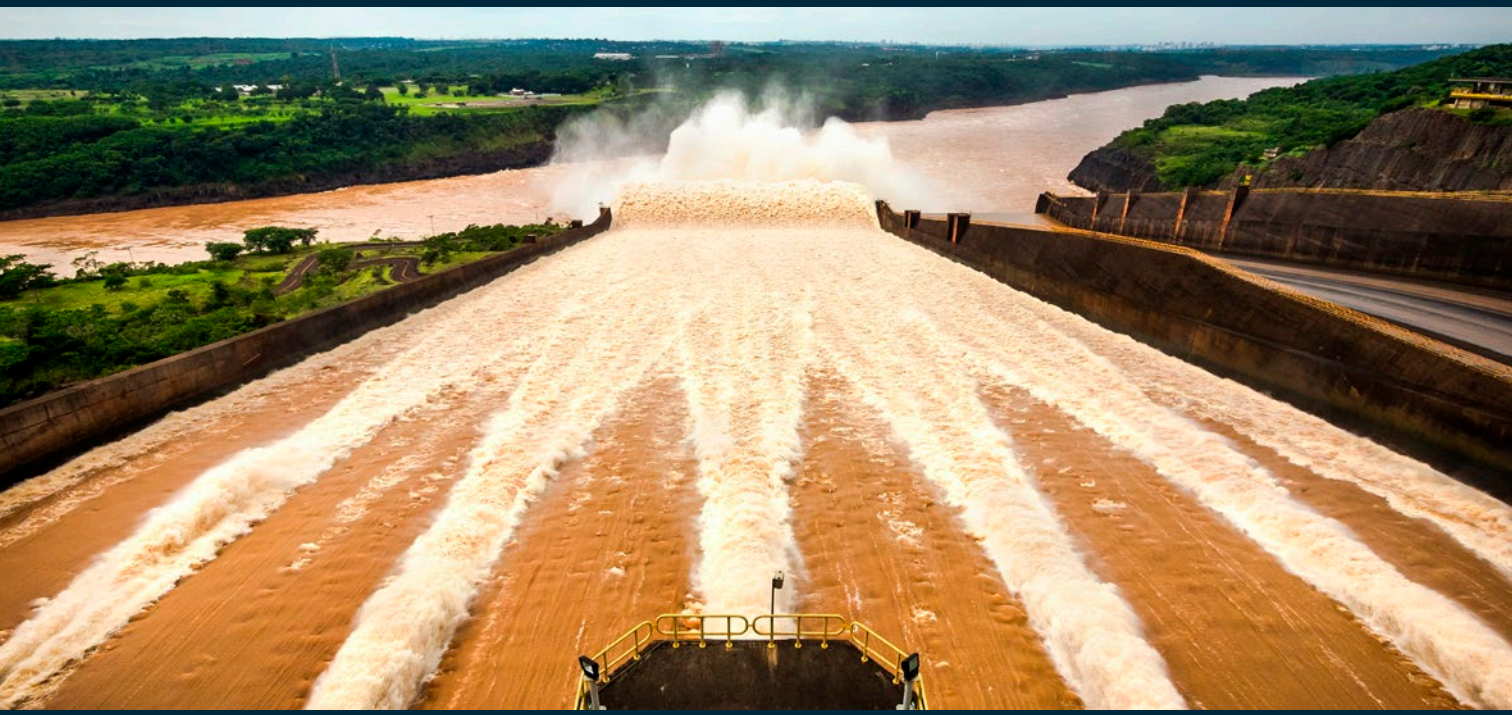
SUMMARY OF COUNTRY PRIORITIES

TECHNOLOGY NEEDS ASSESSMENTS

2015-2018



TNA TECHNOLOGY NEEDS ASSESSMENT

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Cover photo: Spillway at Itaipu Dam, one of the seven modern Wonders of the World, on the border of Brazil and Paraguay. R. M. Nunes / Shutterstock.com.

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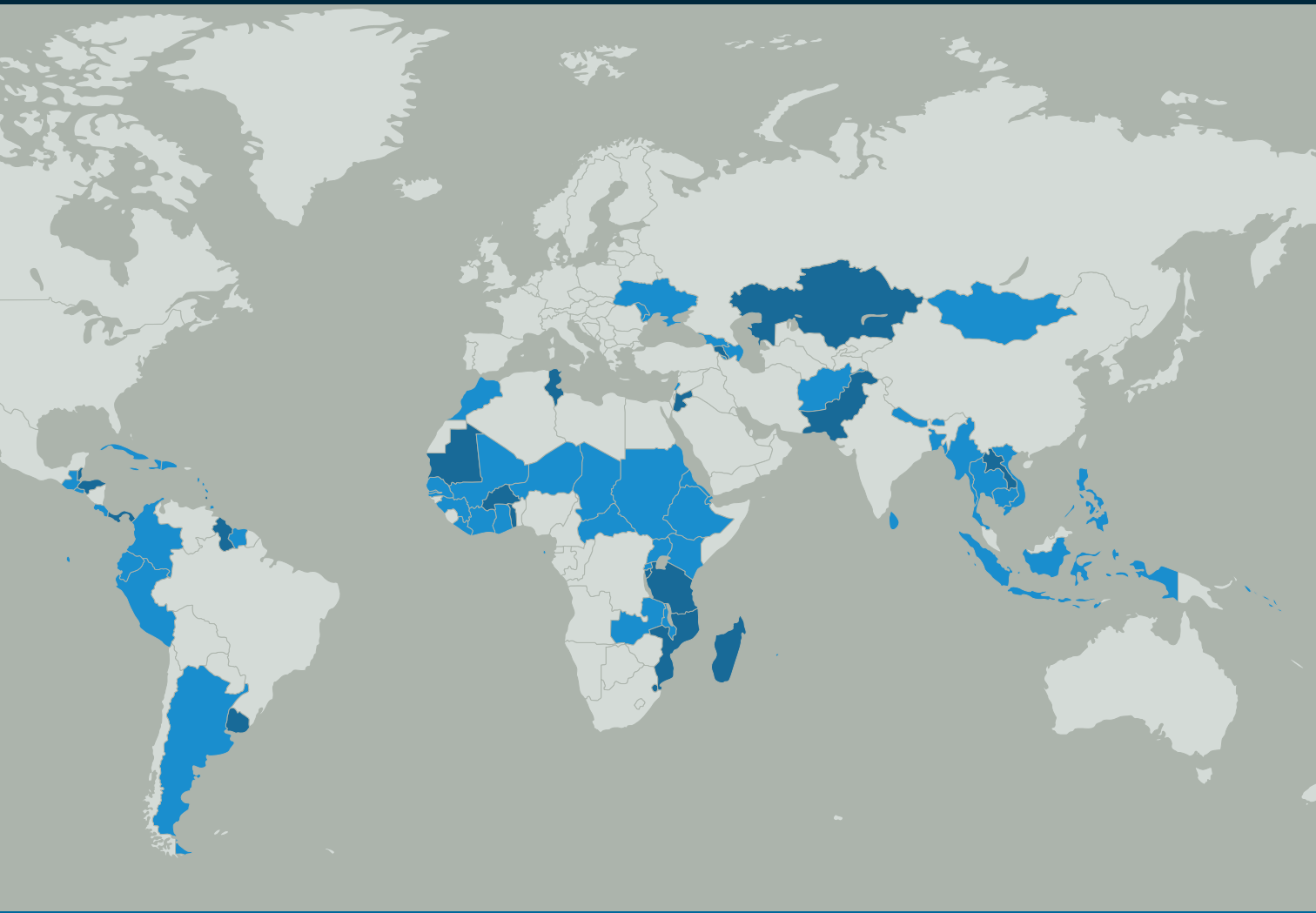


TECHNOLOGY NEEDS ASSESSMENT COUNTRIES

INTRODUCTION

What kind of technologies are best suited to a country's specific climate change situation? Understanding technology needs is the starting point for effective action on climate change. Before investing in technologies that reduce greenhouse gas emissions and adapt to climate change impacts, it is essential to assess and analyse a country's specific needs, as relates to its specific set of circumstances. This information can then be used to set priorities and identify appropriate technologies. Technology Needs Assessments are designed to do precisely this type of in-depth analysis. Using national sustainable development plans as a starting point, Technology Needs Assessments strengthen countries' ability to analyse and prioritize climate technologies, guiding them towards implementation of the UNFCCC Paris Agreement.

Acknowledging the importance of technological change in reducing emissions and stabilizing atmospheric concentrations of greenhouse gas emissions, Technology Needs Assessments were directly referenced in the Paris agreement.[1] Moreover, helping developing countries conduct effective Technology Needs Assessments and implement Technology Action Plans has become instrumental to the UNFCCC process.

Through the Technology Needs Assessment project, UN Environment, together with UNEP DTU partnership, helps developing countries assess their technology needs for mitigating and adapting to climate change. The Technology Needs Assessment project is funded by the Global Environment Facility.

The Technology Needs Assessment project follows a country-driven approach. A designated national institution, such as Ministry of Environment or Prime Minister's Office, takes the lead, involving a wide range of stakeholders in the process. Working with regional centres of excellence in climate change mitigation and adaptation, the project offers support to participating countries in the form of national, regional, and global capacity building workshops, technical support missions, and technical backstopping through electronic means.

This brochure provides an overview of 21 countries' climate technology priorities, identified in their Technology Needs Assessments and Technology Action Plans, prepared between 2014 and 2018. The countries include **Armenia**, **Belize**, **Burkina Faso**, **Burundi**, **Grenada**, **Guyana**, **Honduras**, **Jordan**, **Kazakhstan**, **Laos**, **Madagascar**, **Mauritania**, **Mozambique**, **Pakistan**, **Panama**, **Seychelles**, **Swaziland**, **Tanzania**, **Togo**, **Tunisia**, and **Uruguay**.

[1] Decision 1/CP.21, para 67

TECHNOLOGY NEEDS ASSESSMENT

A village meeting in Dirib Gombo for farmers who took out livestock insurance to receive their first payout after a prolonged drought in the region, Neil Palmer/CIAT.

INTRODUCTION

METHODOLOGY

The Technology Needs Assessments methodology is a mature process which has evolved over the 15 years that it has been used in developing countries. This methodology may also prove useful to developing countries as they work to develop and implement their Nationally Determined Contributions under the Paris Agreement. The Technology Needs Assessments process is organised around three main activities:

a) Identifying and prioritizing mitigation and adaptation technologies for selected sectors;

b) Identifying and analysing the barriers that hinder the successful deployment and diffusion of the prioritized technologies, including its enabling framework;

c) Creating, based on the inputs obtained from the previous two steps, Technology Action Plans, i.e., medium- or long-term plans to support implementation of the identified technologies. The Technology Action Plans outline activities that are further elaborated as project concept notes.

TNA TECHNOLOGY NEEDS ASSESSMENT

ENERGY MITIGATION

Beautiful sunset over Solar Farm, Love Silhouette/Shutterstock.com.

Solar Farms in Guyana

Guyana has committed to shifting to an energy mix consisting of wind, solar, biomass and hydropower to supply grid-connected and off-grid connected systems. The country's Nationally Determined Contribution anticipates that Guyana will develop 100% of its power supply as renewables 'as far as possible' by 2025. in support of this, Guyana's new Technology Action Plan identifies barriers (and means to break them down) associated with the deployment of solar farms to service urban centres and supply the national grid, large-scale (over 5 Mega Watt) hydropower plants to support national energy demands, and stand-alone wind farms to service urban centres and supply the national grid.

In Guyana, the expert working groups set up under the Technology Needs Assessment project identified the lack of a robust policy framework for technology transfer, diffusion and uptake in the energy sector as the key barrier for the deployment of renewable sources of energy. The stakeholder working group identified a related policy shortcoming – the need to develop the institutional and technical capacities of key institutions responsible for deploying, regulating and managing energy-sector technology applications. In light of this, it was recommended to integrate elements of the Public Awareness and Education Programme into Guyana's Human Resources Development Plan, to allow for continuous and sustained education and development at the tertiary level.

Stakeholders further highlighted the need to reduce the financial risk profile of renewable energy investments in the country, by strengthening the policy framework for the sector.

TNA TECHNOLOGY NEEDS ASSESSMENT

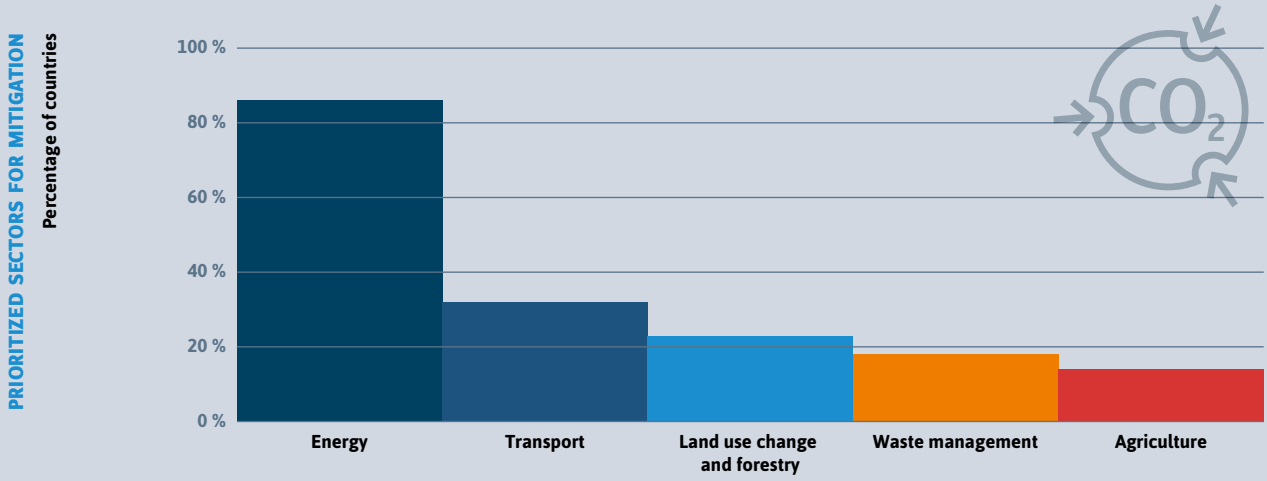
MITIGATION

Bara Bagh, the necropolis of the desert, Rajasthan, India, D'July/Shutterstock.com.

Priority Sectors for Mitigation

Countries in the three targeted regions (Asia & Eastern Europe, Latin America & the Caribbean, and Africa & Middle East) concurred on five priority sectors for mitigation: agriculture, land use change and forestry, energy, waste management, and transport. Of these, the energy sector was singled out as a primary concern by 86% of the countries. In second place was the transport sector (a priority for 32% of the countries), followed by land use change and forestry (23%), waste management (18%), and agriculture (15%).

The same five sectors have been prioritized in Asia & Eastern Europe, and Latin America & the Caribbean, though their relative importance varies. In all the countries, the majority of the identified technologies were linked to the energy sector, Africa & Middle East was the only region where agriculture was not prioritized for mitigation; instead, about a quarter of the selected technologies related to the waste management sector.



TNA TECHNOLOGY NEEDS ASSESSMENT

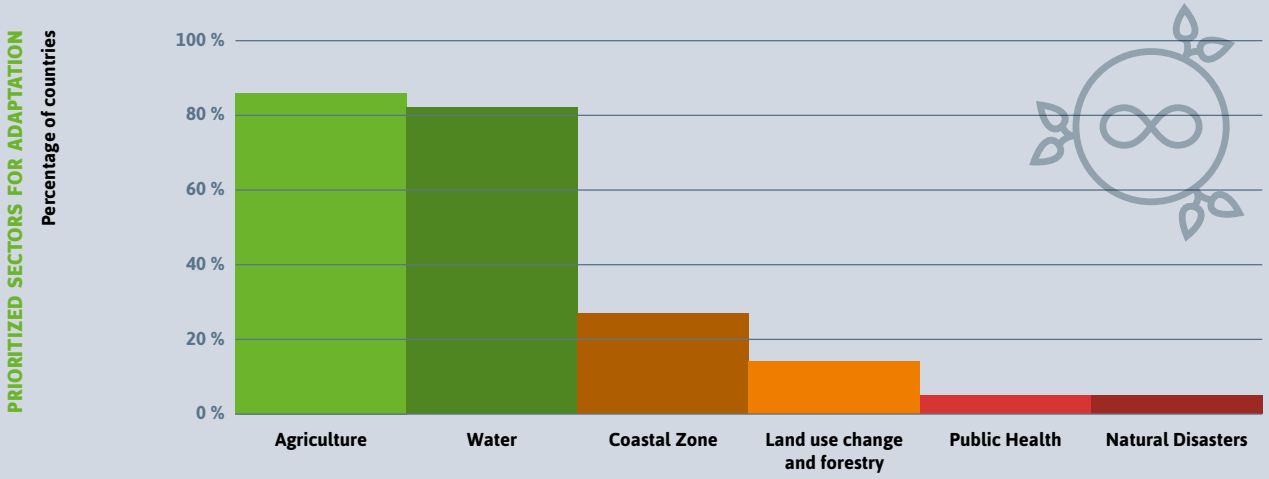
ADAPTATION

Dry season bean production in drought-affected Nicaragua, Neil Palmer (CIAT)/Flickr.

Priority Sectors for Adaptation

Six sectors have been singled out as countries' priorities for adaptation: water, agriculture, coastal zones, land use change and forestry, public health, and natural disasters. Water and agriculture were at the top of the list, prioritized by 82% and 86% of the countries, respectively. The coastal zone sector was identified as a top concern by 27% of the countries and land use change and forestry by 14%, while only a single country (Uruguay) gave public health and natural disasters first place. The importance of the agricultural and water sectors is paramount, in that the majority (≥ 90%) of the identified technologies are related to one of the two sectors. For example, Tanzania prioritizes both the water and agriculture sectors.

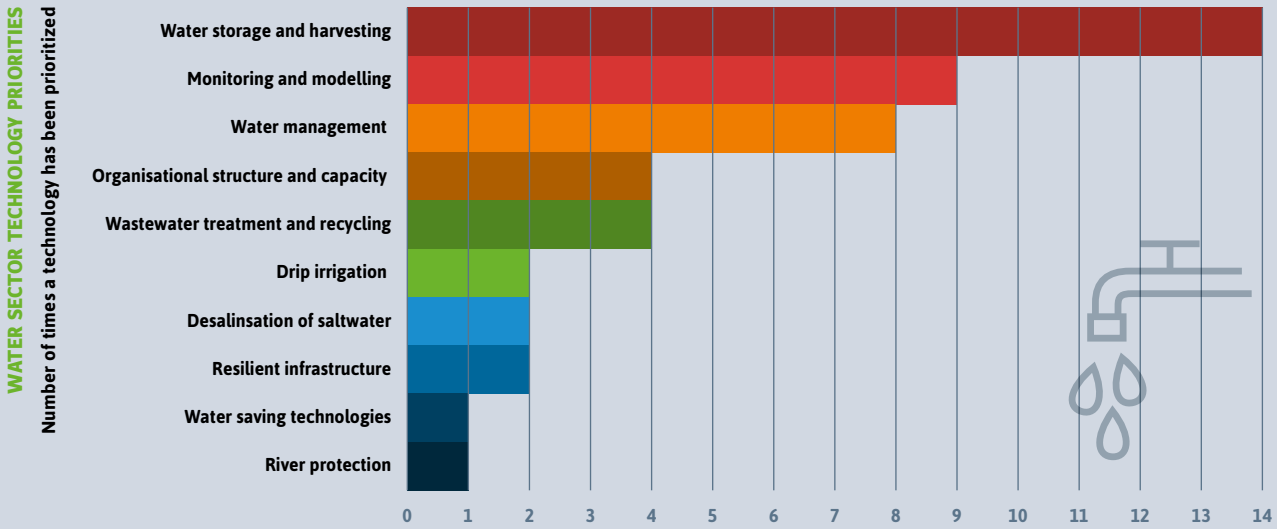
Across the three regions, the water and agriculture sector are dominant. In Asia & Eastern Europe, all the adaptation technologies are linked to those two sectors. In both Africa & Middle East and Latin America & the Caribbean, the coastal zone is a noteworthy prioritized sector (15%). Africa & Middle East also gives primary consideration to land use change and forestry (13%), while Latin American & the Caribbean highlights public health (3%) and natural disasters (3%).



Adegu David, District Meteorological Officer shows the scientific processes of gathering and monitoring data, Department For International Development / International Development Research Centre /Thomas Omondi.

Priority Technologies for Adaptation in the Water Sector

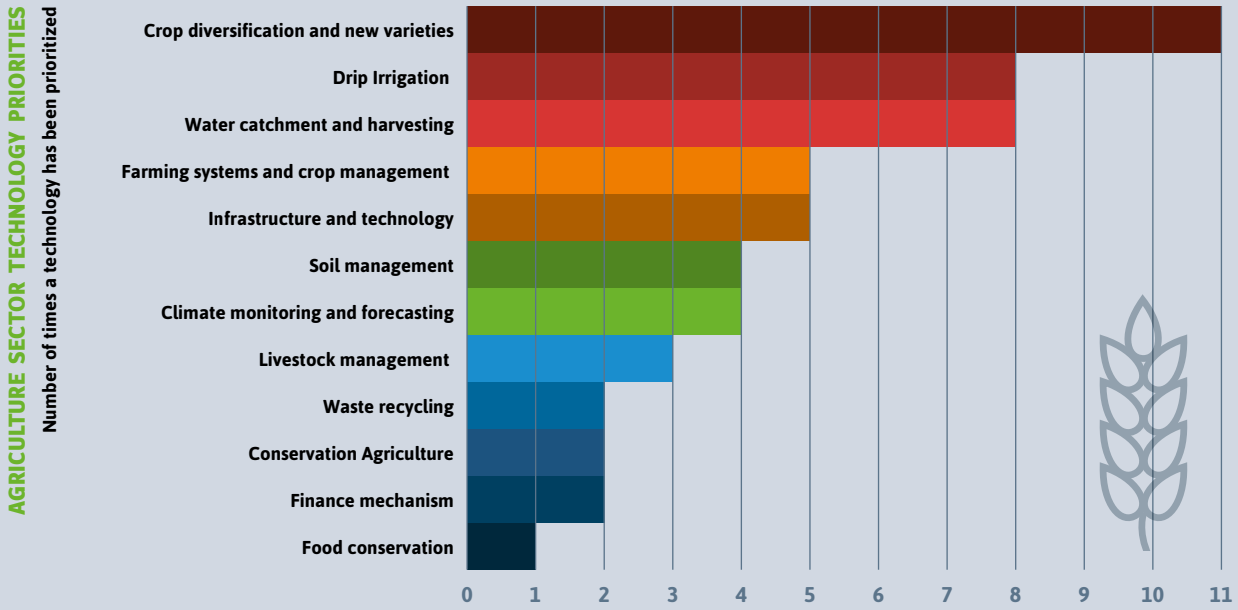
Water storage and harvesting received top priority in the water sector, including rainwater collection from rooftops, storage hardware, and surface water catchments. Next was monitoring and modelling (early warning systems and water resource mapping), organisational structure and capacity (establishing institutions and improving network connections), and water management (water management plans and developing protocols and guidance). However, there is some variation in priorities according to region. Water storage and harvesting are the predominant concern among African & Middle Eastern countries, for example, while technology priorities are more evenly distributed in the other regions.



Beans, Neil Palmer/CIAT.

Priority Technologies for Adaptation in the Agricultural Sector

In the agriculture sector (the most prioritized adaptation sector), crop diversification and new varieties were at the top of the list, including the introduction of climate resilient crops. Drip irrigation systems, water catchment, and harvesting were often first choice technologies, highlighting the popularity of water-related technologies in agriculture. Across all regions, crop diversification and water-related technologies were given high priority, along with monitoring and forecasting, infrastructure and technology, as well as crop, livestock, and soil management.



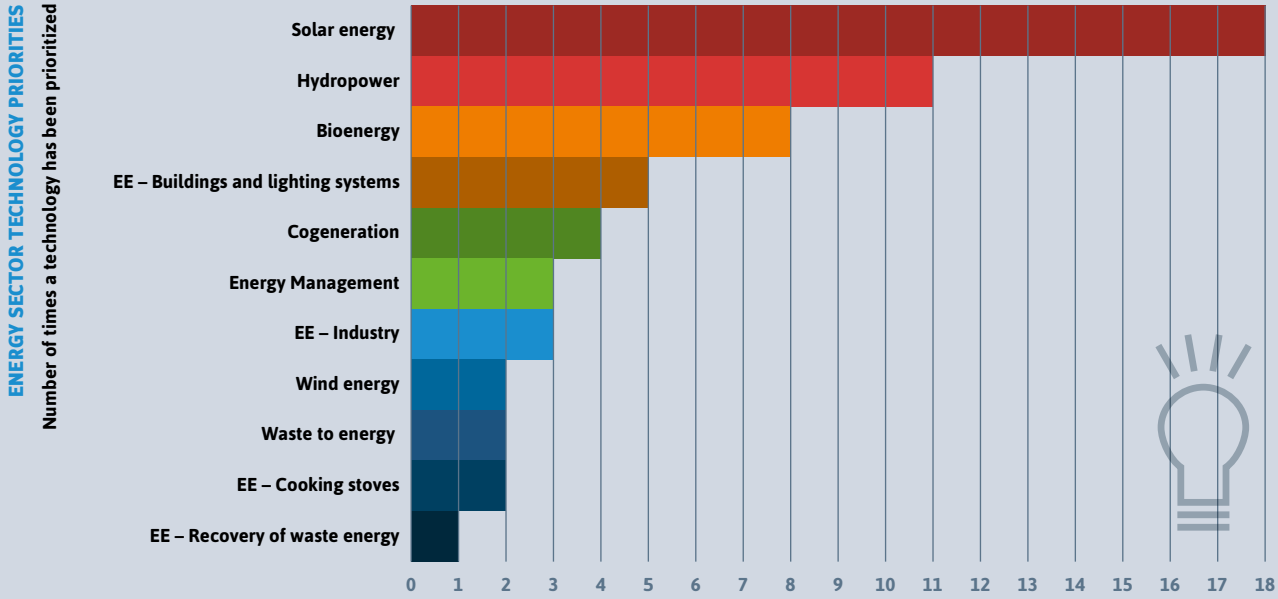
TNA TECHNOLOGY NEEDS ASSESSMENT

ENERGY MITIGATION

Off the grid, but on the up, Abbie Trayler-Smith / Panos Pictures / Department for International Development.

Priority Energy Technologies for Mitigation

In the energy sector, (the top priority sector for all countries) the majority of mitigation technologies were related to electricity generation. Other preferred technologies focused on energy efficiency, energy management, and heat production (often linked to electricity generation). Solar energy (including solar photovoltaic, solar thermal, and other solar energy technologies) was the most prioritized technology, followed by hydropower, energy efficiency in buildings and lighting systems, and bioenergy. Other energy efficiency technologies given high consideration were related to industrial processes, cooking stoves, and energy recovery systems.



TNA TECHNOLOGY NEEDS ASSESSMENT

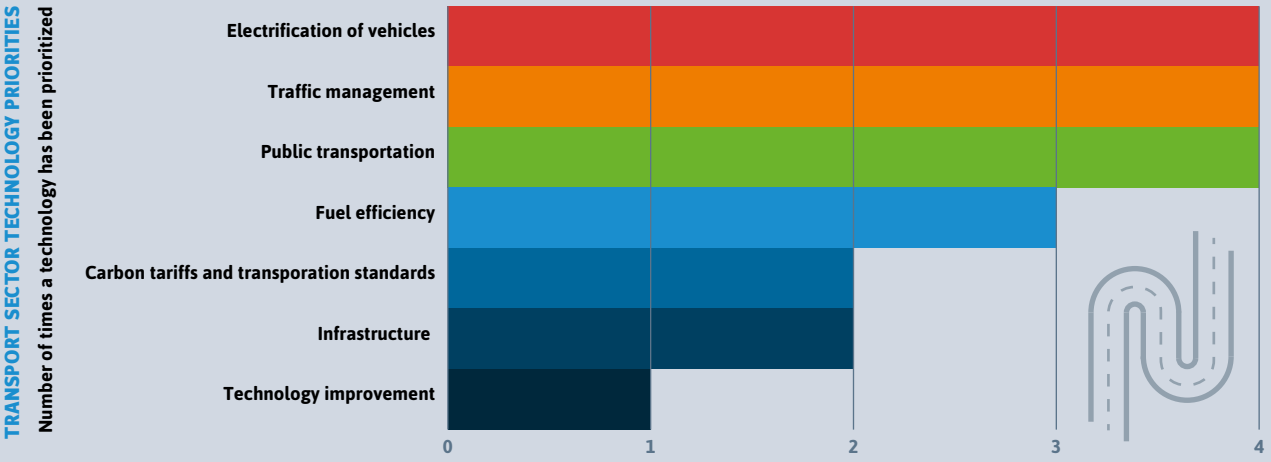
TRANSPORT MITIGATION

The Transjakarta bus system enjoys its own traffic lane to avoid congestion, AsiaTravel/Shutterstock.com.

Priority Technologies for Mitigation in the Transport Sector

Within the transport sector, the highest priority technologies were electric vehicles, traffic management (traffic reduction, traffic management plans, and monitoring systems) and public transportation (including network expansion and improved bus systems). Seychelles gave precedence to a low-carbon private car fleet, traffic management planning initiatives, and electric scooters, while Jordan made Bus Rapid Transit systems and pedestrian infrastructure their top priorities.

For this sector, there appeared to be clear regional differences in terms of technology ranking. While traffic management won first place in Latin America & the Caribbean, public transportation was deemed the highest priority in Asia & Eastern Europe, whereas the electrification of vehicles was ranked highest in Africa & Middle East.



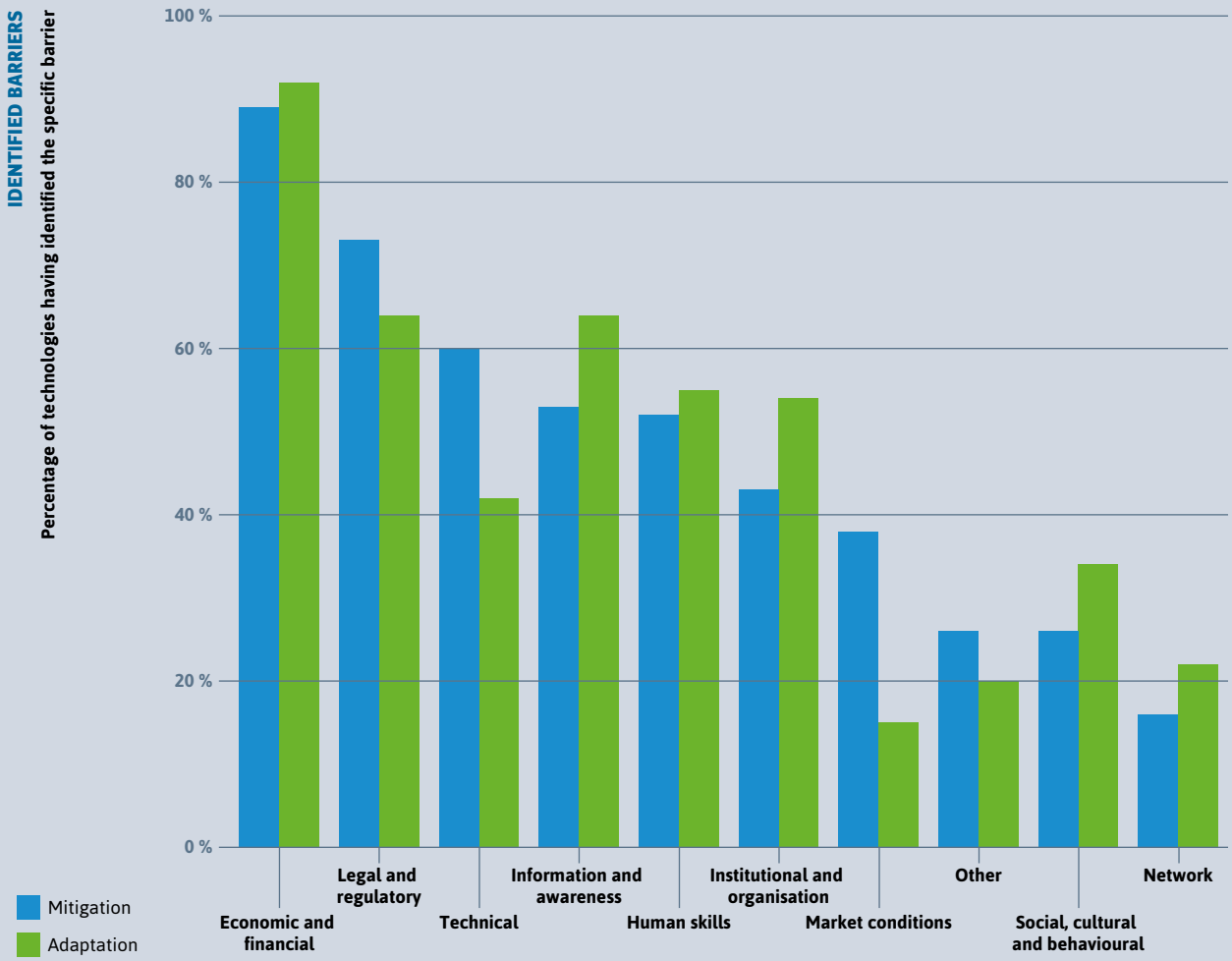
Several water meters. Measurement of water flow, Nordroden/Shutterstock.com.

Smart Water Meters in Tanzania

In Tanzania, Non Revenue Water – water that is produced for consumption and lost before it reaches the customer – is a serious challenge. On average 37% of the water supply in urban areas is lost as Non Revenue Water, while in a large city as Dar es Salaam it is estimated to be up to a 50 % loss. The challenges that the national water authorities in Tanzania face with Non revenue Water, results in water supplies that do not meet the demand. The consequence of water losses is reduced financial viability of water utilities, which again results in poor services and inadequate water access, availability and affordability.

Tanzania's new Technology Action Plan for the water sector identifies Smart Water Meters as a key priority for Tanzania to address this problem. The plan identifies and analyses barriers and the enabling framework conditions, which are required for introducing water leakage management through smart water metering systems, and thereby to start the digitalization of the water sector in Tanzania. Embarking into a smart water metering programme is a huge challenge and involves extensive planning, training of personnel, customer information system and management.

A higher awareness of water consumption is a key contribution by the smart water meters, but digitalization will also have a significant impact on preserving the country's water resources in general. Initiatives like this will contribute to alleviate the climate change-induced impacts on the water sector, threatening people's livelihoods, infrastructure and ecosystems, it is imperative to integrate sustainable management technologies into the local water infrastructure.


IDENTIFIED BARRIERS
Percentage of technologies having identified the specific barrier
100 %
80 %
60 %
40 %
20 %
0 %
Economic and financial
Legal and regulatory
Technical
Information and awareness
Human skills
Institutional and organisation
Market conditions
Other
Social, cultural and behavioural
Network
Mitigation
Adaptation

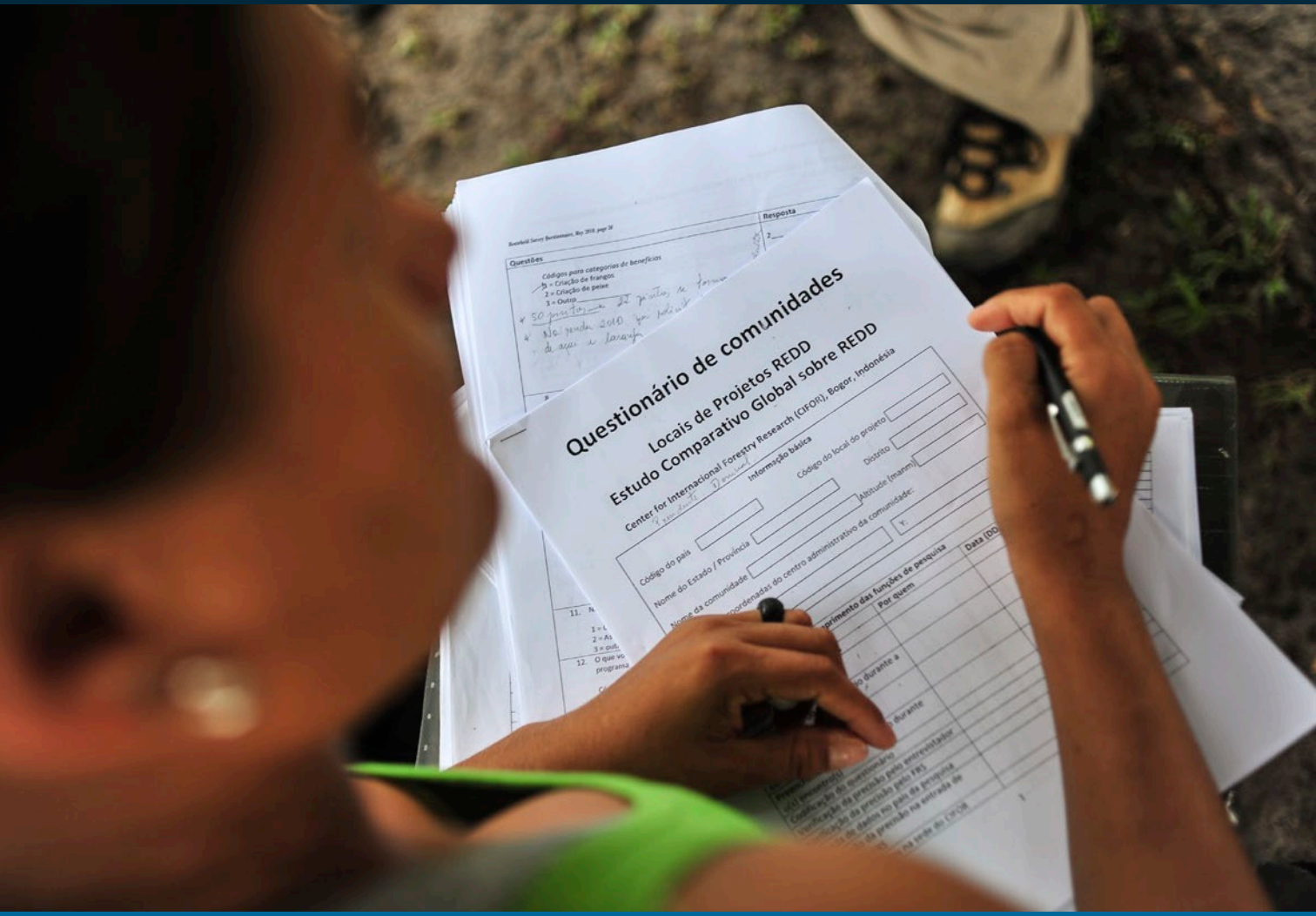
Barriers to Technology Transfer

One of the main activities in the Technology Needs Assessment process is identifying barriers to getting the chosen technologies transferred, diffused and uptaken in a successful, replicable manner. As will be seen, many countries share similar challenges, and the barriers they identify highlight common problems in the priority sectors.

The most frequently noted barriers were economic and financial, affecting 90% of all technologies. As specifically regards mitigation, the most commonly identified barriers related to legal and regulatory issues (73%), technical problems (60%), lack of information and awareness (53%), and inadequate human skills (52%). Legal and regulatory issues were also at the top of the list for adaptation (63%), matched by lack of and information and awareness (63%), and followed by inadequate human skills (54%), and institutional and organisational problems (53 %). There were at least two and as many as nine barriers identified for all technologies together, with an average of four to five barriers for each individual technology.

Economic and financial barriers were often linked to high costs of implementation and operation and maintenance. Difficulties in accessing finance were also identified as a key barrier, as well as uncertain economic viability. Though technologies are inherently dependent or affected by national or regional conditions, certain types of technologies share the same economic and financial barriers across countries. For instance, many developing countries cited the same barriers to the development of solar energy technology: high initial costs, interest rates, and operation and maintenance.

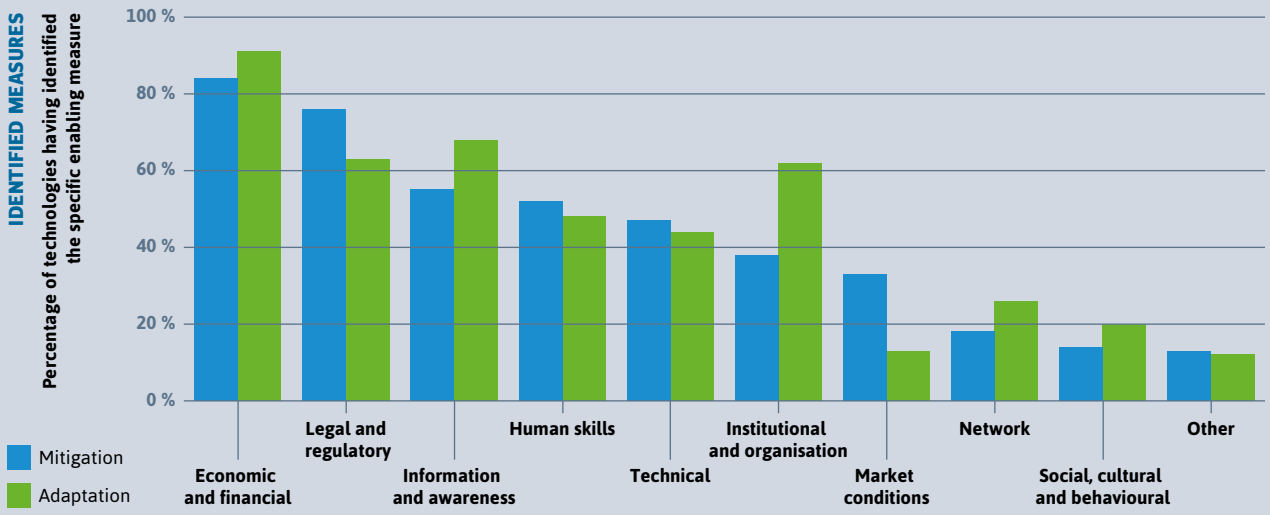
Even though technology has improved and prices have decreased, most countries still identified high installation costs as a barrier. Some countries (for example, Pakistan and Tanzania) explained that high interests rates on loans for solar technologies hinder the penetration of solar photovoltaic, while others (like Belize and Jordan) cited operation and maintenance costs as an additional barrier, especially for small-scale, decentralized, or off-grid solar photovoltaic projects. Despite their prevalence, economic and financial barriers were never listed as the only barrier for a prioritized technology.



A researcher doing field work. Brazil, Neil Palmer/CIAT.

Enabling Frameworks: How to Overcome Barriers

After identifying and analysing barriers to technology diffusion and uptake, countries detect enabling measures that would help them overcome these challenges. The provision or expansion of financial incentives was the most commonly identified means of boosting the implementation and use of the prioritized technologies. New and improved regulations, policies and standards were also specified by many countries as a means of breaking down barriers. Other frequently mentioned enablers crossed sectors, such as establishing information and awareness programmes, providing specific skills training, as well as building capacity in institutions and organisations. For example, in order to overcome barriers to the diffusion and uptake of improved drip irrigation systems, Belize suggested a wide range of measures including economic and financial incentives, legal and regulatory strengthening, improved skills, and information and awareness raising.



TNA TECHNOLOGY NEEDS ASSESSMENT

Flags, mese.berg/Shutterstock.com.

Technology Needs Assessments and Nationally Determined Contributions

Thanks to the information they provide about the potential, ability, and scale of climate change technologies, Technology Needs Assessments can play a unique role in the implementation of Nationally Determined Contributions. Actions identified in the Technology Action Plans highlight what needs to be done to activate robust market systems and enabling conditions for technology diffusion and uptake. These actions can in turn strengthen longer-term strategies elaborated in Nationally Determined Contributions and National Adaptation Plans and potentially raise ambitions by making means of implementation more concrete.

An analysis of 71 countries' Technology Needs Assessments and Nationally Determined Contributions showed that more than 70% of countries who have done a Technology Needs Assessments have integrated the results into their Nationally Determined Contribution. For example, priority technologies identified and assessed through the Technology Needs Assessment process were included in Lebanon's Nationally Determined Contribution. This meant that when creating their Nationally Determined Contributions, Lebanon was able to build upon an existing assessment of prioritized technologies, complete with an analysis of their barriers and potential enabling measures to overcome them.

In the case of Thailand, the results of its Technology Needs Assessment are directly referenced in its Nationally Determined Contribution, clarifying the country's technology needs, and helping pave the way to technology transfer from the international community.

TECHNOLOGY NEEDS ASSESSMENT

TECHNOLOGY NEEDS ASSESSMENTS PROJECT, PHASE I

The Technology Needs Assessments project supported 36 countries between 2009 and 2013. Technology Needs Assessments reports were submitted by 11 countries in Africa and Middle East, 13 countries in Asia and Eastern Europe, and 8 in Latin America and Caribbean. These countries were:

Africa & Middle East: Cote d'Ivoire, Ghana, Kenya, Lebanon, Mali, Mauritius, Morocco, Rwanda, Senegal, Sudan, Zambia, Ethiopia
Asia & CIS: Azerbaijan, Bangladesh, Bhutan, Cambodia, Georgia, Indonesia, Kazakhstan, Lao PDR, Moldova, Mongolia, Nepal, Sri Lanka, Thailand, Vietnam
Latin America & Caribbean: Argentina, Bolivia, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Peru

TECHNOLOGY NEEDS ASSESSMENTS PROJECT, PHASE II

The Technology Needs Assessments project, Phase II, supported 26 countries between 2015 and 2018 in the preparation of their Technology Needs Assessments. Two additional countries that participated in Technology Needs Assessment project Phase I were also supported in concluding their Technology Action Plans. The Phase II countries were:

Africa & Middle East: Burkina Faso, Burundi, Egypt, Gambia, Jordan, Madagascar, Mauritania, Mozambique, Seychelles, Swaziland, Tanzania, Togo, Tunisia
Asia & CIS: Armenia, Malaysia, Philippines, Pakistan, Kazakhstan, Lao PDR
Latin America & Caribbean: Belize, Bolivia, Grenada, Guyana, Honduras, Panamá, Uruguay

TECHNOLOGY NEEDS ASSESSMENTS PROJECT, PHASE III

Phase III of the Technology Needs Assessment project has been approved by the Global Environment Facility and includes 23 countries. The participating countries are Least Developed Countries and Small Island Developing States. The project will start in the middle of 2018.

Africa: Benin, Central African Republic, Chad, Djibouti, Guinea, Niger, Eritrea, Liberia, Malawi, Uganda, Sao Tome and Principe
Eastern Europe: Ukraine
Asia & CIS: Afghanistan, Myanmar, Nauru, Fiji, Vanuatu
Latin America & Caribbean: Antigua and Barbuda, Dominica, Jamaica, Trinidad & Tobago, Suriname, Haiti

More information about the global Technology Needs Assessment Project can be found at:
www.tech-action.org/

More information about the Technology Needs Assessment process under the UNFCCC can be found at:
www.unfccc.int/ttclear/

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