



DNV GL and the Climate Technology Centre and Network (CTCN)

A PARTNERSHIP IN TECHNOLOGY TRANSFER

SAFER, SMARTER, GREENER

A PARTNERSHIP IN TECHNOLOGY TRANSFER

About the CTCN

The Climate Technology Centre and Network (CTCN) is the operational arm of the UNFCCC Technology Mechanism, hosted by the UN Environment Programme and the UN Industrial Development Organization (UNIDO). The Centre promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. They provide technology solutions, capacity building and advice on policy, legal and regulatory frameworks tailored to the needs of individual countries by harnessing the expertise of a global network of technology companies and institutions.

www.ctc-n.org

About DNV GL

DNV GL is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Combining technical, digital and operational expertise, risk methodology and in-depth industry knowledge, we empower our customers' decisions and actions with trust and confidence. We continuously invest in research and collaborative innovation to provide customers and society with operational and technological foresight. With origins stretching back to 1864 and operations in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

www.dnvgl.com

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FOREWORD



The strategic partnership between the Climate Technology Centre and Network (CTCN) and DNV GL has been an efficient and action-oriented alliance with the aim to improve access to climate change mitigation and adaptation

technologies in developing countries. Fundamental to its success has been the shared commitment to advance the mission of the CTCN through building a strong and responsive organisation that will be at the forefront of efforts to enhance the development and transfer of technologies to developing countries.

This public-private partnership has been enabled by the financial support of the Norwegian Government to the CTCN in the period 2014–2017 and by in-kind contributions from DNV GL. As an independent foundation, DNV GL is technology neutral and uniquely placed at the interface between technology providers, research and university organizations, and other governmental and non-governmental entities. It has the independence required to develop a high degree of trust between stakeholders and has utilised this within the partnership to encourage openness, communication and the sharing of best practices.

Through the partnership, DNV GL has supported the CTCN operations by utilizing its extensive experience in risk management, mitigation and adaptation technologies, knowledge management and monitoring and evaluation.

In addition, DNV GL has facilitated engagement with the private sector to stimulate technology cooperation and financing. In providing this support, DNV GL has had the opportunity to advance its own mission to safeguard life, property and the environment.

The partnership has been built upon the complementary strengths of the CTCN hosts and DNV GL and the key deliverables and outcomes of the partnership are characterised by:

- Leverage of company-wide expertise
- Modern digital solutions
- Flexible service orientation
- Business analytical skills and perspectives
- Re-usable tools and techniques

We believe these are critical success factors for advancing the mission of the CTCN and that they have contributed significantly to the facilitation of climate technology transfer to developing countries.

This report provides an overview of and reflections by the core DNV GL team on the work undertaken as part of the strategic partnership. We believe that our cooperation has substantially and positively impacted CTCN's strategy and operations and look forward to continuing our relationship in the years to come.

Bjørn Kj. Haugland
Chief Sustainability Officer,
DNV GL AS

Jukka Uosukainen
Director, Climate Technology
Centre and Network



Photo: DNV GL

The partnership announcement being made during a meeting between Executive Director Achim Steiner, United Nations Environment Programme, and the Norwegian Minister of Foreign Affairs, Børge Brende together with the CTCN Director, Jukka Uosukainen, and DNV GL Chief Sustainability Officer, Bjørn K. Haugland (August, 2014).



We are pleased to support the CTCN through our technical capabilities and global networks. We support its vision to lead the world towards a low-carbon and climate resilient future. Indeed, we have decided to invest our time and resources in this initiative as it is closely linked to our own vision of creating a safe and sustainable future through safer, greener and smarter growth. We will focus our efforts on the CTCN's call for a confluence of technology, knowledge management, and stakeholder involvement skills. We believe a close collaboration with the private sector will be essential for the success of the technology mechanism.

Henrik Madsen, former DNV GL Group President and CEO



Replacing current technologies with cleaner, low-carbon alternatives is a vital part of tackling the causes and effects of climate change. The strategic partnership between CTCN and DNV GL will play a vital role in accelerating the use of new technologies in improving the lives and livelihoods of millions of people in developing countries who are dealing with the impacts of climate change on a daily basis.

Achim Steiner, former United Nations Environment Programme Executive Director





An overview of and reflections by the core DNV GL team on the work undertaken as part of the strategic partnership.

INTRODUCTION



ombining the expertise of the CTCN and the DNV GL Group of companies has provided an effective and strong delivery of knowledge and advice to governments in developing countries whilst enabling effective

participation of stakeholders in both providing technical advice as well as investment into new climate technologies.

The partnership activities have focussed on the design and delivery of:

- An inclusive **Private Sector Engagement programme**
- An effective and comprehensive **Knowledge Management System**
- An internal quality management programme (**Monitoring & Evaluation**) focussed on efficiencies and impacts measurements

DNV GL structured the collaboration by having a task manager for each of the above work streams and one overall project manager. Oversight was provided by a cooperation group consisting of the CTCN Director, CTCN partnership manager and DNV GL senior managers, with the overall project manager as its secretary. This ensured that all activities undertaken as part of the cooperation were focussed to the needs of the CTCN as they arose over the course of time.

This report provides an overview of and reflections by the core DNV GL team on the work undertaken as part of the strategic partnership. It provides some lessons learned by the team and some recommendations or ideas for future consideration by the CTCN going forward. The views and opinions expressed are those of the core project team and do not necessarily reflect the official policy or position of DNV GL, CTCN, hosting organisations or any other consortium member or collaborating entity.



ENGAGE THE PRIVATE SECTOR:

THE CASE FOR ACTION

Active participation of the private sector during and following the interventions of the CTCN is essential for real-life climate technology delivery on the ground. The private sector has the required skills, technology and financial capacity to help achieve transformative change in developing countries.



... identification and development of the most mature, bankable and fundable projects.



The ability to link a process that is traditionally government-led and government-focussed to commercial sector ways of working is key for the CTCN to achieve impact.

A main driver for establishing the partnership was indeed access and transfer of DNV GL's global, private sector experience in key CTCN sectors and business analytical skills and perspectives.

Over the course of the partnership, DNV GL has focussed its efforts on

- building government stakeholder capabilities in working with the private sector
- convening government and private sector actors regionally and making them aware of potentially interesting CTCN projects
- building tools that help communicate the business potential within the CTCN technical assistance requests

INVOLVING BUSINESS STAKEHOLDERS IN CTCN TECHNOLOGY TRANSFER

Since the launch of the CTCN in 2013, over 80 countries have applied for support through the CTCN technical assistance programme. Using the experience of over 180 requests being processed by the CTCN, the role of the private sector and the need to further engage the private sector in the overall technology transfer process has become increasingly clear. The private sector can indeed contribute to the capability, technology, infrastructure and finance required to help achieve the impacts sought by those who commission and implement CTCN technical assistance.

DNV GL has contributed to creating more visibility of the CTCN to the private sector by organising and facilitating a number of CTCN Stakeholder Forums, particularly across Central America, Africa and South-East Asia.

These Stakeholder Forums have been designed to bring together a wide range of leading voices on climate technology; including representatives from Government, the private sector, UN Agencies and NGOs. The CTCN secretariat, its regional network members and DNV GL local offices have collaborated on outreach to a comprehensive mix of stakeholders pre- and post the events.

Pre-meeting, DNV GL undertook analyses of promising climate technologies for a region, based on NDCs, global and regional business developments and the CTCN portfolio of technical assistance.

During these events, participants were encouraged to find solutions to some of the most critical challenges around the transfer of such high-potential climate technologies. These suggested solutions were captured and shared in high-level meeting reports.

Furthermore, attention was paid to the identification and development of the most mature, bankable and fundable projects and how to better develop business opportunities encapsulated, occasionally hidden, in many CTCN technical assistances. For the CTCN to successfully engage the private sector there needs to be clarity for the private sector on the potential opportunities that can be realized. However, it became clear that the dual objectives of maximising financial returns and maximizing societal impact can often be challenging objectives to achieve together.



Photo: CTCN

CTCN Stakeholder Forum, Singapore



Photo: CTCN

CTCN Stakeholder Forum, Bangkok



Photo: CTCN

CTCN Stakeholder Forum, Nairobi

TRANSFORMING TECHNICAL ASSISTANCE

The CTCN technical assistance portfolio represents requests for support on climate technology from developing countries. Successful and efficient implementation of and follow-up to these requests often requires the technology, competence and resources available to the private sector. Therefore, it is vital to identify and communicate the business opportunities inherent in these technical assistances at an early stage. The business model canvas methodology, commonly used by the private sector to design business models, has been instrumental to remodel CTCN projects such that they are easier to grasp by the private sector.

A business model describes how a business creates, delivers and captures value and the business model canvas is a tool for developing such business models. It is a visual chart describing a firm's or product's value proposition, infrastructure, customers, and revenue and cost model. A business model canvas, as it gets populated with growing detail, assists businesses in sharpening how they can create a repeatable, scalable and money-earning mechanism underpinning their product and service offerings. The value of the business model canvas approach lies in its capability to focus discussion, creativity and analysis.

DNV GL has supported the CTCN by reviewing its technical assistance portfolio through the lens of the business model canvas. This has identified those projects that are particularly attractive for private sector partners as they hold potential to create and capture value.

To DNV GL, successful engagement of the private sector by the CTCN requires businesses to clearly see the potential of positive financial returns by clearly outlining investable vehicles or commercial development opportunities: the business model canvas provides an excellent extension of the technical assistance process of the CTCN.

Using this approach right from the inception of requests, the technical assistance can be discussed with the private sector in terms of, for instance, market growth, new customers, new markets or other options for growth that businesses and investors look for.

DNV GL's work in this area was met with interest from Governments and the private sector alike and has confirmed the need for clear communication of the possibilities for commercial development.

To support capacity building, DNV GL facilitated business model canvases workshops in which hands-on training was provided on how to develop business model canvasses from selected CTCN technical assistances. The business model canvas seems well suited for such collaborative efforts, confirmed by participant feedback, in addition to requests for follow-up and further training.



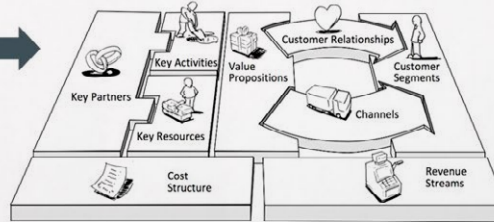
... our multi-stakeholder discussions yielded thoughtful inputs into the challenges faced by all sides and began the process of developing strategies to address them together.

**Matthew Kennedy, CTCN Chair,
CTCN Stakeholder forum, Nairobi, April 2016**

Country:	Thailand	Title:	Energy efficient street lighting technologies and financing models in Thailand
Request identification number:	2015000088		

Summary of the CTN Technical Assistance

This technical assistance will support establishing Thailand's linkages between past and on-going energy efficient street lighting projects and initiatives to provide feasible financial models and recommend changes in regulations to overcome barriers to implement energy efficient technologies for in street lighting. This technical assistance will catalyze the development and investment of practical and affordable energy efficient street lighting technologies in Thai municipalities to enhance the efforts towards energy efficiency done by Provincial Electricity Authority (PEA). CTN technical assistance will carry out a techno-economic study of the implemented energy efficient street lighting projects and also evaluate commercially available new technologies, yet to be implemented, in Thailand. Outputs of the CTN assistance detailed within the project description below include comparative techno-economic assessment of relevant technologies and design options of energy efficient street lighting and development of a financial model to support the implementation. The CTN assistance will take place over 8 months' time period, starting from the final contracting of the implementer. It will involve Thai municipalities, public and private sector partners, and international technical expertise.



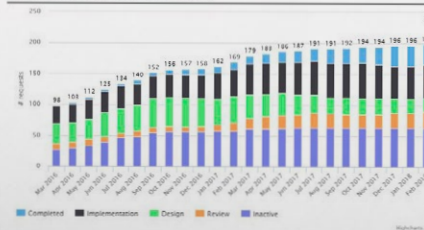
Linking CTCN technical assistance to business frameworks.

Technical Assistance requests
Request visualizations
Submit a request

Request visualizations

The CTN Dashboard provides a live, visual overview of the CTN's technical assistance portfolio. It offers live, high-level graphical information on the technical assistance CTN offers.

Requests by stage (past 24 months)

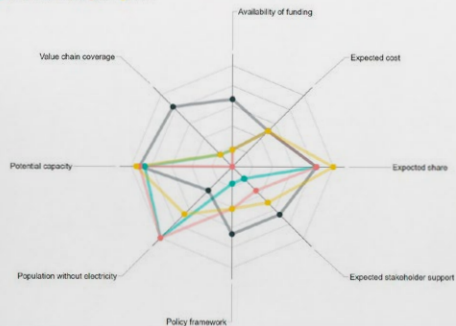


Finding indicators for climate technology opportunities

I Summary solar opportunities Southern Africa

Solar opportunity indexes

● Mozambique ● South Africa ● Zambia ● Zimbabwe



Source: IEA Energy outlook

Potential capacity
Potential capacity for solar based on normal irradiance average of country. Based on REEP calculations/solar atlas.

Expected cost
Expected developments of the average price of electricity generated with solar PV in coming 10-15 years (IEA/IRENA).

Expected share
Expected share of this source in 2050 in the most cost effective scenario. These calculations are based on scenario using IEA/IRENA data. Based on estimates of the Solutions project of Stanford university.

Value chain coverage
Based on the presence of at least one company per value chain part in a country. For the score, the number of elements present in a specific country were counted. Based on assessment Climate scope.

Expected stakeholder persistence
Likelihood and persistence of different stakeholder groups to pursue an opportunity. On stakeholders in value chain plus government, investors, R&D and customer groups. Based on expert opinion.

Policy frameworks
Availability of targets plans and policies to facilitate solar and renewable developments. Based on RISE.

Availability of funding
Value of public and private investment in specific technology and/or clean technology (most recent yearly investments plus timeline). Based on ClimateScope research.

Population with no access to electricity
Percentage of people with no access to electricity. Based on estimates of IEA, Atlas of Africa.

An interactive dashboard for opportunities

IDENTIFYING OPPORTUNITIES

DNV GL has developed a series* of on-line, interactive climate technology opportunity analytics dashboards that provide information to government and business stakeholders on the take-up of climate technologies in different countries.

These climate technology opportunity dashboards aim to support the country/region or sector specific understanding of potential opportunities or barriers for deployment of a specific climate technology.

Opportunities for investment are expressed through a limited set of technology-related and sector-related indicators, such as current and potential technology capacity, relative price, expected market share, quality of the value chain, the likelihood that stakeholders pursue opportunities, the strength of policy frameworks and availability of support funding.

The dashboards are interactive, so that users can drill down in the information and make selections at their choice. DNV GL has developed a methodology for how to create new dashboards for further sectors and regions and has provided the technical tools that allows the CTCN to work with its partners to deliver a broader coverage.

Conversations with user groups around the world suggest that the support offered through this type of dashboards is much appreciated and represents an excellent forward direction for the CTCN to attract interest of the private sector in climate technology opportunities in developing countries.

DRIVING INNOVATION THROUGH OPEN CHALLENGES

As part of the partnership, DNV GL and the CTCN have been looking for ways to innovate processes to attract the private sector to the business of the CTCN. One promising endeavour is the initiation of an open challenge innovation competition** together with WIPO Green and Inventrust. This specific competition looks for ground-breaking innovations in the area of technologies for leak detection and desalination. DNV GL has been instrumental in shaping the competition design, marketing the effort and setting up the collaboration between the competition organisers and the CTCN. The open challenge process is an exciting one and lessons from the first edition will prove valuable for the CTCN to understand if this approach represents an additional, alternative way of linking developing country climate-related issues to innovative solutions, thus directly speaking to the CTCN's mission.

UNLOCKING EXPERTISE

DNV GL has provided ample access to the knowledge of its competence hubs around the globe. Staff has helped to draft and review response plans, deliver expert advice by means of an Ask-An-Expert service to CTCN managers and implement three technical assistances, notably the development of a Grid Code for the Seychelles, a market assessment around energy efficient appliances in Southern Africa, and knowledge management training for Costa Rica.

All-in-all, DNV GL staff from our Arnhem, Bangkok, Cape Town, Dubai, Durban, Houston, London, Nashville, Oslo and Singapore have been involved in sharing their expertise in areas such as energy efficiency, renewable integration in island state grids, wind power, energy transition studies and carbon capture and storage potential.

* <https://www.ctc-n.org/capacity-building/climate-technology-opportunity-analytics>

** <https://www.ctc-n.org/news/safe-water-all-join-competition>

LESSONS LEARNED

THE DNV GL TEAM LEARNED THAT:

- The private sector needs to see where it can step into the CTCN process, by either understanding what investable vehicles are offered to them as a result of what CTCN is doing, what opportunities there are to enter new markets or simply how to win business through the CTCN directly
- It is essential to use language that is easily understood by the private sector. Often, the business opportunities are hidden in the information provided and sometimes it is hard to clearly see the commercial potential
- Engaging the private sector is a long-term commitment. It requires investment in development of relationships, acceptance of disappointment but seeing it as a funnel process, much like professional business developers do, ultimately to facilitate a series of successful business transactions

THE ROAD AHEAD

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ngagement of the private sector will remain essential for the CTCN in its mission to achieve transformative change in developing countries. It is therefore encouraging to see that the CTCN maintains a budget line for this

work in the period to come.

DNV GL believes that involvement of the private sector should be considered for each CTCN technical assistance and we recommend that an assessment of business potential is undertaken in an early stage of the technical assistance development process.

In this respect, the no-nonsense and simple *business model canvas* approach can aid thinking and enable business conversations around the creation, development and delivery of technical assistance to developing countries.

By building business cases out of technical assistances and matchmaking these with the private sector finance as well as solution providers, pathways to follow-on investment can be opened and effective twinning arrangements can be established.

- Given the global reach of the CTCN, it is near impossible to successfully engage the private sector without having regional business developers who can do the outreach and relationship development work, based on intimate knowledge of the local context
- There is potential in mobilising developed country private sector actors through the NDE structure of the CTCN. Here, creating visibility of technology solutions can contribute to easier identification of suitable approaches by developing countries
- For the private sector to engage, the prospect of positive return on investment on their efforts needs to clear. This, in most cases, means that it wants to see projects being developed at a substantial scale, otherwise the cost of business development outweighs its future returns

DNV GL believes that further development of decision making tools such as the climate technology opportunity analytics dashboards is a promising avenue for attracting more attention from the private sector. It will be crucial to keep the information driving the dashboards current and we would therefore recommend that the CTCN works with its Network (including the NDE community) to create an eco-system to expand and maintain the dashboards.





Some further ideas that CTCN could consider are:

- **Run a knowledge booster programme**, which is a way of building capacity by seconding staff to other locations (including private sector positions) temporarily with a view to a focused transfer and build-up of new knowledge and skills. Stories will be captured and shared for each knowledge booster. These activities will be governed by a common and agreed knowledge sharing agenda.
- Set up of a '**Climate Change Combating Club (C4)**'. This is a community of private sector leaders engaging in learning, sharing and collaborative efforts to address the multitude of climate change challenges in our world. The members will both advocate the work of the CTCN in their respective business communities and seek to influence decision making and project realisation and benefit from new knowledge on projects, technologies and opportunities. The community will help to expand the dialogue and productive relationships within the private sector and find new ways to connect with members of the business community, by offering them opportunities to showcase expertise, technologies and solutions in the knowledge management system.
- The creation and realisation of a **CTCN supply chain charter and badge**. Commitment to the charter will entitle signatories to use the badge to brand their work and demonstrate that they are aligned to the values of CTCN.
- The establishment of an **Investment and IPR helpdesk**. Providing services to the private sector including on-line intelligent routing to finance with a directory of R&D grants, philanthropic trusts and advice on intellectual property issues to include consortia agreements and tangible and intangible benefits calculation.
- Consider a **Find-a-Partner service**. An on-line service that helps the private sector (possibly locally/ nationally) to match themselves with a request (or group of requests).



- An **Adopt-a-climate-change project scheme**, where private sector companies can provide support to a project by sharing experience, technologies or competencies and in return gain new experiences, staff development opportunities and further build track record with products and services to willing recipients.
- Recruit a **CTCN Patron** to act as an ambassador to the private sector and to act as its figurehead providing encouragement, support and privileged access to policy makers and international funds and philanthropists.
- Manage an annual **TEDx-type conference** focused on Climate Change Technologies. TEDx was created in the spirit of TED's mission: "ideas worth spreading." The TEDx program is designed to give communities, organisations and individuals the opportunity to stimulate dialogue through TED-like experiences at the local level. TEDx events are fully planned and coordinated independently, on a community-by-community basis.
- Manage a **climate change innovation award** for small and medium enterprises offered annually for impact and/or innovation in the field of climate change technology.
- Capture **good practice stories** and share them through the capacity building work stream and the knowledge management system.
- Engage with the developed country NDE infrastructure to organise **climate technology knowledge transfer missions** to the developing world, involving domestic private sector solution providers from both sides, in order to facilitate partnerships focussed on delivery of solutions.



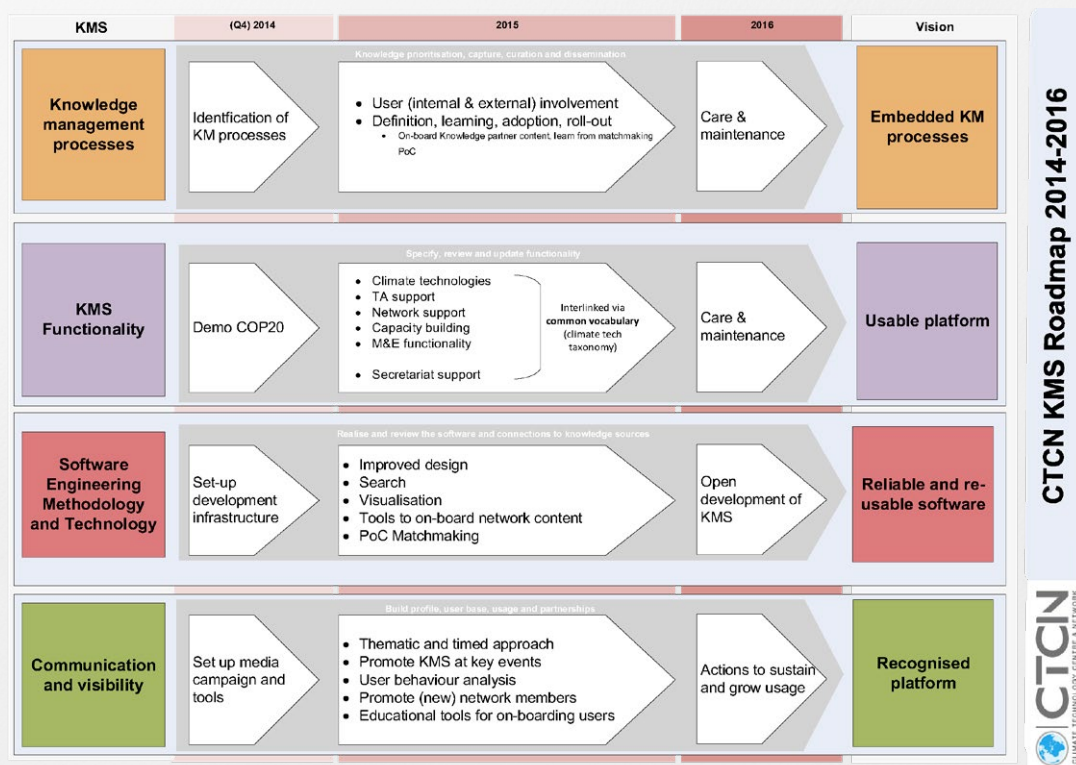
MANAGE KNOWLEDGE: **HAVE THE RIGHT TOOLS**

CORE TO CTCN MISSION

Mobilising the right knowledge and expertise to fulfil developing countries climate technology needs are at the heart of CTCN's mission. The CTCN knowledge management system greatly facilitates matchmaking and dissemination of good practice in climate technology transfer. Through DNV GL's support and flexible service orientation, the CTCN now has at its disposal

- Modern digital solutions
- Re-usable tools and techniques

Through its commitment to the development of CTCN's knowledge management system, DNV GL has provided an essential part of CTCN's interface with the outside world, as well as the tools to manage its own processes. Early in the partnership, DNV GL created a multi-year roadmap for the CTCN knowledge management system. This provided the direction for creating an open, resource-rich and high-connectivity platform, ready for future scale-up scenarios.



Knowledge management system roadmap for the CTCN

CTCN KMS Roadmap 2014-2016



PROCESS IN CONTROL

The CTCN knowledge management system features a wealth of publicly available tools and resources, which can be searched and filtered using a common climate technology taxonomy. What is less visible, yet very impactful, is the support that the system offers to the day-to-day operations of the CTCN secretariat. With a globally dispersed team, the secretariat needed a web-based solution to manage its key processes for technical assistance and network membership management. As there was, understandably for an organisation under construction, no blueprint of these processes at the onset of the partnership, the development of the process-support software had to be extremely flexible. Working alongside key staff at the secretariat, the DNV GL team delivered a set of process and document management tools that provide the required controls to sustain a repeatable and scalable operation.

As the majority of the support tools have been developed using open source software, the secretariat is in a position to further mature and extend its management system without being locked-in to a particular supplier. Furthermore, all software code is maintained in a central place and releases of new versions of the CTCN knowledge management system are managed in a professional development-test-accept-production environment.

MATCHMAKING SUPPORT

Over the course of the partnership, opportunities were explored for automated matchmaking between country requests for expertise on the one side and network member profiles and knowledge resources on the other. Using text analysis software that can recognise key terms in a request submitted to the CTCN and match those to related terms that describe relevant expertise of knowledge providers, the secretariat can act as a broker in the field of climate technology transfer.

Key to the successful operation of matchmaking tools is feeding them with a structured and up-to-date terminology, sometimes called a taxonomy of terms. The CTCN and DNV GL have worked together to develop such a taxonomy, drawing on earlier work in this area such as REEEP's ClimateTagger, WIPO Green's technology platform and the work around micro-finance for eco-based adaptation by UN Environment.

The secretariat is now well-trained in managing the taxonomy and can update it continuously so that it reflects the latest terminology in the domain of climate technologies. This will not only benefit the precision of matchmaking, but the overall performance of the public search engine of the CTCN knowledge management system.

KNOWLEDGE ASSETS CONNECTIVITY

One of the goals of the CTCN is to provide access to knowledge to facilitate the uptake of climate technologies in developing countries. Early in the partnership, it became clear that it would be an unsurmountable effort to build up and curate a body of knowledge with the limited resources available. The strategy became to introduce the concept of 'knowledge partnerships' with the CTCN and then to connect to relevant on-line repositories by means of automated import routines. The CTCN knowledge management system became a one-stop shop for accessing climate technology relevant knowledge, whilst recognising the contributions of knowledge partners. All knowledge resources on the CTCN knowledge management system are available to developing countries courtesy of the group of CTCN knowledge partners.

DNV GL has provided strategic guidance to develop and implement the knowledge partnership concept and has created the various software routines to ingress knowledge resources and manage their meta-data into the CTCN platform.

CTCN is now well-positioned to grow its ambition to be the single point of contact for knowledge on climate technology transfer.

TRANSPARENCY

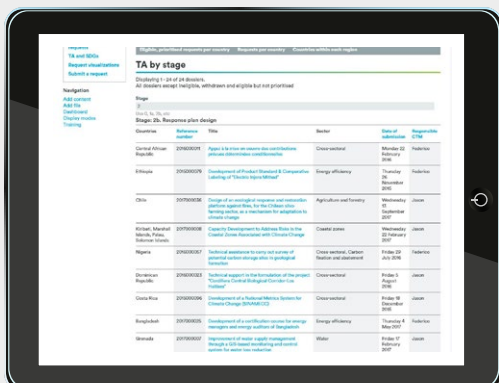
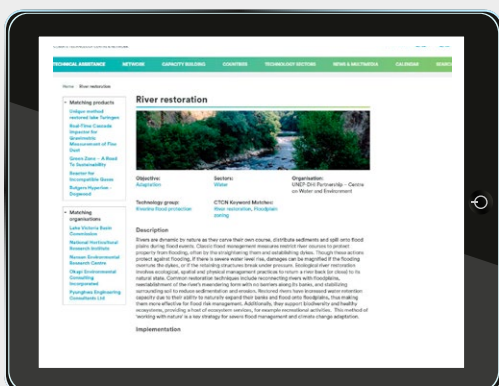
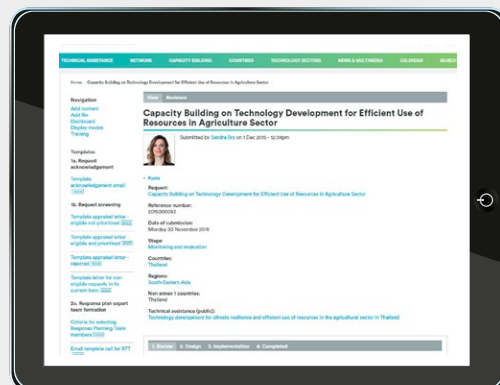
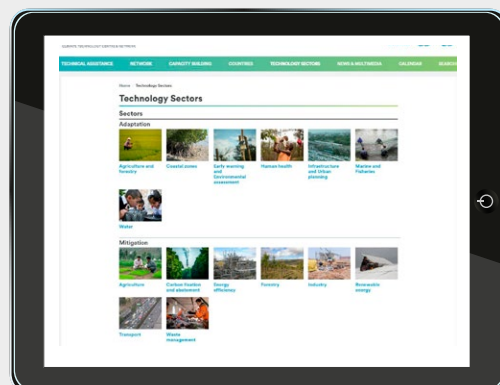
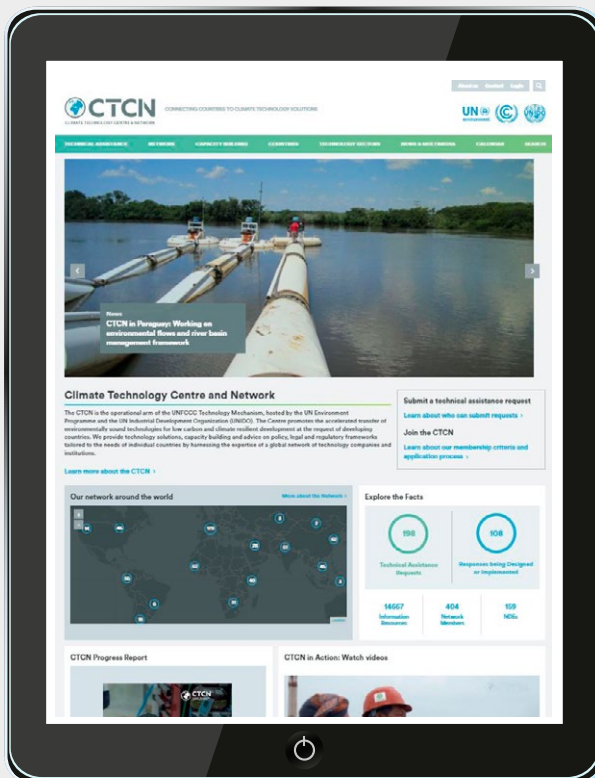
As part of delivering the CTCN knowledge management system, DNV GL has designed a data structure to store key information around the CTCN's operations. Considering the demands for information from different stakeholders, the DNV GL Development team has generated a variety of public, on-line dashboards* that provide transparency around key areas such as CTCN funding, CTCN impact, CTCN technical assistance and CTCN network membership. These are all essential to inform donors, the CTCN advisory board and analysts tracking developments in climate technology transfer.

VISIBILITY

Substantive efforts have gone into architecting, developing and maintaining the CTCN knowledge management platform and it is rewarding to see that thousands of visitors from a great number of nations visit the platform every month. In combination with the e-mail and social media campaigns that DNV GL has helped initiate, the visibility of the CTCN has greatly increased. Where at the start of the partnership the main search engines would return air-conditioning related websites when searching for 'climate technology', today the CTCN knowledge management system is amongst the first few search results.

In addition, DNV GL has made essential CTCN generated data available in machine-readable format as Open Data. This means that other platforms can freely import data and integrate it with their own. This makes technical assistance projects more visible to, for example, the investment community. More information can be found at: <https://www.ctc-n.org/about-ctcn/open-data>.

* <https://www.ctc-n.org/technical-assistance/request-visualizations>, <https://www.ctc-n.org/network/network-visualizations>, <https://www.ctc-n.org/about-ctcn/donors>



CTCN dashboards produced by DNV GL

LESSONS LEARNED

THE DNV GL TEAM LEARNED THAT:

- Have a dedicated contact on both sides of the partnership greatly facilitates alignment of priorities
- Being flexible is a key requirement if one is to serve an organisation that is continuously under development
- Software code repository management and documentation is essential to keep track of the multitude of change requests and their implementation
- Have a shared perspective on the delivery roadmap for a knowledge management system is essential in managing expectations as to what can realistically be delivered by when

THE ROAD AHEAD

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knowledge management system is never finished. It requires continuous content curation, refinements and upgrades.

DNV GL believes that the following areas of future work will help the CTCN fulfil its goal of being a single point of contact for knowledge on climate technology transfer:

- Increased two-way connectivity with platforms of knowledge partners
- Refinement of the CTCN taxonomy to aid matchmaking and search precision
- Inclusion of lessons learned and good practice information that can help accelerate climate technology transfer
- Development of actionable tools over and above a collection of high-quality documents

- Regular, on-site presence prevents misunderstanding of requirements and priorities
- Investment in making data open and thus machine readable greatly enhances outward and inward connectivity and lowers efforts to engage with CTCN knowledge partners
- Knowledge management systems work best if there is a common taxonomy of terms that is agreed by all. Such taxonomy should be factually correct, but designed ultimately with the user in mind. There is no point in building a platform with search filters, keywords and on-screen information groupings that are not recognised by the user population

DNV GL recommends that the CTCN continues working with dedicated resources in this direction and particularly encourages the CTCN to further mature and develop its on-line climate technology opportunity analysis tools* with broader coverage of both sectors and world regions.

* <https://www.ctc-n.org/capacity-building/climate-technology-opportunity-analytics>





...structured sets of process and performance-based indicators across activities, outputs and outcomes.

UNDERSTAND PROCESS AND IMPACT: **MEASURE TO LEARN**

CTCN MONITORING & EVALUATION REQUIREMENT

The need for the CTCN to have a Monitoring and Evaluation (M&E) framework is ingrained in the monitoring, evaluation and reporting requirements established by the UNFCCC COP/Parties. These set out a need to develop and establish a process and impact-focused M&E framework that not only monitors, assesses, and evaluates the CTCN responses to requests for technical assistance but also its other service areas which include capacity building, stakeholder collaboration and knowledge-based activities, and the overall operational performance of the CTCN itself.

USE THIRD PARTY EXPERTISE

DNV GL has supported the CTCN with expertise in developing management and monitoring systems as well as experience in reviewing their application in day-to-day operations across a great variety of organisations with complex multi-country operations.

The DNV GL team has made use of a broad range of business-based analytical skills and perspectives to provide an easy-to-use but comprehensive M&E framework for not only the CTCN's worldwide technical assistance operations but also its other services based on climate knowledge and collaboration. DNV GL has also assisted the CTCN in undertaking a detailed system review of the M&E framework and in recommending measures to further develop the framework and its underlying processes.

MONITORING & EVALUATION FRAMEWORK

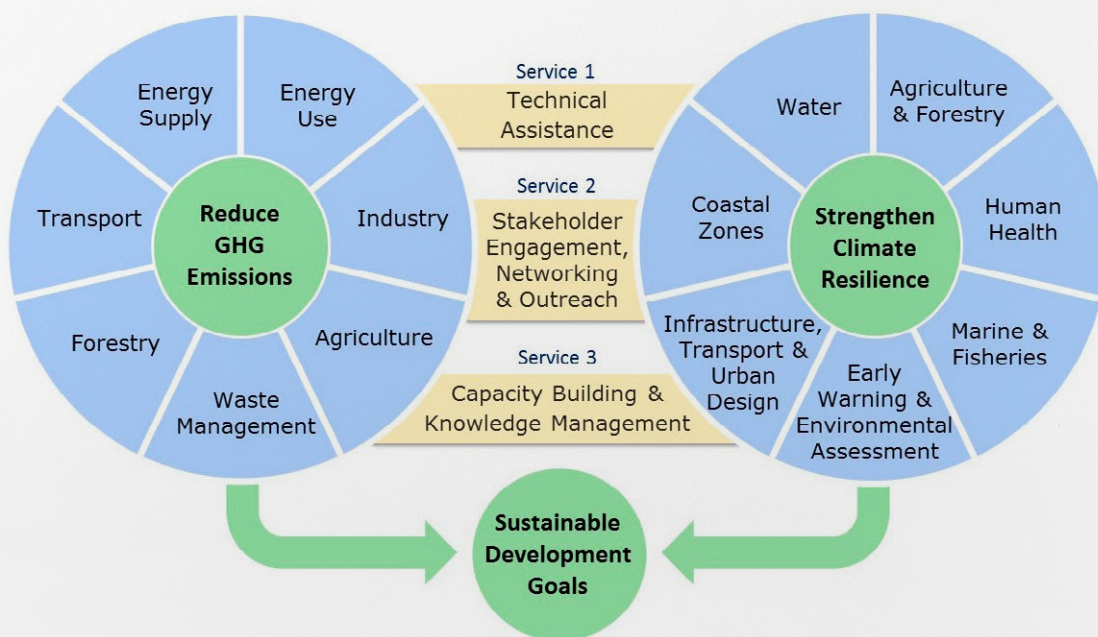
DNV GL worked extensively with key staff from the CTCN Secretariat, UN Environment and UNIDO to develop an M&E framework which was endorsed by the UNFCCC-mandated Advisory Board to the CTCN and subsequently used as the architecture for all CTCN M&E activities. The framework is designed around a 'theory of change' logic structure to link interventions by the CTCN to outputs, outcomes and eventual societal impacts that can demonstrate transformative change towards a low-carbon and more climate resilient society.

The information collected by the M&E framework has been structured so that it can:

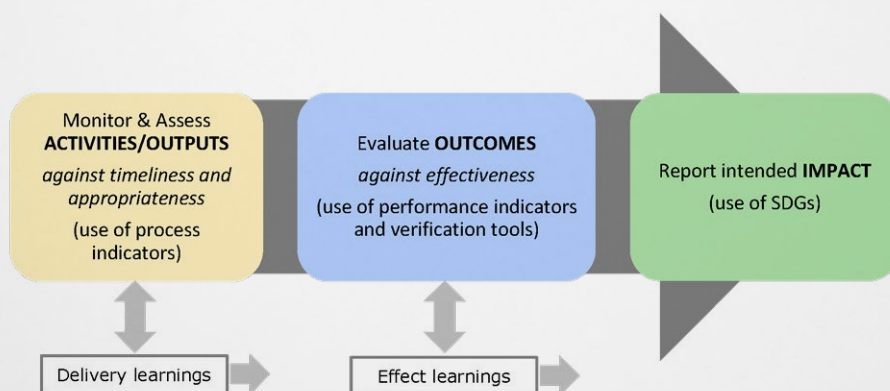
- Provide clear, efficient, and timely reporting to the UNFCCC COP/Parties, CTCN Advisory Board, UN Environment, UNIDO, CTCN Donors, and other interested entities such as civil society organizations.
- Facilitate monitoring of the CTCN's operational performance, contribute to its evaluation processes and demonstrate the CTCN's effectiveness in delivering on its objectives and mandate.
- Gradually strengthen knowledge on climate technologies and establish a learning process that will feed back into the CTCN.

DNV GL designed the M&E framework so that it would allow the CTCN to make use of structured sets of process and performance-based indicators across the activities, outputs and outcomes of its services. The indicators enable the CTCN to track, report and learn from those activities that result in the most timely, appropriate and impactful responses.





CTCN Monitoring and Evaluation Framework by DNV GL



Linking inputs to outputs to achieve outcomes

LESSONS LEARNED

THE DNV GL TEAM LEARNED THAT:

- Having a dedicated M&E-focussed role within an organisation from an early stage can really help facilitate cross-functional processes and more integrated management.
- It is crucial to have a common understanding and ambition with respect to what one can influence directly and what one can only contribute to in an indirect way with the intervention means and tools that are available.
- The underlying requirement for transparency should be balanced by the cost of measurement. Having a stable and well-thought through set of measures over a series of ad-hoc queries reduces operational workload and frees up resources to deliver change on the ground.



THE ROAD AHEAD



he CTCN is a small organisation with a broad and complex mandate. Standing back and seeing the bigger picture of what the effects are of the interventions one is undertaking is a useful learning experience that sharpens

an organisation in achieving its mission.

DNV GL supported the CTCN with this by reviewing the operation of the M&E framework. This allowed a validation of the status and proper functioning of the framework's processes and procedures as well as the provision of recommendations to improve the effectiveness and efficiency of the operation of the framework and the visibility of the CTCN's impacts.

The M&E framework review supported the CTCN in identifying and taking learnings from its activities and achievements to further optimise its operations.

The findings of the M&E framework review suggested that:

- The M&E framework is now effective and well established for its technical assistance-based activities. However, further implementation of the M&E framework for the CTCN's other service areas

that focus on capacity building, stakeholder collaboration and knowledge-based activities is needed to ensure that these are effectively measured and reported on.

- The CTCN would benefit from more specific tools which can be tailored to capture the macro-level impacts from its interventions, such as enabling or condition-setting technical assistance projects and capacity building.
- The presentation of the outputs of the M&E framework could be improved, e.g. by better alignment of reporting lines and through the creation of a dedicated dashboard for results within the CTCN knowledge management system.
- Provide appropriate indicators through specific on-line dashboards. Dashboards could be developed for topics such as capacity building, knowledge sharing and gender. To achieve this, the CTCN could utilise its internal data repositories in a more coherent fashion.

DNV GL recommends that the CTCN considers the findings of the M&E framework review and the implementation of its recommendations. This would rely on a significant degree of collaboration across CTCN services.



WORKING TOGETHER



he partnership between CTCN and DNV GL represents a unique experience of two bodies working together across the public-private divide; an international organisation part of the UN-landscape working together with a

global, business-focussed company. Initially, coming from a different work cultures, it took some time for DNV GL to appreciate the protocols and procedures that the CTCN is subject to by virtue of its position within the UNFCCC-context and its host organisations. Equally, helping to establish and shape the CTCN to become a key player in climate technology transfer has been tremendously rewarding for the DNV GL staff involved.

Collaboration and communication have been open and constructive throughout, from interactions at senior management level, governed by a cooperation group structure, to operational teams working on key issues.

Regular work visits to the CTCN secretariat in Copenhagen and satellite offices have contributed to better understanding the context of CTCN points of view and decisions and we would recommend future partnerships to invest in co-located work and mutual, senior management oversight.

DNV GL has been treated as members of the CTCN team and is grateful for the possibility to contribute to a large variety of topics such as strategic discussions, shaping key processes and helping with SWOT analyses.

The partnership has also been truly impactful for the DNV GL organisation itself through utilising our technical knowledge in new and novel ways and raising our competence in managing and delivering a partnership programme in the important field of climate change.

ACKNOWLEDGEMENTS

WORKING TOGETHER SUCCESSFULLY
FOR THE BEST PART OF FOUR YEARS
DEMANDS A THANK YOU TO ALL
THOSE WHO HAVE BEEN INVOLVED

The CTCN team

- Jukka Uosukainen (CTCN Director), Mark Radka (UN Environment sponsor), Karina Larsen (CTCN – DNV GL partnership liaison), Laia Barbara, Sandra Bry, Manfredi Caltagirone, Jonathan Duwyn, Giulia Ferrini, René Freytag, Rajiv Garg, Adrian Guhr, Emma-Liisa Hannula, Nima Joshi, Irma Juskenaitė, Andreas Karlsen, Naomi Kosaka, Agathe Laure, Victor Low, Marta Monteo, Paramita Mohanty, Yuko Nagata, Patrick Nussbaumer, Jason Spensley, Shanar Tabrizi, Federico Villicato Campbell, Abdel Traore, Scott Willis

The DNV GL team

- DNV GL core team: Bjørn Haugland (DNV GL sponsor), Bente Pretlove (project director), Eelco Kruizinga (overall project manager, knowledge management lead), Mats Rinaldo (private sector lead), Matthew Jones (monitoring and evaluation lead), Edwin Aalders (contract manager), Timo Kouwenhoven (KMS expert) and Hanno Lans (KMS expert)
- DNV GL technical teams from several different units: Climate Action Programme/Group Technology and Research (Norway), Knowledge Management Competence Centre (Netherlands), DNV GL Energy units (UK, Oakland, Dallas, Dubai, South Africa), Clean Tech Centre (Singapore), Business Assurance (UK, South Africa)

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DNV GL

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