Side Event

35th Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

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United Nations Office at Nairobi

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Evolution of SAI

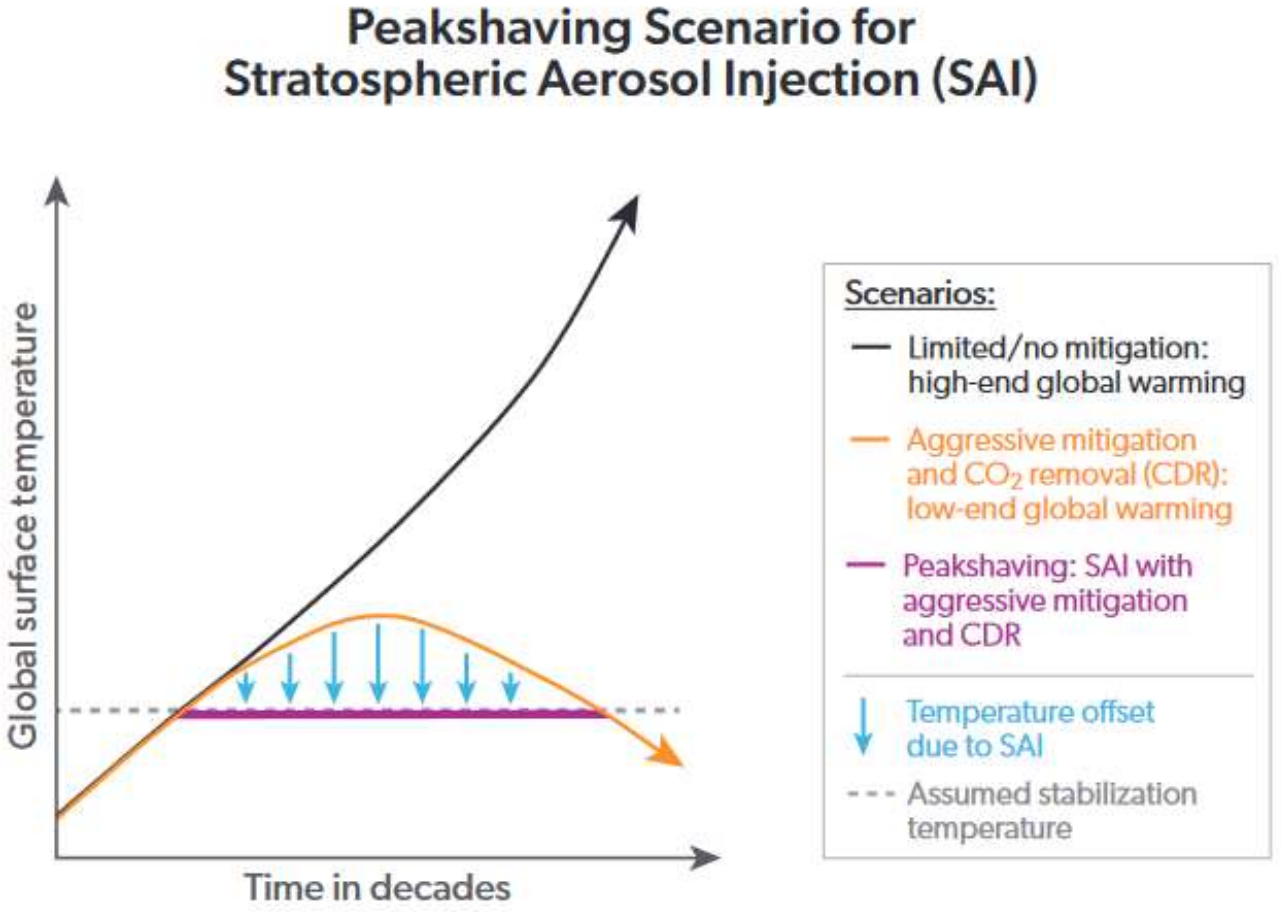
- Impractical technology confined to the labs

Evolution of SAI

- “Emergency” solution to counteract drastic temperature rises in the future.

Evolution of SAI

- Partial or complete substitute to the mitigation of GHG emissions -- *use alongside other GHG mitigation strategies within a decade.*



Source: WMO Scientific Assessment of Ozone Depletion 2022

Critical issues with SRM

- **Benefits** – theorized, unproven, achievable by other means (mitigation, resilience & adaptation)
- **Magnitude of risk** – poorly understood, likely high
- **Scope of risk** – global, uneven, extending beyond national borders

Need for governance

- Research concentrated in few countries; limited information sharing.
- Quickly moving to outdoor experiments
  - Boundary between small-scale outdoor experiment, large-scale outdoor experiment and deployment unclear.
  - Boundary between climate adaptation and SRM deployment unclear.
  - Overlap between climate science experiments and SRM experiments.
- Research governance needed as the scope of risk extends beyond national borders.

Current global governance on SRM

- Convention on Biodiversity (1992)
  - 2010 COP Decision bans geoengineering, with narrow exception for small-scale research **“only if they are justified by the need to gather specific scientific data and are subject to a thorough prior assessment of the potential impacts on the environment”.**
  - No framework for prior assessment and approval.
  - Wide participation, but U.S. not a party.

- London Convention on Marine Pollution (1972)
  - 2010 COP decision **creates research assessment framework for ocean fertilization experiments**
  - Ocean fertilization is a type of carbon dioxide removal geoengineering
  - 87 parties, including US, several EU countries and China. India not a party.

Current global governance on SRM

- London Protocol on Marine Pollution (1992)
  - 2013 parties decision to regulate all ocean-based geoengineering
  - ‘Negative list’ approach – **all activity including experiments prohibited unless expressly assessed and permitted**
  - 53 parties, U.S. not a party.
- Outer Space Treaty (1967)
  - No express governance, could govern space reflectors
  - 114 parties, including all major spacefaring nations
- **No specific global governance on Stratospheric Aerosol Injection, the most advanced SRM technology.**

SAI and Ozone layer modification

Scientific Assessment Panel, 2022

- …. would “very likely cause unintended consequences, including changes in stratospheric ozone concentrations.”
- “Stratospheric Aerosol Injection rates sufficient to achieve 0.5 °C of global cooling over the period 2020–2040 would result in a reduction of total column ozone close to the minimum values observed between 1990 and 2007.”

An independent expert review on Solar Radiation Modification research and deployment, UNEP, 2023

- “Recent studies considering sulphate aerosols indicate that stratospheric ozone depletion would be increased in the polar stratosphere, the Antarctic ozone hole recovery could be delayed by a couple of decades and the ozone hole could become deeper in the first decade of SAI deployment”.

Ozone layer modification and Vienna Convention

- **Article 2.1** - has a wide scope and covers all human activities which “modify or are likely to modify the ozone layer”. ***This will include SAI as it will likely modify the Ozone layer.***
- **Article 2.2 (a)** - parties required to “***co-operate*** by means of systematic observations, research and information exchange in order to better understand and assess the *effects of human activities on the ozone layer* and the effects on human health and the environment from *modification of the ozone layer*”. **This will include SAI research and associated activities.**
- **Article 2.2(c) -** parties required to “***co-operate*** in the formulation of agreed measures, procedures and standards”, **which will extend to procedures and standards for SAI research.**

Regulating SRM under the Vienna Convention: Key Provisions

- **Article 3** - parties commit to ***co-operate*** in, directly or through competent international bodies, the conduct of research and scientific assessments on "climatic effects deriving from any modifications of the ozone layer" and more specifically "*substances, practices, processes and activities that may affect the ozone layer, and their cumulative effects*". **This will include SAI.**

- **Annex I -** Major scientific issues requiring ***cooperation*** are:
  - Modification of the ozone layer which would result in a change in the amount of solar ultra-violet radiation having biological effects (UV-B) that reaches the Earth's surface
  - Modification of the vertical distribution of ozone, which could change the temperature structure of the atmosphere and the potential consequences for weather and climate.

The word modification includes "deliberate modification", such as through SAI outdoor experiment.

The Duty to Co-operate

- Duty to co-operate:
  - Recognized principle of international law
  - Requires states to notify and consult other states ***even if*** they believe that no harm will result or are taking reasonable steps to avoid harm.
  - Complementary to the duty to avoid/prevent transboundary harm.

- Undertaking SRM research activities without making the scope of and risks associated with the research clear to other states is **clearly contrary to the duty to co-operate** in Article 2.2(a) and Article 3 of the Convention.

- The duty to cooperate made explicit under the Convention provides a **strong basis to create a cooperative research framework** to manage SAI and other ozone-depleting SRM research**.**

One integrated global regulatory framework/treaty or Regime Complex

- **Criticism of current governance, proposed solutions**
  - Fragmented in multiple treaties – mix of gaps and overlaps, reducing clarity
  - Need a new integrated global regulatory framework and a new treaty (C2G)
- **Our view:**
  - An integrated treaty is not feasible because different SRM technologies have emerged from different field, have different impact profile and requires distinct expertise.
  - A new treaty will exhaust limited time and political capital
  - Multiple treaties not a problem, can regulate distinct SRM technologies.

One integrated global regulatory framework/treaty or Regime Complex

Regime Complex – multiple treaties operating simultaneously within a particular issue area – has advantage over one treaty:

- They are inherently flexible and adaptable.
- They allow for experimentation and innovation within individual regimes - successful practices can be shared and adopted by others.
- Regime complexes also tend toward specialization
- They are also more inclusive, often involving a diverse set of actors.

The Montreal Protocol is itself a classic example of a flexible, inclusive and specialized treaty.

Regime Complex on SRM

	Scope	Rule Strength	Membership
Convention on Biodiversity 1992	Broad	Strong – 2010 resolution banning all geoengineering with narrow research exception	Does not include the US
London Convention 1972	Moderately broad –ocean pollution or research	Moderately strong – prohibits ocean fertilization except for research approved under an assessment framework	87 countries; US, several EU states and China are parties; India is not a party
London Protocol 1996	Moderately broad –ocean pollution or research	Strong – creates a 'negative' list to govern marine geoengineering	53 countries, US not a party
Outer Space Treaty 1967	Narrow; could govern space reflectors	None at present	114 including all major spacefaring nations
Vienna Convention on for the Protection of the Ozone Layer 1985 and Montreal Protocol of 1987	Moderately broad – all activities affecting the ozone layer	None at present	198 (universal)

Governance of SAI research under the Vienna Convention

- Three categories of research – indoor, outdoor small-scale & outdoor large-scale.
  - Indoor research (model/simulation, lab-based studies) does not require regulation, **but does require norms, guidelines and codes of conduct for research and sharing information.**
  - No definition of small-scale and large-scale outdoor experiments
  - UNEP's Independent Expert Review suggests that the distinction between small-scale and large-scale experiments should be based on "intent". But intent is not an objective basis for governance.

- Our proposal: **All outdoor research should be governed** by internationally agreed norms, guidelines, codes of conduct and best practices for research because:
  - Threshold between small and large-scale is currently unclear.
  - Even "small-scale" experiments can have transboundary impacts
  - Without governance, research on **deployment feasibility** is likely to be prioritized; research on **adverse impacts** will likely be left behind.

Research Assessment Framework under Vienna Convention

1. Information Sharing and Consultation
2. Structured Environmental Impact and Risk Assessment
3. Independent National Oversight
4. An International Approval Process

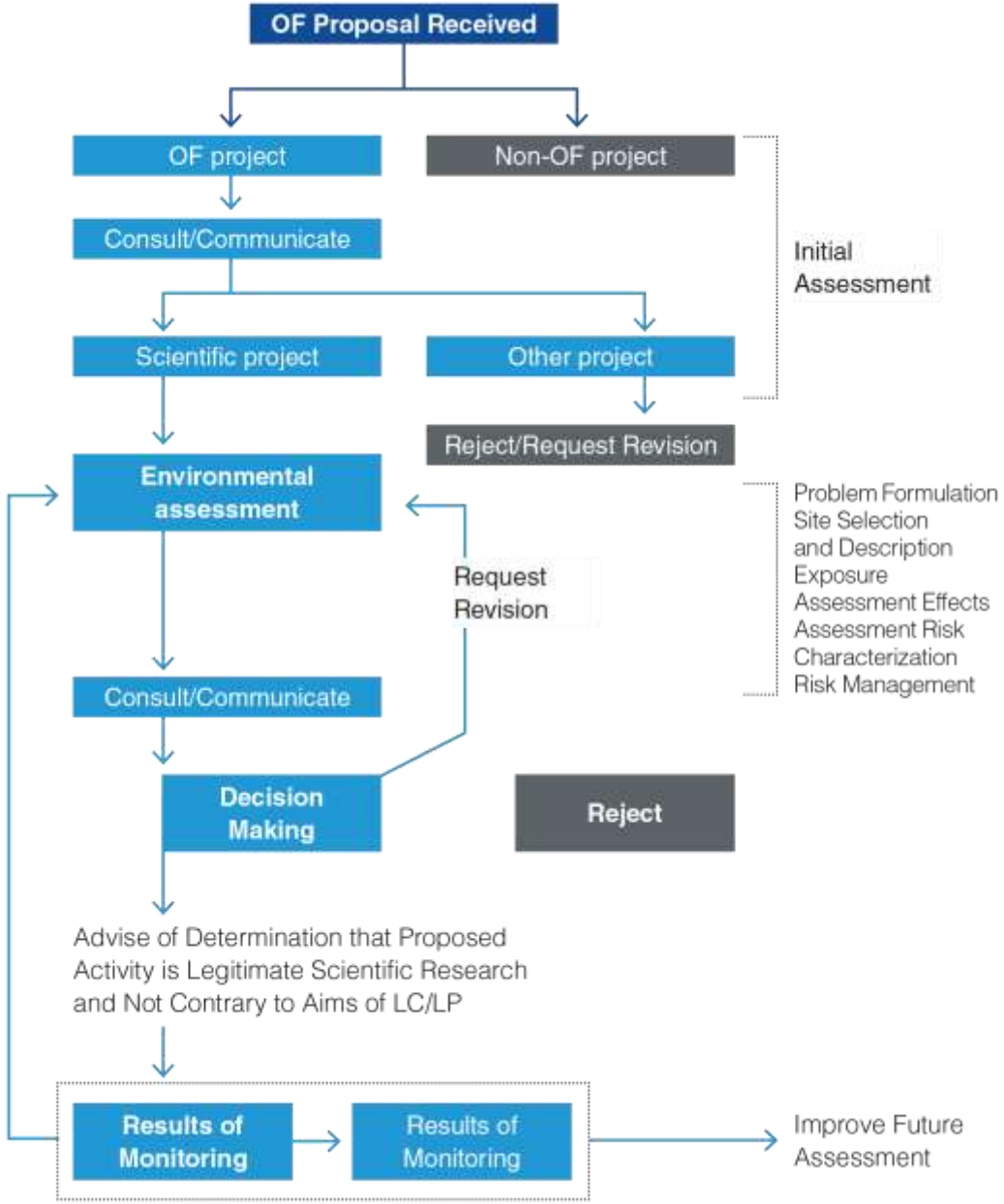
Information Sharing and Consultation

- **Core of the Vienna Convention**
- Can borrow from phrasing in other regimes, such as:
  - Outer Space Treaty – Experiments that "would cause potentially harmful interference with activities of other States" are subject to prior appropriate international consultation
  - London Protocol on Marine Pollution Research Assessment Framework for ocean-based geoengineering – "Where the [proposed activity] […] may have any effect in any area of the sea in which another State is entitled to exercise jurisdiction or in any area of the sea beyond the jurisdiction of any State, **potentially affected countries and relevant regional intergovernmental agreements and arrangements should be identified and notified and a plan should be developed for ongoing consultations on the potential impacts, and to encourage scientific cooperation**."

Structured Environmental Impact and Risk Assessment

- Based on similar requirement in the London Convention Research Assessment Framework for Ocean Fertilization
- Elements of EIRA:
  - Problem Formulation
  - Site Selection and Description
  - Exposure Assessment
  - Effects Assessment
  - Risk Characterization
  - Risk Management

Research Assessment Framework for Ocean Fertilization under the London Convention

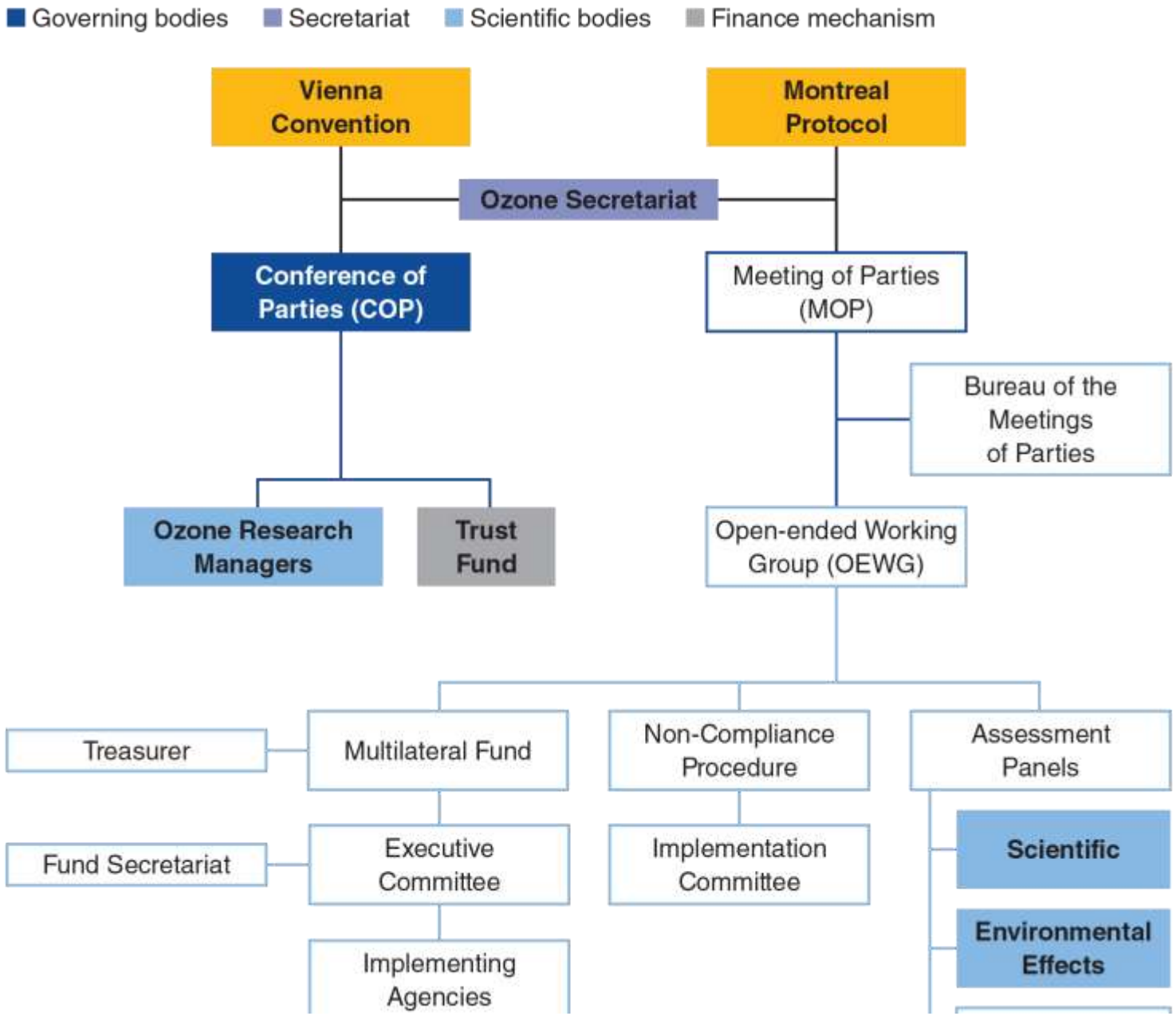


Independent national scientific oversight

- Scientific oversight involves asking the following questions at the national level:
  - The rationale, research goals, scientific hypotheses and methods, scale, timings and locations of proposed experiments, with clear justification for ***why the expected outcomes cannot reasonably be achieved by other methods***.
  - Whether there is any financial and/or economic gain arising directly from the experiment or its outcomes.
  - Whether the proposed experiments has or will go through scientific peer review with the review methodology and outcomes made publicly available.
- Not enough **independent** national institutions to ask these questions –
  - Funding/supporting research and regulation of research are currently combined; they need to be separated.

International approval process

Rebooting the existing institutions under the Vienna Convention



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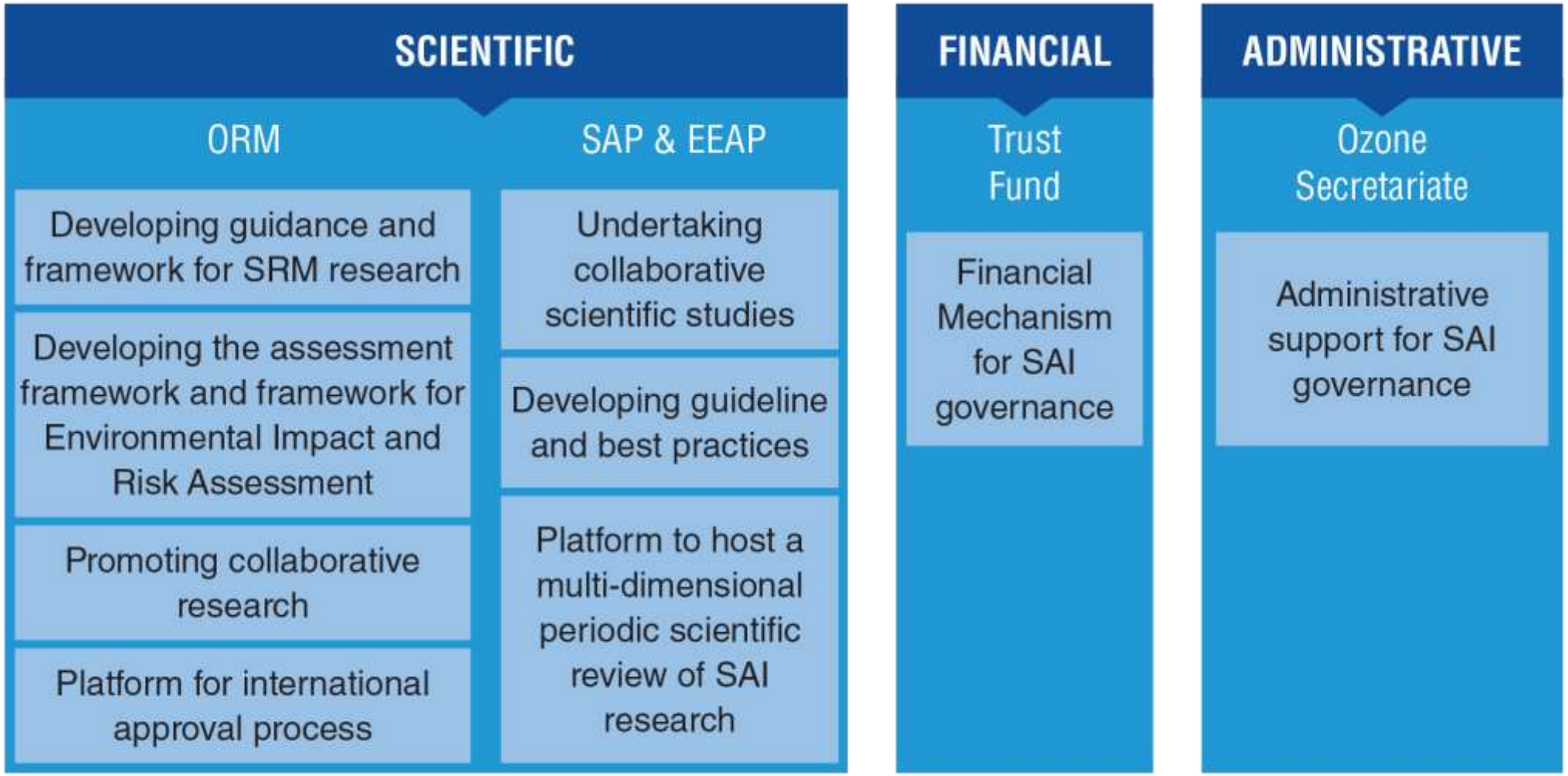

iFOREST
INTERNATIONAL FORUM FOR ENVIRONMENT, SUSTAINABILITY & TECHNOLOGY

Thank You !

Limitations in Using the Montreal Protocol to Regulate SAI

- Regulating SAI under Montreal Protocol is difficult because:
  - Protocol is designed to phase down controlled substances to levels considered safe, rather than preventing introduction of a new substance.
  - “Controlled substance” emission during production and consumption – research activity is not technically production or consumption.
  - Difficult to set a defined ‘schedule’ for phasing down of research inputs – safe amount is unclear.

- Vienna Convention has all the elements to govern SAI research.