in para. B.5.3 of the SPM of the SYR.

² For example, “Deep, rapid, and sustained reductions in greenhouse gas emissions would lead to a discernible slowdown in global warming within around two decades, and also to discernible changes in atmospheric composition within a few years (*high confidence*)” in para. B.1 of the SPM of the SYR.

³ For example, “The choices and actions implemented in this decade will have impacts now and for thousands of years (*high confidence*)” in para. C.1 of the Summary for Policymakers (SPM) of the SYR.





Key technologies such as energy conservation and renewable energies have already existed and are rapidly becoming less costly. The speed of diffusion and the methods of social implementation of these are key.

The UNFCCC and its Paris Agreement are the major international institutional framework, however, they do not guarantee global emission limits, in spite of the call for energy transition by the first global stocktake at the COP28 and the New Collective Quantified Goal—USD 0.3 and 1.3 trillion (by all actors)—on annual finance transfer by 2035 to developing countries agreed at the COP29. Considering the current trend of emissions and the political situations in several large countries, it is rather doubtful that the trajectories of emissions, energy transition and climate finance will be on track.

A proposed single Global Cap-and-Trade Scheme is designed to complement the Paris Agreement and be a *solution* to guarantee steady declining global emissions in which the actions are fostered. The question becomes whether the world leaders can have their firm will for its introduction. We urge world leaders to consider this solution seriously.

Recommendations to the Key World Leaders Concerned

Regarding the proposed Global Cap-and-Trade Scheme, this manuscript recommends that the key world leaders initiate the followings:

- (1) *initiate* a process to assess the Scheme and clarify its *pros* and *cons* of its elements (in comparison to possible alternatives);
- (2) *form* a club-type coalition of voluntarily participating countries which decides on modalities and procedures, including governance for operation;
- (3) *initiate* the Scheme by them;
- (4) *invite* participation by many other countries (and voluntary participating upstream companies outside of the Scheme); and
- (5) the use of allowance auction proceeds should be considered and decided upon after the start of the Scheme.

If the Scheme is successfully initiated, most countries that have declared carbon neutrality will eventually need to join to honor their pledge. It is hoped that *current world leaders* will make decisions based on objective and rational analysis for future generations.





Outline of the proposed Global Cap-and-Trade Scheme

The Global Cap-and-Trade Scheme has several very attractive properties that could enable significant global paradigm shifts in climate change, SDG financing and fossil fuel resource aspects. Below is an overview of its design features.

[0] Guiding principles

From 30 years of experience with the UNFCCC, Kyoto Protocol, and Paris Agreement, we have learned that agreements on *flexible voluntary frameworks are faster and more achievable*. We propose launching the Scheme through a coalition of voluntarily participating countries to quickly establish it as the *de facto* standard. Companies within these participating countries shall adhere to the Scheme's rules.

The design of the Scheme should not distort⁴ ideal carbon pricing features, especially those of the cap-and-trade type, and maximise their benefits.

Various aspects are considered to address the interests and concerns related to climate mitigation, fossil fuel production, energy demand, and the development of low-income communities.

[1] Cap setting — Core element as the climate mitigation measure

Cap-and-trade is a system and a mechanism whereby total emissions are *confined within an allowable cap* (ceiling), by using the dynamic mechanism of market.⁵ The idea is to first determine a “cap” that is consistent with some *external* requirement—in this proposal, the cap is determined by an international decision based on the scientific findings of the IPCC on global temperature increase and the equivalent amount of the allowances are issued. Under this proposed Scheme, the fossil fuel sellers can only sell as much as the allowances (not for emitting CO₂ but for *sales* of fossil fuels) they own. A free initial allocation is not required.

The proposed Scheme starts with the coverage of CO₂ from fossil fuel combustion. Emissions are on a ‘gross’ basis, while CCS and other actions to avoid CO₂ emissions are treated with fungible credits to the allowances for fossil fuels sales (*i.e.*, effectively ‘net’ basis partially).

⁴ Most carbon pricing schemes to date deviate from principled carbon pricing in terms of scheme coverage, price levels insufficient to reduce emissions, price uniformity, market liquidity (for ETS) and international competitiveness in order to address various political challenges in the real world.

⁵ As the emission trajectory is likely to overpass the cap level, the market reacts to increase the allowance price, and this pricing effect will automatically keep the amount of emissions within the cap level.





The cap (called G-CAP with the unit of [Gt CO₂])—decided based on international judgments on temperature rise—is set against the *future accumulation* of emissions (remaining *carbon budget*) rather than annual emissions. For operational reasons, it is broken down into the ceiling of annual emissions (called A-CAP with the unit of [Gt CO₂/yr]) so that they decrease in the form of a logistic curve (see Figure 1 for an image).

When the A-CAP approaches zero, it is set as an emission level at equilibrium with the atmosphere and need not decrease thereafter. Until that time, the magnitude of the G-CAP depends on the desired temperature stabilisation level and acceptable scientific uncertainty. It is proposed that the decision on the G-CAP be discussed as part of the Global Stocktake process under the Paris Agreement and decided by the CMA. The latest IPCC findings are used for adjusting equilibrium-state annual emissions (taking account of the net removal level not covered by the Scheme). In the transitional phase before global coverage, the A-CAP of the covered part will be reduced according to some criteria.

To be discussed in Q&A [a].

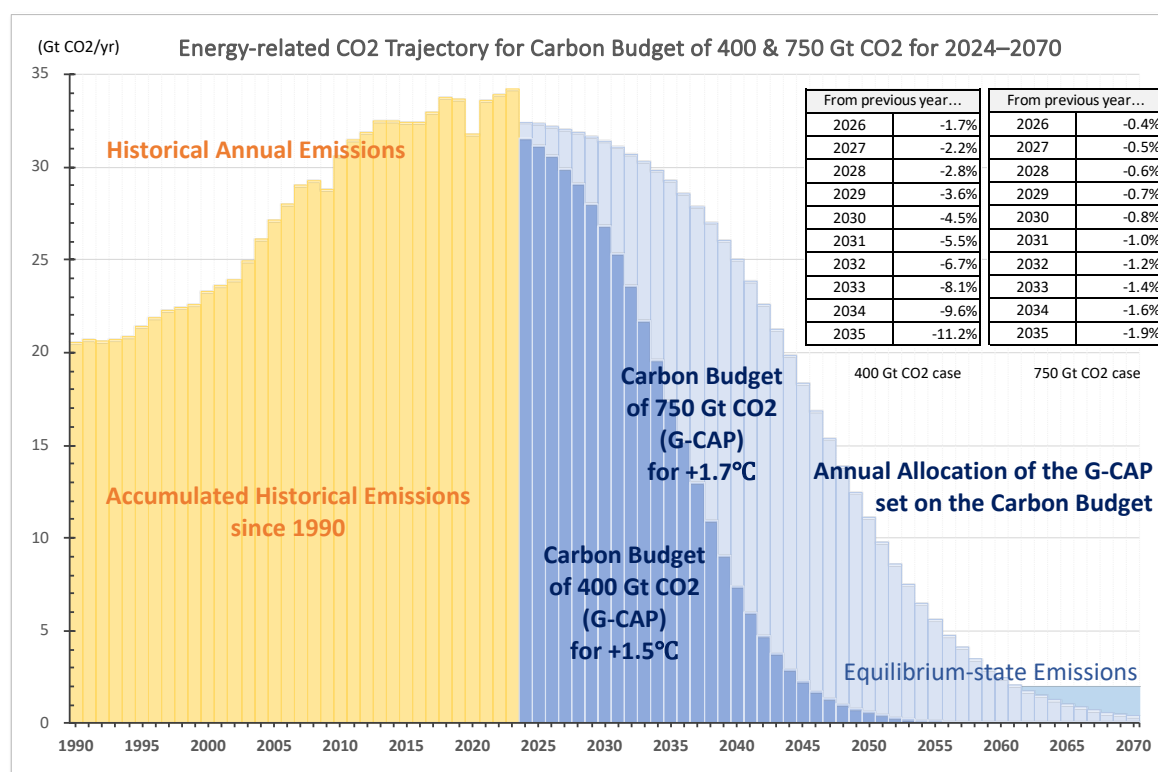


Figure 1: Image of A-CAP transition for +1.5°C and +1.7°C cases from pre-industrial levels (likelihood: 50%).

See [3] below for the governing body of the Scheme.

[2] Regulatory points and the meaning of the allowances — Capturing CO₂ upstream in each country

The proposed Scheme aims to cover as wide a global emissions or emission sources as possible. The point of





regulation is as far upstream as possible in the fossil fuel domestic flow for ease of capture and simplicity of operation.⁶ The regulatory targets are *not* countries, but fossil fuel supply companies directly. Here we call the allowance the “Allowance for Carbon Budget (ACB)”. The outline of the regulation type is as follows:

Fossil fuel producers and fossil fuel importers within the countries participating in the Scheme (ultimately, worldwide) are regulated.

- Producers are required to have corresponding ACBs at the end of the period when selling into the country (in addition to its CO₂ and CH₄ emissions for production); and
- Importers are required to have corresponding ACBs in advance of the import stage.

It is noted that *no free initial allocation* is provided. *All domestic supply* of fossil fuels in participating countries *is covered*.

To be
discussed
in Q&A
[b]

Here we do not choose an alternative scheme design option to regulate fossil fuel *producers only* (option (B) in Figure 2 below, showing the downward arrow as the regulation point), since the proposed Scheme (option (A)) is more realistic in that it *can be introduced only by the fossil fuel-consuming countries (i.e. no need of exporting countries)* and can cover a reasonable amount of fossil fuels.

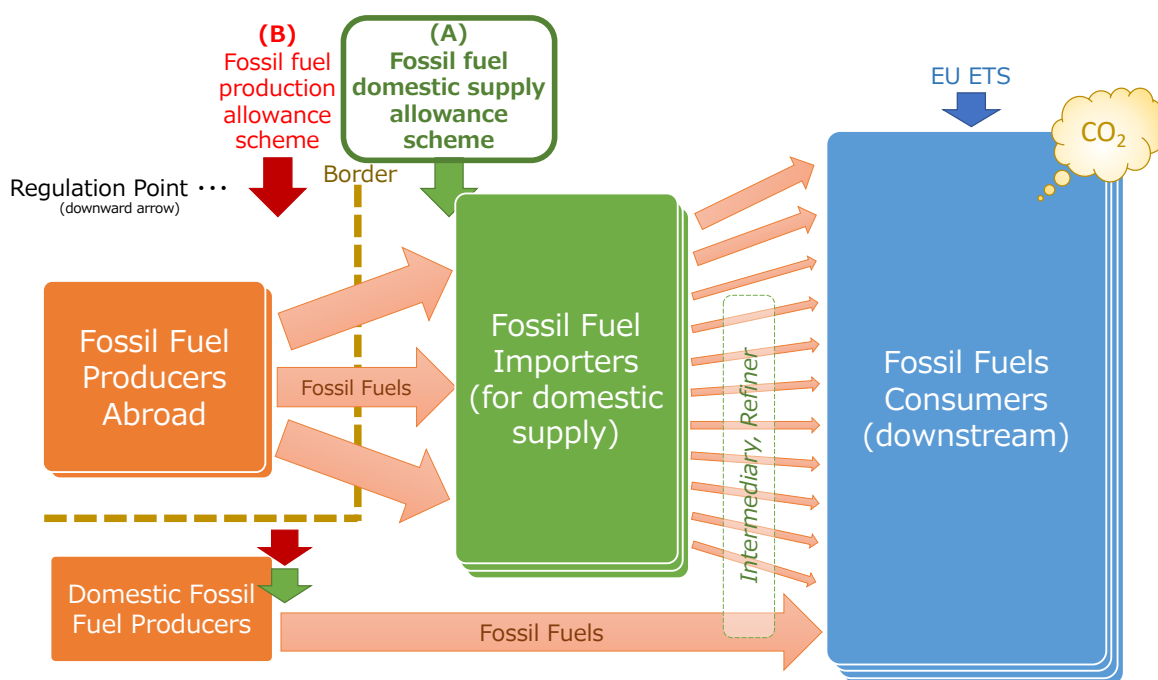


Figure 2: Points of regulation in fossil fuel flows of the two upstream Global Cap-and-Trade Scheme options (option (A) is proposed)

⁶ Among the current ETSSs, it is closer to the New Zealand ETS type. Also, EU ETS2 (2027–) covers buildings, road transport and additional sectors by regulating the relevant fossil suppliers. The author was inspired by Nishimura and Yasumoto’s articles (2011, 2015) which applied the upstream concept to the global cap-and-trade. Especially, he thanks Yasumoto for valuable discussions on selecting option (A) for one of the upstream schemes rather than option (B) in Figure 2.





[3] Governing body of the Scheme — The regulatory body

To be
discussed
in Q&A
[c].

The *single governing body* of the Scheme will be a club-type coalition in which the nations participate voluntarily as members, later converted into an international body. Barriers should be lowered so that countries can participate only at the discretion of the central government (without the need for parliamentary approval).

Given the urgency of the issue, the Scheme will be initiated by *a highly conscious small number of countries* and prepare incentives for other countries to participate.

Participating countries shall pledge:

- to add compliance with the Scheme's regulations to the operating license of fossil fuel-producing enterprises in their home country;⁷ and
- to require evidence of retired ACBs equivalent to fossil fuel imports at the time of importation,

i.e., participation of each country's government is voluntary, however, *all relevant companies in the participating countries shall comply with the associated regulations*. Compliance checking could be carried out by national governments and/or by the Scheme's operating body using third-party certification entities.

Associate members include regulated fossil fuel suppliers, international organisations including the IPCC, treaty bodies including the UNFCCC, business associations, local authorities, research institutions, and NGOs. These could be differentiated.

Many energy supply companies are operating their business internationally. This means that there may be cases where affiliated entities in non-participating countries are also asked to voluntarily participate in the Scheme when they are doing business in both participating and non-participating countries. It is desirable to establish a channel that allows such entities to participate.

This regulatory body shall maintain close contact with the CMA of the Paris Agreement on 'A-CAP set levels' and with the IPCC on 'the latest scientific knowledge on the level of temperature increase, including uncertainties and equilibrium conditions with the atmosphere'.

The auctioning revenue operation requires ingenuity in design and handling, *e.g.*, by outsourcing some rulemaking and operations to multiple institutions.

The Scheme institutionalise several setups. Given the urgency of the issue, the Preparatory Committee, the Steering Committee, and the Technical Review Committee of the Scheme will need to meet frequently at the beginning of the scheme design. The start date for operation should be clearly stated at the first Plenary Meeting.

⁷ It is also expected that this condition will have a screening effect on countries that oppose the Scheme, preventing them from joining in order to block the Scheme's operation.





[4] Full-auctioning type cap-and-trade scheme for fossil fuels suppliers —Market basis

A key characteristic of this proposal is that regulated entities are *not countries but companies that supply fossil fuels* to the country. These companies have sufficient experience and capacity as energy commodity market players.

Since they are supply-side and mostly large (and global) companies—and the Scheme is international—no more concerns are needed about cross-border competitiveness which is needed for demand-side companies. Therefore, even as a *full-auctioning-type Cap-and-Trade scheme with no initial allocation*, there are no major problems in terms of inter-company equity.⁸ The Scheme can cover *all* fossil fuel-derived CO₂ emissions (irrespective of fossil fuel consumers or applications) in the participating countries.

[5] Ensuring fossil fuel availability — Addressing a concern

ACB reserves for emergency demand (with priority to developing countries) and a banking system could be introduced to ensure flexibility in fossil fuel supply and to limit ACB price spikes. Borrowing measures could also be set up for emergencies.

[6] Extension beyond fossil fuel-derived CO₂ and the treatment of fossil fuels that do not result in CO₂ emissions — Supplemented by a crediting scheme

Extension to GHGs⁹ other than fossil fuel combustion CO₂ will be considered in the second step of the Scheme taking account of the accuracy of the monitoring.

For activities that decouple fossil fuel supply from CO₂ emissions, such as CCS, an *ex post* verification scheme of Credit for Carbon Budget (CCB)—fungible with ACB—should also be introduced as a tradeable commodity scheme. It is noted that the CCB scheme allows using any amount of fossil fuels if the associated CO₂ is captured and stored. This scheme is also considered appropriate for plastic manufacturing applications if CO₂ will not be emitted afterwards.

[7] Auctioning revenue stream — A new and huge financing channel

A key strong point of this Scheme is the raise of huge revenues generated from ACB auctions. Assuming an ACB price of USD 40 per tCO₂¹⁰ in 2030, annual revenues would be around USD 1 trillion. This is an order

⁸ Since the Scheme targets the *domestic* fossil fuels market of the participating country, there is no issue of equity between companies within the Scheme or with companies outside it.

⁹ In terms of screening against monitoring accuracy, methane from fossil fuel extraction, CO₂ from cement clinker and F-gases are expected to be eligible. Others are covered by the crediting scheme CCB; while LULUCF is covered by another measure (funding using auctioning revenues).

¹⁰ There is no clear basis for this price figure. Incidentally, the EU ETS allowance price has been around \$60–115/tCO₂ for these couple of years.





of magnitude larger than the climate finance commitments by developed countries to developing countries by 2020 and the World Bank's financing scale. This new revenue stream could be a fundamental solution for climate finance, which will need to expand significantly in the near future, as follows:

The IPCC AR6 concludes that “If climate goals are to be achieved, both adaptation and mitigation financing would need to increase many-fold. There is sufficient global capital to close the global investment gaps but there are barriers to redirect capital to climate action. ... (*high confidence*)” (IPCC, AR6, SYR, SPM, para. C.7). At the COP29 in 2024, the CMA calls on all actors to work together to enable the scaling up of financing to developing countries for climate action from all public and private sources to at least USD 1.3 trillion per year by 2035, in conjunction with USD 0.3 trillion per year for developing countries led by developed countries, as new collective quantified goal (NCQG) on climate finance.

Carbon pricing under this Scheme falls *equally* on the poor in developing countries, so some measures are needed to counter the regressive nature of the burden. A part of the auctioning revenues should at least be used to fund this. Considering the scale of funds, it is preferable to use them from the perspective of SDG objectives, rather than simply from the perspective of mitigating regressivity.¹¹

This can have a very significant (one could say new order) effect in terms of (developing countries') development.¹² Since this manuscript focuses on the CO₂ regulation aspect of the Scheme, it intentionally avoids discussing this element.

It should be noted that only countries participating in the Scheme are entitled to receive a part of this revenue, which is likely to be the *key driver for many countries to participate in the Scheme (esp., for developing countries)*.¹³

[8] Aspects of the fossil fuels market — Price stabilisation effect

Since ACB is an allowance for the fossil fuel supply side, its price is added to the domestic fossil fuel price and derives CO₂ emission reductions by fossil fuel-consuming entities/people.

Historically, fossil fuel prices have often been subject to *positive feedback interactions* (amplification) between factors on both the demand and production sides, leading to unexpectedly large market volatility due to geopolitical tensions, low elasticity of production adjustment, OPEC resolutions, war, structural factors such as

¹¹ Assuming a basic income system that simply provides a lump sum to the poor in developing countries, those with income levels below \$3.2/day (\$1,170/year) (about 1.8 billion people) would see their income almost double.

¹² There are a number of proposals to create huge financial resources for the SDGs through cross-border taxation regimes, such as the Global Solidarity Tax. International taxation on financial services transactions and fossil fuel taxes are among possible options. The proposals in this manuscript are primarily aimed at capping global CO₂ emissions, on the other hand, they are also an answer to the need for a huge international revenue source.

¹³ The Scheme may be designed so that not only developing countries but also developed countries (under common criteria) can receive a share of the auctioning proceeds, which would provide an incentive for developed countries to participate.





global economic growth, pandemic, progress in energy conservation, and speculative money contributing to instability.

On the other hand, in this Scheme, *the fossil fuel supply A-CAP is fixed*, as described above, so that:

- “Demand-side fossil fuel market prices” are influenced *solely by demand-side* variables; and
- The “ACB price” is determined *solely by the supply competition* of fossil fuel suppliers, *i.e.* the variable factors on the supplier side.

To be discussed in Q&A [e].

as the 0th-order approximation. The Scheme can *separate* the factors of supply and demand sides and *suppress the amplification*.

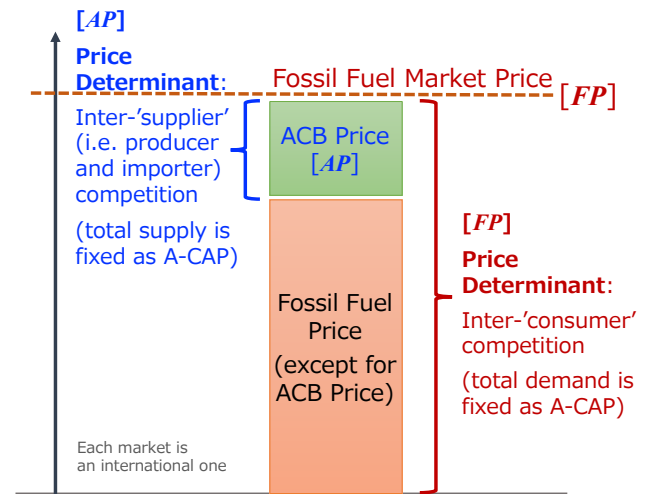


Figure 3: Two determinants of fossil fuel market price and ACB price



Figure 4: Price evolution of fossil fuels and other commodities over the past five years and comparison with the USD40/tCO₂ level





From the demand side, this will be very attractive because variable factors on the production side do not affect fossil fuel price variations. The supply side is affected by variations on both the producing and importing sides, however, the magnitude of variations will not be large because the historical volatility of fossil fuel prices was much larger than expected ACB price itself and its volatility (see Figure 4). It is noted that

$$(\text{ACB auctioning revenue size}) < (\text{ACB market size}) \lesssim (\text{fossil fuels market size}).$$

Fossil fuel price stability is a by-product of the Scheme and is expected to provide greater stability for both the demand and supply sides. However, further theoretical studies are needed (*e.g.*, consideration of plural fuels).

The fossil fuel price stabilisation effect increases the *predictability* of the market and *significantly reduces the risks of investment decisions on fossil fuel production facilities* including the option of using carbon capture and storage (CCS). This is important for both the demand and production sides to promote decarbonisation through the *effective and systematic use of fossil fuels*.

[9] Addressing the equity issues

Under this Scheme, four categories of equity are addressed as shown in Table 1.

The criteria and method of redistribution of auctioning revenues are envisaged to be negotiated between Member States after the launch of the Scheme, as described above.

In addition, developed countries have declared NDCs that reduce emissions almost linearly towards 2050. The fossil fuel consumption of developing countries is expressed as “A-CAP *minus* consumption by developed countries”, which means that, in the case of the +1.5°C goal, developing countries can initially consume more fossil fuels than developed countries. In the case of the +1.7°C goal, this becomes even more pronounced throughout the period.

Table 1: Necessity and how to address issues of equity among fossil fuel suppliers and among consumers arising from the impact of the Scheme

	Among fossil fuel suppliers	Among consumers
Equity in terms of payment per tCO ₂	Addressed (common regulations worldwide without exception for companies in the countries covered)	Addressed (common carbon pricing worldwide without exception for consumers in the countries covered)
Equity due to ability to pay	No equity issue (no need for free allocation as the regulation is on the supply side)	Yes (redistribution of the auctioning revenue)





[10] Interference with national policies and carbon border adjustment

This Scheme is a form of carbon pricing that manifests as higher fossil fuel prices for energy users. However, it does not negate the need for domestic climate change mitigation policies. Countries must still work towards achieving their own NDCs and long-term goals as their committed responsibility. Domestic measures such as renewable energy and energy conservation have co-benefits, including reduced fossil fuel costs and increased energy security. The proposed Global Cap-and-Trade Scheme facilitates the achievement of NDCs and enhances other benefits.

For each participating country, the Scheme does not interfere with its domestic policies except for the introduction of licensing conditions for fossil fuel producers and customs checks on fossil fuel importers. It does not require revision or enhanced NDC target additionally. Respecting *national sovereignty* is crucial for gaining international support. On the other hand, the Scheme can positively influence domestic policies and help countries that are politically unable to introduce carbon pricing.

An increase in fossil fuel prices is unavoidable, but it is only a redistribution of money towards lower global emissions. The Scheme is expected to stabilise fossil fuel price variations and suppress extreme variations. Countries with existing carbon pricing can observe their lower ETS allowance prices or allow lowering carbon tax rates to attain the same emission reductions.

Carbon border adjustment may be unnecessary as the proposed Scheme regulates at the import stage. Developing countries receiving a part of auctioning revenues may follow some guidelines on their use, however, they will benefit significantly from this additional source of revenue.

While avoidance of carbon border adjustment is sometimes mentioned as a stick-type incentive for participating countries as discussed in the context of G7 Carbon Club (*e.g.*, BMF *et al.* (2021), Dellatte (2022), Elkerbout *et al.* (2022)), the proposed Scheme offers auctioning revenue sharing as a carrot-type incentive.

[11] People's freedom for their behaviour

The distinctive feature of the Scheme is that it *guarantees automatically* that the global (strictly speaking, the entire covered countries') CO₂ emissions are kept within a defined framework, no matter what people think and do in their activities.

If people want to enjoy energy-intensive luxuries such as fuel-inefficient sports cars or private jets, they can do so by paying for them. People and entities are free to use fossil fuels as they like that already have an ACB price add-on, *without* being particularly aware of climate change mitigation.

Therefore, since the proposed Global Cap-and-Trade Scheme functions as a *socio-economic "framework"*, it has the important feature that it does not in any way prevent people and entities from being free in their activities (under the fossil fuel price reflecting ACB price).





The Way Forward

This policy brief presents a radical proposal for addressing climate change and fossil fuel resource management, including the development of developing countries. It establishes the framework of the *New Rules of the Global Game* that *allow any activity*, including CO₂-intensive ones, without prohibition using cap-and-trade. By paying the associated cost, total emissions are *automatically* kept within a certain limit (Cap) through *adjustment* of carbon pricing. Incentives are provided for CO₂ emission reduction activities, while others are *not prohibited*.

Additionally, the concept of ‘allowable reserve’ has been introduced for fossil fuel reserves.

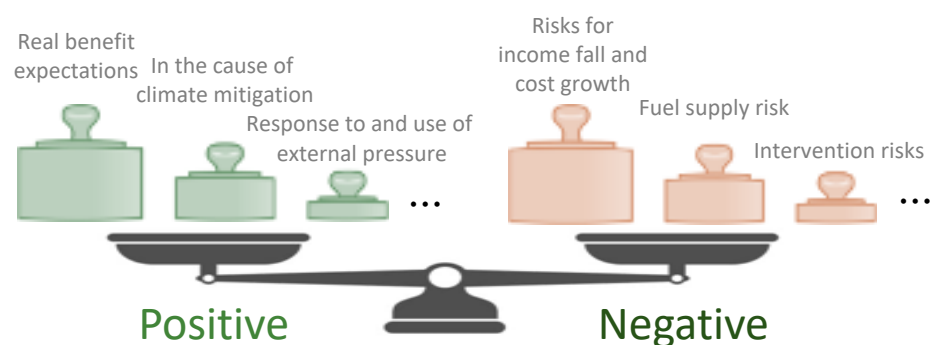
On the other hand, breaking with the status quo may have associated (temporary) disadvantages. In the decision-making process, the disadvantages may outweigh the advantages, and therefore, the decision to reject it may be made. What we are required now is to have a rational judgement comparing both sides, taking into alternative options, including ‘continuation of current practice’.

As the Synthesis Report of the IPCC has repeatedly emphasised, what we do (or do not do) in this decade will leave enormous consequences for future generations.

What we are stressing here is that we should first *put the proposal(s) on the table* and *start considering it (them)*.

We look forward to the **strong will** of current world leaders.

To be
discussed
in Q&A
[f].





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Q&As – Discussion points

[a] Relation between the proposed Scheme and the Paris Agreement/UNFCCC

Q: We are already operating the Paris Agreement under the framework of the UNFCCC: how should the Global Cap-and-Trade Scheme relate to this existing framework of measures?

A: We already have the UNFCCC/Paris Agreement framework, which includes most countries worldwide. However, creating a new regulatory framework under these consensus-based and a facilitative ratchet-up treaty may take a decade, even longer or impossible.

In contrast, several targeted, voluntary coalitions have already been launched to address climate change. Examples include the Major Economies Forum on Energy and Climate (MEF, established in 2009), the International Climate Club (2022), the Carbon Pricing Leadership Coalition (2021), and the Global Methane Pledge (2021). Starting with a new voluntary coalition of countries with shared interests would be more practical and effective in terms of speed and institutional design than developing a new protocol under the UNFCCC or amending the Paris Agreement. After the prompt kick-start, it is essential to install strong incentives in place to encourage as many countries as possible to participate. The main one will be the redistribution of the huge auctioning revenues.

In the proposed Global Cap-and-Trade Scheme, the only “environmental” regulation is the global carbon cap (G-CAP). This involves setting a politically acceptable limit for the remaining carbon budget.

We suggest that the Global Cap-and-Trade Scheme focuses on its operational aspects and leaves the determination of allowable emission levels—tied to the acceptable temperature rise goal—to the UNFCCC and the Paris Agreement. Fortunately, the Global Stocktake, a five-year global progress assessment process, can help set the G-CAP and its annual breakdown (A-CAP) based on actual ongoing climate impacts and the latest IPCC findings. This integration effectively links the two frameworks.

However, if there is a risk that decisions may not be made or may be delayed (as was the case at COP29, when some energy-exporting countries obstructed the negotiation process), it may be necessary to devise conditions that allow decisions to be made by voluntary participating countries only, since the Scheme will be operationalised by those countries.





[b] Regulation point

Q: Regulating the most upstream side of fossil fuels (producers-only) seems preferable, both in terms of coverage of CO₂ and the number of companies targeted. Why do we regulate not only producers but also importers?

A: In the two upstream Schemes (A) and (B), the 1 unit of allowance is defined as

(A) “the right to supply (primary and secondary) fossil fuels for domestic use equivalent to 1 tonne of CO₂ emissions” monitored at the “production stage” and “import stage”.

(B) “the right to produce primary fossil fuels equivalent to one tonne of CO₂ emissions globally”.

as shown in Figure 2 and Figure A-1 below.

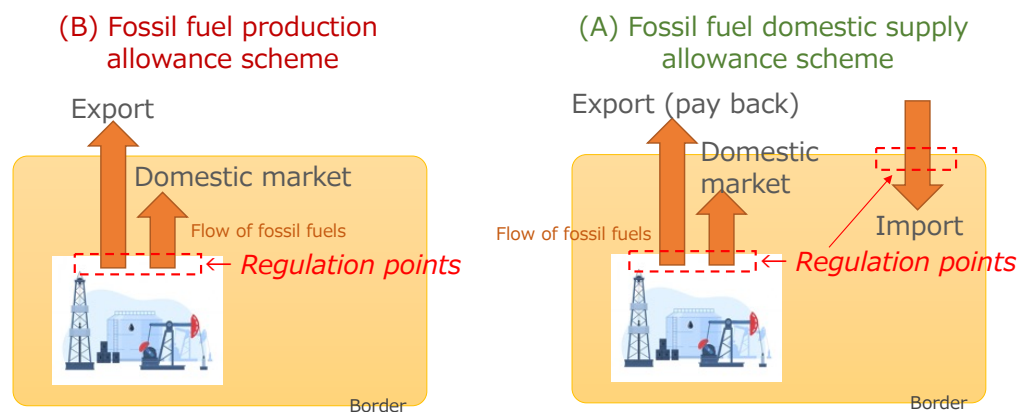


Figure A-1: Difference between two upstream regulation points for a country

The key point here is how much fossil fuel can be covered (see Figure A-2). If all countries in the world could participate in the Scheme from the outset, then Scheme (B) that targets only fossil fuel producers would be the simplest. However, in reality, it is assumed that many fossil fuel exporting countries will not participate in the Scheme.

Therefore, in Scheme (B), the key point is how many (and what percentage of) fossil fuel-*producing* countries participate. On the other hand, in the proposed Scheme (A), the key point is how many (and what percentage of) fossil fuel-*consuming* countries will participate. It is natural to assume that the latter will expand more rapidly.

It is important to note that the proposed Scheme (A) can be initiated and operationalised solely by the will of the consuming countries.



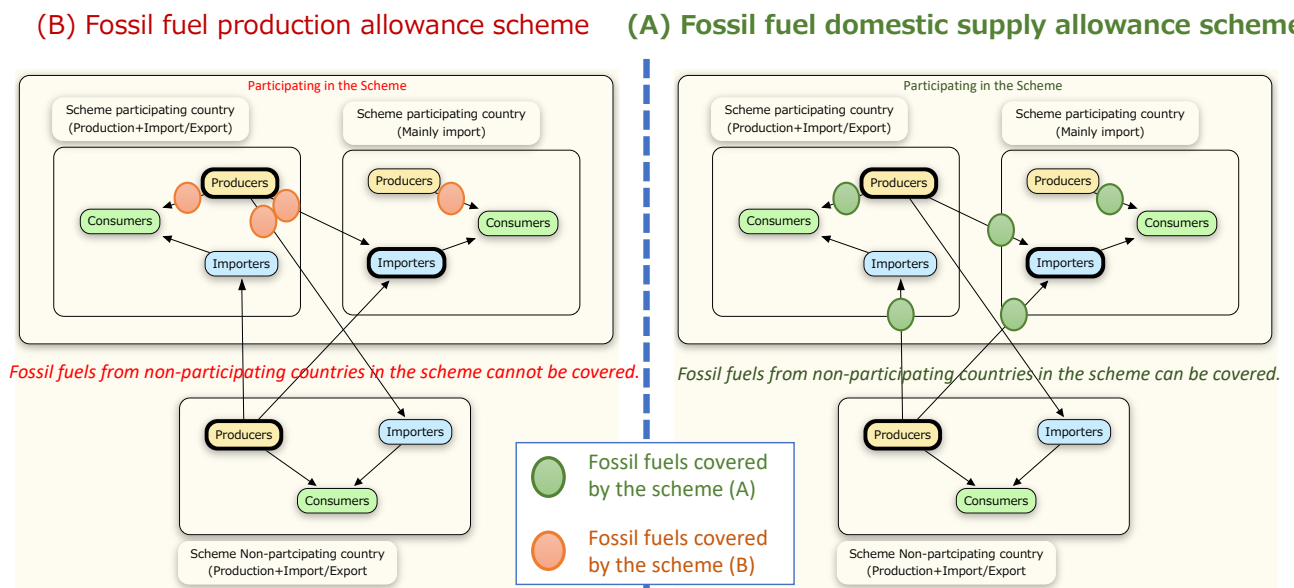


Figure A-2: Coverage of fossil fuels by two different upstream Schemes

[c] Governing body

Q: As a regulatory body, why start as a Coalition of voluntarily participant States as members rather than a Kyoto Protocol type? And what is its mode of operation?

A: As explained in [a], starting with a group of countries that share the same goals as the Scheme is expected to be the best approach. It is proposed that the members of the Club should be national governments because of its regulatory system nature and keeping consistency with the UNFCCC/Paris Agreement, ideally participating through a quicker process that does not require parliamentary approval. There could also be an option for provisional participation before formal membership.

The Club is expected to be upgraded to an international body when many countries participate.

To facilitate the collaborations, several membership statuses could be created to invite international organisations such as the UNFCCC, IPCC, OECD/IEA, IRENA, World Bank, Reginal Development Banks, GEF, GCF, and regulated fossil fuel producers/importers, ... as well as several NGOs as the observers, etc.

As shown before, several subsidiary committees, such as the Preparatory Committee, the Steering Committee, and the Technical Review Committee of the Scheme will need to meet frequently at the beginning of the scheme design, hopefully within a year or two. The start date for the Scheme operation should be clearly stated at the first Plenary Meeting.

Negotiations on how auctioning revenues are to be managed are utilised in parallel with operationalizing the Global Cap-and-Trade regulation, to determine the organisational structure,





criteria for operation and the recipients of the auctioning revenue streams. It is important to ensure that delays in the negotiations of this aspect do not affect the regulatory side.

The rules for entities in non-participating countries could also be decided after the start of the Scheme operation.

[d] Usage of auctioning revenue stream

Q: How does the proposal suggest that auctioning revenues should be used?

A: As mentioned earlier, this manuscript does not propose an institutional design for this aspect because it is highly politicised and involves social considerations. Our current focus is on creating a scheme that ensures global emissions remain within a certain physical limit.

On the other hand, it is apparent that this huge money can have a very significant (one could say new order) effect in terms of (developing country) development. However, it is a somewhat different direction from the original objective of limiting CO₂ within certain limits (it can be used for energy system transitions, for example, but this brings benefits such as reduced dependence on fossil fuels, lower prices, and more resilient energy systems in the country concerned, rather than simple emission reductions).

Although we do not treat this aspect of the Scheme, we would like to give an example of a set of criteria below for future discussion:

- Use of the revenue will be largely for improving the livelihoods of poor people in developing countries;
- Inclusion of applications for energy system transitions in each country;
- Uses that run counter to the objectives of the Scheme will not be adopted, such as fossil fuel subsidies;
- Partially used for forest/ecosystem funds with large SD elements, which are difficult to treat as carbon credits; and
- The current/committed financial flow from developed countries to developing countries (USD 0.3 trillion/year by 2035) is not affected by the Scheme, and
- Priority should be given to moving the emission control aspect of the Scheme, considering the discussions/negotiations on the use of auctioning revenues are likely to take time.

It is important to note that early participation in the discussion and negotiation of revenue redistribution is a significant incentive for countries to join the Scheme, helping it to quickly become global.





[e] Market aspects of the allowance and fossil fuels

Q: How should the allowance (ACB) market be understood? What mechanisms are expected to have a stabilizing effect on fossil fuel prices?

A: The experiences of the EU ETS demonstrate what type of commodity the allowance ACB would be and what the ACB market would look like. The EU ETS allowance, EUA, interacts with the coal and natural gas markets as one of the energy commodities, with its supply by the auction taking place daily at the designated exchange for energy commodities (primary market) and the secondary market being derivative-driven. The EUA market interacts with the coal and natural gas markets. The EUA market has the same degree of liquidity as the fuel markets and functions effectively as a market mechanism to reduce CO₂.

The allowance ACBs in the Global Cap-and-Trade Scheme will also be auctioned daily at (three) dedicated energy commodity exchanges around the world for the supply from the governing body of the Scheme. A derivatives-driven secondary market is then formed, interacting with the fossil fuel markets. The market players are already players (mainly fuel suppliers (and financial entities)) in the fuel markets and do not require any major changes in this sense; just one more commodity type is added.

For the “**price structure**” of the fossil fuels, the ACB price is added to the domestic fossil fuel supply price and drives CO₂ emission reductions by the fossil fuel-consuming entities/people. In other words, after the introduction of the Scheme, fossil fuel market prices can be categorised as:

$$\begin{aligned} & \text{(Demand-side fossil fuel market price (FP))} \\ & = (\text{ACB market price (AP)}) + (\text{fossil fuel market price excluding ACB price (OFP)}) \end{aligned}$$

Each fossil fuel market price will be formed by adding the market price of the allowance ACB, as an additional factor after the introduction of the Scheme.

For the “**pricing mechanisms**” of fossil fuels, by adding a *fixed supply (i.e. fixed demand) constraint called A-CAP*, the principles by which these market prices are determined can be considered to operate in an almost *independent* price formation mechanism, as follows, when considered in a fairly simplified manner, such as with a single market for fossil fuels:

- International ACB market among fossil fuel producers and fossil fuel importers under the Scheme, who compete and trade supply availability of A-CAP in total (price is [AP] in Fig. A-3); and
- Fossil fuel market where fossil fuel users under the Scheme compete and trade the fixed amount of fossil fuels (A-CAP in total) on the fossil fuel consumption side (prices are [FP]).





Here, it is assumed that the supply and demand quantities will never be below the A-CAP, assuming a stage where the constraints have become reasonably severe. In other words, it is assumed that both supply and demand will stick to the fixed A-CAP.

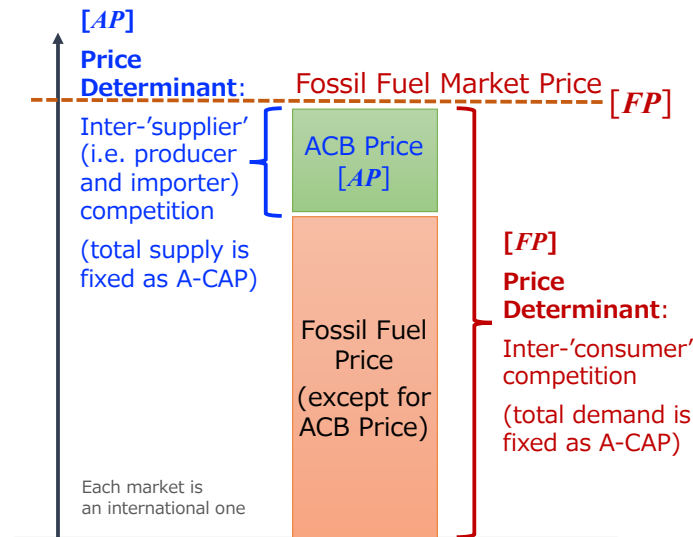


Figure A-3: Two determinants of fossil fuel market price and ACB price (same as Fig. 3)

In other words, the net revenue unit price of fossil fuel suppliers, excluding ACB payments, (shown as $[FP] - [AP]$ in Fig. A-3) is NOT determined by their relationship with consumers (demand), but by competition between consumers $[FP]$ —which is outside the A-CAP, and ACB competition between suppliers $[AP]$, which is inside the A-CAP. In other words, the conventional price formation mechanism based on the relationship between the inside (supply side) and the outside (demand side) is to be modified.

This “fossil fuel market price (incl. ACB price)” may be considered to run parallel to the ACB price if the market response is timely and sensitive (*i.e.*, ACB price as the demand-side carbon pricing level), but it is probably not simple to see how the market behaviour is observed in reality.

Let us consider the “**price stabilisation effect**” of the fossil fuels by the Scheme. Historically, we have observed significant and unexpected market volatility. For oil, in particular, price volatility is primarily caused by geopolitical tensions among producers, low elasticity of production adjustments, OPEC resolutions, and the Russia-Ukraine War. Additionally, structural factors on the demand side, such as global economic growth, the COVID-19 pandemic, penetration of EVs, and progress in energy conservation and climate change mitigation, also play a significant role. Speculative money further contributes to this instability. Both actual market conditions and speculation have a large influence, with these factors interacting and amplifying each other. The dialogue between oil producers and consumers aimed at stabilizing prices has not always functioned effectively.





On the other hand, in this Scheme, the fossil fuel demand A-CAP is fixed, as described above (it is not the tradeability of ACBs, but the existence of the fixed annual emission limit A-CAP that is in effect), so that:

- Demand-side fossil fuel prices are influenced solely by demand-side variables; and
- The ACB price is defined solely by the supply competition of fossil fuel suppliers, *i.e.* the variable factors on the supplier side.

as the 0th-order approximation, assuming that the constraints are somewhat tight and both fossil fuel supply and demand amounts are A-CAP.

For the demand/consumer side, this will be seen as very attractive, as the variable factors on the production side do not affect fossil fuel market price variations.

On the other hand, the supply side is affected by variations on both the fossil fuel producing and importing sides, and importers include the effects of the demand side, such as power companies. However, as the ACB price is small compared to the overall price of fossil fuels (see Figure 4), the magnitude of the variations will not be very large.

The unit price related to the fossil fuel suppliers' net income is expressed in terms of the fossil fuel price excluding the ACB price. This is:

(fossil fuel prices affected by demand-side variables) – (ACB prices affected by supply-side variables).

This means that demand-side variable (fossil fuel prices for consumers) and supply-side variable (net revenue per unit for fossil fuel suppliers) do not interact. As a result, the amplifying effects of these variables are avoided. This desirable outcome is due to the intervention of a non-variable fixed factor, the A-CAP.

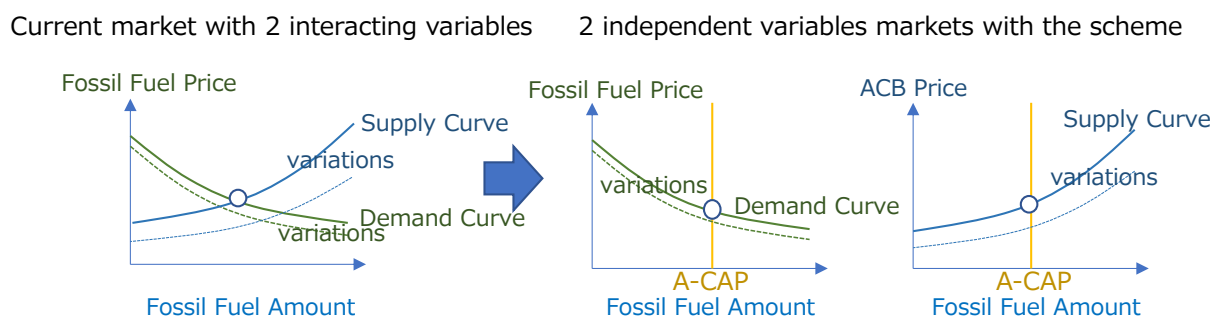


Figure A-4: After the introduction of the Scheme, the respective variables of supply and demand can be separated, and amplification effects are avoided

This fossil fuel price stability is a kind of by-product of the Scheme, but if successfully appeared as an effect, it is expected to provide greater price stability than the absolute ACB price level, a very positive





effect for both the demand and supply sides of fossil fuel market participants. Figure 4 shows the evolution of fossil fuel prices and EU ETS allowance prices in Europe over the past five years. As can be seen from the ACB price image of USD 40/tCO₂, the historical volatility of fossil fuel prices is much larger in absolute terms than this ACB price image and its volatility, and if the fossil fuel price stabilisation effect is realised to a certain extent, it could be more significant than the existence of ACBs themselves. Further theoretical studies are needed, together with aspects of the independence of demand-side and supply-side markets.

[f] Stakeholders' concerns

Q: Various stakeholders are expected to raise concerns about this Global Cap-and-Trade proposal from different perspectives. What concerns can be raised and what answers can the proposal provide them?

A: Governments, fossil fuel-producing companies, demand-side companies (including power companies), financial institutions, consumers, etc., may have different ways of assessing the Scheme, depending on their own positions, values, concerns, risk attitudes, etc.¹⁴ Now let us consider three perspectives from climate change concerns, the producers and purchasers of fossil fuels. It should be noted that a single actor can have multiple perspectives (for example, the US has all three perspectives below). In any case, it is advisable to weigh up *both positive and negative aspects* on each actor's own scale.

From the perspective of those **who weigh the importance of climate change issue**, the guarantee that global CO₂ emissions amount (strictly speaking, that of the covered countries) will be kept within certain limits is basically strongly welcomed. However, those who focus on the content of measures and concrete actions, such as the promotion of renewable energy, for example, may not be comfortable with the approach of a 'framework'. Some governments may find value in trying to make use of this *external* instrument in a way that compensates for the shortcomings of and synergises with their domestic climate mitigation policy measures. Developed countries may welcome the idea of common global carbon pricing, including developing countries, and may be dissatisfied with the use of auctioning revenues mainly for developing countries, while some may welcome the possible solution of the NCQG on climate finance. Financial institutions, consumers, and others. may welcome the ability to influence inclusive aspects through the choice of energies.

¹⁴ We find a case where the evaluation axis is based on 'what others would think' rather than 'my opinion'.

There are also cases where 'feasibility' (based on impressions) rather than content is the focus of the evaluation (the evaluation of this system as a dream before its merits/demerits assessment seems to be based on a sense of rejection of the large deviations from the current situation, such as opposition from the assumed energy producing countries, the huge auctioning revenue and lack of precedents).

It is noted that there are people with diverse values and ways of thinking in the same organisation. The same person generally has different opinions as an individual and as a representative of the organisation.





Fossil fuel stakeholders (on the production side) will, first of all, be strongly opposed to the new restrictions. There will also be significant concerns about reduced income. On the other hand, they may recognise the inevitability of fossil fuel demand reduction and associated income decline (although the future is uncertain) in the face of increasing pressure from societal needs to address climate change issues and the expected significant shift to electric vehicles. In that case, the Scheme can provide clearer rules and targets, and it may be evaluated as a “mechanism for the systematic and effective production and use of fossil fuels”. Logically, moving towards a carbon-neutral economy in the future means that the demand for fossil fuels will also decrease considerably (although not to zero), and investment in the production of new fossil fuels will be limited. In other words, overproduction investment based on excessive expectations will lead to stranded costs, while overproduction to increase market share will lead to further price falls. It is also important to evaluate the impact of CCS. Thus, it is very important to accurately assess the ‘extent’ of these factors quantitatively. This Scheme provides accurate information on future demand (although there are still uncertainties in the transition of shares between fossil fuels).

They may also see value in ‘dispelling negative perceptions of fossil fuels’. In addition, some stakeholders may value the explicit market value creation (credit income), such as CCS. The attraction of fossil fuel price stabilisation is also expected to be significant. In terms of market transactions, if they have traditionally played in the fossil fuel commodity market, ACB is just one more similar commodity item.

The main concerns of **fossil fuel stakeholders (consumers)** are the security of supply and price stability of fossil fuels. Concerns about the risks of this Scheme, especially the security of supply, could be mitigated by the liquidity of the ACB market and two instruments (supply reserve and banking of ACBs) and, in some cases, by agreeing on a borrowing mechanism. Derivatives markets for fossil fuels and ACBs are also essentially markets for hedging procurement risks. Conventional channels of long-term purchase contracts are not expected to be significantly affected. The purchaser of fossil fuels can procure a certain amount of ACBs on the market and negotiate with the fossil fuel producer on that basis (utilisation of ACBs as ‘fossil fuel purchasing rights’). This results in quasi-reserves and enhanced bargaining power. It is envisaged that the traditional production-supply dialogue will play a smaller role, along with fossil fuel price stabilisation, as the supply-side and demand-side markets will have less interaction of influences. It is noted that decarbonisation measures contribute to both sides by (lower fossil fuel purchases required) × (lower fossil fuel prices).

