



Summary report Nefco carbon funds 2008-2021

Mobilising innovative
climate finance by
harnessing the power
of carbon markets

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Nefco carbon funds team in 2011. Photo: Nefco

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Fund manager's overview

Nefco now has almost two decades of experience establishing and managing pioneering carbon funds to meet the compliance needs of Nordic governments and companies. These funds, hereafter referred to as Nefco carbon funds, are essentially procurement vehicles and have included the Baltic Sea Region Testing Ground Facility (TGF, operational 2004-2013), the Nefco Carbon Fund (NeCF 2007-2021) and the NEFCO Norwegian Carbon Procurement Facility (NorCaP, 2013-2021). Their combined assets over time totalled EUR 280 million, and collectively they procured over 31.6 million carbon credits (each equivalent to 1 tCO₂eq), more than the most recent total annual emissions of Denmark¹.

Nefco carbon funds

- The Nordic countries have played a pioneering role in supporting ambitious climate action and sustainable development in developing countries and promoting carbon pricing around the world
- Nefco, the Nordic Green Bank, is an experienced fund manager with a track record of establishing and managing path-breaking carbon funds to meet the climate change commitments of sovereign and private investors
- The Nefco Carbon Fund was an early public private partnership instrument with a peak capitalisation of EUR 165 million, which delivered 6.7 million tCO₂eq of emission reductions from projects on four continents
- The Nefco Norwegian Carbon Procurement Facility was a bilateral instrument which achieved 22.2 million tCO₂eq of emission reductions, targeting stalled projects or those at risk of discontinuation
- Together, the Nefco carbon funds laid the foundations for facilitating international partnerships to reach the ambitious climate actions goals of the Paris Agreement through the testing the next generation of carbon markets

¹ Denmark: What are the country's annual tCO₂eq emissions?
<https://ourworldindata.org/co2/country/denmark>

The Kyoto Flexible Mechanisms

The Clean Development Mechanism (CDM) is a baseline-and-credit, project-based 'crediting' mechanism that operates at the company level. It allows projects in developing countries to generate carbon dioxide-equivalent reductions, which can be purchased by governments and private sector entities and claimed for compliance and other purposes by mitigating countries and companies.

Joint Implementation (JI) is also a baseline-and-credit, project-based instrument for developed countries. It allows carbon assets generated through projects in one mitigating country to be claimed for KP compliance and other purposes by other countries.

By the end of the Kyoto Protocol's second and final commitment period in 2012, some 9,000 mitigation activities had been registered under the CDM and JI with a potential to reduce emissions by approximately 1.4 Gt tCO₂eq by 2012 and over 8 Gt tCO₂eq by 2020. To date, 4.4 Gt tCO₂eq has been issued as CERs and 0.9 Gt tCO₂eq as ERUs.

The first instrument, the TGF, had its origins in the multilateral energy cooperation in the Baltic Sea Region, which includes the European Commission, the Baltic States and the Russian Federation. The TGF became a Public Private Partnership (PPP) in 2006, welcoming as participants nine private sector energy companies from Denmark, Finland and Germany, all seeking compliance units to meet their obligations under the EU's emission trading scheme (ETS). The TGF was ultimately capitalised at EUR 35 million and was the first multi-donor carbon fund outside the World Bank Group.

However, the main focus of this review is the successor instruments, the NeCF (another private-public partnership) and NorCaP (a bilateral instrument for Norway), both global funds. The NeCF was an early 'post-2012' facility comprising governments and utilities from across Europe; it reached a capitalisation of EUR 165 million. Both funds progressed through several phases over different time frames. The first phase was establishment, which included the initial building of pipelines and raising capital (for the NeCF). The active procurement phase comprised identification, assessment, due diligence and the contracting of projects in Eastern Europe, Asia, Latin America and Sub-Saharan Africa. The final phase included portfolio management and fund administration, monitoring and delivery of credits. Both funds were wound up by the end of 2021.

There were bumps in the road along the way. Confidence in the project-based mechanisms suffered a setback due to the decline and subsequent collapse of the carbon credit market at the end of 2011, reflecting the oversupply of both ERUs and CERs, mostly as a result of



Photo: Unsplash

a high supply of credits from successful JI and CDM projects combined with modest demand under the Kyoto Protocol.

For the NeCF, this price slump required a wholesale consolidation of the portfolio and a negotiated exit from several investments. Notwithstanding, the fund ultimately delivered 6.7 million credits to its investors. The project portfolio comprised mainly the energy sector and focused on energy efficiency and renewable energy, predominantly small hydro run-of-river, wind and biomass.

NorCaP was wholly funded by the Norwegian government, acting initially through the Ministry of Finance and later the Ministry of Climate and Environment. The principal purpose of this facility was to keep the carbon market alive by purchasing carbon credits in the second commitment period of the Kyoto Protocol from so-called 'vulnerable' projects. Through its procurement, the facility sought to ensure the viability of existing CDM projects and through them the continued reduction of emissions; the continuation of the mitigation activities of these projects was deemed to be fully dependent on continued access to carbon finance revenues. This was achieved through the swift launch of two Calls for Proposals, with Nefco reaching out to the market and establishing a price by offering to buy credits and thereby providing financial support for mitigation and related sustainable development efforts whilst maintaining monitoring, reporting and verification (MRV) capacity in a rapidly declining market. Over the 2014-2015 period, NorCaP developed a portfolio of 20 projects, which included landfill gas management (capture and removal of methane, sometimes with associated energy recovery) and chemical industry projects such as

The rationale for the flexible mechanisms

The basic principle of market mechanisms is simple: investments in low-cost abatement and related carbon crediting opportunities in other countries reduces the costs of meeting climate targets for the buyer/investor country or company whilst achieving the same climate outcomes.

While the CDM lowers the cost of compliance for developed countries, developing countries will also benefit from not just the increased investment flows but also the requirement that these investments advance sustainable development goals. From a developing country perspective, the benefits of the CDM are the following:

- Attract capital for projects that assist in the shift to a less carbon-intensive economy
- Encourage and permit the active participation of both private and public sectors
- Provide a powerful tool of technology transfer
- Help define investment priorities in projects that meet sustainable development goals

N₂O and SF₆ abatement. Ultimately, the facility delivered 22.2 million credits to the Norwegian Ministry of Climate and Environment.

In recent years, Nefco has been able to leverage a combination of technical (screening, assessment, due diligence), financial and administrative skills gained through managing carbon funds to develop other results-based financing fund assignments for its owner countries in adjacent sectors, notably within energy access. Addressing the pressing demands of Sustainable Development Goal 7 on energy access, Nefco established the Beyond the Grid Fund for Africa (BGFA)² in 2019 and the Modern Cooking Facility for Africa (MCFA)³ in 2021 to accelerate private investment in the fields of rural clean energy provision and modern cooking respectively. There is significant potential to incorporate carbon finance activities in the MCFA in particular.

Nefco, together with its Nordic owners and host country partners, now looks forward to being a pioneering actor in the development of the next generation of carbon markets under Article 6 of the Paris Agreement. The Nordic countries have an extensive track record in supporting ambitious climate action and sustainable development in developing countries and promoting carbon pricing around the world. The Nordic Initiative on Cooperative Approaches (NICA) joint initiative brings this experience and cooperation into the Paris Agreement era as a number of the Nordic countries join forces to facilitate international partnerships for ambitious climate action to meet the 1.5°C target.

² www.beyondthegrid.africa/

³ www.moderncooking.africa/



Furthermore, NICA, currently under Nefco's chairmanship, together with the Nordic countries, will also continue to engage with the international carbon pricing community to promote knowledge sharing, coordination and collaboration and look at practical ways of blending climate and carbon finance to help achieve global goals.

Ash Sharma
Vice President, Head of Special Funds

Background to the Nefco Carbon Fund (NeCF)

Genesis: Baltic Sea Region Testing Ground Facility

The Nefco Carbon Fund was a successor instrument to the Testing Ground Facility (TGF)⁴. The TGF was a pioneering carbon fund established by Nefco that started operations in 2004 and had its origins in existing multilateral energy cooperation in the Baltic Sea Region (BASREC)⁵. The original philosophy of the TGF was to test projects within the Joint Implementation (JI) mechanism and gain experience in what was then an emerging carbon market. However, by the time the facility started operations, and with the subsequent addition of private sector investors in 2006, the implementation of investment projects became more relevant than simply 'testing' the JI concept (although the name remained). It was an early actor in the market: of the first 50 so-called Track 2⁶ JI projects, 9 fell under the TGF.

The TGF purchased emission reductions from projects owned and operated by private enterprises, public utility companies, public-private partnerships and municipal, regional or governmental authorities. Due to its BASREC origins, the TGF only operated in Estonia, Latvia, Lithuania, Poland, Russia and Ukraine and prioritised energy-related projects.

⁴ A review of the TGF, The Baltic Sea Region Testing Ground Facility - A Pioneering Climate Finance Instrument, was published in January 2014.

⁵ In 1999, the energy ministers of the countries in the Baltic Sea Region and the European Commission decided to enhance energy cooperation in the region with the creation of the Baltic Sea Region Energy Cooperation (BASREC) through the Testing Ground Agreement, which came into force in 2004.

⁶ The 'Track 2' procedure is the verification procedure under the UN's Joint Implementation Supervisory Committee, specified in paragraphs 30-45 of the JI guidelines.

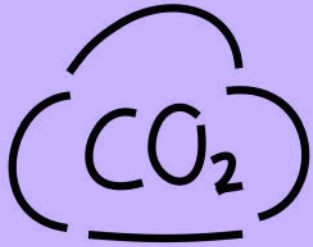
Participants in the Testing Ground Facility

Public Investors	Private Sector Investors
• Denmark • Finland • Germany • Iceland • Norway • Sweden	• DONG Energy, now Ørsted (Denmark) • Fortum (Finland) • Gasum (Finland) • Keravan Energia (Finland) • Kymppivoima (Finland) • Outukumpu (Finland) • Vapo, now Neova Oy (Finland) • Vattenfall Europe Wärme and Vattenfall Europe Generation (Germany)

The TGF was structured as a public-private partnership (PPP) with investors from six governments and nine heat and power and industrial companies. It was capitalised at EUR 35 million, split equally between the public and private sectors. As the first dedicated JI multi-donor fund in the market, the TGF was an excellent example of a functioning PPP, originating as a publicly backed demonstration facility and graduating to a commercially sustainable compliance vehicle. The fund was therefore used as a model for the NeCF, initially targeting participants in the TGF and gradually opening up to other investors.

The TGF was operational until 2013, whereupon the final deliveries were made. The fund was wound up in 2014. In total, it delivered 2.625 million emission reductions from a portfolio of 11 projects in Estonia, Lithuania, Russia and Ukraine. The credits were procured at a gross weighted final average of EUR 6.67 per ERU, significantly below the market price at the time.

Overview of Nefco Carbon Fund



6.7 million

Certified Emission Reductions



19

supported projects



7

countries on 3 continents

Establishment of the Nefco Carbon Fund (NeCF)

The NeCF was a public-private partnership carbon procurement vehicle launched by Nefco in March 2008 for the long-term purchasing of greenhouse gas emission reductions under the Joint Implementation (JI) and Clean Development Mechanism (CDM) that operated until 2020. The NeCF was one of the early 'post-2012' carbon funds that targeted long-term credit purchases extending beyond the Kyoto period to meet compliance needs.

The NeCF had a lifetime of 14 years, received its final deliveries in August 2021 and duly wound up operations at the end of 2021.



Tirta Gemah hydropower in Indonesia. Photo: Nefco

Participants in the Nefco Carbon Fund

Public Investors	Private Sector Investors
▪ Denmark ▪ IFU, Industrialisation Fund for Developing Countries (Denmark) ▪ Finland ▪ Norway ▪ Nordic Environment Finance Corporation	▪ DONG Energy, now Ørsted (Denmark) ▪ Eesti Energia (Estonia) ▪ EPV Energy (Finland) ▪ Electrabel, later GDF Suez and now Engie (Belgium) ▪ Kymppivoima (Finland) ▪ Vapo, now Neova Oy (Finland)

Capital raising

The NeCF was targeted at private (corporate entities with compliance obligations under the EU Emissions Trading Scheme or EU ETS) and sovereign investors. The early fund had a strong Danish contingent, the first investors in the fund, alongside Nefco, were DONG Energy (now Ørsted; Denmark), IFU and the Danish Energy Agency.

Further funds were raised from investors in two tranches:

- Tranche 1: 2008-10 EUR 100 million (against an initial target capitalisation of EUR 50 million); principally open to TGF investors.
- Tranche 2 (post-2012 tranche): 2010-11 EUR 65 million (against a target capitalisation of EUR 30 million); open to initial NeCF investors and new participants Electrabel (later GDF Suez and now Engie, Belgium) and Eesti Energia (Estonia).

The NeCF reached a peak capitalisation of EUR 165 million at the end of 2011.



Alchevsk iron and steel plant in Ukraine. Photo: Nefco

Project origination

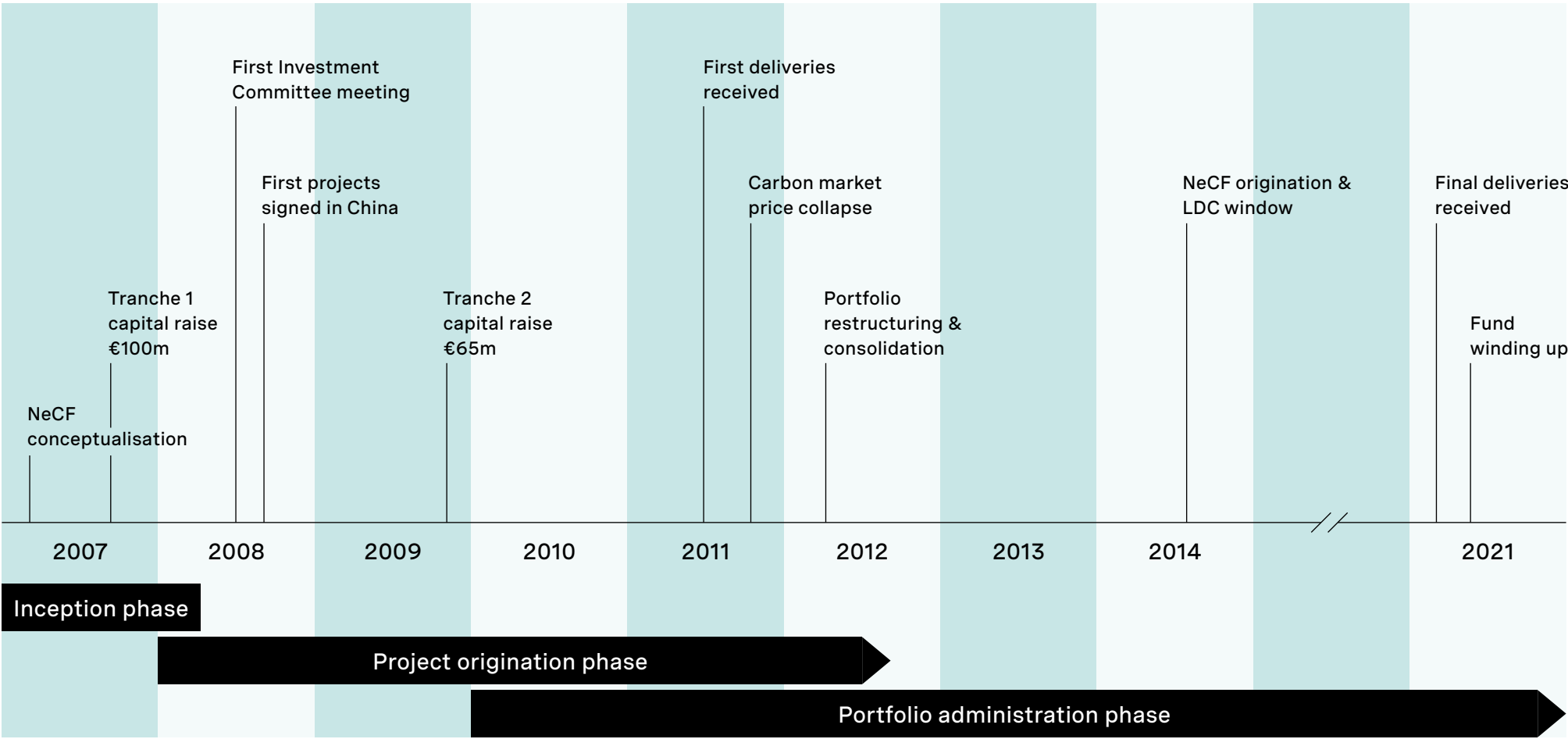
The NeCF invested in a wide range of greenhouse gas mitigation projects including, but not limited to, renewable energy (e.g. biomass, small-scale hydropower and wind), energy efficiency and fuel switching. The final portfolio fell almost exclusively into these categories. Project criteria were expected to align with the requirements of the Kyoto Protocol, in particular the fulfilment of the requirements of the CDM Executive Board and JI Supervisory Committee, and the eligibility criteria under the EU ETS.

Over the 2008-11 period, Nefco identified projects through open origination in a highly competitive global market using various channels, including its own origination networks, brokers and calls for projects.

Following the collapse in the market price for CERs in early 2012, there was little appetite from Nefco investors to undertake further origination, and the portfolio was consolidated. At its peak, the portfolio included over 30 projects.

The NeCF was once again used as a procurement vehicle in 2014-2015. A combined Call for Proposals for the NeCF and NorCaP was made at Norway's request in September 2014, seeking new projects located in least developed countries (LDCs) only.

Timeline of Nefco Carbon Fund (NeCF)



Jiangsu Xiangshui wind power project in eastern China

The Jiangsu Xiangshui wind power project has reduced greenhouse gas emissions in China with the support of carbon financing from NeCF. The project was developed as a CDM project under the Kyoto Protocol and generated 711,000 Certified Emission Reductions (CERs) between 2009 and 2015.

The project entailed the installation and operation of 134 wind turbines, with a total capacity of 201 MW, in Jiangsu province on the eastern coast of China. The project delivers

over 400 GWh/a of emission-free electricity to the East China Power Grid annually, which would otherwise be generated mainly with fossil fuels. By displacing fossil fuel-based electricity generation, the project reduces greenhouse gas emissions. NeCF agreed to buy the CERs, which NeCF investors use to meet compliance requirements under the Kyoto Protocol or EU Emissions Trading Scheme. Such carbon financing helps boost the economic viability of clean energy investments. Besides global climate benefits,



Photo: Unsplash

the project also benefits local sustainable development by reducing air pollution, creating employment opportunities and strengthening expertise in the wind energy sector in China. The project enjoys strong local support, confirmed by the findings of a stakeholder consultation process. The project's Environmental Impact Assessment, prepared and reviewed in accordance with host country legislation, identified no significant negative environmental impacts.

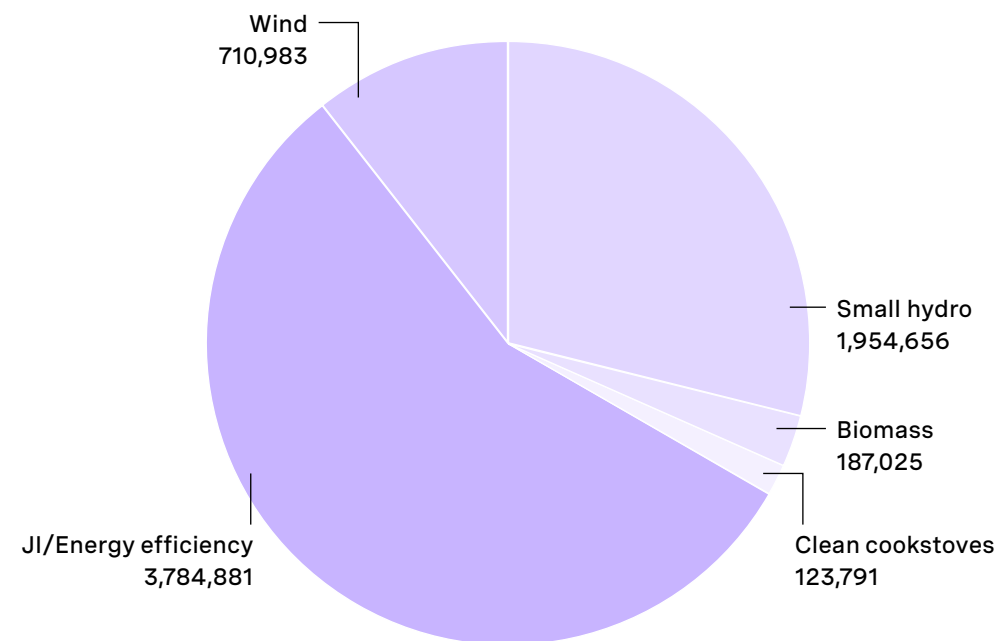
The project is owned and operated by Yangtze New Energies Development Co. Ltd., one of China's largest energy companies, and was developed as a CDM project in cooperation with the Foreign Economic Cooperation Office at the Chinese Ministry of Environmental Protection.

Final portfolio – Nefco Carbon Fund (NeCF)

The final portfolio of projects totalled 6,761,336 credits (ultimately composed of 44.1% CERs, 36.2% AAUs and 19.7% ERUs), which were delivered to investors.

Disaggregated by technology type, the NeCF project portfolio comprised mainly the energy sector and focused on renewable energy (principally small hydro run-of-river, wind and biomass) and energy efficiency.

**NeCF Portfolio by UNFCCC Sectoral Scope
(Volume of credits)**



Final portfolio of the Nefco Carbon Fund

Project	Country	UNFCCC Category	Emission reductions (tCO ₂ eq)
Ban Coc	Vietnam	Small hydro	223,492
Doc Tai	Vietnam	Small hydro	214,168
Nam Khanh	Vietnam	Small hydro	132,526
Lebong	Vietnam	Small hydro	52,169
Tra Xom	Vietnam	Small hydro	259,314
Song Mien	Vietnam	Small hydro	217,495
Thac Xang	Vietnam	Small hydro	204,317
Ha Tay	Vietnam	Small hydro	104,058
Tirta Gemah	Vietnam	Small hydro	63,627
Lan Son Sugar	Vietnam	Biomass	187,025
Da Krong 2	Vietnam	Small hydro	263,445
Guangxi	Vietnam	Small hydro	164,051
Paradigm PoA	Ethiopia	Clean cookstoves	8,341
PoA in Mozambique	Mozambique	Clean cookstoves	115,450
Alchevsk 1	Ukraine	JI/Energy efficiency	2,965,674
Magnitogorsk	Russia	JI/Energy efficiency	819,207
Xiangshui	China	Wind	710,983
Yunnan Yizi	China	Small hydro	42,905
Trung Ho and Van Ho	Vietnam	Small hydro	13,089
Total			6,761,336

Nam Khanh small hydro Clean Development Mechanism project in Vietnam

The Nam Khanh 12 MW run-of-river hydropower project, located in Ban Lien Commune, Lao Cai Province in Vietnam, is a typical NeCF project. The project activity involved the construction of a small reservoir, 2 km tunnel, pressurised well, penstock, powerhouse consisting of 3 units (each with a turbine and power generator) and discharge channels. The net electricity generated from the project is supplied to the national grid via a 110kV transmission line that connects the Nam Trai hydropower plant and an existing transformer station.

NeCF contracted the project in June 2010 to purchase 90% of an estimated total of 188,000 certified emission reductions (CERs) to be generated between 2012 and 2019. The project experienced a small delay from the original plan but was commissioned for commercial operations in February 2012, having been registered in 2011. Ultimately, the project generated 132,500 CERs.

Prior to the project's implementation, no power generation existed at the project location. In Vietnam, electricity supply is generated mainly from fossil fuels and is distributed to



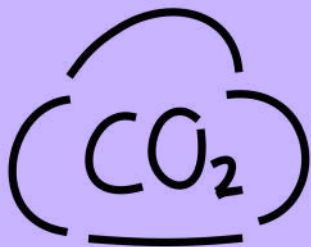
The water dam in Nam Khanh, Vietnam. The project generated 132,500 CERs. Photo: Nefco

consumers solely via the national electricity grid. By displacing fossil fuel-based power generation with renewable hydropower production, the project reduces greenhouse gas emissions. These savings are purchased and used to supplement the reduction of emissions in developed countries.

Traditionally, Vietnam has suffered electricity shortages as a consequence of rapidly increasing demand and insufficient supply, with negative impacts on economic growth and people's daily lives. The clean energy provided by this project contributes to

closing the demand gap. In addition, the project makes a positive contribution to the economic well-being of Lao Cai Province - a poor mountainous area in northwest Vietnam - by facilitating its industrialisation process and supporting economic development. The infrastructure of the Ban Lien Commune, which is also home to minority ethnic groups, has been improved by new roads, better electricity services, new communication links and clean water treatment systems.

Overview of Norwegian Carbon Procurement Facility



22.2
million

Certified Emission Reductions



14

supported projects



5

countries on 2 continents

Background to Norwegian Carbon Procurement Facility

The NEFCO Norwegian Carbon Procurement Facility (NorCaP) was established by Nefco in October 2013 at the behest of the Norwegian government.

The principal purpose of the facility was to fulfil Norway's commitments by purchase carbon credits in the second commitment period of the Kyoto Protocol only from so-called 'vulnerable' projects. Through its procurement, the facility sought to ensure the viability of existing CDM projects and continued emission reductions by providing financial support for the sustainable development outcomes associated with the projects. Additionally, it aimed to maintain monitoring, reporting and verification (MRV) capacity in the market to the greatest extent possible.

NorCaP was a bilateral instrument wholly funded by the Norwegian government, acting through the Ministry of Climate and Environment, and it identified projects solely through a global competitive Call for Proposals (CfP) procedure organised by Nefco.

NorCaP purchased CERs from all CDM project types with the exception of hydro and wind as these could achieve financial sustainability by other income streams⁷.

⁷ All projects types were eligible with exceptions for a) Projects reducing trifluoromethane (HFC-23) produced as a by-product of chlorodifluoromethane (HCFC-22); b) Projects reducing nitrous oxide (N₂O) from adipic acid production, and c) Coal based energy production without carbon capture or storage.

Project origination

The target for the fund was to procure up to 30 million CERs from eligible projects.

Given that projects had already been implemented and registered, the origination channel for NorCaP was the rapid launch of global, competitive Calls for Proposals (CfP).

The first Call for Proposals CfP1 was closed in January 2014. It was heavily oversubscribed, with 232 projects accounting for 211 million CERs offered from 35 countries. Of these, 15 projects were taken forward to due diligence and 10 contracted. In the same calendar year as the first CfP closed, the facility received its first credits from two projects located in Colombia and Brazil, totalling 0.56 million CERs.

The second CfP was launched in September 2014 and closed in December the same year. The CfP2 received 114 project proposals that fulfilled the basic eligibility criteria from 27 countries, in total accounting for some 107 million CERs offered. This was roughly half the number of project proposals by number and volume submitted under CfP1, reflecting the decline in the number of active projects remaining in the market at the time and self-selection in response to the price ceiling set out in the CfP2.

An innovative feature of the CfP2 was a set-aside for up to 5 million CERs from least developed countries (LDCs). Of the project proposals submitted, 9% came from LDCs, which was disproportionate to their 1% representation in the general CDM group of projects at the time.

Vulnerable projects

The principal objective of NorCaP was to prevent the reversal of emission reduction activities by procuring credits from registered and commissioned projects whose continued activity in emission reduction depended on a higher carbon price than achievable under the then market conditions.

NorCaP only purchased CERs from registered and commissioned CDM projects and PoAs that had stalled and were at risk of termination due to prevailing low CER prices; priority was given to projects that could be quickly restarted and had no Emissions Reduction Purchase Agreement in place.

Preventing reversal of emission reductions in São Paulo State, Brazil

The Paulínia waste management centre started operations in May 2000, accepting waste from a catchment area of 7 million people. It is a modern, engineered site located in the Campinas Metropolitan Region, approximately 130 km from the capital of São Paulo State. The site accepts approximately 5,700 tonnes of waste per day.

The aim of the project is to capture and destroy landfill gas, which is typically 50% methane, a potent greenhouse gas. Six enclosed flares, each with a capacity of 2,500 m³/h, operate at the biogas complex. The biogas plant has a

maximum potential capacity of 25,000 m³/h if all wells are connected to the system and additional flaring capacity is installed.

The investment was financed solely by revenue from the sales of certified emission reductions under the CDM. However, due to the price collapse at the end of the Kyoto period (in 2012), the project struggled to meet its significant operating and maintenance costs and was therefore judged to be at risk of discontinuation under NorCaP's methodology developed to assess vulnerability.



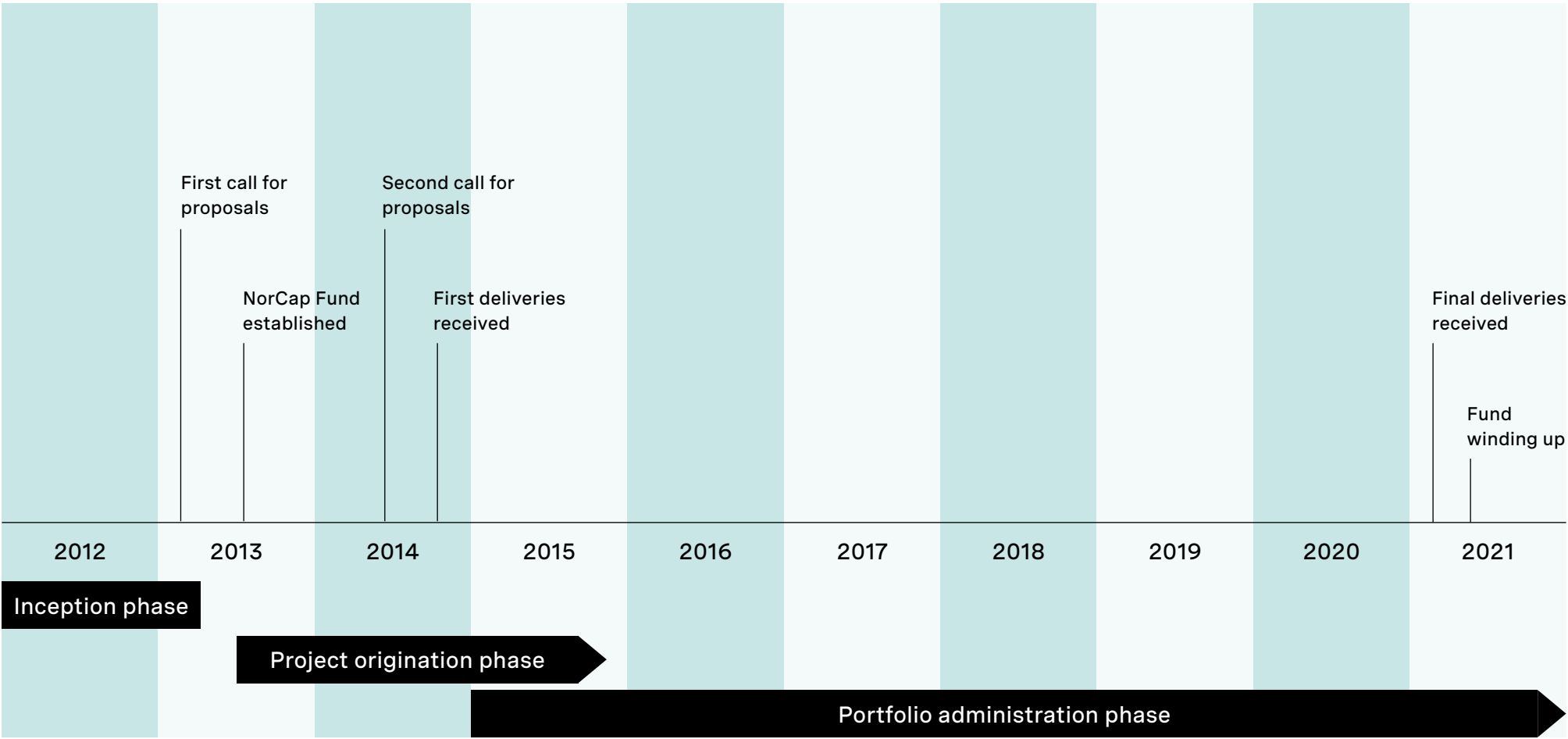
CGR Paulínia is a state-of-the-art disposal facility in Brazil. Photo: CGR Paulínia

The project was re-financed by an Emission Reduction Purchase Agreement with NorCaP. Under this agreement, NorCaP procured 2.4 million certified emission reductions (CERs) up to the 2020 period, thereby ensuring the financial viability of the operation.

At the time of NorCaP's intervention, only 55% of the gas wells at the landfill were producing biogas, 28% were non-producing and 17% were unconnected. The carbon revenue from NorCaP allowed the project owner ESTRE to hire additional technicians, invest in connecting the extra wells and further

extend the collection system. This prevented the reversal of emission reductions, protected the investment and generated various co-benefits.

Timeline of Norwegian Carbon Procurement Facility (NorCaP)



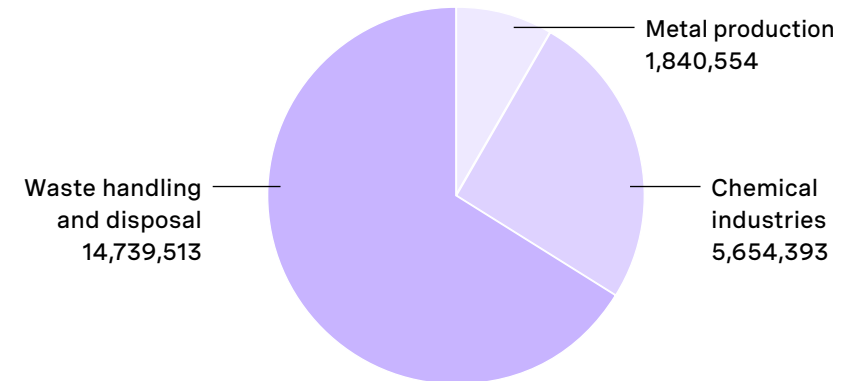
Final portfolio – Norwegian Carbon Procurement Facility (NorCaP)

Final portfolio - Norwegian Carbon Procurement Facility (NorCaP)

The final NorCaP portfolio delivered 22,234,460 CERs to the Norwegian Ministry of Climate and Environment from 'vulnerable' projects.

NorCaP's technology type (UNFCCC Sectoral scope) was dominated by waste management, principally gas management (capture and removal of methane, sometimes with associated energy recovery), which accounted for 66%. This was followed by projects from the chemical industry, of which the principal focus was emission reduction from N₂O and SF₆ abatement⁸.

NorCaP Portfolio by UNFCCC Sectoral Scope (Volume of credits)

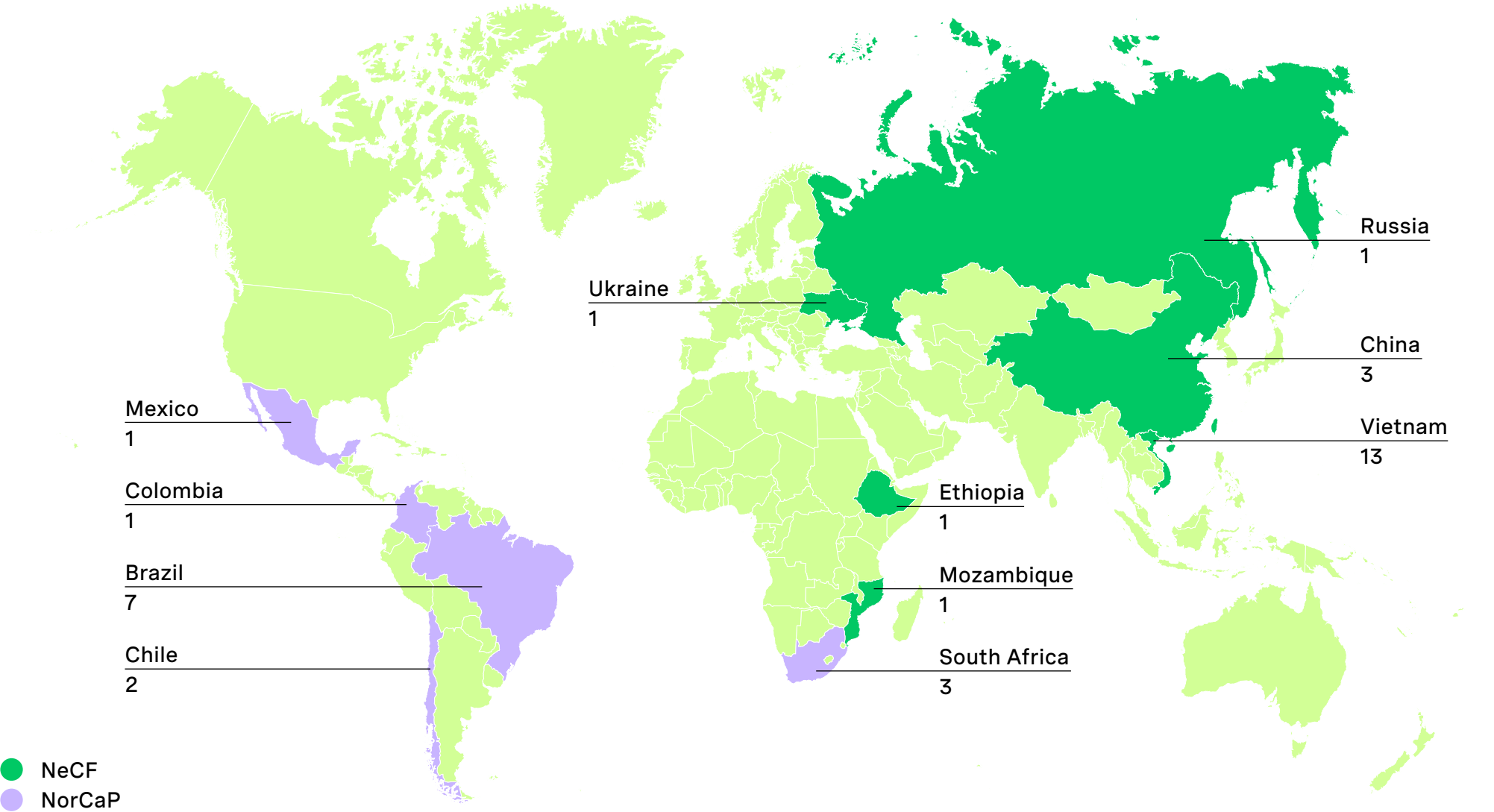


⁸ Sulphur hexafluoride (SF₆) is an extremely potent and persistent greenhouse gas that is primarily utilised in industrial applications as an electrical insulator and arc suppressant. The NorCaP project relates to an abatement project in the magnesium industry which uses SF₆ as an inert 'cover gas' to prevent oxidation during casting.

Final portfolio of the Nefco Norwegian Carbon Procurement Facility

Project	Country	UNFCCC Category	Emission reductions (tCO ₂ eq)
RIMA	Brazil	Metal production	660,554
Paulinia	Brazil	Chemical industries	446,841
Manaus	Brazil	Waste handling and disposal	2,847,720
AEL	South Africa	Chemical industries	871,476
PANNA 3	Chile	Chemical industries	1,400,000
PANNA 4	Chile	Chemical industries	300,000
Doña Juana	Colombia	Waste handling and disposal	2,349,809
Aurá	Brazil	Waste handling and disposal	1,070,701
Fertinal	Mexico	Chemical industries	934,841
Caieiras	Brazil	Waste handling and disposal	6,050,000
RIMA II	Brazil	Metal production	1,180,000
Omnia Fertilizer	South Africa	Chemical industries	767,222
Omnia N ₂ O Abatement	South Africa	Chemical industries	934,013
ESTRE's Paulínia	Brazil	Waste handling and disposal	2,421,283
Total			22,234,460

Geographical location of Nefco carbon funds projects



Lessons learnt from Nefco's carbon market experience

Emission reductions have been achieved across a wide typology of projects and geographies

The Nefco carbon fund portfolio has supported emission reductions across a broad range of sectors and industries. Whilst the emphasis in project origination under the NeCF was renewable energy and energy efficiency, in line with Nefco's early experiences with the Baltic Sea Region Testing Ground Facility, there have also been significant later contributions from waste management, chemical industry projects and cookstoves projects in Africa, primarily in the NorCaP portfolio.

The Nefco carbon funds have had a global reach. In geographic terms, the final portfolio covered four continents: Europe, South America, Asia and Africa.

Carbon funds have been a pioneering testing ground for new, market-based approaches

The Nordic countries have been early movers in fledgling carbon markets. The CDM, which is the bedrock for the Nefco carbon funds, established the first global market for greenhouse gas emission reductions.

Significant investment by participating countries, the private sector and the United Nations Framework Convention on Climate Change (UNFCCC) secretariat has gone into developing the CDM methodologies, rules, procedures and institutional structures. However, the creation



Photo: Tim Bird

and rapid growth of a large and then unprecedented international programme of work has unsurprisingly not been without challenges or controversies. Issues have been raised regarding the governance of the CDM, the quality of approved projects and the contribution of the CDM to sustainable development⁹.

Concerns about these issues have led to debate among policy analysts about the capacity of the CDM to deliver emission reductions of sufficient quality and quantity. These concerns have been addressed over the years and will also influence the detailed rules for the Paris Agreement carbon markets that are currently under development. Nefco's detailed screening, evaluation and due diligence of project processes ensure they are environmentally sound and represent real reductions.

In Eastern Europe, Nefco's carbon funds have assisted in building capacity and competence in using the Kyoto mechanisms and promoting understanding of associated concepts, rules and guidelines. As an early actor in some the countries of operation, the fund was active in enhanced capacity building through 'learning by doing plus', a commercial activity that generated cash flow to renewable energy and energy-efficiency projects and compliance units for investors. This also established a wide range of local stakeholders and partnerships, increasing the acceptance of market-based instruments.

⁹ The Clean Development Mechanism: A Review of the First International Offset Program, Pew Center for Climate and Energy Solutions, March 2011

Key takeaways

- Taken together, the Nefco carbon funds have achieved significant emission reductions across a wide typology of projects and geographies
- As early movers, the Nefco carbon funds have had a strong Nordic identity providing a pioneering testing ground for innovative, market-based approaches
- Leveraging project based carbon projects have been a cost effective tool for investors, both for governments in meeting their international commitments and private, compliance buyers
- Beyond climate mitigation, carbon finance projects have provided a strong contribution to broader green growth benefits, including sustainable development impacts, financing capital investment, technology transfer and promoting international cooperation
- Carbon finance has proven to be an important form of results-based finance, providing a strong platform for Nefco's administration of funds for Nordic development partners in the field of energy access, including the Beyond the Grid Fund for Africa and the Modern Cooking Facility for Africa

Carbon funds have been a cost-effective tool for investors

The international carbon market that has developed since 2004 has enabled emission reductions where it is least costly, generating large flows of carbon revenues to developing countries with lower mitigation costs. In turn, the Nefco carbon funds have provided a cost-effective compliance tool for governments and companies whilst ensuring environmental integrity¹⁰.

The TGF procured its credits at a gross weighted average of EUR 6.67 per ERU. This was significantly below the market price for most of the fund's operations, offering a good return for investors in exchange for the greater risk of developing primary contracts. For the NeCF, the gross weighted average cost for the pre-2012 period was EUR 5.22 per unit and for the post-2012 period EUR 5.06 per unit.

NorCaP operated entirely in the post-market price collapse environment and hence the gross weighted cost was EUR 2.31 per CER.

¹⁰ Nefco carbon projects were subject to monitoring and verification under the relevant UNFCCC mandated methodologies, modalities and procedures, including the requirements of the CDM Executive Board and JI Supervisory Committee. Over 250 methodologies were developed under the CDM for additionality testing, baseline setting and monitoring of a wide range of activity types. Detailed CDM methodologies can provide a solid basis for further developing methodologies for activities under the Paris Agreement and even more stringent requirements for the proposed market mechanism under Article 6.



Photo: Nefco

Nefco's carbon funds have had a strong Nordic identity

Building on the traditions of the Baltic Sea Regional Energy Cooperation and the TGF, the NeCF was instigated by participants from the Nordics requesting access to the global CDM market; the majority of the fund's investors are from the Nordics (accounting for 82% of the fund's peak capitalisation), including both sovereign and private actors¹¹.

In the early days of the NeCF, particularly for projects originating in China and elsewhere in Asia, Nefco benefited from a strong Nordic identity, ownership by the Nordic governments and trust placed in the Nordic brand, even in a highly competitive global market.

The Nefco Carbon Fund's activity has delivered significant volumes of cost-effective emission reductions to help supplement Nordic governments' international climate obligations, complementing the bilateral carbon purchase programmes of the Finnish and Swedish governments and extensive Nordic participation in the multilateral carbon funds. For instance, Denmark, Finland and Norway continued their participation in the NeCF following successful cooperation and outcomes in the TGF. Having participated in both previous carbon funds, Norway turned to Nefco to execute the global NorCaP mandate and meet part of its commitments to the second Kyoto period.

¹¹ The NeCF also onboarded, among others, the largest energy companies in Denmark, Finland and Sweden at the time.

Compensation, offsetting or mitigation?

Nowadays, carbon markets are closely linked with compensation, i.e. offsetting emissions that cannot viably be eliminated or reduced. Voluntary markets are particularly closely associated with compensation.

In Nefco's case, offsetting or compensation was not the primary objective as such. Nefco's role was to acquire high quality, additional carbon credits for investors. Investors utilised the credits for various purposes: companies likely used carbon credits to partially meet their obligations under the Emissions Trading System (EU ETS), and governments may have used them in a limited way to supplement their climate policies. Some investors have simply cancelled their credits, leading to further global net mitigation impacts. The CDM methodologies have also been utilised for monitoring purposes, i.e. to track the effectiveness of climate finance.

Given the above, it is important to make a distinction between the generation of additional carbon credits and the use of credits.

Nefco has acted as an effective and cost-efficient vehicle for its Nordic owners to test new approaches and execute demanding climate mandates. The experience and capacity to do so, on a regional and global level, would not have been possible without the assignments outlined in this report.

In recent years, Nefco has used its experience to help organisations such as Finnair and Finavia, the public limited company responsible for maintaining and developing Finland's airport network to meet its corporate commitments

The CDM has set a high bar for environmental standards

The Nefco carbon funds have worked exclusively with UNFCCC credits, including AAUs, ERUs and CERs. Over the years, the CDM lost some international support after receiving criticism for the lack of additionality and sustainable development contributions of some categories of activities, its inequitable regional distribution (broadly in line with mitigation potential but significantly under-representing certain regions, including Sub-Saharan Africa) and its administrative complexity. Nefco, however, made efforts to diversify its portfolio to include African cookstove projects. Nevertheless, the CDM has been hugely successful in mobilising capital investment¹², transferring technology and expertise and developing carbon management skills.

¹² Carbon markets can support leveraging additional sources of climate finance. The UNFCCC estimated that the CDM led to investments of more than 300 billion USD in emission reduction projects and many CDM projects leveraged several times their volume in carbon finance in the form of private sector investment.

In practice, many actions have further increased the integrity of CDM. These include improvements in CDM methodologies, the EU's exclusion of certain CDM project types and, in the case of NorCaP, contracting only 'vulnerable' CDM projects. Those projects can be seen as especially additional, as continuation of the activity is fully dependent on carbon revenues. It should also be noted that sustainable development was solely assessed by developing countries when host country approval was sought for CDM activities.

Under the Kyoto system, governments could only use instruments such as the CDM. Under the new Paris Agreement-based system, there is more flexibility in how governments can acquire credits for their targets. The Swedish government is considering the use of the Gold Standard, at least in part, for its acquisition of international units under Article 6.

Carbon finance projects contribute to broader green growth

Projects supported by Nefco carbon funds have offered a wide range of significant benefits for the environment, green growth and climate change mitigation. For energy sector projects in particular, these have included:

- cost savings through improved efficiency and reduced fuel consumption and energy losses
- additional financial impetus for the transition to a lower carbon economy, reducing reliance on increasingly expensive fossil fuels
- reduced levels of local air pollution through the elimination of coal and heavy fuel oil, with benefits for human health
- reduced groundwater pollution through the reduced release of nutrients (primarily for animal waste treatment systems)
- improved operational reliability and comfort levels for communities (for example district heating rehabilitations), which is especially important in colder environments
- employment-related benefits through job creation and retention as well as training and the development of new skills
- capital investment, technology transfer and introduction of best practices through international cooperation

Two typically overlooked CDM benefits include adaptation and long technical lifetimes. Many CDM projects have ancillary adaptation and biodiversity impacts, a key example being cookstove projects reducing deforestation. Technical lifetimes of CDM projects typically exceed carbon crediting periods, leading to net mitigation impacts beyond off-setting.

More broadly, Nefco carbon finance projects have contributed to the following SDGs:



Carbon financing is an important form of results-based finance

Carbon finance is an important example of results-based finance (RBF), an instrument that links the extension of finance to the verified delivery of predetermined results, in this case emission reductions. RBF has been used extensively in other aid sectors such as sanitation and health services. However, by shifting the risk to the implementer, RBF requires them to access upfront finance to get the project off the ground. Nefco has long recognised the utility of RBF as a key ‘financing-for-development’ instrument, organising an international workshop linking new market mechanisms and results-based finance in Stockholm as early as October 2013. Whilst RBF is by no means a panacea for nascent markets where access to financing is limited, it can have significant impact by blending finance and de-risking investments.

Since 2019, building on its experience of administering carbon funds, Nefco has developed and managed RBF instruments in the energy access sector, including the Beyond the Grid Fund for Africa and the Modern Cooking Facility for Africa (MCFA), in cooperation with Denmark, Germany and Sweden. Nefco is also seeking opportunities to integrate carbon finance with programmes in which it can add an additional revenue stream, for example by providing upfront funding to advance transaction costs for voluntary market initiatives under the MCFA where there is an opportunity to significantly enhance project economics.

Towards the next generation of carbon markets under the Paris Agreement

The first generation of carbon funds provided valuable 'learning-by-doing' experience, as alluded to by the Testing Ground Facility fund title. Once the Kyoto Mechanisms were formalised, these instruments graduated to compliance vehicles that could meet the obligations of governments and companies under the Kyoto Protocol and ETS respectively. The second generation of funds, including the NeCF, were scaled up compliance facilities with an innovative character, addressing long-term emission reduction purchases beyond the first commitment period of the Kyoto Protocol (which few carbon funds did at the time). NorCaP, despite operating in a low-volume low-price phase of the market, used an innovative 'vulnerability' methodology to screen projects and pay above-market prices to sustain projects at risk of discontinuation.

A third generation of carbon markets will operate under the auspices of the Paris Agreement, which provides a new framework for countries to collaborate on mitigation actions and use Internationally Transferred Mitigation Outcomes (ITMOs) to meet the Nationally Determined Contributions (NDCs)¹³ of participating countries. The rules and work programme to operationalise cooperation under Article 6 (hereafter referred to as the Article 6 rules) were adopted at the Glasgow Climate Change Conference in November 2021 (COP26). These rules will be further developed during 2022-2023:

¹³ NDCs are at the heart of the Paris Agreement and the achievement of the long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change.

Conclusions

- The first generation of carbon funds, operating in the pre-Kyoto era provided a valuable “learning by doing” experience. The second generation were scaled up compliance instruments for sovereign and private sector participants.
- A third generation of carbon markets will operate under the auspices of the Paris Agreement, providing a new framework for countries to collaborate on mitigation actions in order to meet their Nationally Determined Contributions.
- A joint initiative between Nefco and the Nordic countries, the Nordic Initiative for Cooperative Approaches (NICA), seeks to operationalise international market-based collaboration under Article 6 to support and encourage more ambitious climate action.
- Going forward, Nefco seeks to foster partnerships between Nordic private and municipal actors and their global peers that can deliver real and lasting mitigation outcomes, promote greater ambition, harness private sector finance and innovation and deliver sustainable development, including adaptation co-benefits
- Following in the pioneering tradition of the Nefco carbon funds, NICA activities aim to contribute to the development of robust and practical international rules for mitigation outcomes to ensure that market-based cooperation contributes to the goals of the Paris Agreement

- Articles 6.2-6.3 address cooperative approaches involving the use of ITMOs, requiring participating parties to ensure environmental integrity, apply robust accounting and promote sustainable development. ITMOs represent mitigation outcomes achieved from 2021 onwards.
- Articles 6.4-6.7 establish an international (baseline-and-credit) mechanism (Article 6.4 Mechanism) supervised by an international body under the Paris Agreement for issuing carbon credits (Article 6.4 Emission Reductions) against eligible mitigation outcomes achieved from 2021 onwards.

While CDM has proven to be a cost-effective mechanism, a World Bank-commissioned study in 2019 concluded that the potential benefits to cooperation in achieving the NDCs under Article 6 are also great and all parties could benefit. Potential cost reductions from independent implementation of countries’ NDCs could total about \$250 billion per year by 2030. Cost reductions from cooperative implementation are achieved through improved economic efficiency. If countries are inspired to invest these cost savings in enhanced ambition, then Article 6 could facilitate additional abatement under the Paris Agreement by 50 per cent or approximately 5 GtCO₂/year in 2030. The effective rules, however, are critical to obtain these benefits.

A joint initiative between Nefco and the Nordic countries, the Nordic Initiative for Cooperative Approaches (NICA), seeks to operationalise international market-based collaboration under Article 6 to support and encourage more ambitious climate action. NICA strives to demonstrate

Proposed Nordic priorities under NICA

- Ensuring environmental integrity of mitigation outcomes
- Promoting ambition
- Applying robust accounting, including ensuring the avoidance of double counting
- Promoting sustainable development, especially gender equality
- Enabling transformational change
- Fostering a just and inclusive transition towards the 1.5-degree pathway
- Facilitating private sector participation
- Embracing prompt action and learning by doing
- Fostering partnerships and synergies

how international partnerships can scale up and accelerate ambitious climate action (such as broader sectoral approaches), promote sustainable development and harness private sector finance and innovation. NICA aims to build capacity among Nordic actors and their global peers for collaboration that is compatible with the Paris Agreement framework. This was made especially relevant when the rules for Article 6, and concluded in the Rulebook, were adopted at COP26 in late 2021.

Going forward, Nefco seeks to foster partnerships between Nordic private and municipal actors and their global peers that can deliver real and lasting mitigation outcomes, promote greater ambition, harness private sector finance and innovation and deliver sustainable development, including adaptation co-benefits. Following in the pioneering tradition of the Nefco carbon funds, NICA activities aim to contribute to the development of robust and practical international rules for ITMOs to ensure that market-based cooperation contributes to the goals of the Paris Agreement. The use of Article 6 as a key part of the Paris architecture may also be seen as an important signal from the developing countries' point of view in fair global climate policy.

For example, NICA is currently exploring potential opportunities in East Africa for piloting rural electrification with productive-use-of-energy and sustainable transport solutions (e-mobility).

Appendix:

List of abbreviations

AAU	Assigned Amount Unit, a unit of measurement used in international emissions trading under the Kyoto Protocol, denominated in tCO ₂ eq	MCFA	Modern Cooking Facility for Africa, a fund managed by Nefco
Annex 1 Parties	Developed countries as per the UNFCCC definition	MRV	Monitoring, reporting and verification
BASREC	Baltic Sea Region Testing Ground Facility	N ₂ O	Nitrous oxide, a potent greenhouse gas
BGFA	Beyond the Grid Fund for Africa, a facility managed by Nefco	NDC	Nationally determined contributions under the Paris Agreement
CER	Certified Emission Reduction, a unit of measurement under the Clean Development Mechanism, denominated in tCO ₂ eq	Nefco	The Nordic Environment Finance Corporation
CfP	Call for Proposals	NICA	The Nordic Initiative on Cooperative Approaches
CDM	Clean Development Mechanism	NeCF	The NEFCO Carbon Fund, a fund managed by Nefco
ERU	Emission Reduction Unit, a unit of measurement under the Joint Implementation mechanism, denominated in tCO ₂ eq	NorCaP	The NEFCO Norwegian Carbon Procurement Facility, a fund managed by Nefco
ETS	The EU's Emissions Trading Scheme	PoA	Programme of activities under CDM
GS	Gold Standard, a voluntary carbon certification scheme	PPP	Public Private Partnership
JI	Joint Implementation mechanism	RBF	Results-Based Financing
IFU	Danish Industrialisation Fund for Developing Countries	SDG	UN Sustainable Development Goal
ITMO	Internationally Transferred Mitigation Outcome, a unit for measuring mitigation under Article 6 of the Paris Agreement, (typically) denominated in tCO ₂ eq	SF ₆	Sulphur hexafluoride, an extremely potent greenhouse gas
		tCO ₂ eq	Metric tonne of carbon dioxide equivalent
		TGF	The Baltic Sea Region Testing Ground Facility, a fund managed by Nefco
		UNFCCC	UN Framework Convention on Climate Change

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